Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management

Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management

Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management organized by the University of Szeged Faculty of Economics and Business Administration Doctoral School in Economics

SZEGEDI TUDOMÁNYEGYETEM
GAZDASÁGTUDOMÁNYI KAR

Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management

Edited by:
Beáta Udvari – Éva Voszka

Szeged, 2019

Faculty of Economics and Business Administration
Doctoral School in Economics, 2019

Editors:
Beáta Udvari
Éva Voszka

Reviewers:
Beáta Farkas
Gábor Dávid Kiss
Andreász Kosztopulosz
Balázs Kotosz
Miklós Lukovics
Szabolcs Prónay
Balázs Révész
Izabella Szakálné Kanó
Beáta Udvari
Éva Voszka

ISBN 978-963-306-678-2

Contents

Chapter III – Social issues

Chapter IV: The European Union and global issues

Contributors

Dániel Szládek PhD student, University of Szeged.

Andor Máté PhD student, University of Szeged.

John Kibara Manyeki PhD student, University of Szeged.

János Zoltán Varga PhD student, University of Szeged.

Ádám Czelleng PhD student, University of Szeged. Research Manager, GKI Economic Research.

Sisay Demissew Beyene PhD student, University of Szeged.

Balázs Kotosz associate professor, University of Szeged.

Marianna Sávai PhD student, University of Szeged.

János Gyurkovics PhD student, University of Szeged.

Bence Zuti PhD student, University of Szeged.

Nikoletta Nádas MA student, University of Szeged.

Anita Kéri PhD student, University of Szeged.

Dalma Vincze PhD student, University of Szeged.

Dalma Pető PhD student, University of Szeged.

Szabolcs Prónay assistant professor, University of Szeged.

Boglárka Méreiné Berki PhD student, University of Szeged.

Éva Kuruczleki PhD student, University of Szeged.

Boglárka Fekete PhD student, University of Szeged.

Sarolta Somosi assistant professor, University of Szeged.

Cristina Isabel Orozco Espinel PhD student, University of Szeged.

Preface

The third international PhD workshop, organized by the Doctoral School in Economics at the University of Szeged, took place in April 2018. Just like in the previous year, the workshop was held in parallel with the international conference of the Faculty of Economics and Business Administration. In a special section, four participants of the Hungarian New National Excellence Program also presented their results. This offered PhD students a special opportunity for personal interactions with senior and young researchers from several countries. From the 30 presentations we selected and peer-reviewed 18 papers with authors coming mainly from our doctoral school but including also international students.

This time we invited again papers, addressing the national and international challenges of economic policies. The broadly defined subject offered the possibility to the participants to concentrate on the topic, most relevant from the point of view of their theses. This is why the topics and approaches of the volume are rich and varied.

The first chapter of the book deals with financial issues, mainly with stock and bond markets, interest rates and the problems of equilibrium. All six papers are built on sophisticated methodological background. The geographical coverage includes Hungary, other new EU member states as well as two African countries. The next chapter analyses competitiveness on regional and national level, highlighting colorful aspects of the broad and popular topic: the impact of government spending, different university models, mobility infrastructure – with a focus on self-driving cars –, and responsible innovation. The third part is dedicated to several social issues like foreign students' motivation, consumption/ nutrition habits of the young generation, and the experiences with the displacement of a Roma segregate. Three papers of the fourth chapter deal with current European issues: the state of the four freedoms, the competition regulation challenges in new industries and health policy. The last study elaborates on the resource curse in Ecuador – which is not a real threat for most European countries but might be important globally.

We owe our thanks to the reviewers including Beáta Farkas, Gábor Dávid Kiss, Andreász Kosztopulosz, Balázs Kotosz, Miklós Lukovics, Izabella Szakálné Kanó, Szabolcs Prónay, Balázs Révész, for their contribution to the realization of the volume.

Szeged, 2019

The Editors

Chapter I

Financial issues

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 10–25.

Stock prices and macroeconomic variables in CEE – first results for Hungary

Dániel Szládek

The analysis of the macroeconomic environment and stock markets are fundamental topics in the spectrum of economic research. My aim is to explore the relationship between stock prices and macroeconomic variables in Central and Eastern European markets. In this paper, I focus on the Hungarian stock market and economy to uncover the connection between stock prices and selected macro factors. I apply a vector autoregressive (VAR) model on a quarterly dataset from 1995 to 2017. The results suggest that, generally, there is a weak relationship between stock prices and macroeconomic variables in Hungary, with only inflation (–), the euro-forint exchange rate (+) and the DAX index (–) having significant connection with the BUX index, the Hungarian stock market index. Dividing the sample into two periods (before and after accession to the EU) provides no further insight into the connection, as the quarterly data may be insufficient to calculate reliable estimates in the smaller subsamples.

Keywords: stock prices, macroeconomic variables, VAR model, Central and Eastern Europe

1. Introduction

Stock market analysis has been in the center of attention for financial economists for the past decades. Technological advances have improved stock market procedures and evaluation methodologies as well, allowing researchers to form a better picture of the market and explanatory factors. Investors and policy makers also closely follow market developments, as a huge amount of capital is at stake and recent events have shown that capital markets may have an effect on the stability of the whole economy.

In my research, I analyze the relationship between stock prices and selected macroeconomic variables, to determine whether the economic fundamentals have a connection with stock market movements. My aim is to investigate this relationship in the Central and Eastern European countries, because this region has received limited focus in this field of financial research. In this paper, I briefly review the related literature, then introduce the vector autoregressive (VAR) model, which is often applied to uncover the relationship under discussion. In the empirical part of my paper, I concentrate on the Hungarian stock market and economy, to report the first results of my research.

The structure of the study is as follows: Section 2 reviews the literature focusing on the stock price and macro factors relationship, Section 3 presents the methodology applied in the empirical part of the paper, Section 4 introduces the variables included in the model and summarizes the descriptive statistics and the sources of the data, Section 5 reports and analyses the model estimations, and finally, Section 6 gives the concluding remarks.

2. Literature review

In this section, I review the literature related to the connection between stock prices and macroeconomic variables. Generally speaking, the results of the empirical studies very much depend on the analysed country group or region, the time period, the variables included in the model and the applied methodology. I briefly summarize the approach of the papers and their conclusions regarding the stock price and macro factors relationship.

Asprem (1989) analyses ten countries from Western and Northern Europe between 1968 and 1984. They include a wide selection of variables in the model, including inflation, industrial production, consumption, investment, employment, exchange rate, bond rates, money aggregates and a US stock index. The dependent variable – as is usual in the literature – is the stock market index of the given country, rather than individual stocks. This helps eliminate firm-specific effects and allows focusing on market-level interactions. Asprem (1989) finds positive relationship between stock prices and employment, inflation and bond rates, while growth expectations, money aggregates and US stock returns tend to have a positive connection with stock prices.

Mookerjee and Yu (1997) explore the Singaporean stock market and economy to find some linkages between stock prices and macro factors. Singapore is a small, open economy, like the countries in Central and Eastern Europe, thus their results could be relevant for the region as well. Applying cointegration and causality methods on a monthly dataset from 1984 to 1993, they show that money supply (M1 and M2) and foreign exchange reserves have a strong relationship with stock prices, while foreign exchange rates do not.

Bilson et al. (2001) cover twenty developing and least developed countries, where the stock markets are less established than in rich countries; again, this is somewhat true for CEE countries as well. They sort the selected macro variables into two groups: local (money supply, inflation, industrial production) and global (MSCI World Index) factors. Analysing monthly data from 1985 to 1997, they find that local factors generally have a stronger connection with stock prices. Aburgi (2008) follows a similar approach, while researching four Latin American countries (Argentina, Brazil, Chile and Mexico); however, their results are contrasting. Using vector autoregression (VAR) model on a dataset spanning sixteen years (1986–2001), they conclude that global factors elicit a stronger effect on stock prices.

Laopodis (2011) and Peiró (2016) analyse developed European countries, namely France, Germany and UK, while the former study includes Italy as well, comparing them with the US stock market and economy. Laopodis (2011) uses monthly data from 1990 to 2009, Peiró (2016) covers the period of 1969–2013 with annual data. The macro variables examined by both papers are industrial production and interest rate, while Laopodis (2011) adds inflation and oil price to the model. Applying cointegration and VAR model, Laopodis (2011) reveals that the results are different for countries using the euro as their official currency from what is experienced in other countries. Peiró (2016) finds that for European countries both factors influence stock prices, while in the US only industrial production is significant.

Errunza and Hogan (1998) differ from the previously introduced studies, because they do not focus on stock prices, but their main variable is stock return volatility. Researching seven developed European countries and the US on a monthly dataset from

1959 to 1993, their GARCH and VAR models find significant relationship between industrial production, money supply, inflation and stock return volatility in the European countries, but not in the US.

Jain and Rosett (2006) explore the connection between macro variables and another valuation metric, the E/P ratio (which is the reciprocal of the price earnings ratio, P/E). They analyse the Standard and Poor's 500 stock market index from 1952 to 2003, macro factors selected being expected GDP growth, expected inflation, real interest rate, risk premium, maturity structure and dividend payout ratio. Results show that these factors have mixed interaction with the E/P ratio, with inflation having the opposite effect in different time periods, real interest rates having no influence and expected GDP growth indicating an ambiguous relationship.

Chen (2009) takes a unique approach, analysing the relationship between macroeconomic variables and the frequency of recessions in the stock market. They also use monthly data of the S&P500 index and macro factors including interest rate spreads, inflation, industrial production, money aggregates (M1 and M2), unemployment, base rate, foreign exchange rate and government debt. They find that these macro factors can predict recessions better than actual stock market returns, spreads and inflation providing the best estimations.

Finally, I summarize two studies, which focus on the relationship between stock prices and monetary policy, but their variables are quite similar to what I intend to include in my research. Li et al. (2010) compare the effect of monetary policy shocks on stock prices in Canada and the US on a monthly dataset from 1988 to 2003. Their monetary policy variables are inflation, foreign exchange rate, base rate and M2 money aggregate. Their VAR model indicates that monetary restriction (i.e. increased base rate) has a smaller, brief effect on stock prices in Canada, while in the US the response to a shock is bigger and more prolonged. Belke and Beckmann (2015) research the connection between monetary policy and stock market returns in developed countries, e.g. the Eurozone. The time period analysed is different for the countries, generally covering from the 1980s to 2013. Monetary policy variables include money supply, inflation, long and short-term interest rates, ten-year government bond return and capital flows. Their cointegrated VAR model shows that a long-term relationship exists between the monetary policy factors and stock returns; however, it is harder to identify short term connections. They conclude that central banks have limited means to influence stock market returns through monetary policy.

Based on the aforementioned literature, I conclude that there is no clear-cut relationship between stock prices and macroeconomic variables. The results are greatly affected by the evaluated countries and time period, the selected macro factors and the methodology applied. My aim is to uncover the nature of the relationship between stock prices and macroeconomic variables in Central and Eastern Europe, starting with Hungary.

3. Methodology

After reviewing the related literature, I continue with the methodological part of my paper. The studies discussed above apply different techniques to quantify the relationship between stock prices and macroeconomic variables. One of the most frequently used methods is the vector autoregressive (VAR) model, which is a popular way of analyzing

time series data. In this section, I introduce the VAR approach and the steps, which should be taken into consideration when it is applied.

Standard procedure in time series analysis is to check whether the variables are stationary or not. Stationarity means that the first and second moments (i.e. the mean and the variance) of the series are constant in time (Lütkepohl–Kratzig 2004). A generally used test is the augmented Dickey–Fuller (ADF) test, where the null hypothesis states that the time series is not stationary (Kiss 2017). If the null hypothesis cannot be rejected, taking the difference of the variable usually solves the problem of non-stationarity.

The vector autoregressive (VAR) model estimates an equation for every variable in the analysis, including the lagged values of every variable among the independent variables as well. The structure of the VAR model allows the endogeneity of all the variables, thus it is useful for evaluating complex relationships between economic factors (Lütkepohl–Kratzig 2004). One downside of the VAR approach is that economic theory usually does not provide specific guidance for identifying the optimal lag length, though the methodological literature offers two methods to determine the ideal number of lags: cross-equation restrictions and information criteria (Brooks 2008). In the empirical part of my paper, I use the Akaike Information Criterion (AIC) to determine the optimal lag length.

Although the VAR model is able to estimate an equation for every variable under discussion, my sole focus in this paper is to find which macro factors influence stock prices in Hungary. The VAR model equation for stock prices in one country is expressed as follows:

$$r_t = \alpha + \sum_{i=1}^{n} \beta_i r_{t-i} + \sum_{i=1}^{n} \gamma_i y_{t-i} + \varepsilon_t$$

where r_t denotes change of stock prices (returns) in period t, β_i is the coefficient of lagged values of stock returns, γ_i is the coefficient of the lagged macro variables y_{t-i}, while n indicates the optimal lag length determined by AIC. The selection of macro factors is discussed in the next section of the paper.

After estimating the VAR model, I graph the impulse response functions of stock prices to the macro variables. The impulse response functions measure the time profile of the effect of a shock in the explanatory variables on the dependent variable (Aburgi 2008). Another technique to illustrate VAR system dynamics is the forecast error variance decomposition. Variance decomposition determines how much of the forecast error variance of a variable is explained by shocks in each of the explanatory variables (Brooks 2008).

4. Data

The previous section introduced the VAR model estimation technique and the related illustration methods, but the analyzed variables have not been determined yet. In this section, I list the selected macro factors, which will be used in the model to capture the relationship between stock prices and macroeconomic variables is Hungary. I also summarize the descriptive statistics of the variables and sources of information.

The central variable of my research is the stock price variable. A general approach observed in the literature is to use a stock market index as a proxy for market-level stock

prices in order to eliminate firm specific variations. The official stock market index of the Budapest Stock Exchange is the BUX index, which will be analyzed as the market-level stock price for the Hungarian stock market.

The selection of macroeconomic variables is not as well-defined in the literature as stock market index usage. As we have seen in the literature discussion, the studies analyze a diverse collection of factors, which could have a relationship with stock price movements. In this paper, I will include GDP growth, inflation, central bank base rate, foreign exchange rate, oil price and the DAX index in the model.

The DAX index, which is the German stock market index, is added to the model as a proxy for stock market developments outside the assessed market, i.e. Hungary. I choose the DAX index, because the German stock market is one of the most significant in Europe, and Hungary has very deep trade connections with the German economy. The DAX and the BUX index data were collected from Stooq.com.

Inflation is a macroeconomic variable, which is included in most of the studies discussed in Section 2. Generally, the consumer price index (CPI) is used as the inflation metric. CPI data for Hungary were downloaded from the online database of the Central Bank of Hungary, MNB. Other macroeconomic variables obtained from MNB are the base rate and the euro-forint foreign exchange rate. The base rate serves as the main instrument of monetary policy, thus it is a proxy for monetary easing or restriction. Foreign exchange rates can play a significant role in a small, open economy and Hungary is heavily integrated into the European common market, thus the euro-forint (EURHUF) exchange rate is another factor of interest.

To account for the general performance of the Hungarian economy, GDP is also included in the model. Seasonally adjusted GDP data were collected from the Eurostat online database. Oil price is added to the analysis in order to take the developments of the commodity and energy markets into consideration. Brent oil price data were also obtained from the Stooq.com online database.

One of the challenges of time series analysis is how frequently the evaluated data are published. For most economic variables, the frequency is – at best – quarterly data. For the abovementioned factors, I could collect quarterly data from the given sources from the first quarter of 1995 to the last quarter of 2017. Variables, which have quotations, i.e. the BUX and DAX index, the EURHUF exchange rate and the oil price, have higher frequency data. In those cases, the value on last day of the quarter is used in the analysis (an alternative approach would be to use the quarterly averages).

As discussed in Section 3, the ADF test was applied to check whether the variables to be included in the model are stationary or not. Not surprisingly, the null hypothesis can be rejected at the 5% significance level only for the inflation variable (which is already a differenced version of the general price level). The other variables have to be differentiated in order to obtain stationary series. Log-differentiation is used for the BUX and DAX index, the EURHUF exchange rate, the GDP and the oil price data, while the base rate series is first-differenced. The differentiated variables are all stationary at very small significance levels.

The Johansen cointegration test was also run on the log-level variables to validate the application of the VAR methodology. Table 1 presents the eigenvalues, the Trace test statistics and the corresponding p-values of the Johansen cointegration test. Cointegration is not an issue here. Brooks (2008) writes that cointegration is present when the number

of cointegrating vectors is between zero and the number of variables, and the Trace test shows that this is not the case for our data (p-values below and little above the 5% significance level). Thus, I continue with the VAR methodology, using the differentiated time series.

Table 1 Johansen cointegration test

Rank	Eigenvalue	Trace test	p-value
0	0.4942	151.25	0.0000
1	0.3222	91.273	0.0003
2	0.2682	57.048	0.0046
3	0.1515	29.567	0.0534
4	0.1138	15.111	0.0556
5	0.0496	4.4779	0.0343

Source: own based on own calculations

The descriptive statistics of the stationary time series are summarized below in Table 2. It appears that the Hungarian stock market provided higher returns in the sampled period than the German market, although the BUX index had a higher standard deviation as well, implying riskier investment possibilities. Oil price increased a little over the evaluated period; however, it had a relatively high standard deviation. The forint depreciated against the euro, while inflation and GDP growth were also positive between 1995 and 2017.

Table 2 Descriptive statistics, Hungary, 1995Q1–2017Q4

Variable	Mean	Median	S.D.	Min	Max	Source
ld_bux	3.81%	4.96%	15.20%	–53.50%	47.00%	Stooq
ld_gdp	2.21%	2.19%	2.16%	–2.13%	8.96%	Eurostat
inflation	1.74%	1.30%	2.11%	–1.39%	11.20%	MNB
d_baserate	–0.30%	–0.15%	0.85%	–2.50%	3.00%	MNB
ld_eurhuf	0.74%	0.60%	4.14%	–12.70%	15.50%	MNB
ld_oil	1.44%	4.26%	17.70%	–77.40%	36.40%	Stooq
ld_dax	2.09%	4.01%	12.50%	–45.90%	30.10%	Stooq

Notes: ld_ denotes log-differentiation, d_ denotes first difference
Source: own construction based on MNB, Eurostat and Stooq data

5. Results

In this section, I report the VAR model estimations of stock prices and macroeconomic variables for Hungary. First, I show the estimates for the whole sample, ranging from 1995Q1 to 2017Q4. Then, I divide the sample into two periods: 1995Q1–2004Q2 and 2004Q3–2017Q4. In May 2004, Hungary and several other Central and Eastern European countries joined the European Union (EU), which had a great impact on their economies. Thus, it seems a good idea to cut the sample at

2004Q2 and explore the relationship between stock prices and macro factors before and after the EU accession.

5.1. Results for Hungary, 1995–2017

The VAR model estimations of the BUX index for the whole sample from 1995 to 2017 are reported in Table A of the Annex. For brevity, Table 3 below presents only the significant variables of the estimations.

Table 3 Significant variables of the VAR model estimations, BUX, 1995Q1–2017Q4

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
ld_bux_2	0.3714	0.1606	2.3120	0.0243	**
inflation_2	−2.9814	1.4465	−2.061	0.0438	**
ld_eurhuf_2	0.9854	0.4688	2.1020	0.0399	**
ld_dax_1	−0.3221	0.1830	−1.761	0.0836	*
ld_dax_2	−0.3054	0.1792	−1.705	0.0935	*

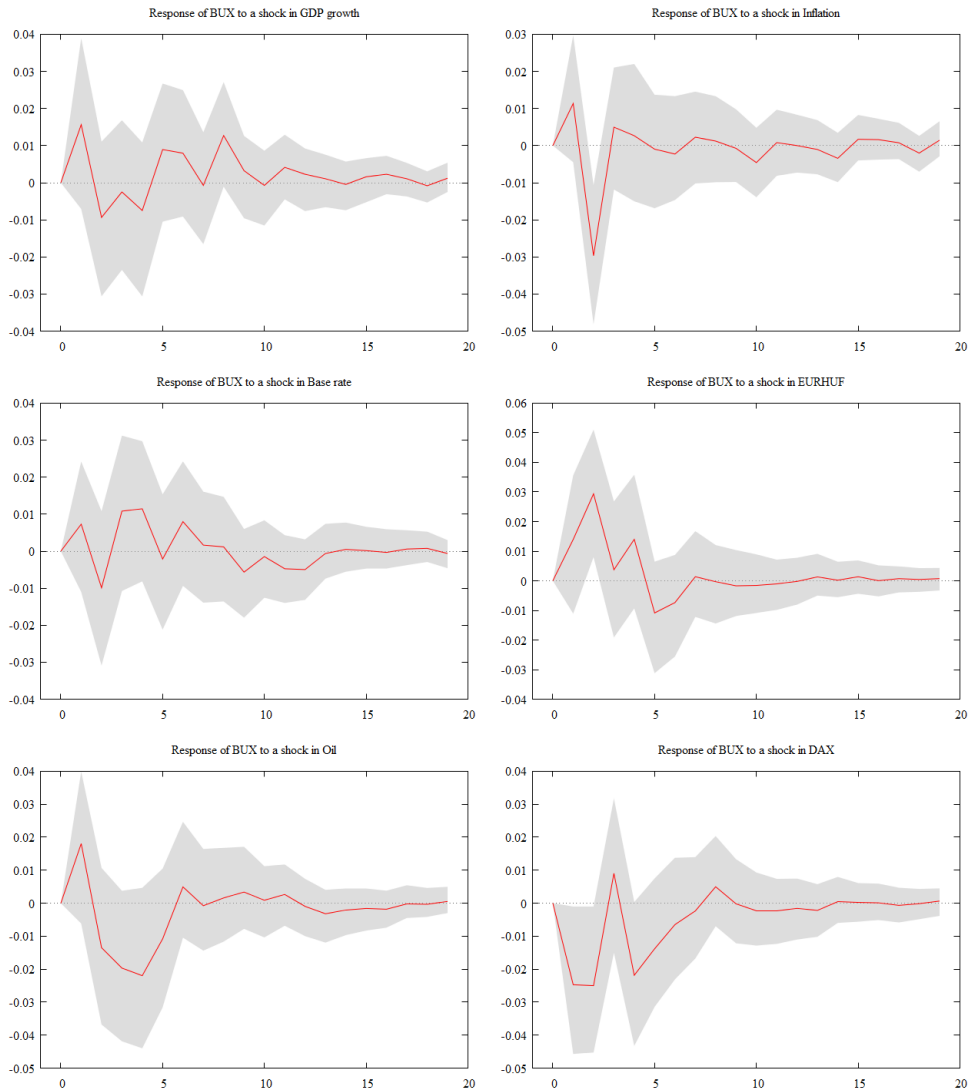
Notes: *significance at the 10% level, **significance at the 5% level
Source: own construction based on own calculations

Table A of the Annex contains the lagged estimates of each macroeconomic variable and of the BUX index as well. Maximum lag length was determined by the Akaike Information Criterion, thus four lags were included for each variable. According to the estimates, there is no strong relationship between stock prices and the evaluated macro variables in Hungary. The GDP, the base rate and the oil price variables show no significance for every lagged value, thus, stock prices in Hungary seem to be insensitive to general economic performance and monetary policy changes.

Significant variables (reported in Table 2 above) at the 5% level are the two-lagged BUX itself, inflation and EURHUF exchange rate, while the one and two-lagged DAX index is significant at the 10% level. The positive coefficient of the two-lagged value of the EURHUF exchange rate indicates that forint depreciation has a positive effect on Hungarian stock prices. One explanation is that a relatively cheaper HUF is beneficial for the export activities of the Hungarian firms, thus driving stock prices higher. A depreciated forint is also attractive to foreign investors, who could invest forint positions into Hungarian stocks, resulting in higher demand and eventually increased prices in the stock market. Inflation and the DAX index, however, show a negative relationship with the BUX index. Inflation can increase production factor prices and lower consumer demand, creating unfavorable circumstances for firms, thus increasing the chance of a declining stock market. The negative coefficients of the one and two-lagged DAX index values reveal an intriguing connection between the Hungarian and the German stock markets. The estimates imply that the two markets usually move in the opposite direction in a half-a-year time-window. Investors may have incentives to allocate their resources from the more developed stock markets to less developed ones during economic upturns (e.g. higher returns), while they could decide to withdraw their investments from riskier markets in times of crisis.

Figure 1 illustrates the impulse response functions of BUX to shocks in the analyzed macroeconomic variables.

Figure 1 Impulse response functions of BUX to shocks in the macroeconomic variables, 1995Q1–2017Q4



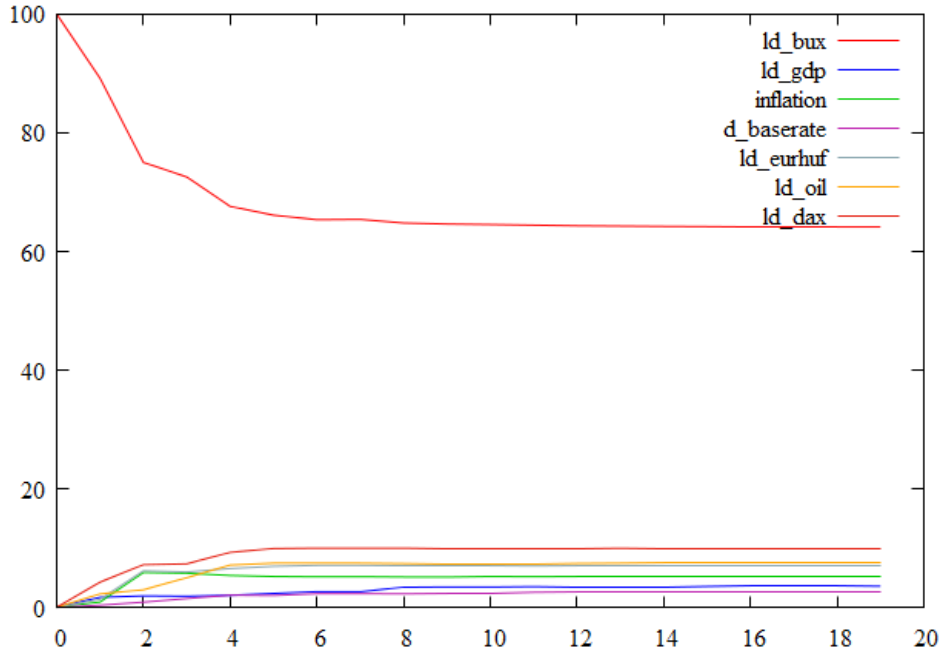
Source: own construction based on own calculations

The impulse response functions shown in Figure 1 tell a similar story to what we have interpreted from the VAR model. Generally, there is no clear-cut response of BUX to shocks in the macroeconomic variables, especially GDP and the base rate causing ambiguous effect. Shocks to inflation, the DAX index and oil price tend to have a negative influence on Hungarian stock prices for 4-6 quarters, while the

EURHUF exchange rate shows a positive relationship with the BUX index performance.

Figure 2 depicts the forecast error variance decomposition of the BUX index for the whole sample period, from 1995 to 2017. The forecast error variance decomposition of BUX shows how much of its forecast error variance is determined by shocks in the macroeconomic variables included in the model. Unsurprisingly, most of it is explained by the BUX index itself, but this is usually observed in the empirical works (Brooks 2008). More than 60% of the variance is explained by the BUX itself in the long run, with the DAX index providing the biggest explanatory power among the other variables, while GDP and the base rate again show little connection with stock prices.

Figure 2 Forecast error variance decomposition of BUX, 1995Q1–2017Q4



Source: own construction based on own calculations

Based on the aforementioned results, I conclude that Hungarian stock prices and macroeconomic variables generally have a weak relationship during the period from 1995 to 2017. Only inflation (-), EURHUF exchange rate (+) and the DAX index (–) show some significant connections with the BUX index on the whole sample.

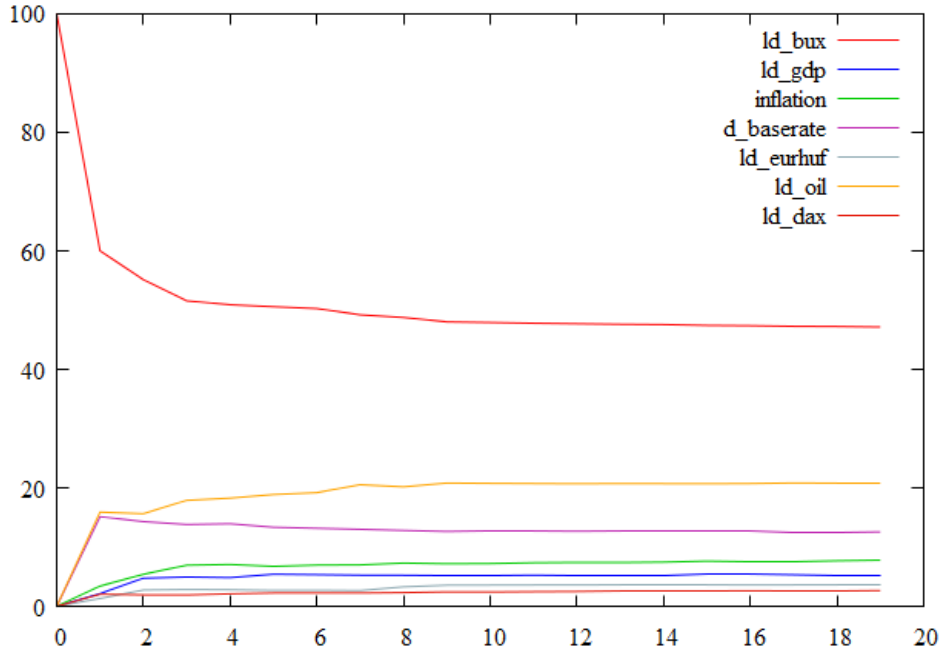
5.2. Results for Hungary, subsamples 1995Q1–2004Q2 and 2004Q3–2017Q4

After reporting the results for the whole sample, I continue with the first subsample, which covers the period from 1995Q1 to 2004Q2, i.e. the period prior to EU accession. Table B of the Annex presents the VAR model estimates for the BUX index in the first subsample.

Table B reports the coefficients of the lagged values of the macroeconomic variables in the model. Unfortunately, only the coefficients of the two-lagged inflation and one-lagged oil price are significant even at the 10% level, thus it seems that no meaningful relationship can be identified between stock prices and macroeconomic variables before EU accession. The problem might be the relatively short time window, the nine and a half years providing thirty-eight observations of each variable, which might be insufficient for the methodology used.

For brevity, I omit the impulse response functions of BUX for the first subsample. Figure 3 illustrates the forecast error variance decomposition of BUX to shocks in the macro factors for the period from 1995Q1 to 2004Q2.

Figure 3 Forecast error variance decomposition of BUX, 1995Q1–2004Q2



Source: own construction based on own calculations

Figure 3 shows a similar picture to what we have observed in Figure 2, most of the forecast error variance of BUX being determined by itself. However, the percentage decreases to around 50% in the long run. The main macroeconomic variable in this subsample is the oil price, which explains approximately 20% of the forecast error variance of the BUX index in the long term.

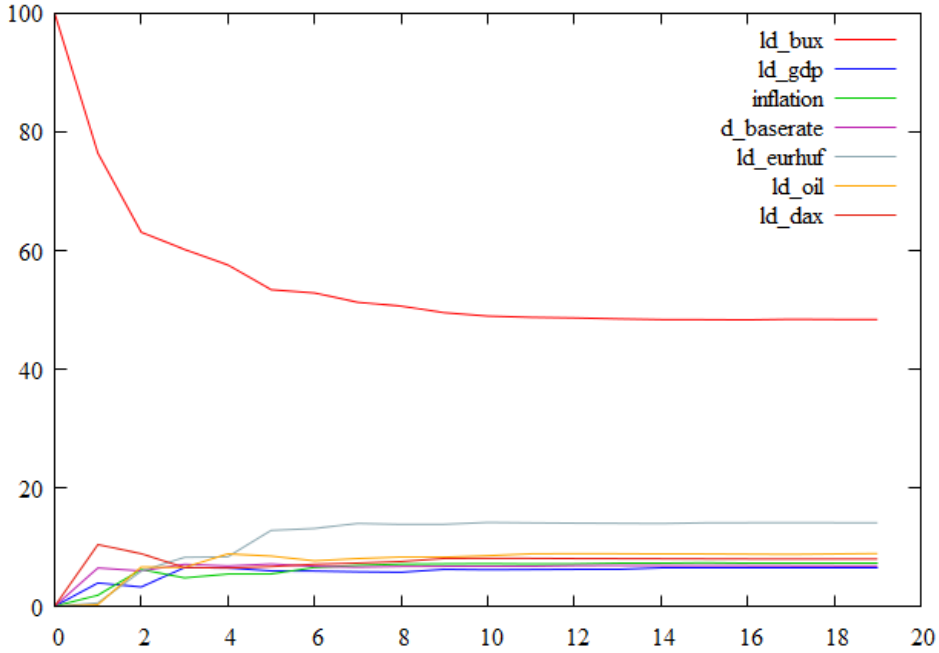
The first subsample of 1995Q1–2004Q2 does not provide further insight into the relationship between stock prices and macroeconomic variables. The period from 2004Q3 to 2017Q4 contains the quarters after EU accession, which had a great impact on the economy of Hungary and other Central and Eastern European countries. Table C of the Annex reports the VAR model estimates for the second subsample period.

Table C presents the coefficients of the macroeconomic variables for the period from 2004Q3 to 2017Q4. Again, the relationship between stock prices and

macro factors appears to be weak, with only the two and three-lagged oil price and the one-lagged DAX index value showing significance at the 10% and 5% level, respectively (apart from the BUX index itself). The second subsample consists of thirteen and a half years, meaning each variable has fifty-four observations, which is greater than in the first subsample, although it still seems to be insufficient.

Figure 4 pictures the forecast error variance decomposition of BUX in the second subsample. It shows that yet again the biggest portion of the forecast error variance of BUX is explained by itself, the long-term percentage stabilizing at around 50%. Of the macroeconomic variables, the euro-forint exchange rate provides the greatest explanatory power in the period from 2004Q3 to 2017Q4, with over 15% of the forecast error variance explained.

Figure 4 Forecast error variance decomposition of BUX, 2004Q3–2017Q4



Source: own construction based on own calculations

Dividing the whole sample into two subsamples has not given us a clearer picture of the connection between stock prices and macroeconomic variables. In fact, the results reported for the quarters spanning 1995Q1–2004Q2 and 2004Q3–2017Q4 indicate that a dataset of higher frequency might be needed to evaluate the effect of accession to the European Union on the stock price and macro factors relationship. Alternatively, statistical break point tests could be applied to identify structural breaks in the time series, but those should be elaborated in a separate study.

6. Conclusion

In this paper, I attempted to explore the relationship between stock prices and selected macroeconomic variables in a Central and Eastern European country, Hungary. The macro factors taken into consideration were GDP, inflation, central bank base rate, EURHUF exchange rate, oil price and the DAX index, while the focus was on the Hungarian stock market index, the BUX index.

I applied a vector autoregressive (VAR) model to uncover the connection between stock prices and macroeconomic variables. Using a quarterly dataset between 1995 and 2017, I reported that only inflation (–), the euro-forint exchange rate (+) and the DAX index (–) have some significant relationship with the BUX index. After dividing the whole sample into two subsamples, 1995Q1–2004Q2 and 2004Q3–2017Q4, to measure the effect of European Union accession, I found that none of the macroeconomic variables seems to have profound relationship with stock prices in Hungary in the periods analyzed. However, the subsamples might not have enough observations to back this result, higher frequency data might be needed to make a clearer picture.

The next step is to include the other Central and Eastern European countries in the model to explore the relationship between stock prices and macro variables in the whole region. If possible, higher frequency data should be used in order to make better estimates when comparing subsample results. The methodological part could be developed into a more complex model and other techniques applied as well, such as panel methods and break point tests. I believe that more data and more advanced methodology will help us understand the relationship between stock prices and macro factors better and provide further insight into the underlying connection.

Acknowledgments: This research was partially supported by Pallas Athene Domus Educationis Foundation. The views expressed are those of the author's and do not necessarily reflect the official opinion of Pallas Athene Domus Educationis Foundation.

References

Aburgi, B. (2008): Empirical relationship between macroeconomic volatility and stock returns: Evidence from Latin American markets. *International Review of Financial Analysis*, 17, 2, 396–410.

Asprem, M. (1989): Stock prices, asset portfolios and macroeconomic variables in ten European countries. *Journal of Banking & Finance*, 13, 4–5, 589–612.

Belke, A. – Beckmann, J. (2015): Monetary policy and stock prices – Cross-country evidence from cointegrated VAR models. *Journal of Banking & Finance*, 54, C, 254–265.

Bilson, C. – Brailsford, T. – Hooper, V. (2001): Selecting macroeconomic variables as explanatory factors of emerging stock market returns. *Pacific-Basin Finance Journal*, 9, 4, 401–426.

Brooks, C. (2008): *Introductory Econometrics for Finance*. Cambridge University Press, Cambridge.

Chen, S–S. (2009): Predicting the bear stock market: Macroeconomic variables as leading indicators. *Journal of Banking & Finance*, 33, 2, 211–223.

Errunza, V. – Hogan, K. (1998): Macroeconomic Determinants of European Stock Market Volatility. *European Financial Management*, 4, 3, 361–377.

Jain, P. – Rosett, J. (2006): Macroeconomic variables and the E/P ratio: Is inflation really positively associated with the E/P ratio? *Review of Quantitative Finance and Accounting*, 27, 1, 5–26.

Kiss, G. D. (2017): *Volatilitás, extrém elmozdulások és tőkepiaci fertőzések.* JATEPress, Szeged.

Laopodis, N. (2011): Equity prices and macroeconomic fundamentals: International evidence. *Journal of International Financial Markets, Institutions and Money*, 21, 2, 247–276.

Li, Y. – Iscan, T. – Xu, K. (2010): The impact of monetary policy shocks on stock prices: Evidence from Canada and the United States. *Journal of International Money and Finance*, 29, 5, 876–896.

Lütkepohl, H. – Kratzig, M. (2004): *Applied Time Series Econometrics.* Cambridge University Press, Cambridge.

Mookerjee, R. – Yu, Q. (1997): Macroeconomic variables and stock prices in a small open economy: The case of Singapore. *Pacific-Basin Finance Journal*, 5, 3, 377–388.

Peiró, A. (2016): Stock prices and macroeconomic factors: Some European evidence. *International Review of Economics and Finance*, 41, C, 287–294.

Annex

Table A VAR model estimations, BUX, 1995Q1–2017Q4

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0197	0.0267	0.7387	0.4631	
ld_bux_1	0.2227	0.1646	1.3530	0.1813	
ld_bux_2	0.3714	0.1606	2.3120	0.0243	**
ld_bux_3	0.0997	0.1629	0.6118	0.5430	
ld_bux_4	−0.0089	0.1609	−0.0555	0.9559	
ld_gdp_1	1.1323	1.0995	1.0300	0.3074	
ld_gdp_2	0.3272	1.0210	0.3205	0.7498	
ld_gdp_3	−0.5181	0.9514	−0.5446	0.5881	
ld_gdp_4	−1.0913	0.9603	−1.137	0.2604	
inflation_1	0.9576	1.5230	0.6288	0.5320	
inflation_2	−2.9814	1.4465	−2.061	0.0438	**
inflation_3	1.2045	1.4952	0.8055	0.4238	
inflation_4	1.0797	1.4625	0.7383	0.4633	
d_baserate_1	1.6416	2.4147	0.6798	0.4993	
d_baserate_2	−1.0133	2.4782	−0.4089	0.6841	
d_baserate_3	0.6411	2.3526	0.2725	0.7862	
d_baserate_4	2.5944	2.3078	1.1240	0.2656	
ld_eurhuf_1	0.4792	0.4957	0.9666	0.3377	
ld_eurhuf_2	0.9854	0.4688	2.1020	0.0399	**
ld_eurhuf_3	0.3766	0.5006	0.7523	0.4549	
ld_eurhuf_4	0.6024	0.4760	1.2650	0.2108	
ld_oil_1	0.1163	0.0985	1.1810	0.2423	
ld_oil_2	−0.1081	0.1016	−1.064	0.2919	
ld_oil_3	−0.0706	0.1025	−0.6892	0.4934	
ld_oil_4	−0.1383	0.1037	−1.335	0.1871	
ld_dax_1	−0.3221	0.1830	−1.761	0.0836	*
ld_dax_2	−0.3054	0.1792	−1.705	0.0935	*
ld_dax_3	0.0644	0.1849	0.3483	0.7289	
ld_dax_4	−0.1687	0.1923	−0.8777	0.3837	

Notes: *significance at the 10% level, **significance at the 5% level
Soucre: own construction based on own calculations

Table B VAR model estimations, BUX, 1995Q1–2004Q2

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.227237	0.159379	−1.426	0.1794	
ld_bux_1	0.189395	0.334411	0.5664	0.5816	
ld_bux_2	0.168623	0.337322	0.4999	0.6262	
ld_bux_3	−0.148634	0.308990	−0.4810	0.6391	
ld_gdp_1	1.58153	3.03430	0.5212	0.6117	
ld_gdp_2	2.96596	3.16711	0.9365	0.3675	
ld_gdp_3	1.97515	2.94442	0.6708	0.5150	
inflation_1	2.93226	3.22831	0.9083	0.3816	
inflation_2	−4.86033	2.56495	−1.895	0.0824	*
inflation_3	3.24703	3.53097	0.9196	0.3759	
d_baserate_1	7.14845	5.19334	1.376	0.1938	
d_baserate_2	−5.08389	5.60846	−0.9065	0.3825	
d_baserate_3	3.91888	4.94698	0.7922	0.4436	
ld_eurhuf_1	0.492613	1.88026	0.2620	0.7978	
ld_eurhuf_2	2.41781	1.70240	1.420	0.1810	
ld_eurhuf_3	−1.57688	1.50743	−1.046	0.3161	
ld_oil_1	0.607266	0.333071	1.823	0.0933	*
ld_oil_2	0.343142	0.344435	0.9962	0.3388	
ld_oil_3	−0.0221204	0.299877	−0.07376	0.9424	
ld_dax_1	−0.361415	0.366187	−0.9870	0.3431	
ld_dax_2	−0.0705739	0.344450	−0.2049	0.8411	
ld_dax_3	−0.220028	0.407307	−0.5402	0.5989	

Notes: *significance at the 10% level
Source: own construction based on own calculations

Table C VAR model estimations, BUX, 2004Q3–2017Q4

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.0432050	0.0586312	−0.7369	0.4697	
ld_bux_1	−0.693247	0.327475	−2.117	0.0470	**
ld_bux_2	−0.0723906	0.282497	−0.2563	0.8004	
ld_bux_3	0.738072	0.253503	2.911	0.0086	***
ld_bux_4	0.367531	0.329498	1.115	0.2779	
ld_gdp_1	2.15419	1.77751	1.212	0.2397	
ld_gdp_2	3.00551	1.96338	1.531	0.1415	
ld_gdp_3	0.221988	1.47705	0.1503	0.8820	
ld_gdp_4	−2.04406	1.39115	−1.469	0.1573	
inflation_1	2.11865	2.46979	0.8578	0.4012	
inflation_2	1.20450	2.54579	0.4731	0.6412	
inflation_3	0.202045	2.61975	0.07712	0.9393	
inflation_4	−2.38010	2.73635	−0.8698	0.3947	
d_baserate_1	−1.78880	6.85680	−0.2609	0.7969	
d_baserate_2	−6.17855	6.09857	−1.013	0.3231	
d_baserate_3	8.31362	6.84048	1.215	0.2384	
d_baserate_4	4.71505	5.93938	0.7939	0.4366	
ld_eurhuf_1	0.889364	0.628663	1.415	0.1725	
ld_eurhuf_2	0.890638	0.674818	1.320	0.2018	
ld_eurhuf_3	0.804726	0.732294	1.099	0.2849	
ld_eurhuf_4	0.868487	0.658704	1.318	0.2022	
ld_oil_1	−0.0996123	0.156590	−0.6361	0.5319	
ld_oil_2	−0.255146	0.146186	−1.745	0.0963	*
ld_oil_3	−0.349823	0.178054	−1.965	0.0635	*
ld_oil_4	−0.207896	0.149933	−1.387	0.1808	
ld_dax_1	0.767864	0.361767	2.123	0.0465	**
ld_dax_2	0.0531623	0.340155	0.1563	0.8774	
ld_dax_3	−0.544003	0.369066	−1.474	0.1560	
ld_dax_4	−0.298981	0.384729	−0.7771	0.4462	

Notes: *significance at the 10% level, **significance at the 5% level, ***significance at the 1% level

Source: own construction based on own calculations

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 26–39.

The external and internal balance in Hungary and Czech Republic

Andor Máté

Nowadays, especially after the global financial crisis of 2008, the external and internal balance of individual countries has become a major area of research. This is even more important in the CEE-region, as the crisis has shown that imbalances in this region significantly increased their sensitivity to the crisis. In our research, we aim to explore whether there is, if any, relationship between fiscal policy and the balance of the current account in Hungary and the Czech Republic. The period which we will analyze is the last, nearly three decades since the fall of communism. Based on the literature review, we examine the effects of certain fiscal policy factors on the external balance with econometric method, using a Vector Autoregressive model. Our results will show that we can find a relationship between the two factors, but that we should address certain methodological problems and use other econometric tools in the future.

Keywords: twin deficit, budget balance, current account balance

1. Introduction

In the last ten years, there have been several economies worldwide, including in Europe, which have had to confront their internal and external imbalances. This is true for Central and East European countries, too, and in this study, we introduce two of them, Hungary and the Czech Republic.

Because of the aforementioned global problem, the examination of these imbalances is nowadays a major area of research. However, it is not a new research area, the twin deficit phenomenon[1] long being at the center of interest, and indeed, there are a lot of empirical studies which attest to the presence of the twin deficit. In this paper we would like to find answers to the questions: (1) Is the twin deficit phenomenon present in Hungary and the Czech Republic? and (2) Does the budget balance have a significant effect on the external balance in these countries?

Our paper will have three main parts and a conclusion at the end of the study. Firstly, we will present a brief literature review to become familiar with previous results, and also with the methodological tools which we intend to use during the examination of twin deficit. After that, we will introduce to the reader the main characteristics and economic processes of the selected countries and set out our hypotheses. In the last main part, we will present our methodology and empirical results, and finally, we will summarize the results and introduce the major conclusions.

[1] The twin deficit hypothesis says that there is strong causal relation between the budget balance and the current account balance.

2. Literature review

In this chapter we would like to introduce the reader to previous studies on our topic, which countries have been examined, what econometric models were used and what empirical results were determined. The methodology of the previous literature is extremely diverse, ranging from the simple regression calculation, vector autoregression models, and Granger-causality testing to the cointegration-multicointegration models, their order as listed above being broadly chronologic.

To begin with, let us start with the basic macroeconomic context, which says that:

$$(1.1) \qquad Y = C + I + G + NX + R,$$

where Y is the domestic product, C is the consumption of the private sector, I is investments, G is the consumption of the government, NX is the net export (Export – Import) and R is the value of the transfers. One can transform this equation to:

$$(1.2) \qquad Y - T - C - I + T - G = CA,$$

where T is the revenue of the government (taxes), CA is the current account balance, which is equal to NX + R. After a further transformation, we get:

$$(1.3) \qquad (S - I) + (T - G) = CA,$$

where S = Y – T – C, the savings of the private sector. From this equation, we see that the difference of the private sector's savings and investments and the net savings of the governmental sector give us the balance of the current account. We could see that a change in the budget balance influences the current account in almost every case. The only exception to this is when the Ricardian equivalence is present, which means that because of the increase of budget deficit, people expect higher taxes in the future, so instead of higher consumption they just increase their savings. In this case, change in the budget deficit has no effect at all on the current account (Barro 1989). Actually, there is a perfect negative relationship (–1) between the budget balance (T-G) and the private sector's savings (S).

If the above-mentioned theoretic conception is not present, there is a relationship between the budget and current account balance. We come across several discussions in the scientific literature about this relationship, invariably on the question of which balance, is the cause, and which the effect. The common attitude has the budget balance as the cause, and the external balance as the effect (Darrat 1988, Abell 1990, Salvatore 2006). The presence of this relationship is, actually, based on the Keynesian macroeconomy and is first described in the Mundell–Fleming model (Mundell 1963, Fleming 1962). It claims that an increasing budget deficit causes increasing domestic real interest rates, which generate capital inflow and stronger domestic currency, and finally, this stronger currency induces the deteriorating current account balance. However, several studies (Summers 1986, Kim–Roubini 2008) say that we cannot consider the budget balance as an exogenous variable, because many governmental measures are taken as a response to the undesirable current account balance. Furthermore, in the US data, Kim and Roubini (2008) detected the opposite interaction between the changes in the two balances, leading them to favor the expression *"twin divergence"* over that of *"twin deficit"*.

Bernheim (1988) examined the twin deficit between 1960 and 1984 in the United States and its five large trade partners (Canada, Mexico, United Kingdom, Japan and West Germany) with a simple Ordinary Least Squares regression. In the following, my first methodological tool will be a similar regression. He detected the twin deficit in all investigated countries (except for Japan, where the current account balance was always

positive). He also observed the above-mentioned Keynesian theory, fiscal expansion in these countries causing higher interest rates, higher capital inflow, stronger currency and finally deteriorating current account balance. He used the current account balance to GDP ratio, and budget balance to GDP ratio, and seasonally adjusted data, and (perhaps of interest to us in the future), that in the case of Canada, the current account balance and budget balance of the United States appeared as explanatory variables, because of that country's close ties with Canada. In the case of the CEE-region, we could, with a view to future research, take into consideration the same indexes for Germany, which is a very important trade partner for these countries.

Darrat (1988) was the first researcher, who detected Granger-causality to certify the twin deficit, and later Abell (1990) also used this methodological tool in his study. He used several independent variables, such as economic growth, consumer price index, interest rates, foreign exchange rates, and money supply. These are the variables which I shall also use in the examination of Hungary and Czech Republic. Abell's (1990) results certified the presence of the twin deficit, but he did not detect a direct relationship between the two balances. He revealed the Granger-causality between the budget deficit and the real interest rates[2], between the interest rates and foreign exchange rates, and finally between the foreign exchange rates and the external balance, so actually, he certified the Mundell-Fleming model. Hence, he detected an indirect relationship through to the money supply as well, and he revealed that the effect of a governmental measure is the strongest one or two years after its enactment. In his study, he showed the impulse response function generated by these governmental shocks. We can see the spillover effect of such shocks through interest rates and foreign exchange rates. He detected that after the shock, initially there is a deterioration in the current account for a short time, but after that there are a few months when thing get better, and then we can see again the expected failing tendency. This is the so-called *"J-curve"* phenomenon, which means that after a shock and change of the foreign exchange rate, the current account balance, initially, does not move in the expected way because import quantities are fixed in advance for a period, while the export-sector can only adapt to the new circumstances relatively slowly (Kolozsi 2011).

There are some studies which attribute great importance to *"structural breaks"*, which can easily influence the results of examinations. In their studies, Gregory and Hansen (1996a, 1996b) showed the huge importance and relevance of structural breaks, because in the ignorance of these breaks and examination for a whole period, we can get wrong or false results. In this case, models would not detect relationship between our variables, however, if we examine them separately, we would likely establish significant relations. Leachman and Francis (2002) also used such structural breaks in their research on the twin deficit in the US from World War II to the turn of the millennium, and they worked with cointegration-multicointegration and error correction models. They confirmed the importance of these structural breaks, for although they could not detect relationship when they examined the whole period, when they went on to examine separately the periods before and after the oil crisis of the 1970's, they indeed found significant relations. Fidrmuc (2003) in his study also identified a structural break. He analyzed eighteen OECD and transition countries between 1970 and 2001, and pointed to

[2] Previously, there are some empirical results (Evans 1987, Hoelscher 1983) which did not reveal causal relationship between these variables.

the structural break of 1989, the year of the transitions. Meanwhile, Obstfeld and Rogoff (1995) also analyzed OECD countries and their external and internal deficits with the same method, highlighting some structural breaks.

In the abovementioned studies we observe that the appointing of structural breaks is often particularly high handed, the authors selecting breaks when a notable historical event occurred. In contrast, Bagnai (2006) used econometric model to find these structural breaks. He examined the relations between the current account balance, the budget balance and the investments in 22 OECD countries. When he identified the important structural breaks, he was able to reveal significant connection between these variables before and after these breaks. Hatemi and Shukur (2002) also worked with similar tools on the US data and got similar results.

It would seem useful here to mention studies which are concerned with specifically European countries. The study of Trachanas and Katrakilidis (2013) could be interesting for us. They analyzed five European countries which were in quite difficult positions, such as Greece, Portugal, Italy, Spain and Ireland. They certified the twin deficit phenomenon with their cointegration tests, but they detected that this phenomenon is stronger when there is a fiscal consolidation and improving current account balance than when there is a fiscal expansion and deteriorating current account balance. The significance of these findings, if true, is that fiscal consolidation could be the solution to handle the external deficit problems in some countries. In contrast, Nickel and Vansteenkiste (2008) said that there is a theoretical or psychological public debt limit above which the public sector adjudges the consolidation unsustainable, so instead of decreasing consumption they consume the same or even more than before. The authors said that this limit stands at about eighty percent of GDP.

Based on the previous literature listed here, we note that there has been a lot of research in this topic, and that the authors have used several methodological tools. In this paper, we will use a Vector Autoregressive Model and in a future research we will refine our methodology by finding the structural breaks and using the other models mentioned, particularly with the cointegration-multicointegration method.

3. Review of the two countries

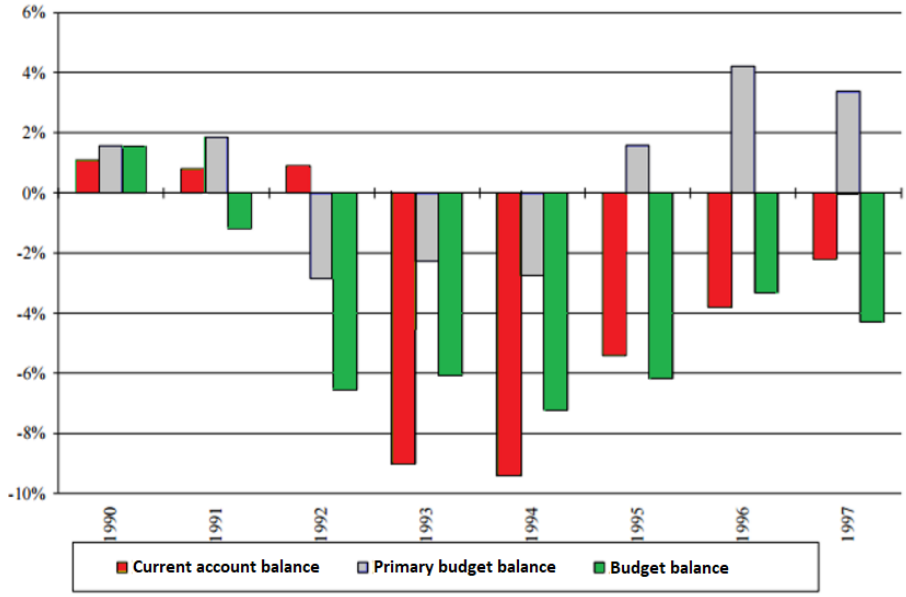
In this chapter, we briefly introduce the main attributions and economic processes of Hungary and the Czech Republic, dividing the last nearly three decades into three subsections.

3.1. From transition to millennium

Although our empirical analysis will not include this decade, we thought it important to introduce the countries' main characteristics and their "starting position" after the transition. In Hungary, the most important feature is the inheritable public debt and its interest liability. In Figure 1 below, we can see that because of the high interest expenditures the budget balance was strongly negative in every year. From the values of the primary balance, we can see that there was a fiscal restriction in 1995 (the so-called "Bokros-package"), which meant, among other things, the restriction of internal consumption, cutting real wages and an eight percent additional duty. Because of the high inflation rate, restrictive monetary policy was necessary in the first half of the decade, and after the fiscal

restriction there was a slow monetary easing. This monetary easing contained the crawling peg regime to help improve the external balance.

Figure 1 Current account and budget balances to GDP ratio in Hungary, 1990–1997 (%)



Source: Barabás et al. (1998, p. 10)

In the Czech Republic, before 1997 there was a quite expansive fiscal policy, which, in particular, meant quasi fiscal expansion mainly due to the state-owned financial institutions' activity. Because of this fiscal expansion, restrictive monetary policy was necessary which led to huge current account deficit (Table 1). In 1997, these problems resulted in a serious currency crisis. After this crisis, monetary easing and restrictive fiscal policy had to be introduced, and similar to Hungary, this involved the cutting of real wages and introduction of additional duty.

Table 1 Current account balance to GDP ratio in the Czech Republic, 1995–2000 (%)

1995	1996	1997	1998	1999	2000
–2.4	–6.4	–6.0	–2.0	–2.4	–4.6

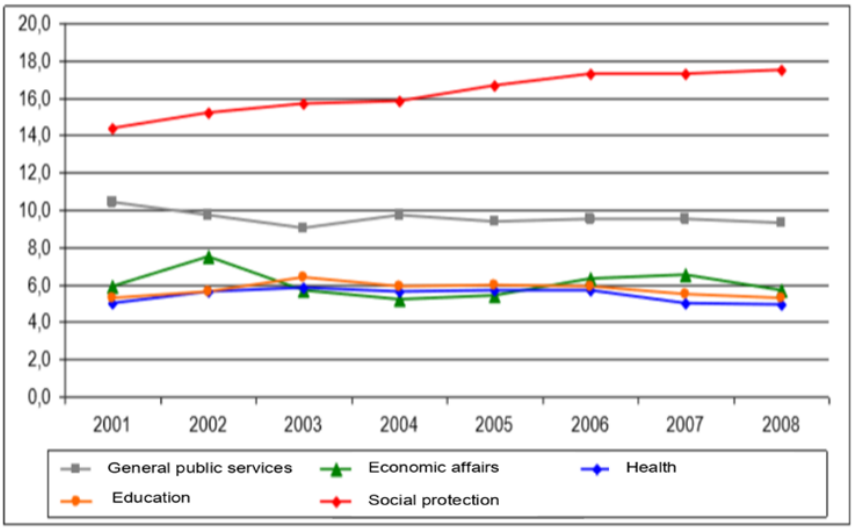
Source: Eurostat (2018)

3.2. Main characteristics before the crisis

In this part of the study we introduce the main characteristics of the two countries before the global crisis. In Hungary, the pre-crisis period was dominated by appreciable fiscal expansion. This expansion mainly affected social expenditure (Figure 2), their contribution

to the public sector improving import consumption and leading to a deteriorating current account balance and high inflation pressure.

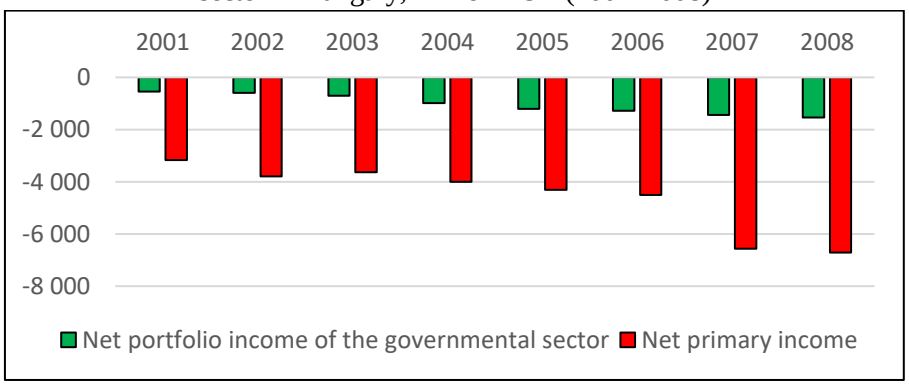
Figure 2 Government expenditures to GDP in Hungary, 2001–2008 (%)



Source: Eurostat (2018)

The abovementioned high inflation pressure resulted in restrictive monetary policy and relatively high interest rates. The high interest rates and the high CDS spread, due to the large public debt, led to huge interest expenditure in the governmental sector (Figure 3). Furthermore, because of the high foreign interest rates, foreign currency loans spread rapidly in Hungary and increased the country's sensitivity to crisis.

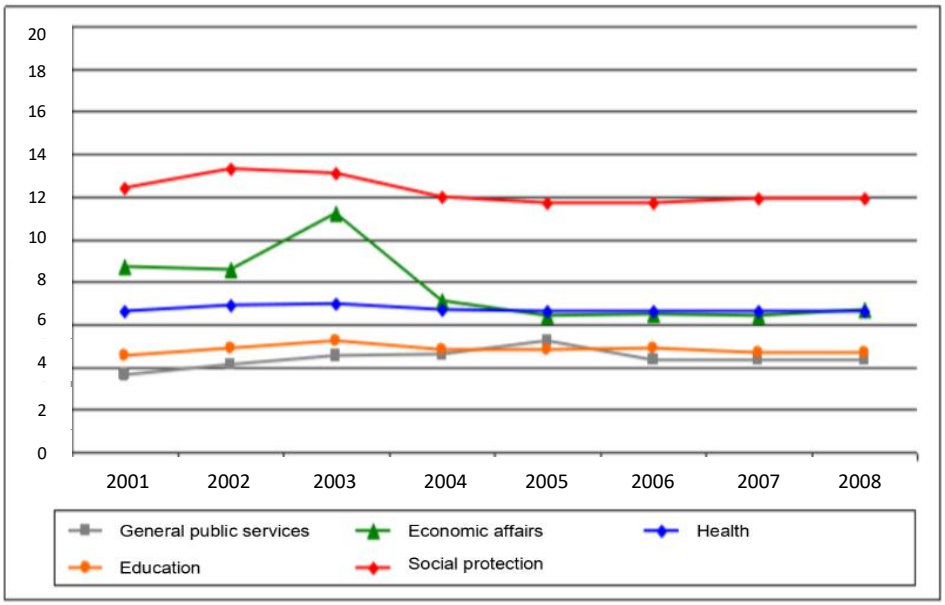
Figure 3 Primary income balance and the portfolio income balance of the governmental sector in Hungary, million EUR (2001–2008)



Source: MNB (2018)

Initially, the expansive fiscal policy in the early 2000's was present in the Czech Republic as well. However, the increasing fiscal expenditure did not affect social expenditure, but the expansion was noticeable in the contributions and subsidies to certain export-oriented industrial sectors and SME's. These expenditures are visible in the economic affairs below (Figure 4). We can also see that learning from the previous currency crisis, there was a fiscal restriction from 2004 to avoid overheating the economy, this restriction being evident in the social expenditures and in economic affairs. The restrictive fiscal policy, the previous subsidies to the export-oriented sectors and relatively low interest rates resulted an improving current account balance before the global crisis.

Figure 4 Government expenditures to GDP in the Czech Republic, 2001–2008 (%)

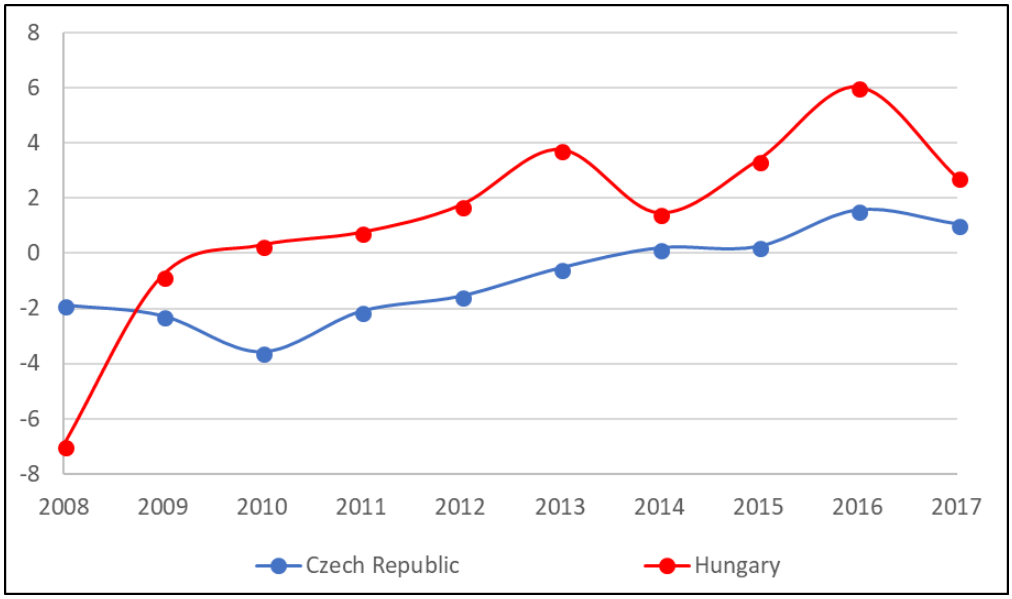


Source: Eurostat (2018)

3.3. Effects of the crisis and the post-crisis period

In this part of the study we introduce the main characteristics of Hungary and the Czech Republic during and after the global crisis. During the crisis, Hungary was not able to use fiscal easing as a crisis management measure, because of the preceding long-term expansion. Fiscal restriction was necessary, which affected mainly social expenditure. These lower social contributions led to decreasing consumption and more strongly decreasing imports than exports, so the current account balance quickly improved (Figure 5). The public debt conversation was also useful to improve the current account, a large fraction of the public debt going into domestic hands, so the previously high interest payments abroad decreased. The macroeconomic environment enabled an expansive monetary policy and a relatively weak domestic currency, which also helped to achieve a better current account balance.

Figure 5 Current account balance to GDP ratio in Hungary and the Czech Republic, 2008–2017 (%)



Source: OECD (2018)

In the Czech Republic, there was scope for an initial fiscal stimulus because of the former restrictions. The expansion affected the export-oriented sectors' subsidies, and we can see in Figure 5 above, that the current account balance improved after 2011. Monetary easing was present as well, and the Czech National Bank used discretionary monetary tools to influence directly the foreign exchange rate; this measure also resulted in an improving current account.

3.4. Hypotheses

We could see that in Hungary, fiscal expansion and restriction usually affected social expenditure and interest paid on the public debt. The higher social contributions resulted in higher import consumption, while the higher paid interest resulted in higher income outflows. In the Czech Republic, the fiscal measures usually affected the export-oriented industrial sectors and SME's, so they did not have a direct effect on import consumption. What is more, sometimes it had the contrary effect, the expansion contributing to the improving current account. We also saw the key role of exchange rate policy in the Czech economy. Based on these features, we can set out our hypotheses, which are the following:

1. The twin deficit is present in Hungary; budget balance has significant effect on the current account balance.
2. In Czech Republic, the twin deficit is not present; the main explanatory variables of the current account can be found in the foreign exchange rate and industrial production.

4. Methodology and empirical results

In this chapter we introduce which indicators and what econometric model we used, where we have found the necessary data, and the main results we obtained from these models.

In particular, we seek to confirm the twin deficit, and the effect of the budget deficit on the current account, so we use the quarterly current account balance (in million EUR) as a dependent variable and the quarterly budget deficit (in million EUR) for an independent variable. Naturally, besides the budget deficit we use other control variables, such as the foreign exchange rate, the inflation rate, the quarterly gross domestic product and the money market interest rates. The sources of the interest rates and the foreign exchange rates were the two national banks' databases (MNB 2018, CNB 2018), whereas the other data were available on the website of Eurostat (2018). Most of the data were available from the year of 1999, so our econometric examination covers the period from the first quarter of 1999 until the last quarter of 2017.

In our empirical investigation, it could be easy to use Ordinary Least Squares models, as we see in Bernheim's study, but this method would not handle the endogeneity problem, which is very common in the field of public finance (Revelli 2005). The endogeneity technically means that there is correlation between some explanatory variables and the error term.[3] In our case, it is present because we might have omitted variables and our independent variables could be also influenced by the previous values of the current account balance.

To overcome this problem, we had to use a more sophisticated econometric model, and based on the above-mentioned previous literature, we chose a Vector Autoregressive Model. In our case, we use a multivariate autoregression (Lütkepohl 2005, Sims 1980), which means that we will have *n* (the number of variables) equations, *n*-variable linear model in which each variable is explained by the current and past values of the other remaining variables and its own lagged values. In the case of univariate time series and finite examined period (p), we arrive at the following formula (Lütkepohl 2005):

$$(4.1) \qquad \hat{y}_{T+1} = \nu + \alpha_1 y_T + \alpha_2 y_{T-1} + \cdots + \alpha_p y_{T-p+1}, \text{ and}$$

$$(4.2) \qquad y_{T+1} = \hat{y}_{T+1} + u_{T+1} = \nu + \alpha_1 y_T + \alpha_2 y_{T-1} + \cdots + \alpha_p y_{T-p+1} + u_{T+1}$$

where u_{T+1} is the forecast error, the difference between the predicted and the real value of y_{T+1}. We assume the forecast errors for different periods are not correlated to get an autoregressive process, which means that there are no systematic forecast errors. So, we derive the formula:

$$(4.3) \qquad y_t = \nu + \alpha_1 y_{t-1} + \cdots + \alpha_p y_{t-p} + u_t$$

If we have multiple time series, we extend the prediction of $y_{k,T+1}$ to the following formula:

$$(4.4) \qquad \hat{y}_{k,T+1} = \nu + \alpha_{k1,1} y_{1,T} + \alpha_{k2,1} y_{2,T} + \cdots + \alpha_{kK,1} y_{K,T} + \cdots + \alpha_{k1,p} y_{1,T-p+1} + \cdots + \alpha_{kK,p} y_{K,T-p+1}, \quad k = 1,\ldots, K$$

To simplify this, we use the vectors: $y_t := (y_{1t},\ldots,y_{Kt})'$, $\hat{y}_t := (\hat{y}_{1t},\ldots, \hat{y}_{Kt})'$, $\nu := (\nu_1,\ldots,\nu_K)'$ and

[3] $cov\,(X_t, u_t) \neq 0$

$$A_i := \begin{bmatrix} \alpha_{11,i} & \cdots & \alpha_{1K,i} \\ \vdots & \ddots & \vdots \\ \alpha_{K1,i} & \cdots & \alpha_{KK,i} \end{bmatrix}.$$

That's a consequence, we can use the following compact formulae (Lütkepohl 2005):

$$\hat{y}_{T+1} = \nu + A_1 y_T + \ldots + A_p y_{T-p+1} \quad (4.5)$$

$$y_t = \nu + A_1 y_{t-1} + \ldots + A_p y_{t-p} + u_t, \text{ where } u_t = (u_{1t}, \ldots, u_{Kt})' . \quad (4.6)$$

For our VAR-model, firstly we had to examine whether our variables are stationary or not, because our variables must be stationary if we wish to use VAR-model (Kiss 2017). To examine this feature, we employed the Augmented Dicky-Fuller test (Dicky–Fuller 1979). When we had a looked at the results – for example in the case of the budget balance (*Table 2*) – we established that none of our variables are stationary, so we had to use differentiated data, except for the GDP because we used the log differentiated data of the GDP to get stationary data.

Table 2 Augmented Dicky-Fuller Tests for the budget balances

	Hungary	Czech Republic
Assymptotic p-value before the differentiation	0.4083	0.1019
Assymptotic p-value after the differentiation	8.366×10^{-16}	1.785×10^{-8}

Source: own estimation

After we got the differentiated data, we chose what lagging had to be used. Based on the Akaike Information Criterion method (Kiss 2017), eight-year-lagging was the optimal solution in both cases. Unfortunately, because of the relatively short period, we had insufficient data to handle the global crisis as a structural break and to divide the whole period into two parts. Running down the model, we got – naturally – six different equations. The most important equation, which is the estimation of the current account, can be seen on the next page (Table 3). In this table, only the significant explanatory variables are already present.

In this estimation, we found almost opposite results than we expected. We did not find significant relationship between the current account balance and the budget balance in Hungary. Based on this model, in Hungary (and also in the Czech Republic), the current account was influenced negatively by own previous values, which means that after a decrease (increase) in current account, it would be increasing (decreasing) in the next period. This, indeed, corresponded with intuition, because we can see that in the quarterly current account balance values, there is huge volatility quarter by quarter. We found a negative relationship between interest rates and the current account in Hungary, however this model detected a positive connection with the foreign exchange rate, which contradicted our intuition. It would

mean that the current account improves when the foreign exchange rate becomes stronger, which does not match the reality. A positive relationship with inflation was also detected.

Table 3 VAR-model - Estimation of the current account balance in Hungary and Czech Republic

Hungary					Czech Republic				
	Coefficient	*Std. Error*	*t-ratio*	*p-value*		*Coefficient*	*Std. Error*	*t-ratio*	*p-value*
Diff. current account (lag 1)	−0.4717	0.2426	−1,944	0.0686	Diff. current account (lag 1)	−1.0317	0.2456	−4.200	0.0006
Diff. current account (lag 2)	−0.5881	0.2042	−2,881	0.0104	Diff. current account (lag 2)	−1.1744	0.3339	−3.517	0.0026
Diff. current account (lag 7)	−0.4249	0.2395	−1.774	0.0939	Diff. current account (lag 3)	−0.7891	0.3706	−2.129	0.0482
Diff. FX-rate (lag 1)	28221.4	7618.50	3.704	0.0018	Diff. current account (lag 5)	−0.7279	0.3543	−2.055	0.0556
Log. Diff. GDP (lag 1)	−0.9521	0.2291	−4.156	0.0007	Diff. current account (lag 7)	−1.1070	0.3211	−3.447	0.0031
Log. Diff. GDP (lag 5)	−0.4894	0.2655	−1.843	0.0828	Diff. budget balance (lag 6)	1.3586	0.4291	3.166	0.0056
Log. Diff. GDP (lag 8)	0.4705	0.1639	2.870	0.0106	Log. Diff. GDP (lag 8)	−0.6412	0.3280	−1.955	0.0673
Diff. inflation (lag 4)	223.81	81.533	2.745	0.0138	Diff. interest rates (lag 3)	−5297.48	2316.55	−2.287	0.0353
Diff. interest rates (lag 1)	−239.890	79.677	−3.011	0.0079	Diff. interest rates (lag 6)	−4187.26	2115.96	−1.979	0.0643
Diff. interest rates (lag 6)	−224.399	108.190	−2.074	0.0536	Diff. interest rates (lag 7)	4218.20	2216.16	1.903	0.0741
R^2		0.89792			R^2		0.94695		

Source: own estimation

In the case of the Czech Republic, we found a direct effect of the budget balance on the current account balance. Although this runs contrary to our hypothesis, it is nevertheless conceivable. We saw that the Czech fiscal easings affected the budget contributions to the industrial sector and to new investment, and for this new investment, initially, some import purchasing could be necessary in many cases. The table below shows the GDP's effect to be negative, which seems counterintuitive. The interest rate effects, however, are mostly negative values, which corresponds to our expectations.

Our theoretically correct method, Vector Autoregressive model, produced completely different results to those we expected after the revision of the last three decades, which moreover ran contrary to both reality and intuition. What could the problem behind and reason for these results have been?

As we can see in the previous literature, the presence of a structural break can influence the empirical results. It is evident, that in this period, there was a structural break, namely the global financial crisis of 2008. But in our model, we did not handle this problem, because of the lack of available data, the two resulting periods would be shorter than required. Moreover, there could be variables, not represented in our model, but having a significant effect on the external balance. These variables could be, for example, the monetary variables (such as money supply), which were not present in our model, but as we have seen in the previous literature, are worthy of taking into consideration.

5. Summary and conclusion

Finally, we summarize our results and the tested hypotheses, introduce our conclusions and the prospects of further research. After we got know the countries' characteristics, we set out our hypotheses. We saw that in Hungary, fiscal expansion and restriction usually affected social expenditure and the interest paid on public debt. The higher social contributions resulted in higher import consumption, the higher interest paid resulted in higher income outflows. Based on these features, our first hypothesis was that in Hungary, the twin deficit was present, and that the budget balance had a significant effect on the current account balance.

In the Czech Republic, fiscal measures usually affected the export-oriented industrial sectors and SME's, so they did not have a direct effect on import consumption. What is more, sometimes it had the contrary effect, the expansion contributing to improving export performance. We also saw the key role of the Czech exchange rate policy. Based on these characteristics, our second hypothesis was that in the Czech Republic, the twin deficit was not present; the main explanatory variables of the current account could thus be foreign exchange rates and industrial production.

To handle the endogeneity problems, we were not able to use OLS-model, we had to use a Vector Autoregression model. Based on the results of this model, we should reject our hypotheses, because we did not find significant relation between the current account and budget balance in Hungary, while in the case of the Czech Republic we did. In fact, we found several results which are inconsistent with intuition and reality. These results indicate that there are problems with this method. Based on the previous literature, the problem could be the structural break at the time of the global financial crisis, which we were not able to incorporate due to the short periods involved and insufficient data before and after the crisis.

The main conclusions to be drawn from these results might be that it is worth dealing with external and internal imbalances, as it is a significant problem in several countries, but also that we should find better methodological tools to investigate the twin deficit. In future research, we should examine longer periods, we should work with monetary indicators, or use other econometric models, such as the cointegration-multicointegration models mentioned above, or the two-stage least squares method with instrumental variables. It would be also interesting in the future to widen our examination to include other Central and Eastern European countries, and use panel analysis on their data.

Acknowledgment: This research was partially supported by Pallas Athene Domus Educationis Foundation. The views expressed are those of the author's (authors') and do not necessarily reflect the official opinion of Pallas Athene Domus Educationis Foundation.

References

Abell, J.D. (1990): Twin deficits during the 1980s: an empirical investigation. *Journal of Macroeconomics*, 12, 81–96.

Bagnai, A. (2006): Structural breaks and the twin deficits hypothesis. *International Economics and Economic Policy*, 3, 137–155.

Barabás Gy. – Hamecz I. – Neményi J. (1998): A költségvetés finanszírozási rendszerének átalakítása és az eladósodás megfékezése. *MNB Füzetek,* 1998/5, Budapest

Barro, R.J. (1989): The Ricardian approach to budget deficits. *The Journal of Economic Perspectives*, 3, 2, 37–54.

Bernheim, B.D. (1988): Budget deficits and the balance of trade. In Summers, L.H. (ed.): *Tax Policy and the Economy.* National Bureau of Economic Research, vol. 2. MIT Press, Cambridge, MA, 1–31.

CNB (2018): Czech Financial and Monetary Statistics. https://www.cnb.cz/en/statistics/ Accessed: April 1, 2018

Darrat, A.F. (1988): Have large budget deficits caused rising trade deficits? *Southern Economic Journal*, 54, 879–887.

Dickey, D. A. – Fuller, W. A. (1979): Distribution of the Estimators for Autoregressive Time Series With a Unit Root. *Journal of the American Statistical Association*, 74, 366, 427–431.

Eurostat (2018): European Statistics. http://ec.europa.eu/eurostat/ Accessed: March 31, 2018

Evans, P (1986): Is the Dollar High Because of Large Budget Deficits? *Journal of Monetary Economics*, 18, 227–249.

Fidrmuc, J. (2003): The Feldstein–Horioka puzzle and twin deficits in selected countries. *Economic Planning*, 36, 135–152.

Fleming, J. M. (1962). Domestic financial policies under fixed and floating exchange rates. *IMF Staff Papers*, 9, 369–379.

Gregory, A.W. – Hansen, B.E. (1996a): Residual-based tests for cointegration in models with regime shifts. *Journal of Econometrics*, 70, 99–126.

Gregory, A.W. – Hansen, B.E. (1996b): Tests for cointegration in models with regime and trend shifts. *Oxford Bulletin of Economics and Statistics*, 58, 555–560.
Hatemi-J, A. – Shukur, G. (2002): Multivariate-based causality tests of twin deficits in the US. *Journal of Applied Statistics*, 29, 817–824.
Hoelscher, G. (1983): Federal Borrowing and Short Term Interest Rates. *Southern Economic Journal*, 50, 319–333.
Kim, S. – Roubini, N. (2008): Twin deficit or twin divergence? Fiscal policy, current account, and real exchange rate in the U.S. *Journal of International Economics*, 74, 362–383.
Kiss G. D. (2017): *Volatilitás, extrém elmozdulások és tőkepiaci fertőzések.* JATEPress Kiadó, Szeged.
Kolozsi P. P. (2011): Az árfolyampolitika és a kereskedelem kapcsolatának intézményi alapjai. *Gazdasági Élet és Társadalom,* 1–2, 41–61.
Leachman, L.L. – Francis, B. (2002): Twin deficits: apparition or reality? *Applied Economics Letters*, 34, 1121–1132.
Lütkepohl, H. (2005): *New Introduction to Multiple Time Series Analysis.* Springer, Berlin.
MNB (2018): Hungarian Financial and Monetary Statistics. http://www.mnb.hu/en/statistics Accessed: March 28, 2018
Mundell, R. A. (1963). Capital mobility and stabilization policy under fixed and flexible exchange rates. *Canadian Journal of Economic and Political Science*, 29, 4, 475– 485.
Nickel, C. – Vansteenkiste, I. (2008): *Fiscal policies, the current account and Ricardian equivalence*. Working Paper No. 935. European Central Bank., Frankfurt am Main.
Obstfeld, M. – Rogoff, K. (1995): The intertemporal approach to the current account. In: Grossman, G. – Rogoff, K. (eds.): *Handbook of International Economics*, vol. III., Elsevier, Amsterdam, 1731–1799.
OECD (2018): OECD Data. https://data.oecd.org/trade/current-account-balance.htm Accessed: April 30, 2018
Revelli, F. (2005): On Spatial Public Finance Empirics. *International Tax and Public Finance*, 12, 475–492.
Salvatore, D. (2006): Twin deficits in the G-7 countries and global structural imbalances. *Journal of Policy Modeling*, 28, 701–712.
Sims, C. A. (1980): Macroeconomics and Reality. *Econometrica*, 48, 1–48.
Summers, L. (1986): *Debt problems and macroeconomic policies.* Harvard Institute of Economic Research Discussion Paper No. 1272., Harvard University, Cambridge.
Trachanas, E. – Katrakilidis, C. (2013): The dynamic linkages of fiscal and current account deficits: New evidence from five highly indebted European countries accounting for regime shifts and asymmetries. *Economic Modelling*, 31, 502–510.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 40–59.

Household-Level Livestock Market Participation among Southern Rangeland Kenyan Pastoralists

Manyeki John Kibara

Despite the well-known potential benefits of engaging in markets, very low levels of market participation are observed among smallholder farm households throughout most of Sub-Saharan Africa. So, what motivates some smallholder pastoral households to produce and participate in the livestock markets in Kenya while others do not? A Double Hurdle model was applied that involved two sequential stochastic processes. The results indicate that livestock farmers make little use of livestock markets, that prices matter with regard to the extent of participation, and that transaction costs matter both in terms of the probability and extent of participation; offering additional evidence in favor of a well-known behavioral irregularity. Policy interventions aimed at facilitating pastoralists' access to education, productive assets such as pasture land, and at reducing transaction costs are central to stimulating pastoral farmers' market participation and escaping semi-subsistence livestock production traps.

Keywords: Pastoralist; Market participation; Transaction costs; Kenya

1. Introduction

Markets and improved market access are critical to improving rural incomes and lifting rural households out of poverty traps, particularly in developing countries (Barrett 2008). Despite the well-known potential benefits of engaging in markets, very low levels of market participation are observed among household farmers throughout most of Sub-Saharan Africa (SSA) (Poulton et al. 2006). However, in spite of low level of markets participation, there is overwhelming evidence that practically all rural farmers depend on trading for some household needs, and hence seek income generating activities (Siziba et al. 2013). This increased dependence on markets puts a premium on understanding household market participation behavior as the foundation for development strategies. This justifies the need for market analyses as it represents a principal guide to the formulation of sectoral and microeconomic policies that aim to improve the welfare of agricultural households. This is because market-based development strategies may fail to facilitate wealth creation and poverty reduction if many households do not participate actively in markets or do not respond to market signals.

As observed by Asfaw et al. (2010), the pathway out of the poverty trap for many SSA countries (such as Kenya) depends on growth and development of the agricultural sector, which in turn creates market opportunities for other sectors either directly or indirectly. The main focus should be to stimulate the integration of subsistence farmers into the input and output markets of agricultural products with a view to increasing their productivity and income levels and hence reducing poverty

(Holloway–Ehui 2002). However, agricultural households often face imperfect or incomplete markets for some goods and factors, which are then non-tradable, and this market failure is associated with costs resulting from distance to markets, poor infrastructure, imperfect information and supervision, and incentive costs (Sadoulet–de Janvry 1995). These are the reasons why many scholars in the world have taken an interest in the effects of transaction costs on market participation (e.g. Goetz 1992, Key et al. 2000, Holloway et al. 2005, Poulton et al. 2006, Bellemare–Barret 2006, Ouma et al. 2010, Amankwah et al. 2012, Kgosikoma et al. 2016). As a result, the reduction of transactions costs, as a means of increasing market participation, has been identified as the main limitation to the development agenda, and therefore this paper is largely restricted to the transaction costs framework, but also considers other non-transaction costs variables in explaining the possible cause of market failures in the livestock industry in Kenya.

In Kenya, there are numerous studies on market participation by smallholders growing crops (e.g. Alene et al. 2008, Omiti et al. 2009, Olwande–Mathenge 2012, Fischer–Qaim 2014) but those focusing on the livestock industry are largely limited to dairy production (e.g. Burke et al. 2015). To the best of my knowledge, there is no nationwide empirical study on the pastoral livestock market participation except for a Kenya-Ethiopia cross border study by Bellemare and Barret (2006). The conceptual and limited empirical evidence available on pastoral livestock farmers' market participation casts some doubt on attempts to facilitate national "self-sufficiency" in livestock commodities or, more generally, to induce vigorous supply response or broad-based rural welfare gains through trade and price policy instruments alone, as instituted in Kenya three decade ago (GoK 1997). The present study attempts to bridge this gap of information with a special focus on pastoral livestock marketing in the southern rangelands (SR) zone of Kenya. This zone was found fit for this analysis because it is one of the potential livestock producing and marketing areas in Kenya, accounting for over 32.8% of the total 75.8% of the national livestock herd found in arid and semi-arid lands of Kenya (GoK 2010). In this zone, it is also common to see some agricultural pastoral households who participate in livestock markets and respond to market signals. So, what motivates some households to produce and participate in the livestock markets while others do not? This study addresses this question with the objective of determining the effect of farm and household characteristics as well as market performance and institutional factors on the decisions to participate and sell livestock in the SR of Kenya. The novel aspects of the study are twofold: Firstly, the probability of market participation by agricultural pastoral household and the intensity of participation are incorporated in the same analysis. Secondly, the focus of the study is on livestock markets in the SR of Kenya, which is often neglected by researchers and policy makers, due to data limitations (the gathering of which requires a significant investment in time and money) and the difficult terrain in which the livestock are produced. It is basically an output-oriented microeconomic analysis incorporating transaction cost factors.

In trying to understand the possible reasons why some household participate in the livestock market while others do not, the rest of the paper is organized into three sections. In section two, I review the various theoretical frameworks of household market participation and present an analytical framework appropriate for this analysis,

which will assist in model formulation and estimation procedure. Section three follows in describing the farm survey data and the methodologies used, before presenting and discussing the econometric results. The last section closes the paper with concluding remarks and policy implications.

2. Theory Background and Literature Review

Many authors have recognized that analysis of smallholder market participation cannot be carried out using standard microeconomic models. Special theoretical and empirical models are required to understand the behavior of smallholder farmers in market participation. This section provides the keys theoretical frameworks in the market participation literature. Subsequently, the theoretical model of market participation is discussed, which provides the main constituents of the framework for the study of livestock market participation behavior among pastoral farm households in the SR of Kenya.

2.1. Theoretical Framework of Market Participation

The theory of market participation has developed various theoretical approaches and prominent among the critical ones are asset-based theory (ABT), transaction cost theory (TCT) and agricultural developmental theory (ADT). The ABT is well summarized by Boughton et al. (2007), who held that market participation depends fundamentally on households' initial asset endowments with market-based development strategies favoring initially wealthier household. The ADT views market participation as both a cause and a consequence of economic development[4] (Barrett 2008). The TCT, which is part of the New Institutional Economics (NIE), postulates that economic activity does not occur in a frictionless environment, but rather is always accompanied by the transaction costs of carrying out the exchange which are directly influenced by the efficiencies of the institutions (Key et al. 2000, Renkow et al. 2004). From the time TCT was coined, the theory has gained popularity in explaining farmer market participation in different production enterprises (e.g. Williamson 2000, Alene et al. 2008, Ouma et al, 2010). The present study contributes to this momentum and TCT nested in the NIE forms the theoretical foundation for gaining insight into the reasons why some pastoral farm households will participate in the livestock market while others will not, applying cross sectional data of farmer-specific and input variables for smallholder pastoral livestock farmers residing in southern rangelands of Kenya.

[4] Cause of Economic Growth because market participation may stimulate an increase in aggregate demand for products (inputs and outputs), which may further stimulate a rise in agricultural output if the economy has unused resources. Consequence of Economic Growth because an increase in agricultural output can improve people's income and living standards. Further, higher agricultural output and incomes increase government tax revenue (both foreign and domestic), making it easier for governments to finance measures to reduce poverty, increase health care provision and raise educational standards, without having to raise tax rates.

Market participation depends on the status of institutions, and institutions are transaction cost minimizing arrangements which may change and evolve with changes in the nature and sources of transaction costs. TCT is a major theory of NIE; a school of economics that resulted following a refinement of the old institutional school pioneered by Commons, Veblen and Hamilton's which argued that institutions were a key factor in explaining and influencing economic behavior. However, critics of the old institutional school of thought argued that it operated outside of neoclassical economics, since the school did not provide any quantitative theory from which reliable generalizations could be derived or sound policy choices could be made. The NIE by Williamson acknowledges the important role of institutions, but argues that one can also analyze institutions within the framework of neoclassical economics. Therefore, under the NIE, the assumption of self-seeking individuals attempting to maximize an objective function which is subject to constraint(s) still holds, but some of the assumptions of neoclassical economics such as perfect information, zero transaction costs, and full rationality are relaxed. The NIE thus represents an expanded economics that focuses on the choices people make, while at the same time allowing for factors such as occurrence of information and human limitations on the processing of information, evolution of norms, and the willingness of people to form bonds of trust, which all contribute to cost of exchange or transaction costs. The costs of exchange depend on the efficiency of institutions of a country, which includes the legal system, political system, social system, educational system, culture, the financial system, market system, and so on. In effect, it is the institutions that govern the performance of an economy by minimizing the transaction costs economic agents incur in market participation. Since the majority of agricultural farm households in the SR of Kenya are located in remote areas with poor transport networks and market infrastructure, contributing to the high transaction costs faced, then TCT framework seems ideally suited in explaining the market participation behavior of its pastoralists.

2.2. Theoretical Model of Market Participation analysis

Pursuant to the underlying theoretical background of TCA in NIE framework, this paper considered livestock farmers' participation in the market and hypothesized that the household pastoral farmers always tend to avoid participation in the market if transaction costs are high. As a result, the reduction of transaction costs as a means of increasing market participation is identified as a goal of development policy. Therefore, in this context, those factors that influence the decision to participate as well as the level of participation are commonly referred to as transaction costs. These costs are attributable to endogenous factors related to household characteristics and other factors, which are exogenous to the household. The choice to participate in the market is always influenced by expected net returns that are assumed to be guided by transaction costs. Positive net returns result in market participation while negative net returns lead to non-market participation (Boughton et al. 2007).

Pastoralist households in the SR of Kenya routinely make decisions as to whether to sell livestock, the principal form of wealth in the region. Under the hypothesis maintained, that market behavior is driven by a household's objective of maximizing profit it enjoys, one can usefully focus attention on the choice problem

that relates optimal and, of course, non-negative quantities sold, Q_s, to household attributes and the environmental factors that condition market behaviors. Recognizing that smallholder pastoral farm households in the SR of Kenya typically face natural, market and social uncertainties that influence their decision behavior, the optimal level becomes unattainable and therefore they are forced to 'satisfice' (settle on an acceptable level) often referred to as 'bounded rational' behavior. Bounded rationality can be expressed by assuming complexity in the transaction cost function, which includes observable and non-observable costs associated with livestock marketing, making the farmer unable to evaluate and process the available information in time, the so-called cognitive limitations of their minds. For a representative household, we assumes that the cost function may depend on household specific characteristics that include education attainment, gender, household size and age reflected in the vector (Z), household endowment such as land size and livestock number reflected in the vector (G), information asset such as television and mobile phones reflected by vector (A), and institutional factors represented by livestock prices, access to extension service, access to market information, access to financial institution and group affiliation reflected in vector (Y) and others such as off-farm sources of income or liquidity which may be earned or unearned (K), and household wealth index reflected by vector (D).

$$C = c(Z, G, A, Y, K, D) \quad (1)$$

The households' choice to satisfice profit (π), subject to the complex cost function represented as;

$$Max\ f(\pi) = PQ_s - c(Z, G, A, Y, K, D) \quad (2)$$

Subject to the constraint that $\pi = R - C \geq \pi^*$
Where P and Q_s are as earlier defined and π^* is the firm specific minimum acceptable profit level referred to as lower bound.

In this profit function, transaction costs are the major impediments and determinants of market participation. Although a livestock market does exist in the SR of Kenya, the gains for a particular household may be below or above cost, with the result that some households will use the market while others will not. The definition of market failure is thus household specific and not commodity specific, as the same commodity can be a tradable for one household while being a non-tradable for another. Another impediment in solving equation (2) is that a smallholder does not possess perfect knowledge of the transaction costs contained in the cost function constraints in this theory. This information asymmetry forces the farmer to have only two decision; first, the decision whether or not to participate in the livestock market and second, the number of livestock to supply in order to maximize household welfare given the fixed and variable transaction costs faced by the household (to be revisited in section 3.2). The two decisions may be made in a single (simultaneous) or a sequential two-step process. In the sequential process, the farmer decides whether or not to participate in the market and, if they choose market participation, the next step in the decision is about the quantity to sell. An increasing body of research on

sequential decisions on market participation has been accumulated in recent years (e.g. Holloway et al. 2005, Boughton et al. 2007, Omiti et al. 2009). Simultaneous decision-making means that the farmer makes choices about market participation and quantity at the same time (Abdoulaye–Sanders 2005). In this study, a sequential mode of decision making is assumed because pastoral households make the discrete participation decision at home, not yet knowing information available only at the market. In the second stage, those households that have chosen to participate in the market proceed to market, received additional information, and would make their continuous sales.

3. Material and Method

This section describes materials and specific methods used in the present study. The study is based on national household survey data on livestock production for the SR of Kenya. The section is organized into three sub-sections. Study areas and database used are described in section 3.1, while the econometric model of market participation applied in the study is explained in section 3.2. In this section, special theoretical models that are required to understand the behavior of smallholder pastoral farmers in market participation are discussed. And finally, the variables used in empirical model are presented.

3.1. Study area and Data

The main task of this study was to appropriately analyze the constraints limiting pastoral farm household in participating in livestock markets. I therefore used the national cross-sectional farm household data that was collected jointly by the University of Nairobi and the Kenya Agricultural and Livestock Research Organization during September to October 2013[5]. In this survey, Ellis's (1993) definition of peasants was adopted to define agricultural pastoral farm households as a group of persons who derive their livelihoods mainly but not exclusively from agriculture, predominantly utilize family labor in farm production, are characterized by a partial engagement in input and output markets, and are both producers and consumers of agricultural goods and services. However, the term peasant was avoided due to the negative connotations usually associated with it in preference for the more neutral term, households. Indeed, the agricultural pastoral farm household defined conforms with the recent paradigm production trend manifested by a gradual shift from the traditional nomadic pastoralism to sedentary pastoral farming (Mwang'ombe et al. 2009, Bebe et al. 2012). Therefore, the model of smallholder pastoral farm household behavior hypothesized in this study describes a semi-commercial family farm. And in total, 1512 pastoral households were selected for analysis and were confined to ten counties, namely Kajiado, Makueni, Kitui, Machakos, Narok, Taita-Taveta, Tana-River, Lamu, Kwale and Garissa, all in the SR of Kenya and the predominent production systems (agro-ecological zones) available within each county

[5] Household sampling and data collection were generously funded by the Swedish Government under the Agricultural Sectoral Development Support Program.

were considered during selection. The basis for selecting these counties was because livestock farming is the mainstay among the households and cattle grazing is generally carried out in association with goat and sheep production and, to a lesser degree, cropping. Output and input data were extrapolated on the basis of the prevailing market values. In this study, it is also worth noting that household analyses were grouped into two classes based on the livestock production enterprises: cattle representing large ruminant, and shoats representing small ruminants i.e. sheep and goat. The grouping of sheep and goat together was prudent because the two species of livestock share the same inputs and are marketed together, and therefore the reason for market participation among such households is assumed to be the same.

3.2. Econometric Model of Market Participation

There is a considerable number of studies on agricultural household market participation that have largely modeled both/either output and/or input market participation decisions as a single or sequential two-step decision process. These studies have used either the sample selection model of 1979 by Heckman, the Tobit model of 1958 or the double-hurdle models developed by Cragg in 1971. The sample selection model of Heckman is ideally used to deal with non-random samples as a result of survey design, non-response to survey questions, sample attrition or the specific attributes of the variable being analyzed. The Heckman model also addresses the problem associated with zero observations generated by non-participation decisions, arguing that an estimation on a selected subsample, as is the case with Tobin model (i.e. censored estimation), results in sample selection bias. The Heckman model overcomes these problems by undertaking a two-step estimation procedure (known as Heckit). This is done by computing a selection term or Mills ratio from the first equation (selection model) and including it as a regressor to correct for self-selection in the second stage regression involving observations from the selected sample usually referred (Dow–Norton 2003, Wooldridge 2010). This selection bias was viewed by Wooldridge (2010) as the omitted variable in the selected sample which is corrected by this procedure. The model also assumes that different sets of variables could be used in the two-step estimations. As opposed to the Heckman model, the Tobin model is a type of corner solution outcome and accounts for the clustering of zeros due to non-participation. The Tobit estimator fits conceptually well when we think of decisions on market participation and degree of participation in livestock markets as being made simultaneously. However, a major limitation with the Tobit model is that it assumes that the same set of parameters and variables determine both the probability of market participation and the level of transactions, and the model is too restrictive as it assumes all zeros to be the respondents' deliberate choices.

Cragg (1971) modifies the Tobit model to overcome the restrictive assumptions inherent in it and developed the 'Double Hurdle' (DH) or 'Two-stage' model to tackle the problem of too many zeros in the survey data by giving special treatment to the participation decision and also allowing different mechanisms to determine the discrete probability of participation and the level of participation. In this model, two hurdles must be crossed which are decisions to participation and the level of participation. Since the decision to participate in a livestock market and

supply are assumed sequential, the DH model was found ideal as it allows for a separation between the initial decisions to participate (Y>0 vs Y=0) and the decision of how much Y given Y>0. Further, the DH model is appropriate for analyzing the possibility that the factors influencing a farmer's decision to participate in the livestock market may not affect the quantity sold. In addition, the model allowed us to consider that the same factor can potentially affect participation and the amount sold in different ways. Although more recently Burke et al. (2015), tried to modify the Tobin model and described a triple-hurdle model of the ordered Tobit model that includes non-producers, the focus for this analysis was purely on farmers engaging on livestock production, and since our aim was to provide an insight into those factors that would influence their decisions on market participation, therefore the DH model was found to be most appropriate.

The DH model applied in this research is a parametric generalization of the Tobit model, in which two separate stochastic processes determine the decision to participate and the level of participation. The first equation in the DH model relates to the decision to participate and can be expressed in Probit formulation as follow:

$$P(Y_i = 1|X_i) = P(Y_s > 0) = f(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_K x_K + \varepsilon_i)$$
$$P(Y_i = 1|X_i) = f(X_i \beta_i) + \varepsilon_i \quad (3)$$

Where $f(.)$ is a function taking on values strictly between zero and one for all real numbers and *Y* takes the value of one if a household made any positive decision to participate in the livestock market and zero if not. *X* is a matrix of factors (transaction and other non-transaction cost factors which include household characteristics, household endowment, transport assets, information assets, institutional asset etc.) that affect the discrete probability of participation by pastoral farmers, β_i is a vector of parameters and ε is the error term assumed to be normally distributed disturbance with mean zero and standard deviation of σ; and captures all unmeasured variables.

The second hurdle, which closely resembles the Tobit model, is expressed by a truncated regression function. The main advantage of the truncated normal distribution over the lognormal mostly applied under Heckman procedure is that it nests the usual Tobit Model (Wooldridge 2010). The model was specified as follows;

$$Q_i^* = Z_i' \gamma_i + \mu_i \quad (4)$$
$$Q_i = Q_i^* > 0 \text{ and } Y_i > 0$$
$$Q_i = 0 \text{ Otherwise}$$

Here, Q is the proportion of number of livestock sold; i = Cattle, sheep and goat (shoats henceforth); Z defines a matrix of factors that determine intensity of participation and $\gamma_i$is a vector of parameters; μ is the random disturbance for unit i for intensity equation. Since the decisions by pastoral household are assumed to be sequential, following Smith (2003), then the error terms ε_i and μ_i are independently

and normally distributed: $\varepsilon_i \sim N(0,1)$ and $\mu_i \sim N(0, \sigma^2)$, and thus we have the following expression: $\begin{pmatrix} \varepsilon_i \\ \mu_i \end{pmatrix} N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{matrix} 1 & 0 \\ 0 & \sigma^2 \end{matrix}\right]$[6].

Because of the stochastic nature of Market Participation and outcome model, I used the maximum likelihood (ML) estimation procedure. The two stages or double hurdle are estimated separately based on the assumption that the respective error terms (ε and μ) are not correlated. The dependent variable in the Probit model (3) was whether or not a farmer participated in the market while in the truncated regression models (4) represent the quantities sold. Since the probability equation does not show by how much a particular variable increases or decreases, the likelihood of participating in the livestock product market was considered by comparing probabilities of that result when dummy variables take the values 1 if participated in livestock product markets and zero otherwise, while holding other independent variables at their sample mean values (Wooldridge 2010). Now, if we assume that we have a random sample of size N, the ML estimate of β is the particular vector $\hat{\beta}^{ML}$ that gives the greatest likelihood of observing the sample $\{q_1, q_2, .. q_N\}$ conditional on the explanatory variables x. By assumption, the probability of observing $\{q_1 = 1\}$ is $f(x\beta)$ while the probability of observing $\{q_1 = 0\}$ is $f(1 - x\beta)$. It follows that the probability of observing the entire sample is

$$L(q|x;\beta) = \prod_{i\in l} f(x_i\beta) \prod_{i\epsilon m}[1 - f(x_i\beta)] \quad (5)$$

where l refers to the observations for which $q = 1$ and m to the observations for which $q = 0$. We can rewrite this as:

$$L(q|x;\beta) = \prod_{i=1}^{N} f(x_i\beta)\,[1 - f(x_i\beta)]^{(1-q_i)} \quad (6)$$

Because when $y = 1$ we get $f(x_i\beta)$ and when $y = 0$ we get $1 - f(x_i\beta)$, the log likelihood for the sample is:

$$lnL(q|x;\beta) = \sum_{i=1}^{N}\{q_i ln\, f(x_i\beta) + (1 - q_i) ln[1 - f(x_i\beta)]\} \quad (7)$$

From equation 7, we can get the ML estimates of β that maximizes this log likelihood function. If $f(x_i\beta)$ is the standard normal cumulative distribution function (CDF) we get the Probit estimator as:

$$lnL(q|x;\beta) = \sum_{i=1}^{N}\{q_i ln\, \Phi(x_i\beta) + (1 - q_i) ln[1 - \Phi(x_i\beta)]\} \quad (8)$$

The second hurdle involves the truncated normal regression model (equation 4) and I followed the Wooldridge (2010) estimation procedure. The classical model assumptions are μ must not only be independent of Z, but also normally distributed,

[6] Alternatively, if both decisions are assumed to be made jointly then the error term could be defined as $(\varepsilon_i, \mu_i) \sim N(0, \theta)$ where $\theta = \begin{bmatrix} 1 & \rho\sigma \\ \rho\sigma & \sigma^2 \end{bmatrix}$

$\mu|\boldsymbol{z}\sim N(0,\sigma^2)$. To estimate γ_i (along with σ) we need the distribution of Q_i given that $Q_i \leq c_i$ and $\boldsymbol{z_i}$. This can be expressed as:

$$g(Q|\boldsymbol{z_i}, c_i) = \frac{\mathrm{f}(Q|\boldsymbol{z_i}\gamma_i,\sigma^2)}{\mathrm{F}(c_i|\boldsymbol{z_i}\gamma_i,\sigma^2)},\ Q_i \leq c_i \quad (9)$$

where $\mathrm{f}(Q|\boldsymbol{z_i}\gamma_i,\sigma^2)$ denotes the normal density with mean $\gamma_0+Z_i'\gamma_i$ and variance σ^2 and $\mathrm{F}(c_i|\boldsymbol{z_i}\gamma_i,\sigma^2)$ is the normal cdf with the same mean and variance, evaluated at c_i. By taking the log of equation 9, summed across all i, and maximizing the result with respect to γ_i and σ^2, then we obtain the maximum likelihood estimators which leads to consistent approximately normal estimations.

3.3. Variables used in model estimations

The dependent variable, market participation, is measured by both the probability of participation and the number of livestock sold in the market. Thus, there are two dependent variables for each household. The first variable indicates whether the household participates in the market. This is an indicator variable, which takes the value of one if the household participates, and zero otherwise. For those who participate, the second variable indicates the total number of livestock marketed, which constitutes the level of participation. The average market participation is about 35.9% and 45.3% for cattle and shoats respectively, and that of the degree of participation is 1.488 and 3.651 for cattle and shoat respectively. These results indicate a moderate market orientation of poor pastoral smallholders households in the study area and confirmed the long-observed and puzzling limited use of livestock markets by east African pastoralists, who hold most of their wealth in the form of livestock, and who are regularly confronted with climatic shocks that plunge them into massive herd die-offs and loss of scarce wealth (Bellemare–Barrett 2006, Barrett 2008).

To determine factors affecting participation and intensity of participation, a number of covariates analyses were conducted to reflect the potential effects of observed covariates and the transaction costs[7]. Transaction costs are the barriers of access to market participation by resource-poor smallholders, and are normally defined as all costs of entering into contracts, exchange or agreement, searching for trading partners, screening potential candidates, obtaining and verifying information, bargaining, transferring the product, monitoring, controlling and enforcing the transaction (Randela et al. 2008). At best, these costs are partly observable. The variables that were included in the two models and their description statistics are summarized in Table 1. The choice of the variables used in this study is largely based on work by Bellemare and Barrett (2006), Barrett (2008), Randela et al. (2008), Alene et al. (2008), Ouma et al. (2010) and Rutto et al. (2013) who extensively reviewed factors that influence farmers to participate in marketing. Based on the reviewed literature, it was found that market participation cannot be explained by a single factor (such as price incentives), but other variables classified as household characteristics, household endowment, transport assets, information asset, and institutional asset.

[7] Note the result covariant analysis is not presented.

Table 1 Descriptive statistics of the variables used in Double hurdle estimation

	Cattle (N=1245)			Shoats (N=1512)		
Variable Name	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
Dependent variables						
Market participation	0.359±0.480	0	1	0.453±0.498	0	1
Livestock sold*	1.488±4.492	0	80	3.651±7.801	0	105
Independent variables						
Household characteristics						
Gender	0.868±0.338	0	1	0.859±0.349	0	1
Age	48.818±15.030	15	102	49.281±14.962	15	102
Education level	6.160±5.209	0	19	6.006±5.131	0	19
Household endowments						
Land asset (ha)	33.388±158.851	0.13	3002	28.758±144.864	0.13	3002
Livestock produced	18.378±49.463	1	958	33.284±72.003	1	1,307
Transport assets						
Own Car	0.0305±0.1721	0	1	0.0284±0.1663	0	1
Own Motorcycle	0.0996±0.2996	0	1	0.0893±0.2853	0	1
Information assets						
Own TV	0.13656±0.3435	0	1	0.1389±0.3459	0	1
Own Radio	0.68196±0.4659	0	1	0.6528±0.4762	0	1
Own cell phone	0.7575±0.4288	0	1	0.7579±0.4285	0	1
Institutional factors						
Distance to market	9.578±14.273	1	85	11.042±15.51	1	85
Average selling price*	25,812 ±11,941	1700	80,000	3,378 ±1,135	250	9,500
Credit services	0.0129±0.1127	0	1	0.0099±0.09914	0	1
Veterinary services	0.36467±0.4815	0	1	0.3307±0.4706	0	1
Livestock information	0.15347±0.3605	0	1	0.1138±0.3176	0	1
Market information	0.25067±0.4335	0	1	0.2474±0.4316	0	1
Others						
Off-farm Income	76,940±196,217	0	3,420,000	76,388±183,126	0	3,420,000
Per capita wealth	84.35±181.93	0	2,417.71	78.75±174.50	0	2417.71

Note: * Cattle, N=447; Shoats, N=683

Source: Own construction from National household data of September-October 2013

The household characteristics included were gender, age and education level of the household. The descriptive statistic indicates that more than 85% percent of the households are male-headed. This variable was categorical with 1 representing if the household is male-headed and 0 otherwise. This variable capture differences in market orientation between males and females, with males expected to have a higher propensity to participate in livestock markets than females, hence positive sign is expected. The other variable in this category was age of household head, which was measured in years. The average age of the sampled household was 49 years which indicate that majority of the sampled households are relatively old adult, which is expected to have a positive influence on both livestock production and market participation. Older producers are expected to be more experienced, have established contacts and hence easier market access. Next in line was the number of years the household head had spent acquiring formal education. More years are assumed to be a proxy for better education, and hence for better negotiation skills and better use of available information, and thus a positive effect on market participation. For the sampled households, the average level of education was about 6.0 years with a high

standard deviation of over 5.1 years indicating that a large proportion of the sampled households do have formal education of at least one year; a figure which shows a significant rise in literacy among pastoral communities.

On household endowments assets, two variables were included in this category. One of them was the number of livestock owned measured in livestock head count. The greater the number the more wealth and more surpluses for the market. For the sampled households, total livestock owned averages 18.378 cattle and 33.284 shoats, respectively. The other variable in this class was pasture land size and was measured in hectares. More hectares imply higher number of livestock production and excess marketed surplus; hence a positive effect is expected. On average, the sampled household operates on about 28.758 hectares of land though the variation is quite large across households as is evident in the large standard deviation of more than 144.864. In addition, security of land tenure is a wealth indicator and also influences the production objective function and types of initiatives that a household would undertake.

On transport assets, dummy variables for car or motorcycle ownership were included to assess households' ease of transportation to livestock markets and therefore a positive relationship was expected. However, less than 1% indicated owning a transportation asset. A positive relationship was expected between information assets and household market participation. Ownership of communication assets eases access to information on prices and other market incentives. To capture access to information and communications technology, the author used a dummies representing proxy for the information assets variable such as mobile phone, TV or radio. Mobile phone penetration topped with over 75% of the population followed by radio with over 65%. This is very close to the observation by Wickramasinghe et al. (2014) on smallholder agricultural households in Papua New Guinea.

The author also included various proxies for capturing the institutional factors that are considered transaction cost minimizing arrangements; hence positive contribution to market participation. Transaction costs are not measurable using available data and are approximated by distance to markets, access to credit and market information; a common approach in empirical research. In this study, rural farm households in the study area are on average about 10 km away from nearest market center. For a better and more efficient livestock market, prices are expected to act as an incentive to market participation, hence a positive effect. In this study, the average prices, ranges from Ksh 25,812.75 and Ksh 3,378.45 for a cattle and shoats respectively. Access to credit and the use of veterinary services is limited with the latter provided to a mere 36% of the farm households, while the credit facilities are extended a little less than 1%. Access to market and livestock information is hypothesized to play a significant positive role in influencing market participation. The result also shows that equivalent to 25% of all households rearing livestock had access to market information, while only 15% accessed information related to livestock production and marketing.

Other variables included in the analysis were off-farm income and per capital income; and the descriptive statistic shows that farmers operate at a different wealth index. Off-farm income was viewed as an alternative to livestock cash incomes and was therefore expected to result in an increase in market access and a reduction in entry barriers. Per capital wealth is expected to have a controversial effect on

market participation. High per capita wealth per day may reduce market entry barriers for smallholder producers resulting in a high level of sale. Similarly, high per capita wealth per day may limit number of livestock offered for sale, hence a negative effect.

4. Results and discussion

In this section, I discuss the results of the analysis of market participation behavior of pastoral farm households of the SR of Kenya. The results are organized under two main topics. The first topic presents and discusses the econometric results of the double-hurdle estimation that corresponds to the model of sequential household choice. In this section, the determinants of the probability of livestock market participation and the degree of participation are presented and discussed. In the second topic, I present and analyze the degree of market participation.

4.1. Determinants of the Probability of Livestock Market participation

This section discusses results of the significant factors that determine the probability of market participation by poor pastoral farm households. As explained when the model was specified, the dependent variable used in determining the probability of market participation is "market participation". The Probit regression was designed to use a mix of continuous and categorical predictor variables to predict a categorical outcome – "market participation". All variables mentioned in Table 1 were considered for the Probit model and the results are summarized in Table 2 below. The analysis find three household characteristics that influence market participation: the gender, age and education level of the household head. On gender, the coefficient had the expected sign (although significant in case of cattle) suggesting that being a male-headed household increases the likelihood of market participation. This seems to suggest that male-headed households face less resource constraint for effective engagement in markets. A closely related result was found by Bellemare and Barrett (2006) where female-headed households among pastoralists were found to participate less by buying and selling fewer animals than their male counterparts. The negative significant of age contrary to the *a priori* expectation confirms the general observation that farming operations in the study area are increasingly manned by the elderly (as old as 102 years). A possible explanation that can be advanced for this is that older farmers view farming as a way of life rather than as a business and have a strong emotional or almost biological connection with farming and land. The result is also found to be consistent with the Alene et al. (2008) argument that market participation declines with age since the older people are perceived to be risk averse and reluctant to adopt technology. Lower education level is inversely related to the probability of market participation but propensity to participate increases with advancement in education (variable Education level squared). High level of education gives an indication of the household's ability to have better access to understanding and interpretation of information than others, which may lead to the reduction of search, screening and information costs.

Table 2 Determinants of livestock market participation decision

	Cattle		Shoats	
Variable Name	**Coef.**	**Std. Err.**	**Coef.**	**Std. Err.**
Constant	0.02556	0.21881	0.3171*	0.18666
Household characteristics				
Gender	0.48240***	0.12513	0.05444	0.09892
Age	-0.01174***	0.00273	-0.00918***	0.00238
Education level	-0.17947***	0.02691	-0.07991***	0.02305
Education level squared	0.00866***	0.00159	0.00238*	0.00140
Household endowments				
Land asset (ha)	0.00115***	0.00044	0.00194***	0.00068
Livestock produced	0.00265***	0.00103	0.00313***	0.00068
Transport assets				
Own Car	0.25585	0.23657	0.18995	0.21948
Own Motorcycle	0.26886**	0.13314	0.30384**	0.12405
Information assets				
Own TV	0.19449	0.12045	0.02383	0.10680
Own Radio	0.20582**	0.09053	0.05091	0.07492
Own cell phone	-0.10996	0.09591	-0.02772	0.08161
Institutional factors				
Distance to the market	-0.01414***	0.00323	0.00132	0.00234
Credit services	0.29621	0.32694	0.17448	0.32967
Veterinary services	0.16275*	0.08458	0.21289***	0.07330
Livestock information	-0.10598	0.11144	-0.01285	0.10793
Market information	-0.06210	0.09415	0.07126	0.08048
Others				
Off-farm Income	-0.18101***	0.06681	-0.02634	0.04956
Per capita wealth	0.00224***	0.00048	0.00008	0.00027
LR chi2(18)	205.98***	-	149.05***	-
Pseudo R2	0.1271***	-	0.0718***	-
Marginal effects	0.35191	-	0.4594	-

*Significant at 10% level; **Significant at 5% level; ***Significant at 1% level.
Source: own calculations.

One of the biggest challenges to the pastoral household involvement in the process of agricultural transformation in Kenya can be associated with the nature and quantity of household endowment factor at the farmer's disposal (Manyeki–Kotosz 2018). Household endowment of assets was measured in terms of number of livestock and size of the land in hectares owned by the household. Both variables exhibited the expected positive impact on the likelihood that participation will occur. This result is supported by Heierli and Gass (2001) who found that acquisition and ownership of productive assets (e.g. cattle) can pave the way for a family to participate in economic activities. Ownership of transport equipment such as motorcycles has a positive impact on market participation by reducing the cost of transporting output from the farm to the market. A similar finding was reported by Key et al. (2000). On

information assets, ownership of radios was found to be positive as expected and statistically significant. This result concurs with Ouma et al. (2010) findings, though in Ouma's case, ownership of radios turned out to be statistically insignificant in influencing market participation for both sellers and buyers. This is possibly because communication assets are more useful in accessing market information and in facilitating transactions in the region. In Kenya, currently there has been an increase in radio stations in local languages and agricultural production price information is nowadays also announced through these channels.

Turning to the institutional factors, two variables found to be significant and to have the expected sign were distance to market and access to veterinary services. Distance to market is considered a proxy for transaction costs and, the farther away a household is from the market, the more difficult and costly it would be to get involved. Thus, greater distance to the market increases transaction costs, which are associated with institutional failures. Access to veterinary services had the expected positive sign and was statistically significant. Veterinary activities make vital contributions to all stages of livestock production from 'farm to fork' by reducing animal diseases at farm and market level and public health risks, and attaining food quality and safety standards. The coefficient for off-farm income was negative and significant, a result that did not conform to expectations that households with access to off-farm income would result in increase in market access and reduction in entry barriers. A possible explanation for this result could be that farmers may be involved in substitute high-value enterprises rather than livestock farming, thus motivating them to subsistence livestock production rather than producing surplus for sale. The coefficient for per capita income was positive and significant. This implies that, high per capita wealth per day would reduce market entry barriers for smallholder producers resulting to high level of sale. The Chi-square value (LR chi2(18)) showed that likelihood ratio statistics are highly significant ($P < 0.000$) suggesting that the model had strong explanatory power.

4.2. Determinants of the Level of Livestock Market Participation

Having established the important factors that influence the probability of smallholder market participation, the question remains as to why there exists such a low rate of participation (36% and 45% for cattle and shoat, respectively, of the total observations). This question was addressed by determining the factors influencing the extent of market participation in livestock marketing. The truncated regression model was estimated with the livestock sale volumes being endogenous variable. A step by step process of deletion of insignificant variables reduced the number of significant variables to thirteen, as shown in Table 3. Here, age, education, number of livestock produced, cell phone and shoats' and cattle price, distance to market, access to veterinary services and livestock information and per capital income emerged as the significantly factors that influence the household behavior toward livestock marketing. With the exception of access to the veterinary services that had the unexpected negative sign, all the other significant variables portrayed the a priori expected influence on the degree of market participation. Health of an animal is an important determinant of the market price it can obtain. However, the negative

influence to shoats marketing could perhaps mainly be due to an inadequate recognition of the contributions shoats make to the livelihoods of the poor pastoralists, resulting in underutilization of professional health services following animal health services liberalization.

Table 3 Determinants of level/degree of livestock market participation

	Cattle		Shoats	
Variable Name	**Coef.**	**Std. Err.**	**Coef.**	**Std. Err.**
Constant	2.383186*	1.29742	0.62503	1.19595
Household characteristics				
Gender	0.27852	0.19948	-0.02964	0.17119
Age	-0.00781**	0.00375	-0.00471	0.00336
Education level	-0.03026***	-0.0108	-0.00556	0.00985
Household endowments				
Livestock produced	0.00447***	0.00089	0.002832***	0.00039
Transport assets				
Own Motorcycle	-0.04679	0.13837	-0.21717	0.13689
Information assets				
Own cell phone	0.30865***	0.11511	0.12124	0.10536
Institutional factors				
Distance to market	-0.00250	0.00500	-0.01017*	0.00539
Credit services	0.39071	0.49844	-0.98364	0.61863
Veterinary services	0.03394	0.10909	-0.19773*	0.10398
Livestock information	0.11325	0.13724	0.26281*	0.13585
Price of cattle	0.03560	0.08700	0.18144**	0.08737
Price of shoats	-0.19286*	0.10308	-0.04630	0.09211
Others				
Per capita wealth	0.00036	0.00022	0.00042*	0.00022
/sigma	0.66596***	0.03862	0.74178***	0.03410
Wald chi2(13)	62.65***	-	112.98***	-

**Significant at 10% level; **Significant at 5% level; ***Significant at 1%*
Source: own calculations.

Price information is a vital instrument during marketing because it informs the farmers about marketing conditions. Farmers who have price information prior to marketing tend to sell more of their produce than those without. However, the analysis produced varying results, with livestock own price in both cases being insignificant. Cattle price was found to have a complementary effect to the extent of shoat market participation while shoats prices portray a substitution effect to cattle market participation. The Wald Chi-square value (Wald chi2(13)) showed that statistical tests are highly significant ($P < 0.000$) suggesting that the model had strong explanatory power.

5. Conclusion

This paper contributes to empirical evidence of the probability of market participation by the Kenyan SR agricultural pastoral household, and intensity of their participation, which is often neglected by researchers due to data limitations. Applying the Double Hurdle estimation reveals that market participation is governed by two independent decisions: the decision to participate in the market and the decision on the extent of participation. The empirical results show that pastoralist households in the southern rangelands counties of Kenya make relatively little use of livestock markets with an average market participation ranging between 35.9–45.3% and intensity of participation between 1.488-3.651 animals annually. The estimation results show that these two separate decisions are determined by different sets of factors. The results confirmed the existence of a significant relationship between gender, age and education level of household head and household livestock market participation. This finding brings to the fore the importance of a demographic policy which takes into account equity in resource distribution, literacy and youth empowerment. In addition, physical linkage of production areas to markets is a policy that could improve local and national livestock trade. Such linkages include the establishment and maintenance of roads and road security, as well as market information services, thus reducing the transaction cost. These high transaction costs emanate from, among other factors, the long distances involved in trekking animals to market and high transport costs. Other issues that hamper the effective participation of producers include their limited education and poor knowledge of the national language. However, a finding worth noting is the effect of land size towards household livestock market participation. The positive direction of the impact of land size is probably an indication that increased market participation is also a function of land productivity. This holds true from our earlier studies (Manyeki– Kotosz 2017, 2018). It therefore implies that any initiative in the livestock industry to increase land size must be preceded with efforts to increase the productivity of the land currently at farmers' disposal.

In summary, the policy and programmatic implication of these results is not that the ongoing public investment effort in market access in Kenya has no role to play in increasing market participation, but that, with current levels of production technology, increased private asset endowments (such as herd size and land quality) appear necessary for households to be able to take advantage of the reasonably open access to livestock markets in Kenya, and of any associated public investments in improving market information flow or physical access to markets. However, it is important to note that the study uses cross-sectional data that mainly focused on the production side and that did not capture changes over time. A longitudinal study would serve to capture changes over time with regard to smallholder pastoral livestock production and marketing. In addition, a consideration of other supporting market infrastructural facilities such as slaughterhouses, cooling facilities, meat processing and climate could help in better understanding the phenomenon. Future research could also investigate whether there is a possibly that farmers decisions are made simultaneously.

Acknowledgements: The author of the article is deeply grateful for the unreserved technical guidance provided by Dr. Balázs Kotosz, the Associate Professor at the Faculty of Economics and Business Administration, University of Szeged, Hungary, for his constructive comments and suggestions.

References

Abdoulaye, T. – Sanders, J. H. (2005): Stages and Determinants of Fertilizer Use in Semiarid African Agriculture: The Niger Experience. *Agricultural Economics*, 32, 2, 167–179.

Alene, A. D. – Manyong, V. M. – Omanya, G. – Mignouna, H. D. – Bokanga, M. – Odhiambo, G. (2008): Smallholder Market Participation Under Transactions Costs: Maize Supply and Fertilizer Demand in Kenya. *Food Policy,* 33, 4, 318–328.

Amankwah, K. – Klerkx, L. – Oosting, S. J. – Sakyi-Dawson, O. – Van der Zijpp, A. J. – Millar, D. (2012): Diagnosing constraints to market participation of small ruminant producers in northern Ghana: An innovation systems analysis. *NJAS-Wageningen Journal of Life Sciences*, *60*, 37– 47.

Asfaw, A. – Amare, M. – Davis, B. – Lipper, L. – Simutowe, F. (2010): Small Holder Market Participation and Rural Poverty: Evidence from Tanzania and Ethiopia. Working Paper. *Food and Agricultural Organization, FAO*.

Barrett, C. B. (2008): Smallholder Market Participation: Concepts and Evidence from Eastern and Southern Africa. *Food Policy*, 33, 4, 299–317.

Bebe, B. O. – Lagat, J. K. – Magembe, E. M. (2012): Evaluation of the Factors Associated with Shift from Pastoral to Agro-pastoral Farming Systems in Trans-Mara West District of Narok County-Kenya. *Asian Journal of Agricultural Sciences*, 4, 6, 403–410.

Bellemare, M. – Barrett, C. (2006): An Ordered Tobit Model of Market Participation: Evidence from Kenya and Ethiopia. *American Journal of Agricultural Economics*, 88, 2, 324–337.

Boughton, D. – Mather, D. – Barrett, C. – Benfica, R. – Abdula, D. – Tschirley, D. – Cungura, B. (2007): Market Participation by Rural Households in a Low-Income country: An Asset-Based Approach Applied to Mozambique. *Faith and Economics*, 50, 64–101.

Burke, W. J. – Myers, R. J. – Jayne, T. S. (2015): A triple-Hurdle Model of Production and Market Participation in Kenya's Dairy Market. *American Journal of Agricultural Economics*, 97, 4, 1227–124.

Cragg, J. G. (1971): Some Statistical Models for Limited Dependent Variables with Application to the Demand for Durable Goods. *Econometrica*, 39, 5, 829–844.

Dow, W. H. – Norton, E. C. (2003): Choosing Between and Interpreting the Heckit and Two-Part Models for Corner Solutions. *Health Services and Outcomes Research Methodology*, 4, 1, 5–18.

Ellis, F. (1993): *Peasant Economics*. Cambridge University Press, Cambridge, UK.

Fischer, E. – Qaim, M. (2014): Smallholder Farmers and Collective Action: What Determines the Intensity of Participation? *Journal of Agricultural Economics*, 65, 3, 683–702.

Goetz, S. J. (1992): A Selectivity Model of Household Food Marketing behavior in sub-Saharan Africa. *American Journal of Agricultural Economics*, 74, 2, 444–452.

GoK (1997): *Liberalization in Respect of Kenya's Agricultural Sector*. Technical Paper, Ministry of Agriculture, Nairobi.

GoK (2010): *Livestock Population by Type and District – 2009*. Government of Kenya, Nairobi, Kenya, Census Vol II Q, 11.

Heckman, J. J. (1979): Sample Selection Bias as a Specification Error. *Econometrica*, 47, 1, 153–161.

Heierli, U. – Gass, T. (2001): Enhancing employment and income generation in rural areas. Paper submitted to the Operations Committee of the Swiss Agency for Development and Cooperation (DEZA) 11 October 2001. www.deza.admin/themen.

Holloway, G. J. – Barrett, C. B. – Ehui, S. (2005): The Double-Hurdle Model in the Presence of Fixed Costs. *Journal of International Agricultural Trade and Development*, 1, 1, 17–28.

Holloway, G. J. – Ehui, S. (2002): Expanding Market Participation among Smallholder Livestock Producers: A Collection of Studies Employing Gibbs Sampling and Data from the Ethiopian Highlands, 1998-2001. Socioeconomics and Policy Research. Working Paper 48. International Livestock Research Institute (ILRI), Nairobi, Kenya.

Key, N. – Sadoulet, E. – de Janvry, A. (2000): Transaction Costs and Agricultural Household Supply Response. *American Journal of Agricultural Economics*, 82, 1, 245–259.

Kgosikoma, K. – Malope, P. (2016): Determinants of market participation and the institutional constraints: Case study of Kweneng West, Botswana. *Journal of Agricultural Extension and Rural Development*, 8, 9, 178–186.

Manyeki, J. K. – Kotosz, B. (2017). Supply Response of Livestock Products: A farm-level Analysis in Southern Rangelands of Kenya. In: Szendrő, K. – Horváthné Kovács, B. – Barna, R. (eds) *Proceedings of the 6th International Conference of Economic Sciences*, 2017.04.05-07, Kaposvár. University of Kaposvár, Kaposvár. 53-66.

Manyeki, J. K. – Kotosz, B. (2018): Technical efficiency estimation in the livestock industry: Case study of the southern rangelands of Kenya. In Udvari B. – Voszka É. (eds): *Challenges in National and International Economic Policies*. University of Szeged, Doctoral School in Economics, Szeged, 97–114.

Mwang'ombe, A. W. – Nyariki, D.M. – Thompson, D.M. (2009): Land Use Change and Livestock Production Challenges in an Integrated System: The Maasai Mara Ecosystem, Kenya. *Journal of Human Ecology*, 26, 3, 163–173.

Olwande, J. – Mathenge, M. (2012): *Market Participation among Poor Rural Households in Kenya*. International Association of Agricultural Economists (IAAE) Triennial Conference.

Omiti, J. M. – Otieno, D. J. – Nyanamba, T. O. – Mccullough, E. (2009): Factors Influencing the Intensity of Market Participation by Smallholder Farmers: A Case Study of Rural and Peri-urban areas of Kenya. *Afjare*, 3, 1, 57–82.

Ouma, E. – Jagwe J. – Obare, A. G. – Abele, S. (2010): Determinants of Smallholder Farmers' Participation in Banana Markets in Central Africa: The Role of Transaction Costs. *Agricultural Economics*, 41, 2, 111–122.

Poulton, C. – Kydd, J. – Dorward, A. (2006): Overcoming Market Constraints on Pro-Poor Agricultural Growth in Sub-Saharan Africa. *Development Policy Review,* 24, 3, 243–277.

Randela, R. – Alemu, Z. G. – Groenewald, J. A. (2008): Factors Enhancing Market Participation by Small-Scale Cotton Farmers. *Agricultural Economics Research, Policy and Practice in Southern Africa,* 47, 4, 451–469.

Renkow, M. – Hallstrom, D. G. – Karanja, D. D. (2004): Rural Infrastructure, Transactions Costs and Market Participation in Kenya. *Journal of Development Economics,* 73, 1, 349–367.

Rutto, J. K. – Odhiambo, M.O. – Njuguna, E.M. – Murithi, F.M. (2013): Determinants of Market Participation Decisions in Small Ruminants' Market by Livestock Keepers in Isiolo and Marsabit Districts, Kenya. *Livestock Research for Rural Development. 25, #42.*

Sadoulet, E. – de Janvry, A. (1995): *Quantitative Development Policy Analysis*. Baltimore and London: The Johns Hopkins University Press.

Siziba, S. – Nyikahadzoi, K. – Nyemeck, B. J. – Diagne, A. – Adewale, A. – Oluwole, F. (2013): Estimating the Impact of Innovation Systems On Maize Yield: The Case of Iar4d in Southern Africa. *Agricultural Economics Research Policy Practice South Africa*, 52, 3, 83–100.

Smith, M. D. (2003): On dependency in Double-Hurdle models. *Statistical Papers*, 44, 4, 581–595.

Wickramasinghe, U. – Omot, N. – Patiken, A. D. – Ryan, J. (2014): *Market Participation of Smallholder Agricultural Households in Papua New Guinea*. CAPSA Working Paper No. 108. Indonesia.

Williamson, O. E. (2000): The New Institutional Economics: Taking Stock, Looking Ahead. *Journal of Economic Literature,* 38, 3, 595–613.

Wooldridge, J.M. (2010): *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 60–76.

Interest rate pass-through in Czech Republic, Hungary and Romania. Weighted Average Cost of Liabilities approach

János Zoltán Varga

In order for monetary policy's interest rate channel to operate smoothly and effectively, the relevant retail interest rates of the real economy should react quickly and follow the movements of the prime rate. It has been observed that this connection has weakened since the financial crisis and it was suggested that the so called Weighted Average Cost of Liabilities (WACL) might be a better proxy for the banks' marginal costs than the prime rate or interbank rate. In this study we calculated the WACL for Czech Republic, Hungary, Romania, and applying cointegration tests and ARDL models, we examined whether their long run relationships with the retail loan rates rate are more stable. Results: 1. using the WACL instead of the interbank rate yields slightly more stable long-term relationships with the retail loan rates, and the WACL has been proved to be somewhat more stable than the interbank rate. 2. The interest rate pass through has been efficient for the household loan rates in all 3 countries, but only in Romania for the corporate loan rates. 3. The results suggest that the central banks can effectively influence the commercial banks financing costs, although this cost represents only one component of the loan rates, and the movements of the other components can offset the changes of the prime rate.

Keywords: Monetary transmission, bank pricing policies, cointegration, autoregressive distributed lags, break-point unit root

1. Introduction

During the last couple of decades, the main tool of monetary policy in developed countries has usually been interest rate steering. The central banks have intended to influence national retail rate levels (and consequently the country's economic activity) by setting the interest rate on some financial asset or liability issued by them. In order for the interest rate and credit channel of monetary policy to operate smoothly and effectively, the relevant interest rates of the real economy should react quickly and follow the movements of the base rate. However, during recent years it has been demonstrated that this pass-through effect has not been perfect, the loan and deposit rates do not necessarily move perfectly with the base rate or some relevant short-term interbank rate, and the break-down of the interest rate pass-through (IP henceforward) is seemingly associated with the financial crises. It has been suggested that instead of using the base rate or interbank rate, the financing cost of the lending rate is more closely connected to the weighted average cost of liabilities (WACL), and it is more relevant for banks in pricing their loans. In this article we investigate the interest rate pass-through process in Czech Republic, Hungary, and Romania, compute the WACL and test whether its relationship with the retail lending rates are more stable than that of the interbank rate.

The structure of the study is the following: the banks' pricing behavior and the reasoning behind the Weighted Average Cost of Liabilities (WACL) approach and the applied methodology is briefly discussed. After that the relevant time series (interbank and loan rates, spreads and the constructed WACL for the selected countries) are presented and followed by the formal tests of monetary policy's interest rate channel.

2. Background

According to the marginal cost pricing model, the banks, like any other profit-oriented firm must consider the marginal costs of their operations when pricing their products. Hence, the relationship between lending rate and some marginal cost price (this refers to some market interest rate) can be captured by the following equation:

$$i = \alpha + \beta r \tag{1}$$

where i is the bank's lending rate, α is some markup constant (at the end of this section we address the issue of the non-constant markup rate), r is some market rate and represents the marginal costs of intermediation and β is the sensitivity coefficient (Rousseas 1985, de Bondt 2005). Usually, it is assumed that the marginal cost of the banks' lending activity is either some reference rate or the interbank rate. Therefore, it is expected that a given country's relevant loan rate and the reference rate (or the interbank rate which can usually serve as a proxy) move together in the long run, that is, they are cointegrated. However, there has been growing empirical evidence that, especially after the financial crisis, this pass-through process has not been perfect in many countries. Aristei and Gallo (2014), Blot and Labondance (2013), van Borstel et al. (2016) and ECB (2009) documented for the Euro Area, Gambacorta et al. (2015) for Italy, Spain, United Kingdom and USA, Andries and Billon (2016), Havranek et al. (2015) for Czech Republic, Varga (2016) for Hungary that the IP had been impaired by the financial crisis.

Recently, it has been proposed by Illes et al. (2015) that the interbank rate or prime rate might not be the best proxy of the banks' marginal cost and the observed weakened long term relationship between the prime rates and retail rates might be a consequence. They suggest that using the so called Weighted Average Cost of Liabilities (WACL henceforward) might perform better and might represent the funding costs of commercial banks more accurately. They tested their hypothesis on data for Euro Zone member countries and found that the pricing behavior of banks did not substantially change after the crisis and in fact the relationship between the retail rates and WACL has been stable. Following this research, Kapuscinski and Stanislawska (2016) studied the Polish IP and arrived at a similar conclusion.

The WACL is a weighted average of the interest rates at which commercial banks can obtain funding:

$$WACL = \sum_{i=1}^{n} w_i r_i \tag{2}$$

Where r_i-s are new business interest-rates on the different liabilities of the banks, and w_i is the proportion of that liability in total liabilities (outstanding stocks of liabilities) (Illes et al. 2015). Using the stock of outstanding liabilities and new business interest rates in the calculation of WACL implicitly assumes that the current liability structure is a good predictor or proxy for the liability structure of the near future. The assumption is reasonable if one considers that changing the composition of liabilities for a bank is a slow process, since there are many items on the liability side of the balance sheet that have a maturity much longer than overnight, in fact more than a year or so. That explains the hybrid characteristics of WACL, i.e. stock liability structure and flow interest rate statistics (Illes et al. 2015).

So far, the markup α in (1) was assumed to be constant. However, this is not necessarily the case: theoretical models and empirical findings suggest that the margin is subject to changes and shifts. For instance, one of the most influential models on the topic by Ho and Saunders (1981) assumed that the banks act as risk-averse dealers in deposit and loan markets. According to their model, the interest rate spread consists of two terms. The first term expresses the market structure, that is, if the market demand and supply for loans and deposits are inelastic, the bank is able to charge higher margins. The second term depends on three factors: the management's risk aversion, the size of the transactions and the volatility of interest rates. This implies that these factors can influence the spread of banking interest rates and had these factors change the margin would change as well. The model was later extended by (among others) Allen (1988), incorporating loan heterogeneity into the model, and it was found that due to the portfolio effect, the spread might be reduced when cross-elasticities of bank products exist. Angbazo (1996) introduced default risk and showed that banks with more risky loans tend to charge higher margins. Entrop et al. (2015) augments the Ho-Saunders model with interest rate risk and found that higher maturity mismatch of loans and deposit leads to higher margins.

Wong (1997) applied industrial organization approach to show that market structure, operating costs, and the exposure of credit and interest rate risk are in a positive relationship with the interest rate spread. Robert Merton proposed a corporate loan model based on option pricing. It takes into account the possible effects of credit risk and finds that the firms' debt to equity ratio, the volatility of their assets and the duration of the loan determines the margins (Freixas–Rochet 2008). Empirical studies corroborated one or more of the above models' predictions: for example, in Saunders and Schumacher (2000), Angbazo (1997), Entrop et al (2015) Lopez–Espinosa et al. (2011), using data for 7 OECD countries, the USA, the German banking system and 15 developing developed countries, respectively.

The determinants of the interest rate margin are not the subject of our analysis, but from the above discussion it is already clear that changes in these factors can change the spread, thereby they can possibly impair the IP. For example, consider a situation in which the central bank cuts the reference rate by 50 basis points, but parallel to this decision, the banks' risk perception shifts, thus increasing the interest rate spread. The net effect on the retail interest rate might be close to zero, making the IP less effective. This points to the fact that the funding costs of loans is only one (albeit very important) aspect of the pricing of the loan, but that the variations of the margins should not be ignored either.

3. Data and Methodology

3.1 Data

In order to examine the IP, selected retail loan rates, WACL and interbank rates are needed. For loan rates, the new business interest rates on over 1 million-euro loans to nonfinancial corporations, and interest rates on loans to household for house purchasing were considered. The interbank rate is the proxy for market rate, and monthly average of overnight interbank rates are used here in concordance with the literature (see e.g. Gambacorta et al. 2014). It should be noted, however, that in Hungary the spread between the prime rate and the interbank rate has widened since the end of 2008. The reason for this is the surge in excess interbank liquidity after that the country obtained a loan from the trio of IMF, European Commission and World Bank at the onset of the financial crisis in 2008. Most of the loan was used to refinance sovereign debt denominated in local currency. The excess liquidity in turn increased the liquidity supply in the interbank market thereby pushing the interbank rate downwards. Thus, the spread between loan rate and interbank rate is significantly higher than the spread between loan rate and prime rate (Varga 2016). Consequently, the spread over interbank rate is distorted, and for this reason one could argue that, from the perspective of interest rate transmission to retail rates, using the prime rate is more appropriate. However, for the sake of comparison, the interbank rate was used in the case of Hungary as well.

In computing the WACL we took a banking sector level approach, that is, we used the monetary statistics provided by the central banks and calculated the different proportions of liabilities for the whole banking sector. Following Kapuscinski and Stanislawska (2016) we considered only liabilities denominated in local currency. Having obtained weights for the liabilities, these are multiplied by the corresponding interest rates. Central banks provide statistics for the new business interest rates on deposits for different economic sectors (households, non-financial corporations, financial corporation other than MFIs), therefore they can be used in a straightforward manner. As for government (local and central) deposits, due to the lack of specified interest rate statistics, the rates applied for non-financial corporations were used. In case of debt securities issued by banks, we found the interest rate to be paid on them in most cases is fixed to some interbank rate, hence the one-year interbank rate is used as financing cost for calculating the WACL. It should be noted however, that the markup of debt securities on the interbank rate is not zero, thus using only the interbank rate as the cost could lead to underestimation of the true WACL. Having said that, the proportion of debt securities, as can be seen in the next section, is relatively small in all three countries, so adding some markup constant to the interbank rate would not change the WACL significantly, and, what is more, it would only change the level of WACL, not its evolution.

In this study, we investigated the long-run relationship between the WACL, interbank rate and in three selected Central and Eastern European EU member

countries – Czech Republic, Hungary and Romania. Illes et al. (2015) studied the WACL for euro area countries, while Kapuscinski and Stanislawska (2016) did the same for Poland recently. Therefore, we intend to extend the scope and study the possible effects for other non-euro area EU member countries.

The time series start at 2003, 2004 and 2007 for Hungary, Czech Republic and Romania, respectively, and end in October 2017. Monthly values are used in all cases, the data being obtained from the corresponding National Banks databases (Hungarian Central Bank - MNB, Czech National Bank – CNB, National Bank of Romania – NBR).

3.2 Cointegration

To test the efficiency of interest-rate transmission formally, one usually looks for cointegrating relationships between the variables in question. Economic time series often exhibit non-stationarity and estimating regression between such variables can lead to spurious regressions, that is, the test statistics will be unreliable. Although if the time series are related to each other in some way, it can often be observed that they exhibit a common trend and it is possible to find a linear combination of them which would be stationary (that is, the variables are cointegrating). So, the usual way to investigate interest-rate pass through is first to test the stationarity of the variables involved in the analysis, using the well-known unit-root tests such as the Augmented Dickey-Fuller or the Philips-Perrion tests. If the null hypothesis of non-stationarity cannot be rejected, the analysis can proceed by testing the cointegration relationships by applying cointegration tests such as the Engle-Granger or Johansen-test.

The problem with this approach is that the economic time series often contain structural breaks which can lead to under-rejection of the non-stationarity null hypothesis using the standard unit root tests (Maddala–In-Moo 1999, Perron 1989). As a response to the financial crisis, interest rates have tended to decrease and reached historically low levels. Indeed, in Fig 1. the evolution of interest rates and WACL can be seen and they do exhibit signs of structural breaks. Therefore, it is reasonable to assume that there have been structural changes in the interest-rate-related time series, hence special unit root test should be carried out which could handle regime shifts and changes. For this reason, the unit-root test proposed by Vogelsang and Perron (1998) is applied beside the usual unit-root tests to take into account the possible effects of structural changes. The advantage of this test is that it does not require an exogenously set break date but is able to find it endogenously; thereby it does not depend on a priori assumptions concerning the exact date of structural change.

The next step in the analysis is to check whether there are any cointegrating relationships between the interbank rate or WACL and the loan rates. As mentioned above, cointegration occurs when a linear combination of the given variables is stationary; in other words, the variables have a common stochastic trend (Lütkepohl–Krätzig 2006). When the time series are cointegrated, the cointegration regression can be considered to be the long-run equilibrium model between the variables. The widely used Johansen-test and Engle-Granger test were carried out to inspect whether there is a long-term relationship between the given variables. For each country, four possible cointegrating relationships were considered: the interbank rate with corporate

loan rate and household loan rate, and WACL with corporate loan rate and household loan rate.

However, one notable problem can occur with the traditional cointegration tests when the order of integration of variables differs. The seminal articles on cointegration by Engle and Granger (1987) and Johansen (1991) assumed that both (all) series are *I(1)*, i.e. they are difference stationary, that is differencing the series transforms them to stationary. However, it may very well be the case that one of the series is not *I(1)* or the order of a series is uncertain thanks to the size distortions and low power accompanying the usual unit root tests (see e.g. Maddala–In-Moo1999). This is the unbalanced equation problem and one consequence is that the critical values for hypothesis testing might not be reliable. One way to handle the situation is to use Autoregressive Distributed Lags (ARDL) models as proposed by Pesaran et al. (2001). As will be seen in the next section, the breakpoint unit root tests indicate that some of the series are *I(0)* and some are *I(1)*, therefore in addition to the Engle-Granger and Johansen tests, ARDL models have been carried out to investigate the long run relationship between the variables and the short run dynamics of interest rate pass-through. An ARDL (p,q) model in general is the following:

$$y_t = \alpha_0 + \alpha_t t + \sum_{i=1}^{p} \phi_i y_{t-1} + \sum_{j=1}^{q} \theta_j x_{t-j} + \varepsilon_t \qquad (3)$$

Where $\varepsilon_t \sim iid(0,\sigma^2)$ disturbance, α_0 constant, α_t, ϕ_i and $\beta_{j,l}$ are coefficients of the linear trend, lags of the dependent variable and the regressors, respectively. Let $\Delta y_t = y_t - y_{t-1}$, now, (3) can be transformed into

$$\Delta y_t = a_0 + a_1 t + \alpha y_{t-1} + \theta x_{t-1} + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} \psi_j \Delta x_{t-j} + u_t \qquad (4)$$

Where $\alpha = -(1-\phi)$. Let $\beta = -\theta/\alpha$, then (4) can be rearranged as:

$$\Delta y_t = a_0 + a_1 t + \alpha(y_{t-1} - \beta x_{t-1}) + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} \psi_j \Delta x_{t-j} + u_t \qquad (5)$$

Where β is the long-term parameter, and the error correction (EC) term, which is also the cointegration relationship, is the following:

$$EC = y_{t-1} - \frac{\theta}{\alpha} x_{t-1} \qquad (6)$$

Pesaran et al. (2001) proposed bounds test and the corresponding critical values for the EC's coefficient and showed that these tests are in fact consistent. H_0: $\alpha = \theta = 0$ and rejecting the null hypothesis would indicate cointegrating relationships between the variables.

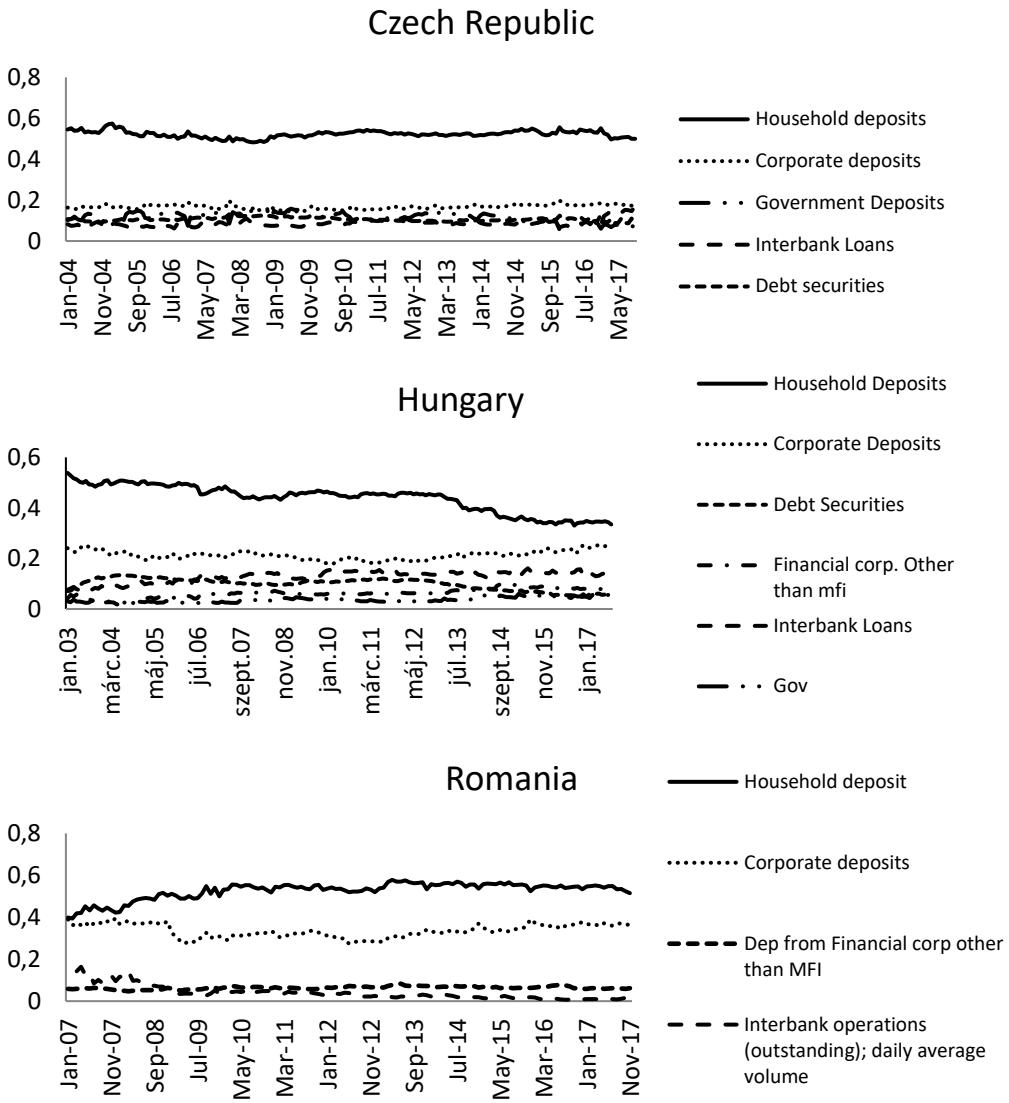
4. Results

4.1 Liability composition

The liability structure of the commercial banks can be seen in Figure 1. Not surprisingly, in all three countries the household deposits represent the most important

financial funding for banks; their proportions ranging from 35 to 60 percent of the total liabilities. Czech Republic has seen the most stable liability structure, the main components have barely changed during the period between 2004 and 2017, with household deposits being the most important; around 50 percent of the banks' liabilities come from this source. The share had been on a mild decline during the pre-crisis period, fell below 50 percent, but started to increase after that. Similar trajectories were observed in other European countries (Illes et al. 2015, Kapuscinski–Stanislawska 2016), suggesting that commercial banks tended to rely more on stable financing sources as a response to the global financial disturbances. The deposits of non-financial corporations were just below 20 percent and interbank loans and debt securities made up around 10 percent, respectively.

Figure 1 The evolution of the liability compositions, proportion of total liabilities



Source: CNB, MNB, BNR Own construction.

In Hungary, the picture is different: while household deposits still constitute the largest proportion of liabilities, their importance has weakened, and at the end of 2017, their weight fell as low as 35 percent. One of the most important factors contributing to this decline is the government's high-volume bond issuance to households. As mentioned earlier, Hungary had to resort to the IMF in order to avoid sovereign default and used its loan mainly to refinance sovereign debt which resulted in a huge surge in the share of foreign currency denominated debt in the debt structure (which was already significant: around 40% before the crisis, and almost 70 % after exercising the IMF loan).[8] The need to refinance the relatively high level of foreign

[8] For reasons that led to Hungary's de facto sovereign default in 2008 see e.g. Kovács (2009).

debt carries substantial risk, and the government decided to decrease this vulnerability by refinancing the maturing foreign currency denominated debt with Hungarian Forint denominated debt. The process involved issuing bonds directly to the household and making them attractive by paying a higher interest rate than one could obtain on bank deposits. The household deposits in turn were shifted from bank deposits toward government debt instruments. After the financial crisis the proportion of both interbank loans and corporate deposits increased, and the former can be explained partly by the high interbank liquidity discussed above. Debt securities have made up around 10 percent of the liabilities.

As for Romania, the share of household deposits was already increasing before the crisis, from the 40 percent level, and staying in the range of between 50 and 60 percent during the post crisis period. One of the direct consequences of the financial turmoil in 2008-2009 was the sudden drop in the proportion of corporate deposits (around 10 percentage point) but this has recovered since and again reached almost 40 percent.

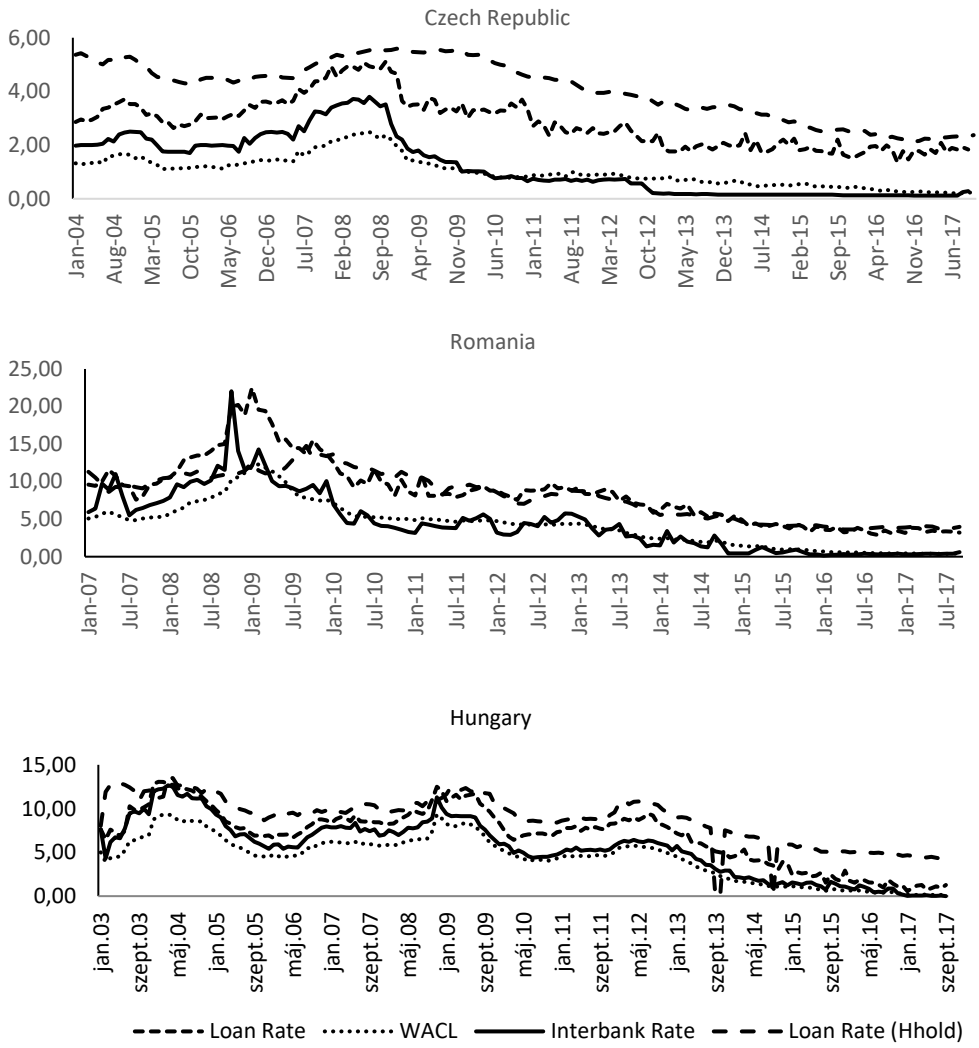
In all three countries the proportion of overnight deposits comprise a substantial share of deposits (ranging from around 40 to 60 percent), thereby providing a cheap albeit liquid financing source for the banking sector.

4.2. WACL and loan rates

To obtain the WACL, the liability weights are to be multiplied with the appropriate interest rate. “The evolution of WACL and loan rates can be seen in Figure 2.” In Czech Republic the WACL had been lower than the interbank rate during the pre-crisis period but has been higher since then. This has been mainly due to the fact that the spread of household deposits on interbank rate had been negative until around 2010 but has been constantly positive since. In Hungary, the WACL has been lower than the interbank rate during the whole period, but the two are moving together very closely. In Romania, the WACL and interbank rate basically has been moving together with the WACL proving the more stable.

Non-financial corporate loan rates reached their maximum during the financial crisis and basically have been declining since. Indeed, they are currently at historically low levels in all three countries discussed here. In Hungary and Romania, the loan rate, WACL and interbank rates are generally moving together, while in the Czech Republic the relationship between corporate loan rate and interbank rate is stronger, due to the fact discussed above, and the evolution of Czech WACL has been somewhat different from that of the interbank rate.

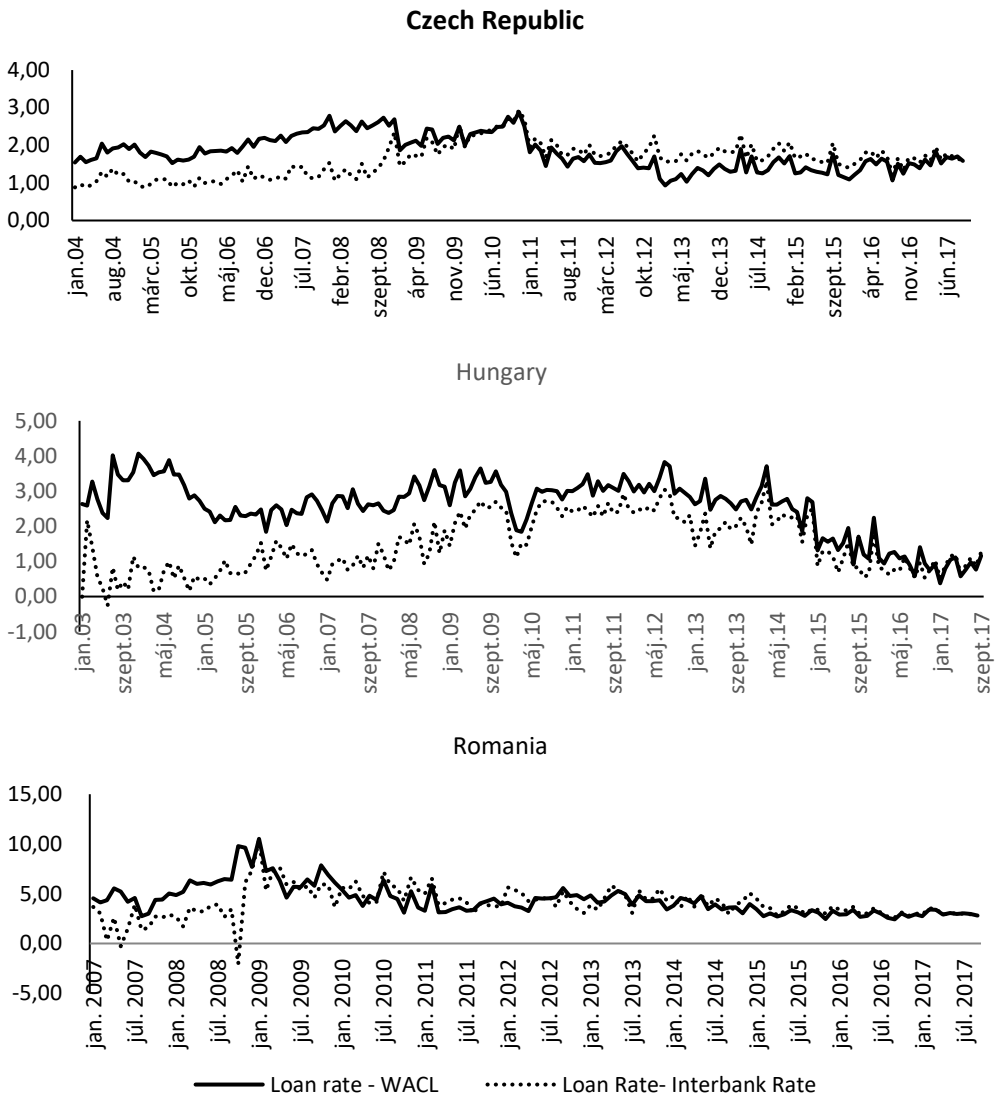
Figure 2 The evolution of WACL, interbank rate and loan rates



Source: CNB, MNB, BNR Own construction.

Figure 3 is a transformation of Figure 2, that is, it shows the spreads of corporate loan rates over interbank rate and WACL. Basically, in all three countries the spread on interbank rate had constantly increased before and at the onset of the crises, while the spread on WACL has been somewhat more stable and in fact on average it fell below the pre-crisis level. Both spreads have declined everywhere since their peak after the crisis probably due to the historically low interest rate environment. Over the last 4-5 years, the spreads have been moving closely together, suggesting that the difference between spreads is partly influenced by the absolute level of interest rates. Interestingly, the spread over WACL and the spread over interbank rates usually have been very close to each other since the crisis, with the only exception being Hungary, where the spread over WACL has been constantly higher, especially before 2013.

Figure 3 The evolution of corporate loan rate spreads.

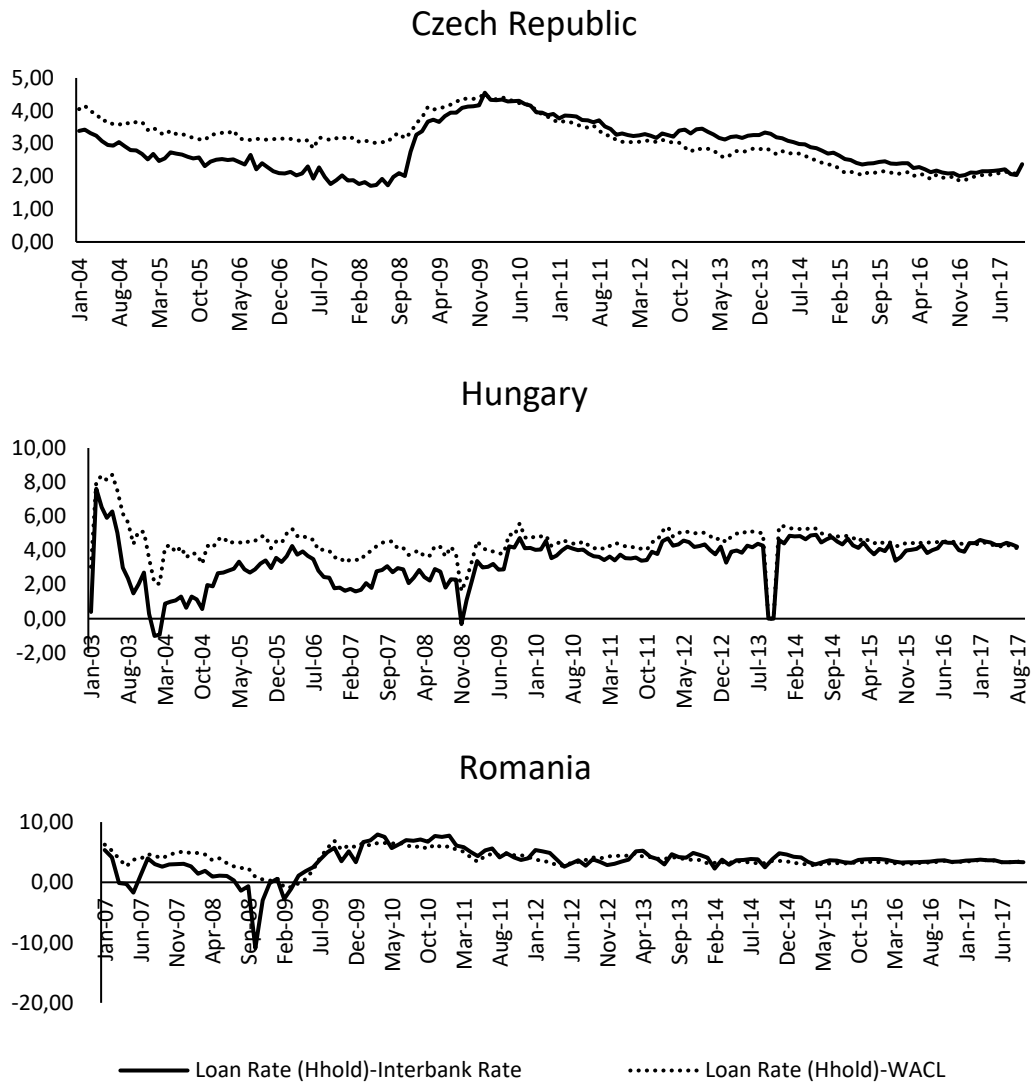


Source: CNB, MNB, BNR Own construction.

Regarding the interest rate on household loans for house purchasing, the evolutions of spreads are a little bit different (see Figure. 4): the spreads had already been declining before the crisis, but then started to increase sharply as a consequence of the financial disturbances and spiked around the end of 2009. The spreads have been decreasing since then, except for Hungary where the spreads stayed at a relatively high level, and in fact has even increased. Aczél et al. (2016) argues that the main reason behind this is that the proportion of loans with long term fixed interest rate is relatively high (around 50 percent) in Hungary, and the spread on those loans

is higher than the average in the region, meaning customers pay a higher premium for stable and predictable installments.

Figure 4 The evolution of household loan rate spreads.



Source: CNB, MNB, BNR Own construction.

4.3 Interest-rate pass-through

As discussed in Section 2 before we can proceed to cointegration analysis, the stationarity of the time series must be checked. The test results of the Vogelsang-Perron break point the ADF and the PP can be seen in Table 1. Interestingly, the

traditional tests cannot reject the null hypothesis, implying that all the time series are non-stationary. In contrast, the break point unit root test indicates that 8 of the 12 time series are in fact stationary with a break in the data (in 6 cases the results are significant even at 1 percent level). This is important since the standard cointegration tests are unreliable for unbalanced equations.

Table 1 Unit Root tests

Country	Time series	Break Point Unit Root	ADF	PP
Hungary	WACL	-5.99***	-0,582431	-0,799214
	Loan Rate (Corp.)	-3,81	-0,41251	-0,766459
	Loan Rate (HHold)	-5.24**	-0,70563	-0,724023
	Interbank Rate	-7.99***	-0,581947	-0,838534
Czech Republic	WACL	-3,21	-2,623	-0,945901
	Loan Rate (Corp.)	-4.05*	-0,955368	-1,169111
	Loan Rate (HHold)	-9.66***	-0,41216	-0,230224
	Interbank Rate	-6.37	-1,442749	-1,006835
Romania	WACL	-5.81***	-1,282144	-0,747615
	Loan Rate (Corp.)	-5.45**	-1,284174	-0,89882
	Loan Rate (HHold)	-2,51	-0,605741	-0,675612
	Interbank Rate	-5.67***	-1,535654	-1,616276

Null-hypothesis: the time series is not stationary. ***,**,* indicate significant levels at p<0.01, p<0.05, p<0.1, respectively. Source: own construction.

Source: Own calculations.

For the above reasons, the ARDL model is better suited to examine the long-term relationships of the variables. The test results can be seen in Table 3. In addition, the ARDL model with a crisis dummy variable was estimated (third columns). Moreover, for comparison purposes, the Johansen and the Engle-Granger tests were carried out as well, the results are displayed in Table 2. It can be seen from the test statistics that in Romania both tests were able to find cointegrating relationships, using the WACL and the interbank rate as well, for both loan rates. These suggest that the Romanian interest-rate pass through is operating efficiently, and the monetary authority is able to steer the retail interest-rates (these results are in concordance with the findings of Enache-Radu (2015)). In Czech Republic and Hungary, the picture is different – long-term relationships were found for the household loan rates, but not for the corporate loan rates. It was suggested by Varga (2016) that in Hungary the excess interbank liquidity might account for the deviations of corporate loan rates from equilibrium.[9] In fact, if the ARDL model for Hungary is augmented by the Hungarian interbank liquidity, the bound test indicates that the long-term relationship between the interbank rate and the corporate loan rate is restored. As for Czech Republic, Havranek et al. (2015) analyzing Czech bank level data found that some

[9] Indeed, the financial crises induced significant changes in the central bank balance sheets Europe-wide see e.g. Kiss and Balog (2018).

banks try to smooth out the changes in the policy rate for their clients, thereby they are not following the base rate that immediately or closely.

Table 2 Cointegration tests

	Variables	Johansen test	Engle-Granger
Hungary	WACL - Loan Rate (Corp.)	-	*
	Interbank - Loan Rate (Corp.)	-	-
	WACL - Loan Rate (HHold.)	***	***
	Interbank - Loan Rate (HHold.)	***	***
Czech Republic	WACL - Loan Rate (Corp.)	-	-
	Interbank - Loan Rate (Corp.)	-	-
	WACL Loan - Rate (HHold.)	-	-
	Interbank - Loan Rate (HHold.)	**	-
Romania	WACL - Loan Rate (Corp.)	**	***
	Interbank - Loan Rate (Corp.)	**	***
	WACL - Loan Rate (HHold.)	***	**
	Interbank - Loan Rate (HHold.)	-	-

Null-hypothesis: no cointegration. . ***,**,* indicate significant levels at p<0.01, p<0.05, p<0.1, respectively. Source: own construction.

Source: Own calculations.

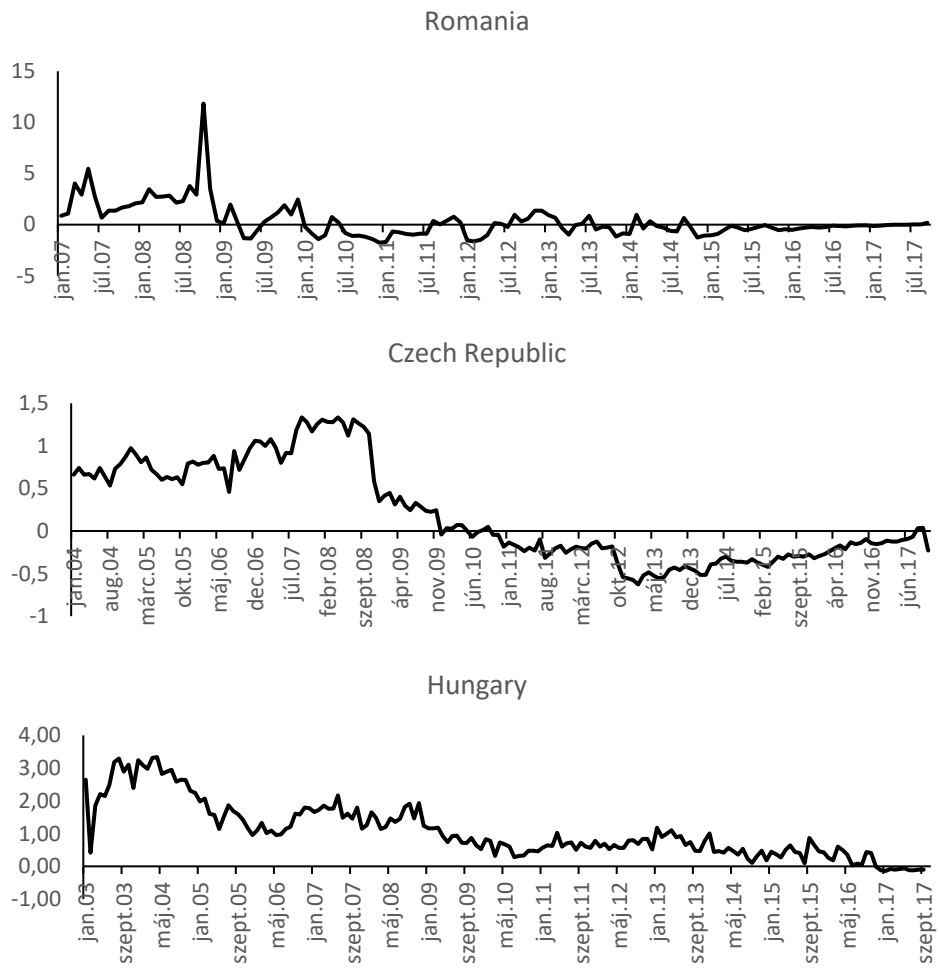
Table 3 ARDL cointegration analysis

	Variables	ARDL f bound test	ARDL f bound test with shift dummy
Hungary	WACL - Loan Rate (Corp.)	3.67	4.53‡
	Interbank - Loan Rate (Corp.)	2.63	3.58
	WACL - Loan Rate (HHold.)	21.53***	21.63***
	Interbank - Loan Rate (HHold.)	5.93**	6.65**
Czech Republic	WACL - Loan Rate (Corp.)	4.95*	4.69‡
	Interbank - Loan Rate (Corp.)	2.45	3.34
	WACL Loan - Rate (HHold.)	6.46**	6.86**
	Interbank - Loan Rate (HHold.)	6.01**	7.72**
Romania	WACL - Loan Rate (Corp.)	13.27***	12.66***
	Interbank - Loan Rate (Corp.)	6.16**	11.51***
	WACL - Loan Rate (HHold.)	9.73***	13.17***
	Interbank - Loan Rate (HHold.)	6.04**	4.97*

Null-hypothesis: no long-term relationship. ***,**,* indicate significant levels at p<0.01, p<0.05, p<0.1, respectively. Source: own construction.

Source: Own calculations.

Figure 5 The evolution of Interbank rate-WACL



Source: Own construction based on CNB, MNB, BNR.

It is important to note that using the WACL instead of the interbank rate does yield better test statistics and slightly better results, although the number of long-term relationships found by using the WACL is not really different. These results show that the WACL can estimate the banks' funding costs somewhat better than the base rate or interbank rate. However, one caveat is in order: in Figure 5, it can be seen that the WACL and the interbank rate in all 3 countries have moved closer together *after* the crisis. Thus, the interbank rate's inadequacy in representing the commercial banks' funding costs cannot account for the weakened long-term relationships observed in numerous countries after the recent financial turmoil. In order to gain a better understanding of the efficacy of the interest rate channel and credit channel, a more micro approach is needed, that is, the components that comprise the margin of retail interest rates should be studied using individual bank level data.

5. Conclusions

In developed and developing countries, interest rate steering has been of central importance for monetary policy (Bindseil 2014). This assumes that retail interest rates, through mainly the interest rate and credit channel, follow changes in the base rate. After the 2008-2009 financial crisis, interest-rate pass through has seemed to be less efficient. We found that the Weighted Average Cost of Liabilities was more stable during the studied period than the overnight interbank rate, and its long-term relationship is slightly better with respect to the retail rates. Nevertheless, the results are modest, and in fact, the deviation of WACL from interbank has been significantly lower since 2008–2009 (see Figure 5). Our findings suggest that observed impaired long-term relationships might be explainable by changes in the components of the retail interest rate margins. Thus, it seems the central banks can still influence the funding costs of commercial banks, although, conventional monetary policy tools might not be able to effectively affect the margins of retail interest rates.

References

Aczél, Á. – Banai, Á. – Borsos, A. – Dancsik B. (2016): A lakáshitelek felárát meghatározó tényezők azonosítása a magyar bankrendszerben. *Hitelintézeti Szemle*, 15, 4, 5–44.

Allen, L. (1988): The determinants of Bank Interest Margins: A Note. *Journal of Financial and Quantitative Analysis*, 23, 2, 231–235.

Andries, N. – Billon, S. (2016): Retail Bank interest rate pass-through in the euro area: An empirical survey. *Economic Systems*, 40, 170–194.

Angbanzo, L. (1997): Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking. *Journal of Banking and Finance*, 21, 1, 55–87

Aristei – Gallo (2014): Interest rate pass-through in the Euro area during the financial crisis: A multivariate regime-switching approach. *Journal of Policy Modeling*, 36, 2, 273–295

Bindseil, U. (2014): *Monetary Policy Operations and the Financial System*. Oxford University Press, Oxford. doi:10.1093/acprof:oso/9780198716907.001.0001

Blot, C. – Labondance, F. (2013): Business lending rate pass-through in the Enrozone: Monetary policy transmission before and after the financial crash. *Economic Bulletin*, 2, 1, 973–985.

De Bondt, G. J. (2005): The Interest Rate Pass-Through: Empirical Results for the Euro Area. *German Economic Review*, 6, 1, 37–78

ECB (2009): *Recent developments in the retail bank interest rate pass-through in the euro area*. Monthly Bulletin, ECB, Frankfurt am Main, August.

Enache, R. – Radu, R. (2015): Interest rate pass-through in Romania. Recent empirical evidence and regional comparisons. *Occasional Papers*, 16, National Bank of Romania.

Engle, R. F. - Granger, C. W. H. (1987): Co-integration and error correction: Representation, estimation and testing. *Econometrica* 55, 2, 251–276.

Entrop, O. – Memmel, C. – Ruprecht, B. – Wilkens, M. (2015): Determinants of bank interest margins: Impact of maturity transformation. *Journal of Banking and Finance*, 54, 1–19.

Freixas, X. – Rochet, J-C. (2008): *Microeconomics of Banking*. MIT Press

Gambacorta, L. – Illes, A. – Lombardi, M. J. (2015): Has the transmission of policy rates been impaired by the global financial crisis? *International Finance*, 18, 3, 263–280.

Havranek, T. – Irsova, Z. – Lesanovska, J. (2015): Bank Efficiency and Interest Rate Pass-Through: Evidence from Czech Loan Products. *Prague Working Paper*, 24, Institute of Economic Studies, Faculty of Social Sciences Charles University.

Ho, T. S. Y. – Saunders, A. (1981): The Determinants of Bank Interest Margins: Theory and Empirical Evidence. *The Journal of Financial and Quantitative Analysis*, 16, 4, 581–600.

Illes, A. – Lombardi, M. – Mizen, P. (2015): Why Did Bank Lending Rates Diverge From Policy Rates After The Financial Crisis? *Working Paper*, 486, BIS.

Johansen, S. (1991): Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models. *Econometrica*, 59, 6, 1551–1580.

Kapuscinski, M. – Stanislawska, E. (2016): Interest Rate Pass-Through In Poland Since The Global Financial Crisis. *NBP Working Paper*, 247. Economic Institute Warsaw.

Kovács, Gy. (2009): Financial stability and the banking system, or the imbalance of the intermediary system. *Public Finance Quarterly*, 54, 1, 50–68.

Kiss, G. D. – Balog, E. (2018): Conventional and unconventional balance sheet practices and their impact on currency stability. *International Journal of Monetary Economics and Finance*, 11, 1, 76–94.

Lopez-Espinosa, G. – Moreno, A. – Perez de Gracia, A. (2011): Banks' Net Interest Margin in the 2000s: A Macro-Accounting international perspective. *Journal of International Money and Finance*, 30, 6, 1214–1233.

Lütkepohl, H. - Krätzig, M. (2004): *Applied Time Series Econometrics*. Cambridge University Press, Cambridge

Maddala, G. S. – In-Moo, K. (1999): *Unit Roots, Cointegration, And Structural Change*. Cambridge University Press, New York.

Pesaran, M. H. – Shin, Y. – Smith, R. (2001): Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, 3, 289–326.

Perron (1989): The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis. *Econometrica*, 57, 6, 1361–1401.

Rousseas, S. (1985): A Markup Theory of Bank Loan Rates', *Journal Of Post Keynesian Economics*, 8, 135–144.

Saunders, A. – Schumacher, L. (2000): The determinants of bank interest rate margins: an international study. *Journal of International Money and Finance*, 19, 6, 813–832.

Van Borstel, J. – Eickmeier, S. – Krippner, L. (2016): The Interest Rate Pass-Through In The Euro Area During The Sovereign Debt Crisis. *Journal of International Money and Finance*, 68, 386–402.

Varga, J. Z. (2016): The Effect of Interbank Liquidity on Corporate and Interbank Rates. *Public Finance Quarterly*, 61, 1, 94–109.

Vogelsang, T. J. – Perron, P. (1998): Additional Tests for a Unit Root Allowing for a Break in the Trend Function at an Unknown Time. *International Economic Review*, 39, 4, 1073–1100.

Wong, K. P. (1997): On the determinants of bank interest margins under credit and interest rate risks. *Journal of Banking and Finance*, 21, 2, 251–271.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 78–88.

The financial integration of the Visegrád countries: Examining the co-movement of stock and bond market return and volatility by wavelet and copula tests

Ádám Czelleng

The paper aims to explore financial integration between the Visegrád countries from a new perspective. Its purpose is to examine the short-term interdependency of stock exchange returns, volatility and long-term bond market volatility and market movement by applying three-dimensional continuous wavelet transformation to the daily market data. By using wavelet method, we can estimate the interdependence level and lag-lead relationship among the financial markets of the Visegrád countries for the post – crisis period (from January 2012 to February 2018). The level of interdependence for bond market movement varies over time as Hungary seems to be becoming more independent as a result of the programs launched by the National Bank of Hungary. In spite of the independent price return on bond markets, we can still detect interdependent volatility within the market, which means volatility on international markets continues to affect the Hungarian market. The level of interdependence for stock market movements and volatility are stable over time and were found to be stronger in the short term. The copula approach can help us to understand the causality between variables within the region and to understand whether the level of co-movement is temporary or not.

Keywords: Wavelet, Copula, Financial integration, Co-movement

1. Introduction

Many economists are concerned with the causal influence of one country's performance on other countries. In this paper, I focus on the Visegrád countries, especially on Hungary, and examine whether the Czech, Polish and Slovakian financial markets affect the Hungarian economy. Contrary to most of the literature, both stock and bond markets are examined from various aspects i.e. price and volatility.

The topic of price co-movement among international stock markets has been much analyzed recently and become a widely discussed topic in international finance. A knowledge of financial market linkage between national financial markets is very important for the investors' hedge strategy, who are thereby able to build optimal portfolios which fully reflect their risk appetite.

Bond market interdependency is a less popular research topic in the financial literature, even though the global financial crisis pointed out the importance of global financial networks. An appreciation of the linkage between bond markets, i.e. sovereign government bond markets, is very important for policy makers, as well as for fiscal and monetary policy decision makers. Bond market linkage can have an impact on the yield curve and exchange rate, and therefore co-movement can affect monetary policy, transmission mechanisms and thus financial stability. Bond market interdependency

is also very important for fiscal policy as it can affect the cost of financing and the risk of refunding (liquidity risk).

2. Literature review

Co-movement within stock markets is a widely studied area among researchers. As early as the 1960s and 1970s, Grubel (1968) and Solnik (1974) studied the correlations between domestic stock markets and found that they were low in that instance. However, in a study two decades later, Goldstein and Michael (1993) found increasing linkages between international stock markets. In more recent years many have studied co-movement during times of financial crisis. An especially fertile ground for such studies was provided by the 1997 Asian financial crisis. Authors studying the Asian crisis also found that the crisis had an integrational effect, and Lee (2009) by applying a cointegration test found that interdependence among ASEAN countries had increased after 1997. Almost a decade later, Dewandaru et al. (2015) came to the same conclusion in their study. Lee (2009) uses a cointegration test to study the effect of financial crisis on the level of co-movement among ASEAN markets and finds that the level of interdependence increases after the 1997 financial crisis. Dewandaru et al. (2015) note that the 1997 financial crisis greatly increased interdependence in the Asian market. More recently, Jiang et al. (2017), found by utilizing wavelet and copula estimation methods that the countries in the region did not move in unison but in time lag in their stock markets' otherwise highly similar response.

Many studies have noted the strong relevance of domestic events in the US and their international effect on stock markets. Amongst others, Copeland and Copeland (1998), Janakiraman and Lamba (1998) and Jeong (1999) all found that there was a very noticeable co-movement between international stock markets and the US stock market, which some of the authors argued, shows a close interrelationship between the markets of different regions. Moreover, by applying the Copula-GARCH model to data they gained from the FTSE100 and S&P500 stock indices, Xiao and Dhesi (2010) show strong co-movement between the US and UK stock markets. Pilajk (2013) also found that co-movement between the seven government bond markets and that of the US is certainly present, however domestic macroeconomic factors influence how rapidly the adjustment takes place. Engsted and Tanggaard (2006) studied the co-movement of US and German bond markets between 1975 and 2003 and came to the conclusion that the most important macroeconomic factor influencing it was inflation data, usually that generated in the American economy. In an earlier study of the two authors (Engsted–Tanggaard 2001) used VAR models to determine the causes of co-movement in the Danish stock and bond markets and found that unlike in the US, news in Denmark about higher future inflation lead to an increase in expected future stock returns, and that excess stock return news and excess bond return news are negatively correlated. Meanwhile, relying on the same methodological approach as this paper does, Albulescu et al. (2015) found strong correlations among European stock markets after transforming time series data into a series of wavelet frequencies.

3. Methodology

In this paper, the analysis is mainly based on wavelet coherence method and copula methods. The co-movement of the analyzed variables is determined by wavelet method by transforming time series into frequencies. For ease of observation and implementation, color maps are used for the plots. In periods where significant co-movement was measured, various copulas are applied to investigate the dependence of the variables. A range of copulas including symmetric and asymmetric copulas help us to identify the nature of the dependence.

3.1. Wavelet analysis

Wavelet transform methods were favored over Fourier transform due to practical reasons. While the Fourier transform could possibly help the research by providing it with the ability to convert information from time domain into the frequency domain, however it could only do so much, i.e. only help us detect frequency. On the other hand, the wavelet transform is capable of exhibiting both spatial (time) and wave-number (frequency) information. Its benefit is therefore manifested in the fact that it can fulfil all the requirements of a comprehensive financial time series analysis at once. In addition, a further advantage of wavelet transformation stems from its special characteristic of it allowing the avoidance infinite differentiability and a smoother interpolation (In–Kim 2013, Sanderson 2010).

The name of the methodology was constructed to mean 'little waves'. The term itself was introduced by Morlet et al. (1982). Chui (1992), and Strang and Nguyen (1996) provide good introductions to wavelets. Gencay et al. (2002) discusses and illustrates how wavelets can be applied in economics and finance.

Wavelets can be thought of as small, localized oscillations. Unlike Fourier series, locality can be achieved in both the time and frequency domains simultaneously, providing a natural foundation for representing nonstationary functions. We define a wavelet $\varphi \in L^2(R)$

$$C_\varphi = \int_{-\infty}^{\infty} \frac{|\psi(\omega)|^2}{|\omega|} d\omega > 0 \qquad (1)$$

where $\psi(\omega)$ is the Fourier transform of $\varphi(x)$ and C_φ is the wavelet admissible constant. Condition (1) is referred to as the admissibility condition and ensures that the wavelet is localized in frequency. The admissibility condition also implies that $\psi(0) = 0$ so that

$$\int_{-\infty}^{\infty} \varphi(x) dx = 0 \qquad (2)$$

which ensures $\varphi(x)$ is localized in time (as it implies $\varphi \in L_1(R)$) and is oscillatory. The continuous wavelet transform (CWT) is defined as the integral over all time of the signal multiplied by scaled, shifted versions of the wavelet function φ (*scale, position, time*)

$$C\ (scale, position) = \int_{-\infty}^{\infty} x_t\ \varphi(scale, position, time)dt \qquad (3)$$

The results of the CWT are many wavelet coefficients *C*, which are a function of scale and position. The scale and position can take on any values compatible with the region of the time series x_t. Multiplying each coefficient by the appropriately scaled (dilated) and shifted wavelet yields the constituent wavelets of the original signal. If the signal is a function of a continuous variable and a transform that is a function of two continuous variables is desired, the continuous wavelet transform (CWT) can be defined as

$$F(a, b) = \int x_t\ \varphi\left(\frac{t-a}{b}\right) dt \qquad (4)$$

with an inverse transform of :

$$x_t = \iint \mathrm{F(a, b)}\ \varphi\left(\frac{t-a}{b}\right) da\ db \qquad (5)$$

where $\varphi(t)$ is the basic wavelet and a, b ∈ R are real, continuous variables. To capture the high and low frequencies of the signal, the wavelet transform utilizes a basic function (mother wavelet) that is stretched (scaled) and shifted.

3.2. Marginal distribution: GJR GARCH

In order to analyse the tail dependency, a copula-based estimation was applied, while to figure out the marginal distribution, the GJR-GARCH model was picked following the work of Glosten et al. (1993). Generalized autoregressive conditional heteroscedastic (GARCH) models have a long and comprehensive history, they are not free of limitations (for details, see Kiss 2017). For example, he documents that stock returns are negatively correlated to changes in returns volatility, implying that volatility tends to rise in response to bad news and fall in response to good news. An asymmetric GARCH model, popularly known as GJR-GARCH model, deals with the limitation of symmetric GARCH models. In accordance with Shahzad et al. (2016), we assume that the marginal distribution for each returns and volatility are characterized by the GJR-GARCH(1,1). This model is utilized to capture the asymmetric effect. The GJR-GARCH- skewed t model examines the asymmetric volatility by inserting a dummy variable into the standard conditional variance equation. The equations for this model are shown in Eq. (6-8).

$$r_{i,t} = \alpha_i + \varepsilon_{i,t} \qquad (6)$$

$$\varepsilon_t | I_{t-1} = h_{i,t} z_{i,t} \qquad z_{i,t} \sim \text{skewed} - \mathrm{t}(z_{i,t}, \lambda_i, \Phi_i) \quad (7)$$

$${h_{i,t}}^2 = \omega_i + \theta_i {h_{i,t-1}}^2 + \zeta_i I\left(\varepsilon_{i,t-1} < 0\right) {\varepsilon^2}_{i,t-1} + \delta_i {\varepsilon^2}_{i,t-1} \quad (8)$$

where $r_{i,t}$ denotes i stock returns at time t; I_{t-1} represents the information set at time t-1, ${h_{i,t}}^2$ denotes the conditional variance at time t. I(·) = 1 when $\varepsilon_{i,t-1}$ is negative, otherwise I(·)=0. If δ_i is larger than 0, then leverage effect is present in the conditional

variance, and this means that a negative shock has a larger impact on returns and volatilities.

3.3. Copulas method

A symmetric copula method is applied in this paper in order to examine tail dependency. Copulas have recently become a sophisticated modelling asset in many fields where multivariate dependence is of interest. In finance, these models are primarily used for asset pricing, credit scoring, risk modelling, and risk management (e.g. Bouye et al. 2000, Embrechts et al. 2003).

The inversion method is used to acquire the copulas by substituting the information from the joint distribution with the marginal functions. This substitution is important for sorting out the effects of the marginal distribution on the tail dependence. Sklar theorem provides the theoretical explanation for copula applications and it is represented in equation (9) (Yan 2007). A copula is a multivariate distribution whose marginals are all uniform over (0, 1). For a p-dimensional random vector U on the unit cube, a copula C is

$$C(u_1, u_2, \dots, u_p) = \Pr(U_1 \le u_1, U_2 \le u_2, \dots, U_p \le u_p) \quad (9)$$

Combined with the fact that any continuous random variable can be transformed to be uniform over (0, 1) by its probability integral transformation, copulas can be used to provide multivariate dependence structure separately from the marginal distributions. Copulas first appeared in the probability metrics literature. Let F be a p-dimensional distribution function with margins $F_1, \dots, F_p$. A p-dimensional copula C such that for all x in the domain of F,

$$F(x_1, x_2, \dots, x_p) = \mathrm{C}\{F_1(x_1), F_2(x_2), \dots, F_p(x_p)\} \quad (10)$$

In this paper, we will utilize the Gaussian copula to analyze the potential symmetric tail dependence, the Gaussian copula that is based on Gaussian-distribution and is specified in Eq (11).

$$C_\rho^{Ga}(u_1, u_2) = \Phi_\Sigma(\Phi^{-1}(u_1), \Phi^{-1}(u_2)) \quad (11)$$

where Σ is the 2 × 2 matrix with 1 on the diagonal and ρ otherwise. Φ denotes the cdf of a standard normal distribution while Φ_Σ is the cdf for a bivariate normal distribution with zero mean and covariance matrix Σ.

4. Data

Two kind of dataset were used for this paper. The dataset consists of daily stock and bond market data. Polish, Slovakian, Czech and Hungarian daily returns and volatility were gathered for both stock and bond market. Daily return means the logarithmic difference of the indices or price while the volatility is the difference of daily maximum and daily minimum price or index value from Reuters database.

Stock and long-term government bond market are different in structure as they are order and dealer driven markets respectively, and they differ in length time series. For bond markets, only the common and continuous periods were used for analysis.

Daily stock market indices were analyzed between January 2012 and February 2018, which means 1543 data points. Hungary was considered the most volatile index on average, which resulted in the highest average return.

Table 1 includes the descriptive statistics for stock data. Volatility is measured as the difference of daily maximum and daily minimum price as a percentage of closing price. Return is the changes in daily closing prices.

Table 1 Descriptive statistics for stock data

	N	Mean	Std. Deviation	Minimum	Maximum	Range
Hungary volatility (%)	1543	1.43	0.79	0.32	8.66	8.34
Czech volatility (%)	1543	1.17	0.67	0.28	10.30	10.01
Poland volatility (%)	1543	1.05	0.61	0.26	7.81	7.55
Slovakia volatility (%)	1543	0.64	0.77	-	6.29	6.29
Hungary return (%)	1543	0.05	1.18	-6.45	5.67	12.12
Czech return (%)	1543	0.01	1.03	-7.24	4.57	11.81
Poland return (%)	1543	0.03	1.02	-6.74	4.07	10.81
Slovakia return (%)	1543	0.03	1.08	-8.91	9.55	18.45

Source: Reuters

Table 2 includes the descriptive statistics for bond data. Volatility is measured as the difference of daily maximum and daily minimum price as a percentage of closing mid-price. Return is the changes in daily closing mid-prices.

Table 2 Descriptive statistics for bond data

	N	Mean	Std. Deviation	Minimum	Maximum	Range
Hungary volatility (%)	1305	0.59	0.65	0	5.85	8.34
Czech volatility (%)	1305	0.18	0.55	0	13.22	10.01
Poland volatility (%)	1305	0.72	0.48	0	6.84	7.55
Slovakia volatility (%)	1305	0.43	0.31	0	2.79	6.29
Hungary return (%)	1305	0.01	0.89	-18.96	3.02	12.12
Czech return (%)	1305	-0.04	1.09	-20.79	1.41	11.81
Poland return (%)	1305	-0.01	0.35	-5.26	1.13	10.81
Slovakia return (%)	1305	0.01	0.80	-22.05	8.08	18.45

Source: Reuters

5. Results

The analysis was coded in *R* software package (R Development Core Team 2016) which is a leading, open source software facility for data manipulation, calculation and graphical display. Table 3 shows the correlation matrix including the Pearson correlation coefficients related to stock market data in which the highlighted cells are

the ones with significant values lower than 10%. As we can see, Hungary, Czech and Poland data show significant linear correlation while Slovakia stock index seems to be linearly independent from the others. Returns and volatility have positive correlation with other countries' respective data, while returns have negative correlation with own volatility.

Table 3 Correlation matrix for stock market data[10]

	Hungary return		Czech return	Poland return	Slovakia return	Hungary volatility	Czech volatility	Poland volatility	Slovakia volatility
Hungary return	1		.501	.522	-.007	-.148	-.146	-.155	.014
Czech return			1	.553	.016	-.129	-.210	-.163	-.026
Poland return				1	-.018	-.170	-.142	-.250	-.024
Slovakia return					1	-.006	-.012	-.031	.045
Hungary volatility						1	.471	.465	.031
Czech volatility							1	.443	.061
Poland volatility								1	.014
Slovakia volatility									1

Source: author's calculation

Bond market linear dependency was also checked with correlation for both price changes and daily volatility shown in table 4. We found that Hungarian bond price movement is significantly correlated with the bond price movements in Poland and Slovakia. Hungarian volatility is also found to be significantly correlated with Hungarian price movements and also with the other countries bond market volatilities.

These findings confirm our previous assumption regarding the relevance of using an asymmetric model for obtaining marginal distribution.

In order to evaluate the lag-lead relationship and co-movement level between each stock market index on a longer horizon, the paper will utilize a wavelet analysis. This wavelet coherence approach is applied when we want to capture interdependence through time and frequencies. The frequencies in this instance stand for the duration in days within which a movement in one variable affects the other variable through a specific time period. The dataset and wavelet coherence used in this paper are carried out solely in pairs with Hungary.

The horizontal axis stands for the time period, while the vertical axis for the frequency. The bar on the right represents the strength of the dependence between two variables. Red shows that the dependency is strong, while deep blue signifies low dependency between the variable pairs. Correspondingly, the black thick line scattered around in the red area represents strong coherency at the 5% significance level with respect to that frequency and time period.

[10] Values with p value lower than 0.1 are highlighted in the table

Table 4 Correlation matrix for bond market data[11]

	Hungary return	Czech return	Poland return	Slovakia return	Hungary volatility	Czech volatility	Poland volatility	Slovakia volatility
Hungary return	1	.012	.232	.063	-.064	-.013	-.038	-.027
Czech return		1	.027	.039	.030	-.015	-.017	.034
Poland return			1	.103	-.052	-.015	-.101	-.067
Slovakia return				1	-.008	.005	-.008	-.013
Hungary volatility					1	.124	.404	.219
Czech volatility						1	.026	.076
Poland volatility							1	.290
Slovakia volatility								1

Source: author's calculation

The stock market returns have strong interdependence in the short term at 1 day to 5 days frequency, as does stock market volatility. The interdependence between the data pairs seem to be constant over the examined period. Copula methods confirmed positive tail interdependency, which means that massive changes in return and volatility can be reflected in other national markets while the low values have no fertilization effect. According to the lagged models, we cannot identify the dominant country within the pairs.

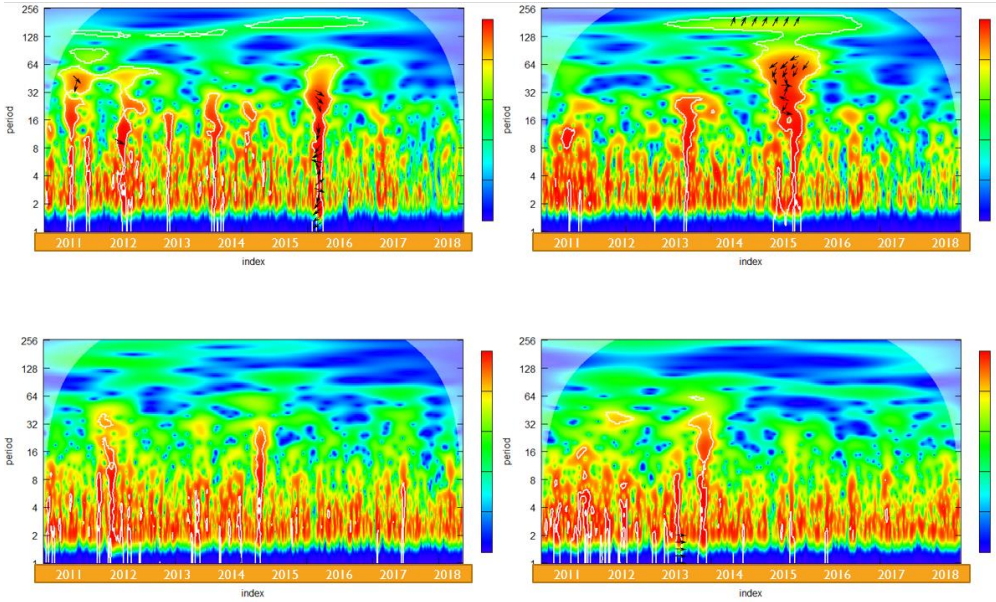
The bond market seems to be more complicated than the stock market. Czech bond data seems to be non-continuous and not as liquid as the others. As it is illustrated on figure 1, Hungary seems to have been co-moving with Poland and Slovakia in terms of bond prices until the beginning of 2017. After the first quarter of 2017, the Hungarian bond price movements became increasingly independent from Poland and Slovakia. The price changes impact can be measured for up to 64 for days as it is reflected on the upper maps of the following graph. The wavelet analysis of Hungary – Poland co-movement is illustrated on the left while Hungary – Slovakia is illustrated on the right graphs. The volatility is visualized in the bottom graphs. As we can see in spite of the independent price movement after 2017, significant volatility co-movement was detected over the whole period.

Copula methods confirmed positive tail interdependency, which means that massive changes in return and volatility can be reflected in other country's markets while the low values have no fertilization effect. Figure 2 shows the result of the Gaussian copula's ρ parameter for various lagged models. The negative values show whether the positive tail dependency has a lasting impact on the Hungarian market from effects starting on the Slovakian market and the opposite on the positive numbers. According to the lagged models, we can identify Slovakia's bond market

[11] Values with p value lower than 0.1 are highlighted in the table

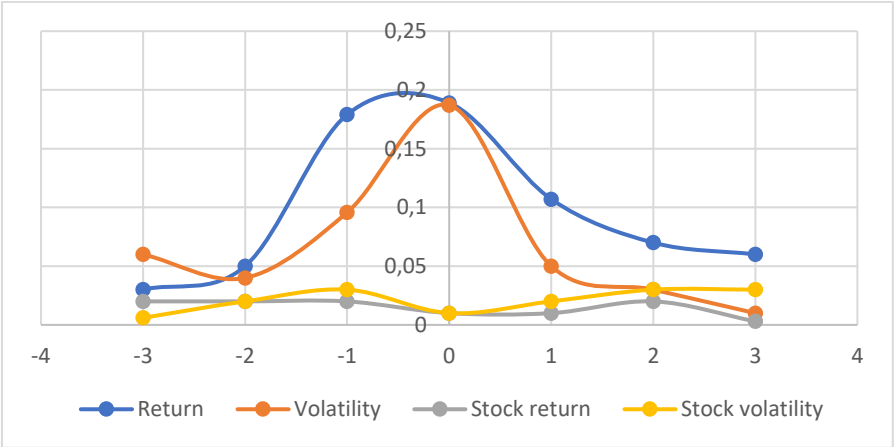
dominating the Hungarian bond market as changes on the Slovakian bond market can have protracted impact on the Hungarian market.

Figure 1 Wavelet squared coherence on bond market return (upper) and volatility (bottom) between Hungary and Poland (on the left) and Hungary and Slovakia (on the right)



Source: author's calculation

Figure 2 Coefficients from lagged Guassian copula models to detect causality between Hungary and Slovakia



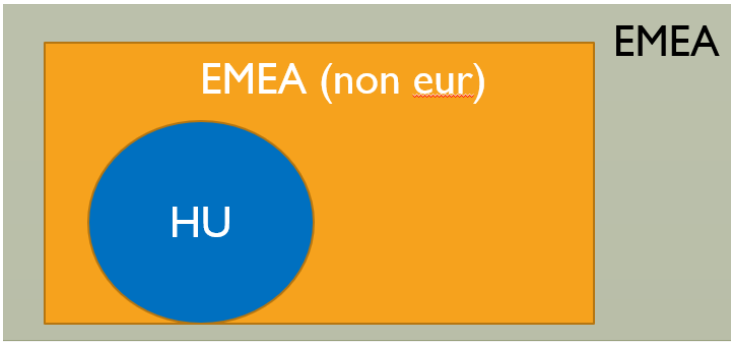
Source: author's calculation

6. Conclusion

As a result of our wavelet and copula approach, we can conclude the stock markets have been moving together with positive tail dependency but no dominant market was detected within the region under study. We can infer that stock markets are integrated to the global markets, therefore all of the countries within the region are following the same pattern and they react to global events rather than regional ones. In case of bond markets, we detected price return interdependency after the first quarter of 2017, which is likely to have been caused by the self-financing program (by the National Bank of Hungary) in long term bonds. The central bank's program aimed to make the Hungarian bond market more or less independent from international financial turmoil. As a result of the program, Hungarian monetary policy became less transparent, while the domestic banking system was captured by the state, however in the meantime, has certainly became more independent on a price level. In spite of the independent price return on bond markets, we can still detect interdependent volatility within the market which means volatility on international markets continues to affect the Hungarian market. Turbulence in the foreign bond market causes turbulence in the Hungarian market as well, so volatility can be identified as one of the certain fertilization channels.

As a result of the symmetric copula tests we can conclude the Slovakian market dominates the Hungarian market. It could be caused on the one hand, by the shared set of investors from the countries of the CEE region, on the other by the euro denominated debts in Slovakia, which allow it to enjoy the advantage of broader acceptance of its currency without FX risk to the investors. Hungary seems to be the bottleneck within the region, as Hungary is the only country offered 'junk' or not recommended sovereign debt by credit agencies. We can infer that the investors, who invest into Hungary also invest in the region, while CEE investors might not invest in Hungary due to their risk appetite or investment policy. As a result of this phenomenon if something happens to CEE investors, it certainly affects the Hungarian bond market, while Hungarian bond market investors are just a smaller proportion compared to CEE investors as you can see it on figure 3.

Figure 3 The disposition of investors within the region



Source: author's construction

References

Albulescu, C.T. – Goyeau, D. – Tiwari, A.K. (2015): Contagion and dynamic correlation of the main European stock index futures markets: a time-frequency approach. *Procedia Economics and Finance*, 20, 19–27.

Bouye, E. – Durrleman, V. – Bikeghbali, A. – Riboulet, G. – Rconcalli, T. (2000): Copulas for finance – A reading guide and some applications. Working paper, Goupe de Recherche Op´erationnelle, Credit Lyonnais.

Copeland, M. – Copeland, T. (1998): Lads, lags, and trading in global markets. *Financial Analysts Journal*, 54, 70–80.

Chui, C. K. (1992): *An Introduction to Wavelets*. San Diago: Academic Press

Dewandaru, G. – Masih, R. – Masih, A.M.M. (2015): Why is no financial crisis a dress rehearsal for the next? Exploring contagious heterogeneities across major Asian stock markets. *Physica A: Statistical Mechanics and its Application*, 419, 241–259.

Embrechts, P. – Lindskog, F. – McNeil, A. (2003): Modelling dependence with copulas and applications to risk management. In Rachev, S. (ed.): *Handbook of Heavy Tailed Distribution in Finance*. Elsevier, 329–384.

Engsted, T. - Tanggaard, C. (2001): The Danish stock and bond markets: Comovement, return predicatbility and variance decomposation, *Journal of Empirical Finance*, vol. 8 no.3, 243 - 271

Engsted, T. – Tanggaard, C. (2006): The co-movement of US and German bond markets. *International Reviwe of Financial Analysis*, 2, 2, 172-182.

Gencay, R. – Selcuk, F. – Whitcher, B. (2002): An Introduction to Wavelets and Other Filtering Methods in Finance and Economics. London: Academic Press.

Glosten, L.R. – Jagannathan, R. – Runkle, D.E., (1993): On the relation between the expected value and the volatility of the nominal excess return on stocks. *Journal of Finance*, 48, 5, 1779–1801.

Goldstein, M. – Michael, M. (1993): The integration of world capital markets. *IMF Working Paper*, No.93/95, 1–6.

Grubel, H. (1968): International diversified portfolio: welfare gains and capital flows. *American Economic Review*, 58, 1299–1314.

In, F. – Kim, S (2013): *An Introduction to Wavelet Theory in Finance: A wavelet mulstiscale approach.* World Scientific Publishing

Janakiraman, S. – Lamba, A.S. (1998): An empirical examination of linkages between Pacific-Basin stock markets. *Journal of International Financial Markets, Institutions and Money*, 8, 155–173.

Jeong, J. (1999): Cross-border transmission of stock price volatility: evidence from the overlapping trading hours. *Global Financial Journal*, 10, 53–70.

Jiang, Y. – Nie, H. – Monginsidi, J. (2017): Co-Movement of ASEAN stock markets: New evidence from wavelet and VMD-based copula tests. *Economic Modelling*, 64, 384 –398

Kiss, G. D. (2017): Volatilitás, extrém elmozdulások és tőkepiaci fertőzések. Szeged: JATEPress Kiadó.

Lee, K. L. (2009): Convergence and interdependence between ASEAN-5 stock markets. *Mathematics and Computers in Simulation*, 79, 2957–2966.

Morlet, J. – Arens, G. – Fourgeau, E. – Giard, D. (1982): Wave propagation and sampling theory. *Geophysics*, 47, 2, 222–236

Pilajk, V. (2013): Bond markets co-movement dynamics and macroeconomic factors: Evidence from emerging and frontier markets, *Emerging Markets Review*, 17, 29–43.

R Development Core Team (2016) R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna

Sanderson, J. (2010): Wavelet methods for time series with bivariate observations and irregular samping grids; PhD dissertation, University of Bristol.

Shahzad, S.J.H. – Nor, S.M. – Kumar, R.R. – Mensi, W. (2016): Interdependence and contagion among industry-level US credit markets: an application of wavelet and VMD based copula approaches. *Physica A*, 466, 310–324.

Solnik, B.H. (1974): Why not diversify internationally. *Financial Analysis Journal*, 30, 48–54.

Strang, G. – Nguyen, T. (1996): *Wavelets and Filter Banks. Wellesley*. MA: Wellesley–Cambridge Press.

Xiao, L. – Dhesi, G. (2010): Dependence structure analysis using Copula-Garch modedl: An application to UK and US stock markets, In Kovács, P. – Szép, K. – Katona, T. (eds.): *Proceeding of the Challenges for Analysis of the Economy, the Businesses and Social Progress International Scientific Conference*, 624–635.

Yan, J. (2007): Enjoy the joy of Copulas with a Package copula. *Journal of Statistical Software*, 21, 4, 1–21.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 90–107.

The Determinants of External Indebtedness of Ethiopia: An Econometric Analysis Using Johansen Co-Integration Approach

Sisay Demissew Beyene – Balázs Kotosz

The concern about determinants of external debt has attracted significant interest from researchers and decision makers in both developing and developed countries. Even though Ethiopia is one of the Heavily Indebted Poor Countries (HIPC), there is a lack of country-relevant empirical studies. Therefore, this study examined the determinants of external indebtedness of Ethiopia. The results show that current account deficit, fiscal deficit, capital flight, debt service and the interest rate all contributed to external indebtedness. However, appreciation of the terms of trade is negatively and significantly affects the external indebtedness of Ethiopia. Furthermore, the study recommends that Ethiopia should apply appropriate fiscal policies, monetary policies, supply side policies, while creating a conducive political, social, and economic environment remains essential.

Keywords: Determinants, External Indebtedness, Johansen cointegration, Ethiopia

1. Introduction

The goal of any country is to attain rapid and sustainable economic growth. However, the African economic growth problem can be a composite of interrelated factors of both an internal and external nature (WB 1994). These factors are responsible for the African debt crisis.

The causes of the external indebtedness of developing countries have generated debates in academic circles, policymakers, and in the broader international community from the beginning of the debt crisis in August 1982 (Menbere 2004). Different authors as cited by Ajayi (1991) have emphasized various aspects of the causes for the external debt crisis. For example, Cline (1985) focuses on global macroeconomic considerations in the case of developing countries. Sachs (1984), however, stresses not only the global shocks but also country-specific factors, and Greene (1989) combines both the external and internal elements in his description of the causes of Sub Saharan Africa (SSA) debt.

Africa's external debt, between 1970 and 1999 and especially on June 1998, exploded to unsustainable levels. Starting with just US$ 11 billion, it rose to over US$ 120 billion during the oil shocks of the early 1980s. The debt situation worsened in the 1980s and early 1990s when Structural Adjustment Programs (SAP) were introduced. The year before the launching of the HIPC initiative, the debt stock reached a peak of about US$ 340 billion. During the 1970s Africa's average external debt stood at US$ 39 billion, but it exploded to more than US$317 billion by the late 1990s (UN 2004). Even during the early 2000s average external debt was US$ 298 billion. Currently, according to the UN (2016) report, between 2011 and 2013 the annual average foreign debt stock of Africa amounted to US$443 billion.

Ethiopia is one of the HIPC (IMF 2015). The size of external debt profoundly increased after 1975. It was US$ 371 million during 1975 (Teklu 2000). Besides, on average, it rose to more than thirteen times that between 1980 and 1990 and reached US$ 5,172 million. Surprisingly, due to the current government coming to power in May 1991 and a fragile macroeconomic environment, the external debt of Ethiopia also rose in the 1990s, showing an average of US$ 9,814 million between 1991 and 1997 (WB 1999). Currently, according to Africa Zeal (2017), in Ethiopia the magnitude of external debt as well as per capita debt is increasing continuously.

Currently, in both developed and developing countries, the issue of the causes of foreign debt has attracted great interest among researchers, but there is a lack of country-relevant empirical studies in the case of Ethiopia – even though the state is one of the HIPC. This has resulted in a knowledge gap in the literature, thus necessitating the need for a systematic examination. Moreover, the sources of debt accumulation differ from one developing country to another. Thus, identifying the primary sources of external indebtedness of Ethiopia requires a precise empirical analysis. Hence, the primary objective of the study is to examine the determinants of external indebtedness of Ethiopia from 1981–2012 using Johansen co-integration approach.

The study is organized as follows: The next part presents the theoretical and empirical literature. The third section offers the methodology and estimation techniques of the research. The fourth section displays the trend and growth of external debt. The fifth part examines and discusses the empirical findings, and the final part presents the conclusion of the study, as well as policy recommendations and suggestions for future research.

2. Literature Review

In this section, both theoretical and empirical literature are discussed in detail. Under theoretical literature, different theories are discussed that explain the causes of external debt of a given country or group of countries. Besides that, different empirical studies are presented in the empirical literature which describe the determinants of external debt.

2.1. Theoretical Literature Reviews

In this s literature dealing with determinants of external indebtedness is presented. Generally, both domestic as well as external causes of external indebtedness of developing countries and Sub Sahara Africa (SSA) countries are presented. Since Ethiopia is one of developing countries and SSA countries, we used theories of developing countries and SSA countries as a benchmark for the case of Ethiopia.

The debt accumulation of African nations attributed to several factors ranging from home policies to external shocks (Ajayi 1991, Edo 2002, Habimana 2005). According to Edo (2002), the tendency of most governments to develop an over-ambitious plan, without having enough domestic resources to speed up the process of growth and development, is one factor which has led to massive external borrowing. The borrowing, which used to be done on international capital markets, where interest rates were low at that time, expanded in value because of rising interest rates. The

second domestic factor is the fiscal irresponsibility of these countries. They incurred massive and rising budget deficits which had to be covered by domestic and foreign borrowing. Another internal aspect is the over-valuation of local currency, which encouraged the importation of goods and services but hampered exporting. The sizeable current account deficits ensuing from trade deficits have been financed via borrowing from foreign banks on a short-term and medium-term basis. Moreover, the external factors which aggravated the debt problem include oil price shocks, deterioration of terms of trade and rising interest rates in international capital.

Furthermore, according to Habimana (2005), the factors behind the increase in the external debt burden in most of the crisis countries are different and interrelated. The combination of both internal and external factors, which led to the rise in the debt are unfavorable terms of trade, adverse weather conditions, non-concessional lending and refinancing policies (terms and conditions) of creditors, high-interest rates, inadequate debt management reflected in abandoned borrowing at unfavorable terms, civil war and social strife (Menbere 2004, Habimana 2005).

While all sources are closely linked, the reasons of the external debt accumulation fall into two categories: the domestic factors (usually merged under the general term of poor performance of macroeconomic policy), and the external factors. The division of the reasons into these two substantial sections is, however, not justified. Indeed, external factors significantly influence what happens domestically and vise versa (Ajayi 1991). Even though this study has examined both domestic and external factors independently, for the sake of simplicity and coherent discussion, the review of theoretical literature is presented in the following manner.

2.1.1. Domestic (Poor Macroeconomic Performance) Causes of External Indebtedness

The Relationship between Capital Flight and External Debt

There is a consensus that one of the primary causes of the external indebtedness of indebted countries is undoubtedly capital flight. Although developing countries have become heavily indebted, in an apparent contradiction, they were reported to also have the highest capital flight in the world. Part of the reason is macroeconomic instability in developing countries (Menbere 2004). Over the past decades, external debt and capital flight have become inseparable and highly related. Capital flight has been a significant issue since the early 1980s in developing countries. A massive amount of capital has left these countries over the last three decades (Alam–Quazi 2003).

Economists have identified the relationship between external debt and capital flight in two main contexts: the first considers the various macroeconomic issues that relate to external debt and capital flight, where it is generally believed that if resources held abroad were used at home for increasing investment that would increase the availability of foreign exchange, this would enable countries to invest and grow faster. In this context, others also argue that in the absence of capital flight, the external debt of developing countries would have been much lower than with capital flight (Menbere 2004). However, the causality between external debt and capital flight is another way how economists show their relationship. There are two kinds of linkages between external debts and capital flight. The first linkage runs from external debt to capital flight and the second from capital flight to external debt. Each of these linkages

can also be subdivided into two. Thus, the direct linkage can be divided into four groups based on whether the direction of causality runs from debt to capital flight or vice versa or whether one provides merely the cause for the other or provides the means as well (Menbere 2004, Suma 2007). The four types of linkages are a Debt-driven capital flight, Debt-fueled capital flight, Capital flight-driven external borrowing, and Capital flight-fueled external borrowing.

Debt-driven capital flight refers to a situation where excess external borrowing motivates private residents to shift their capital abroad. Some of the reasons for this are associated with the expectation of currency devaluation, fiscal crisis, and avoidance of the risks these entail, among other distortions. Debt-fueled capital flight refers to a situation when borrowed funds are directly transferred abroad. Under this scenario, external debt provides the resources and motivations for capital flight. Capital flight-driven external borrowing refers to a situation when the continued outflow of funds creates a financing gap bridged through external financing. Finally, flight-fueled external borrowing refers to a situation in which domestic residents' exported capital is borrowed back under the round-tripping hypothesis (Fofack 2009, Ampah et al. 2018).

Poverty (Savings- Investment Gap)

Several studies relate the most important cause of external indebtedness to the vicious circle of poverty type of argument. For example, Uzun et al. (2012) argue that the saving amount which is left from consumption is channeled to investment and economic growth. However, in developing countries because of insufficient domestic resources and less tendency of saving, states have difficulties in financing economic development. Thus, overseas borrowing is needed to meet investment requirements when domestic savers are unable or unwilling to save.

Likewise, Ayadi and Ayadi (2008) remarked that growth would not take-off until the capital stock had risen to a given threshold. As capital rises, and investment and output rise, in a virtuous circle, the savings level will also continue to grow. Beyond a given level, the increase in both capital and savings will be sufficient to create self-sustaining growth. The reason for choosing external finance, to ensure continued development along with domestic resources, is provided by the theory of 'dual-gap. According to this theory, since investment is a function of saving, and in developing countries there is also a lack of domestic savings to fund the needed investment, it is logical to look to the use of complementary external funds.

The Foreign-Exchange Constraint (Balance of Payment (BOP) deficit)

Another equally important justification to the external borrowing of developing countries is that of the foreign exchange gap. Because even assuming that there is no capital deficiency and no savings gap, the growth rate of developing countries may still be hindered by a foreign exchange gap (Menbere 2004, Uzun et al. 2012). Export earnings are usually insufficient to generate enough foreign exchange to finance imports, making external borrowing the essential means of gaining access to the technology that is vital for the expansion of the export sector that ultimately leads to rapid economic growth (Menbere 2004).

Fiscal Irresponsibility

The problems caused by the external factors have in most cases been exacerbated by the adoption of misguided macroeconomic policies. One of such domestic errors that has occurred is massive fiscal deficits (Ajayi 1991). The fiscal deficit occurs when government expenditure is higher than its revenue. This condition is a common phenomenon in most developing countries including Ethiopia.

According to Fischer and Easterly (1990), there are four ways of financing the public-sector deficit: by printing money, running down foreign exchange reserves, borrowing abroad, and borrowing domestically. Higher government expenditure relative to its revenue, in the context of developing countries, puts further pressure on the current account balance and hence increases external indebtedness to fill the gap.

An optimal tax smoothing model developed by Robert Barro explains the causes of government debt. This model tries to tell whether there is any role for government debt if it hardly affects real outcomes such as investment and consumption. According to the neoclassical view of public finance, there is still a role for government debt in smoothing intertemporal distortions arising from government policy especially from raising taxes. In particular, government debt may be used to smooth tax and inflation rates and therefore private consumption over time. Such neoclassical views on public finance give prescriptions for the creation and existence of government budget deficits and thereby government debt to finance the budget deficit (Heijdra 2002).

2.1.2. External Causes of External Indebtedness

Oil price shocks along with policies of developed countries and their banks

The principal cause of the international debt crisis of the 1970s and 1980s was the increase in oil prices in 1973 and 1979. The quadrupling of the oil price was particularly harmful to non-oil producing developing countries, who experienced an enormous rise in their import expenditure, on top of which the resulting recession severely curtailed their export earnings. As a result of this, the current account deficits of the developing countries rose.

In fact, most of today's indebted developing countries became indebted during and after these periods. This went along with a dramatic fall in the terms of trade of especially primary commodities, which further increased the trade deficit and made things even more complicated. An increase in the price of oil raised its revenues far in excess of these countries' demand. These "petrodollars" were, therefore, deposited in the Eurodollar markets by OPEC (Organization of the Petroleum Exporting Countries). The "fund-starved" developing countries then borrowed these funds from the Eurodollar market to pay their import bills from Europe, the United States and Japan. Moreover, most developing countries themselves are net importers of oil, adding further pressure on their demand for foreign exchange either in the Eurodollar market or elsewhere (Menbere 2004).

On the policies of developed countries and their banks, the policies adopted by the developed countries and their bank were instrumental in creating the debt crisis

in Africa. Before the 1970s, the developing countries' external debt was relatively small (Suma 2007). However, between the end 1970s and the early 1980s, the rise in oil prices had increased the revenue of oil exporting countries. Nonetheless, they were unable to absorb them within their economies. They deposited a large volume of Petrodollars in the commercial banks of the developed world. Thus, these banks had accumulated huge funds which could not be used by the developed countries. Nevertheless, African countries needed funds for their economic development programs which these banks 'recycled' in the form of loans to Africans. In this regard, Dymski (2002) accuses multinational banks in developed countries in the late 1970s and early 1980s of "pushing" credit on to less-developed countries in their desperation to clean up these accumulated petrodollars.

2.2. Empirical Literature

In this section, the empirical studies are presented on the determinants of external indebtedness. For the sake of simplicity, clarity, and attractiveness we used tabulation. From Table 1, except a few studies (Ajayi 1991, Menbere 2004, and Greenidge et al. 2010), all used a time series data set of more than twenty years. Beyond that, their methodologies were very different. Awan et al. (2011) is the only study that used Johansen co-integration approach. However, the results of most of the studies have some similarities even though their time scope, case studies and methodologies are different.

Table 1 Survey of Empirical Literature

Author and year	**Model Type Adopted**	**The scope and case study**	**Results**
Ajayi (1991)	OLS (Ordinary Least Square)	From 1970 to 1988, Nigeria	Deterioration in the terms of trade, the rise in foreign real interest rates, a fall in the growth of industrial countries and increase in external debt. However, the reverse is true for improvement in the fiscal positions
Mbire–Atingi (1997)	OLS	From 1970 to 1995, Uganda	An increase in the foreign interest rate, appreciation in the real effective exchange rate, deterioration of the fiscal position, worsening of the terms of trade significantly worsens the debt to export ratio.
Menbere (2004)	Random and Fixed effects	From 1982 to 1999, For 60 developing countries	Poverty (saving gap), income instability, debt service payment and capital flight are the leading causes of external borrowing.
Greenidge et al. (2010)	Dynamic OLS	From 1987 to 2005, For 12 Caribbean Community	An increase in the output gap, the decline in government spending, a rise in the real effective exchange rate leads to a reduction in the stock of external debt, but the higher difference between actual and expected government expenditure, and depreciation of currency leads to more accumulation of foreign debt.

Table 1 Survey of Empirical Literature (continued)

Sulley (2010)	OLS	From 1975 to 2008, Tanzania	Domestic factors such as budget deficit and low domestic saving have a significant share in explaining external debt compared to external factors such as trade deficit, real exchange rate, and interest payment even though all are the causes of foreign debt.
Awan et al. (2011)	Johansen Cointegration	From 1972 to 2008, Pakistan	The fiscal deficit has no significant impact on external debt. However, three channels of uni-directional causality were found running from fiscal deficit to foreign debt, terms of trade to exchange rate and fiscal deficit to terms of trade.
Bittencourt (2013)	Dynamic panel data (Pooled OLS, Fixed Effects, difference-GMM (Generalized Method of Momentum) and system-GMM estimators)	From 1970 to 2007, For nine Young Democracies of South America	Economic growth, Trade openness, the liquid liability, and inflation reduce the debt burden. However, income inequality increases the external debt.
Awan et al. (2014)	ARDL (Auto Regresive Distributed Lag)	From 1976 to 2010, Pakistan	Fiscal deficit, nominal exchange rate, and trade openness increase the debt burden.
Al-Fawwaz (2016)	ARDL	From 1990 to 2014, Jordan	Terms of trade lead to indebtedness in the long run. However, GDP per capita has a negative impact.
Adamu–Rasiah (2016)	ARDL	From 1970 to 2013, Nigeria	Oil price, exchange rate debt service, gross domestic saving and fiscal deficit are causes of external debt accumulation.

Source: own construction

3. An Overview of External Debt in Ethiopia

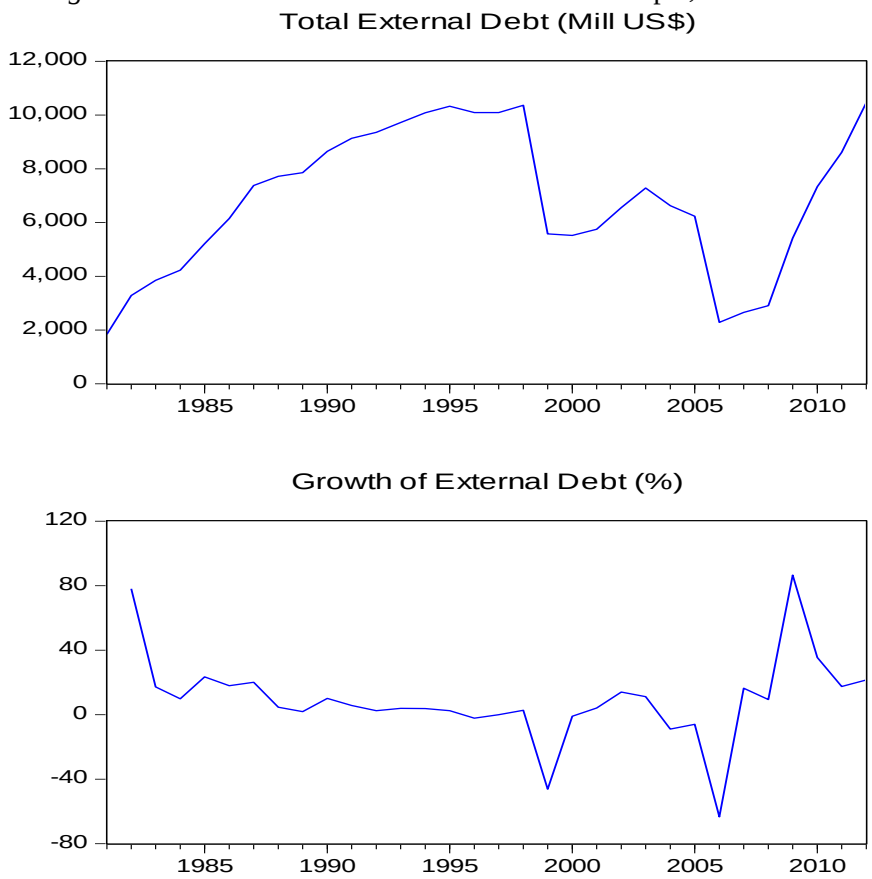
This section presents an overview of external debt, trends in foreign debt along with its growth rate during the period from 1981–2012. It is a descriptive study that shows the past status of the external debt. It is presented using trend analysis.

3.1. The Trends in External debt and its Growth Rate in Ethiopia

Ethiopia's external debt has changed significantly in its magnitude over the last four decades. During the 1980s the external debt of Ethiopia becomes very high. As can be seen from Figure1, the total external debt of Ethiopia increases continuously from 1981 to 1995. By 1981 the total foreign debt was 1.84billion US $, and it grew steadily until 1995 when it reached 10.32 billion US $.

The growth rate of external debt fluctuated in the 1980s, reaching a peak of 78% in 1981, then it declined to 1.8% in 1989. But, in 1990 Ethiopia's external debt grew to 10%. However, after 1992 it declined continuously and reached –46.3% in 1999. Even if the growth rate of external debt started to rise in the early 2000s, it fell in the mid of 2000s, down to –63.3% in 2006. The increase in total debt in the early 2000s was attributed to two factors. First, transfers from external creditors to support the implementation of the Sustainable Development and Poverty Reduction Program (SDPRP). The reason for a large decline in foreign debt during 2006 was associated with debt relief or cancellation of HIPC initiative. The external debt of Ethiopia again started to rise continuously from 2.6 billion US$ in 2007 to 10.4 billion US$ in 2012.

Figure 1 Total and Growth of external debt in Ethiopia, 1981–2012



Source: Authors own construction based on World Bank data

4. Data Sources, Model Specification, and Methodology of the Study

In this section, we present the source of data for the study. Besides that, using the theoretical and empirical studies as a base, the model is specified. Furthermore, the methodology that we have used is described in detail.

4.1. Data Type, Source, and Data Analysis

In this study, secondary data were used for time series data running from 1981 to 2012. The sources of the data were international bureaus and organizations. Further, in the study we used both descriptive statistics (averages, percentages, trends, and tabulations) and econometrics to analyze the determinants of external indebtedness for Ethiopia.

Table 2 Definitions, measurement and sources

Variables	Definition and Measurement	Source
ED	External debt as a percentage of GDP	WDI
CAB[12]	Current account balance as a percentage of GDP	IMF
DEF	Budget deficit as a percentage of GDP	IMF
CFL	Capital flight as a percentage of GDP	Political Economy Research Institute database.
DSR	Total debt service as a percentage of exports of goods, services and primary income.	WDI
INT	Interest rate	WDI
TOT	Terms of trade as a percentage of GDP	WDI

Source: own construction

4.2. Model Specification

Like previous studies in the case of developing countries and SSA countries, the analytical framework for this study included both domestic and external causes of foreign debt determinant variables. Hence, based on the literature, the study employed the following model.

$$Y_t = \alpha + \beta X_t + \varepsilon_t \quad (1)$$

where Y_t is external debt stock to GDP ratio (ED) at period *t*.
X_t is a vector of explanatory variables included in the model at period *t*.
ε_t is the error terms at period *t*.

Besides that, variables in the vector X identified are based on theoretical and empirical evidence in the literature. It captures both internal and external macroeconomic factors which cause indebtedness directly or indirectly. These factors are current account balance, budget deficit, debt service, capital flight, interest rate, and terms of trade. Therefore, X can be written as:

$$X_t = F(CAB, DEF, DSR, CFL, INT, TOT) \quad (2)$$

More specifically, the model we used is:

$$ED_t = \beta_0 + \beta_1 CAB_t + \beta_2 DEF_t + \beta_3 DSR_t + \beta_4 CFL_t + \beta_5 INT_t + \beta_6 TOT_t + \varepsilon_t \quad (3)$$

[12] The record of all transactions in the balance of payments covering the exports and imports of goods and services, payments of income, and current transfers between residents of a country and nonresidents.

$$(+) \qquad (+) \qquad (+) \qquad (+) \qquad (+) \qquad (-/+)$$

where β_0 is an intercept term, and β_1, β_2, β_3, β_4, β_5, and β_6 are the long run coefficients that will be estimated. The signs in parenthesis are the expected hypothesized signs of the variables.

4.3. Methodology

Before carrying out the estimation of the above model, the time series characteristics of each data must be investigated. The unit root test, selection of lag length, and cointegration test are the main tools before estimation, and diagnostic tests are used after estimation. Finally, the study used Johansen co-integration for long-run and short-run estimation of the model.

4.3.1. Unit Root Test and Lag Length Determination

The regression results from the above model are appropriate if and only if the variables in the model are all stationary because non-stationary variables lead to spurious results. This study used the classical unit root test, namely, the Augmented Dickey-Fuller (ADF) test. Further, after unit root test and before estimating the model, we have to decide the maximum lag length, to generate the white noise error terms. Different information criteria can be used to determine the optimal lag length. The most popular are the Akaike information criterion (AIC) and Schwarz's Bayesian information criterion (SBIC).

4.3.2. Co-integration Test

We can use two ways to test for the existence of co-integration: the Engle-Granger two-step approach or the Johansen maximum likelihood estimation procedure. Since the Engle-Granger two-step approach has several limitations, to overcome these limitations, this study used the Johansen maximum likelihood for the analysis. According to Harris (1995), there are two test statistics for cointegration under the Johansen approach. These are the trace statistics (λ_{trace}) and the maximum Eigenvalues (λ_{max}). These test statistics values can be obtained as follows:

$$\lambda_{trace(r)} = -T \sum_{i=r+1}^{k} \ln(1-\lambda) \tag{4}$$

$$\lambda_{max(r,r+1\ )} = -Tln(1-\lambda r+1) \tag{5}$$

where T is sample size, λ is the largest canonical correlation, r is the null hypothesis of cointegrating vector, and *r+1* is the alternative hypothesis of cointegrating vectors.

The trace test (λ_{trace}) is a joint test where the null hypothesis is that the number of cointegrating vectors is less than or equal to r, against an unspecified alternative that there is more than r. On the other hand, the maximum Eigenvalue test (λ_{max}) tests the null hypothesis that the number of cointegrating vectors is r against the alternative of r+1.

Once we get the cointegration of the variable, we used the VECM (Vector Error Correction Model) to examine the short run and long-run relationships in a system of variables. The VECM can be written as follows:

$$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \cdots + \Gamma_{p-1} \Delta Y_{t-p} + u_t \quad (6)$$

Where; $\Pi = -(I_m - A_1 - \cdots A_p)$

$\Gamma_i = -\left(A_{i+1} + \cdots A_p\right), i = 1,2, \ldots P-1$

$Y_t = a\ vector\ of\ all\ endogenous\ variables\ of\ the\ system\ and\ they\ are\ I\ (1)$

$u_t = stochastic\ error\ term\ and\ p\ is\ the\ number\ of\ lags\ in\ the\ equation$

Finally, it is necessary to run diagnostic tests such as serial correlation using Breusch-Godfrey serial correlation LM test, heteroskedasticity test using Breusch-Pagan-Godfrey test, normality using Jarque-Bera test, and stability tests using CUSUM and CUSUM of squares.

5. Econometric Estimation Results and Discussion

This part presents the econometric results and their interpretation, along with theoretical and empirical support. In particular, the unit root test using ADF, lag length selection using SBC, cointegration test using trace statistics and maximum Eigen statistics, long run and short-run dynamics using Johansen cointegration, and diagnostic tests (normality, heteroscedasticity, autocorrelation, and stability tests) are presented.

5.1. Unit Root Test

Before we checked the presence of long-run relationship (cointegration) between the variables, we checked the order of integration of each variable in the model by using Augmented Dickey-Fuller (ADF) (Table 3). The result shows that all variables included in the model are I (1) at one percent level of significance. Since all variables have the same order of integration, the Johansen cointegration approach could proceed.

Table 3 Unit root test

Variables	ADF test statistics (with intercept)		Order of integration
	Level	First difference	
ED	-1.155256	-4.730746 ***	I(1)
CAB	-2.694467*	-5.671643 ***	I(1)
DEF	-3.270316**	-6.466197***	I(1)
CFL	-3.513721**	-6.169509***	I(1)
DSR	-1.814258	-6.977144***	I(1)
INT	-3.478557**	-8.179621***	I(1)
TOT	-3.426241**	-9.522251***	I(1)

Note *** Significant at 1% level, ** Significant at 5%, * Significant at 10 % level
All the values in the table are t-statistics,
Source: Authors own construction based on Eviews 9 result (2018)

5.2. Lag Length Determination

There are different types of criteria to select the optimal number of lags for estimation of the long run as well as the short run models. The most common criteria are Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (BIC)[13]. The result shows the optimal lag length is ambiguous (see Table 4). Besides that, because of the number of variables in the model, and a small number of observations; the two-lag model would have been unstable, so we decided to apply the one lag solution.

Table 4 Lag Length Determination

Lag	AIC	**BIC**
0	42.84592	43.17287
1	40.39644	**43.01201***
2	38.61603*	43.52022

Note: * Optimal lag length using AIC and BIC.
Source: Authors own construction based on Eviews 9 result (2018)

5.3. Number of Cointegration Vectors

To check the existence of cointegration among the variables we have used the Trace Statistics and the Maximum Eigen statistics. "Table 5 and 6 shows the analysis rejects the null hypothesis that there is no cointegrated vector (None)." The trace statistics describe there being at most three co-integrated vectors. Furthermore, the maximum Eigenvalue statistics show there is at most two co-integrated vectors. Hence, both statistics showed the presence of a high association between explanatory and dependent variables.

Table 5 Trace Statistics

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of E(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.948309	222.5122	125.6154	0.0000
At most 1 *	0.857457	133.6380	95.75366	0.0000
At most 2 *	0.618992	75.19464	69.81889	0.0175
At most 3	0.490176	46.24658	47.85613	0.0703

Note: * rejection of the hypothesis at 5 % level. Trace test indicates three cointegrated equations.
Source: Authors own construction based on Eviews 9 result (2018)

[13] Relative to AIC, BIC is designed to identify the true model, and is good for consistent estimation (Acquah 2010, Prabhat 2010). Furthermore, BIC is more tolerant, penalty for additional parameters is more in BIC and hence it chooses the more parsimonious model (Prabhat 2010).

Table 6 Eigenvalue Statistics

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of E(s)	Eigen value	Max-Eigen Stats	0.05 Critical Value	Prob.**
None *	0.948309	88.87419	46.23142	0.0000
At most 1 *	0.857457	58.44340	40.07757	0.0002
At most 2	0.618992	28.94806	33.87687	0.1731
At most 3	0.490176	20.21068	27.58434	0.3268

Note: * rejection of the hypothesis at 5 % level. Eigenvalue statistics indicates two cointegrated equations.

Source: Authors own construction based on Eviews 9 result

5.4. The Long Run Equation

The result of Johansen approach cointegration test confirmed the existence of long-run equilibrium relationship between the variables used in the estimation of external debt determinants. The Johansen long-run equation will be:

ED =89.24562 + 9.73CAB + 2.8DEF + 1.01CFL + 1.02 DSR + 15.3INT – 1.47TOT
(14.68***) (3.31***) (4.63***) (5.186***) (9.64***) (–6.11***)
*** Significant at 1% level

The numbers in parenthesis under the estimated coefficients are t-values of the estimated coefficients. From the above long-run equation, it can be observed that all variables are significant in determining the external indebtedness of Ethiopia.

Moreover, the current account balance, fiscal deficit, capital flight, debt service, and interest rate positively and significantly affect external indebtedness of Ethiopia. Moreover, the current account balance and fiscal deficit positively and significantly affect external indebtedness of Ethiopia. This means the rise in the current account and fiscal deficit by one percentage point results in an increase in the external debt of Ethiopia by 9.73 and 2.8 percentage points respectively. The reason behind this is both current account and fiscal deficit caused by the resource gap. As a result, the country was forced to borrow from foreign sources to fill this gap. This means large and growing fiscal deficits, as well as current account deficits, were financed through borrowing from foreign sources on a short-term, medium-term, or long-term basis. This result is also consistent with Menbere (2004) in the case of 60 developing countries, Ajayi (1991), Mbire and Atingi (1997) in the case of Nigeria and Uganda respectively. Also, our result supports the hypothesized sign that we set/made previously.

Capital flight is another variable that affects external debt accumulation of Ethiopia positively and significantly. The rise in capital flight by one percentage point results in an increase in the external debt of Ethiopia by 1.01 percentage points. The reason behind is when there are substantial capital outflows in the form of capital flight, there are no resources available to finance imports and domestic investment,

which may lead to external debt. This result, moreover, is consistent with Menbere (2004). Also, our result supports /match the hypothesized sign we set previously.
A one percentage point increase in debt servicing leads to the rise of external debt by 1.02 percentage points. This is because the debt service payment incites further demand for external borrowing. This result is consistent with Menbere (2004), Adamu and Rasiah (2016). Also, our results match with the hypothesized sign. In our results, the interest rate is one of the significant variables. A one percentage point increase in the interest rate causes an increase in the external debt by 15.3 percentage points. This result is matched with the finding of Ajayi (1991), Mbire and Atingi (1997), Sulley (2010), and it is also similar to the hypothesized sign.

However, unlike the above variables, the terms of trade negatively and significantly affect external indebtedness of the country in the long-run. That means the rise in the terms of trade by one percentage point results in a decrease in external debt of Ethiopia by 1.47 percentage point. This means an improvement in the terms of trade makes the external debt of Ethiopia fall. This is because when the terms of trade of the country deteriorate, the country may lack foreign exchange to undertake different activities, especially to import different commodities which are the basis for economic growth. As a result, the country is forced to borrow from foreign sources even at unfavorable terms and conditions. The reverse is true when there is an appreciation in the terms of trade, like in this study. Furthermore, this result is in line with the works of Ajayi (1991) and Mbire and Atingi (1997) in the case of Nigeria and Uganda respectively.

5.5. The Short Run Estimation

The short-run equation relates the difference of dependent variable with the difference of the independent variables, and the error term in the lagged periods. More specifically, the one period lagged difference terms for D(ED), D(CAB), D(DEF), D(CFL), D(DSR), D(INT), and D(TOT) capture the short-run change in the corresponding level, while the error correction term (ECM) captures the long run impact.

Here the error correction term (ECM(-1)) coefficient is negative and significant as expected, implying that there is reasonable adjustment process towards the long-run steady state. This guarantees that although the actual external debt may temporarily deviate from its long-run equilibrium value, it would gradually converge to its equilibrium. The coefficient of the error correction term of -0.381115 shows that about 38 percent of the deviation of the actual external debt from its equilibrium value is eliminated every year; hence, the full adjustment would require almost two and half years.

We also applied diagnostic tests to the model. The diagnostic tests such as tests of normality test of Jarque–Bera, serial-correlation of Breusch-Godfrey LM, heteroskedasticity test of Breusch-Pagan-Godfrey were conducted. The estimated residuals did not provide any significant evidence of non-normality, serial-correlation, and heteroskedasticity effect in the error term (see Annex1). The model stability is necessary for prediction and econometric inference. Thus, stability test was conducted using recursive residual (CUSUM) and CUSUM of square (CUSUMSQ) tests (see Annex 1).

Table 7 Short-run Estimation Result of D(ED)

Variable	Coefficient	Std. error	t- statistic	Prob.
D(ED(-1))	-0.443138	0.10135	-4.37236	0.0003***
D(CAB(-1))	-1.835750	0.464893	-3.948756	0.0007***
D(DEF(-1))	-1.129293	0.430623	-2.622463	0.0159**
D(CFL(-1))	-0.024313	0.104088	-0.233587	0.8176
D(DSR(-1))	-0.447233	0.112927	-3.960367	0.0007***
D(INT(-1))	-1.984597	0.722226	-2.747888	0.0121**
D(TOT(-1))	0.497879	0.112110	4.440976	0.0002***
C	-0.222294	0.823540	-0.269925	0.7899
ECM(-1)	-0.381115	0.037968	-10.03786	0.0000***
R-squared	0.888112	Mean dependent variable		-0.352149
Adjusted R- squared	0.845488	S.D dependent variable		11.44352
S.E. of regression	4.498221	Akaike information criterion		6.088566
Sum squared resid	424.9138	Schwarz criterion		6.508925
Log-likelihood	-82.32849	Hannan-Quinn criteria		6.223043
F-statistic	20.83597	Durbin-Watson stat		2.107525
Prob(F-statistic)	0.000000***			

Note: *** Significant at 1% level ** Significant at 5% level
Source: Authors own construction based on Eviews 9 result (2018)

6. Conclusion, Policy Recommendations, Future Study

The central focus of this study is to examine the determinants of external indebtedness of Ethiopia. The Johansen cointegration approach was used to assess the long run and short-run dynamics of the variables. The result showed that the current account balance, budget deficit, capital flight, debt service, and interest rate significantly increase the external debt of Ethiopia. However, the terms of trade displayed a negative and significant effect on external debt of Ethiopia.

Based on our findings and intuitive knowledge, reducing external indebtedness is feasible following an appropriate fiscal policy (contractionary fiscal policy) via cutting unnecessary government spending and increasing tax collection efficiency, monetary policy (via exchange rate devaluation and deflationary policy), and supply-side policies to improve the competitiveness of an economy and exports. Finally, creating a conducive political, social, and economic environment to attract FDI and to control capital flight is vital. Even though this study tried to meet the existing literature gap, it also has limitations. This study was restricted to a small number of variables due to the Johansen cointegration approach, which needs all variables to be I(1), and therefore other variables such as exchange rate, political instability, trade openness, inflation rate, economic growth, and methods of financing current account deficits such as foreign direct investment were omitted. Hence, future research could expand the investigation by taking these factors into account.

References

Acquah, H.G. (2010): Comparison of Akaike Information Criterion and Bayesian Information Criterion in Selection of an Asymmetric Price Relationship. *Journal of Development and Agricultural Economics*, 2, 1, 001–006.

Adamu, I. – Rasiah, R. (2016): On the determinants of external debt in Nigeria. https://ssrn.com/abstract=2865568. Accessed: September 10, 2016

Africa Zeal (2017): Most Indebted African Countries. http://www.africanzeal.com/african-indebted- countries/ Accessed: April 11, 2017

Ajayi, S. I. (1991): *Macroeconomic Approach to External Debt*: A case of Nigeria. African Economic Research Consortium Research Paper, No. 8, English press Limited, Kenya.

Alam, M.I. – Quazi, R.M. (2003): Determinants of Capital Flight: A case of Bangladesh. *International Review of Applied Economics*, 17, 1, 85–103.

Al-Fawwaz, T.M. (2016): *Determinants of External Debt*: A case of Jordan. International Business Research, Canadian Center of Science and Education, 9, 7, 116–123.

Ampah, I. K. – Kiss, G. D. – Kotosz, B. (2018)/ Capital flight and external debt in Heavily Indebted Poor Countries in Sub-Saharan Africa: An empirical investigation. In Udvari, B. – Voszka, É. (Eds): *Challenges in National and International Economic Policies.* University of Szeged, Doctoral School in Economics, Szeged, 135–159.

Awan, A. – Asghar, N. – Rehman, H. (2011): The Impact of Exchange Rate, Fiscal Deficit, and Terms of Trade. A case of Pakistan. *Austrian Journal of Business and Management Research*, 1, 3, 10–24.

Awan, R. – Anjum, A. – Rehim, S. (2014): An Econometric Analysis of Determinants of External debt. A case of Pakistan. *British Journal of Economics, Management & Trade*, 5, 4, 382–391.

Ayadi, S. – Ayadi, O. (2008): The Impact of External Debt on Economic Growth. A Comparative Study of Nigeria and South Africa. *Journal of Sustainable Development in Africa*,10, 3, 234–264

Bittencourt, M. (2013): Determinants of Government and External Debt. Evidence from the Young Democracies of South America. Economic Research Southern Africa Working Paper 341.

Cline, W.R. (1985): International debt: Analysis, experience and prospects. *Journal of Development Planning*, 16, 25–56.

Dymski, G.A. (2002): *The International Debt Crisis.* Handbook of Globalization, second edition, Published by Edward Elgar publishing limited, USA, 117–134.

Edo, S.E. (2002): The External Debt Problem in Africa. A Comparative study of Nigeria and Morocco. *African Development Review*, 14, 2, 221–236.

Fischer, S. – Easterly, W. (1990): The Economics of the Government Budget Constrain. The World Bank Research Observer, 5, 2, 127–142.

Fofack, H. (2009): Causality between External Debt and Capital Flight in Sub-Saharan Africa. Policy Research Working Paper No. 5042.

Greene, J.E. (1989): External debt problem of Sub-Saharan Africa. IMF staff paper, 36, 4, 836–874

Greenidge, K. – Drakes, L. – Cragwell, R. (2010): The External Public Debt. A case of the Caribbean Community. *Journal of Policy Modeling*, 32, 3, 418–431.

Habimana, A. (2005): The Effects of External Debt Burden on Capital Accumulation. A case of Rwanda. The degree of Master Commercii (unpublished), University of the Western Cape.

Harris, R. (1995): *Using Cointegration Analysis in Econometric Modeling*. Prentice Hall, London.

Heijdra, B. J. (2002): *The foundation of modern macroeconomics*. Oxford University Press Inc., New York.

IMF (2015): International Financial Statistics Yearbook. Washington, DC: International Monetary Fund.

Mbire, B. – Atingi M. (1997): Growth and Foreign Debt. The Ugandan Experience. AERC Research Paper No. 66, Nairobi: African Economic Research Consortium.

Menbere, W. (2004): An Empirical Investigation into the Determinants of External Indebtedness. A case study of 60 developing countries. *Prague Economic Papers*, 3, 261–277

Prabhat, S. (2010): Difference Between AIC and BIC. http://www.differencebetween.net/miscellaneous/difference-between-aic-and-bic/ Accessed: October 3, 2010

Sachs, J. (1984): *Theoretical Issues in International Borrowing*: Princeton Studies in International Finance 54, Princeton University Press at Princeton, New Jersey.

Sulley, P.E. (2010): Macroeconomic Determinants of Accumulation of Public External Debt. A case of Tanzania. MA (Development studies) unpublished, International Institute of Social Science, Netherland.

Suma, D.F. (2007): *The External Debt Crisis and its Impact on Economic Growth and Investment in Sub-Saharan Africa. A Regional Econometric Approach of ECOWAS Countries*. Wirtschaft University, Vienna.

Teklu, T. (2000): *External Resource Mobilization and External Debt Situation.* Addis Ababa: Inter Africa Group

UN (2004): *Debt Sustainability: Oasis or Mirage?* New York and Geneva: United Nations.

UN (2016): *Debt Dynamics and Development Finance in Africa: Oasis or Mirage?* New York and Geneva: United Nations.

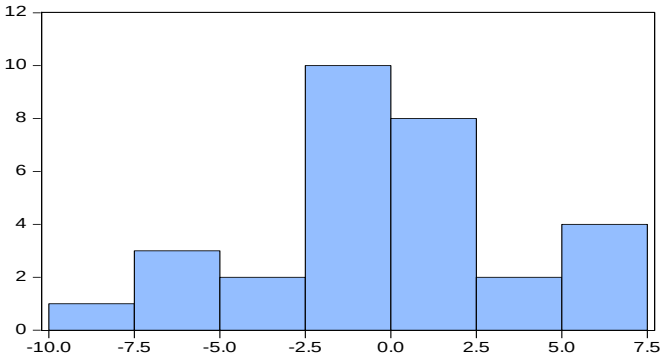
Uzun, A. – Karakoy, C. – Kabadayi, B. – Emsen, O.S. (2012): The Impacts of External Debt on Economic Growth in Transition Economies. *Chinese Business Review*, 11, 5, 491–499

WB (1994): *External Debt of Developing Countries*. World Bank, Washington, DC.

WB (1999): *World Debt Tables/Global Development Finance.* World Bank, Washington, DC.

Annex 1: Diagnostic Tests

A. Normality Test



Series: Residuals	
Sample 1983 2012	
Observations 30	
Mean	3.08e-13
Median	-0.209557
Maximum	7.259211
Minimum	-8.460150
Std. Dev.	3.827819
Skewness	-0.110969
Kurtosis	2.924124
Jarque-Bera	0.068767
Probability	0.966201

B. Autocorrelation test

Breusch-Godfrey Serial Correlation LM Test:

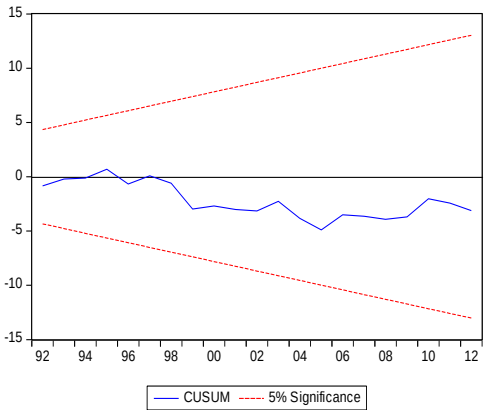
F-statistic	0.343644	Prob. F(2,19)	0.7135
Obs*R-squared	1.047307	Prob. Chi-Square(2)	0.5924

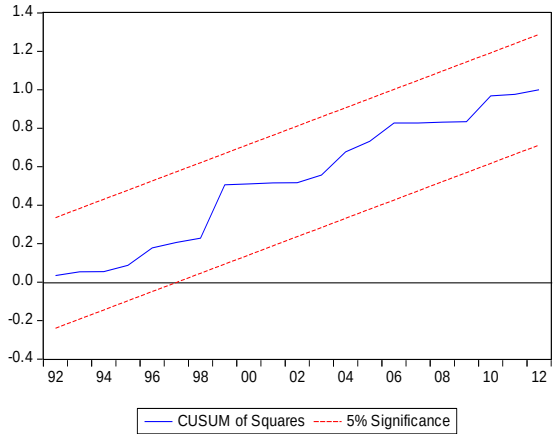
C. Test for Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.327505	Prob. F(14,15)	0.2960
Obs*R-squared	16.60119	Prob. Chi-Square(14)	0.2781
Scaled explained SS	7.825971	Prob. Chi-Square(14)	0.8982

D. Model Stability test





Chapter II
Technology and competitiveness

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 109–124.

Long-term relationship between competitiveness and government economic affairs in V4

Marianna Sávai

The competitiveness of a country depends on internal and external conditions. This paper aims to analyze the relationship between competitiveness and government expenditure in the long run by highlighting the theoretical background. We focus on the government's economic affairs, labor productivity and the global competitiveness index. The reference group was made up of Visegrád Group Countries in the period 2002–2016. We examined panel data with co-integration model. The results verify a long-run relationship between competitiveness measured by unit labor cost and economic affairs.

Keywords: economic affairs, panel ARDL, panel co-integration, V4

1. Introduction

In 2000, the Lisbon Strategy of the European Union set as an aim that the EU would become "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" (EC 2000) by 2010. In 2005, the European Commission and the European Parliament admitted that these declarations were unrealistic, so the Lisbon Agenda failed. Europe 2020 was the next program with similar objectives. There was a strategy for smart, sustainable and inclusive growth in the EU in the period 2010–2020. The European Commission realized that innovation is the most important factor in achieving their new aims (EC 2010). The EC revised the innovation policy of the EU and established Horizon 2020. "The goal is to ensure Europe produces world-class science and technology, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering solutions to big challenges facing our society" (EC 2014, p. 40). Innovation is an essential factor of increasing competitiveness.

The goal of the present study is to analyze the connection between macro level competitiveness and government economic affairs. Based on the theoretical background, we show the most important connections between government and competition, furthermore we present an empirical model to examine the coherence of government economic affairs and competitiveness both in the short run and in the long run. We focused on the Visegrád Group Countries (V4) in the period 2002 and 2016. We used panel ARDL model in Stata 13.

The paper is organized as follows: Chapter 2 gives the theoretical background, summarizes literature on the possible indicators of competitiveness and examines some macroeconomic connection factors in V4. Chapter 3 shows the methods of empirical examination and describes data acquisition. Chapter 4 contains the results of empirical examination and Chapter 5 constitutes the conclusions.

2. Theoretical background

In a globalizing world, competition and competitiveness and their determinants are controversial questions. Still, government is able to modify the conditions for competition. Competition promotes the decrease of production costs, facilitates more effective allocation, and stimulates companies to increase their innovation potentials and enhance customer satisfaction. As a result, productivity increases (Cincera–Galgau 2005). Interventions of the government are aimed at general legal standards, market structure influence, market protection by competition policy, stimulations of competition, and restrictions of competition (Voszka 2003).

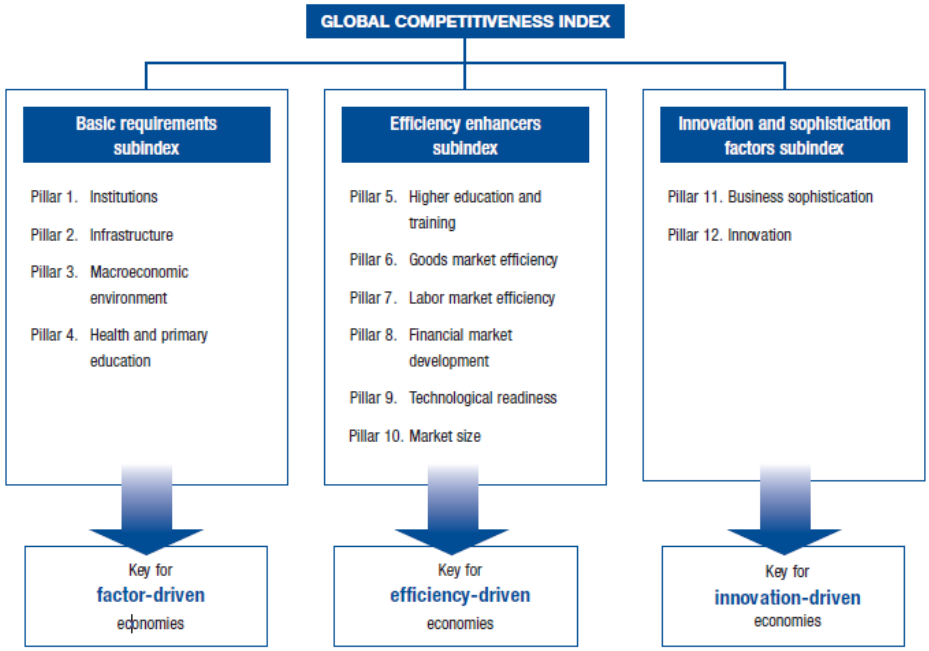
The notions of competition and competitiveness are different, however, and sometimes they might be conflicting. Micro level competitiveness means an inclination to competition and skill in jockeying for position, which can be measured by market share, profitability or other indicators of success (Lengyel 2003). "Competitiveness at the macro-economic level is defined … as a sustained rise in the standards of living" (EC 2009, p. 106)." Macro-economy is more than the sum of economic operators, because government policy-making contributes to the formation of business environment and market structure. In fact, micro and macro level competitiveness advance long-term economic growth. Meanwhile, the international level of competitiveness is a special dimension of capital attractiveness, namely a sum of circumstances constructed by countries which contribute to profitable productivity (Losoncz 2005). In fact, government is the main actor in setting macro level competitiveness. If the power of the government reduces, competitiveness can decrease (Chikán–Czakó 2009, Boros et al. 2012).

In the global market, the competitive advantages of companies derive from their ability to innovate, generate and transfer knowledge (Lengyel 2003) so we analyse these factors in an examination of macro level competitiveness. International organizations have created certain special measures of competitiveness on the national level, for example, the International Institute for Management Development (IMD) publish World Competitiveness Yearbook[14] and the World Economic Forum (WEF) issues its Growth Competitiveness Report.

The WEF published the first international summary of macro level competitiveness in 1979. After that, numerous studies have focused on comparing different countries by competitiveness (Szentes 2012). The WEF uses the Global Competitiveness Index (GCI) to measure macro level competitiveness. As we used this index in our empirical examination, we present a brief description of its framework. The WEF defines competitiveness "as the set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can achieve" (WEF 2016, p. 4). Nowadays, they use 114 indicators in 12 pillars and 3 sub-indices (Figure 1).

[14] See IMD (2016) for more details.

Figure 1 The framework of the Global Competitiveness Index



Source: WEF (2016, p. 5)

These 12 WEF pillars are: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size, business sophistication and innovation. These pillars summarize 3 sub-indices with different weightings. Countries are classified on the basis of GDP per capita in US dollar (Table 1).

'In the first stage, the economy is factor-driven, and countries compete based on their factor endowments—primarily unskilled labor and natural resources. Maintaining competitiveness at this stage of development hinges primarily on well-functioning public and private institutions (1st pillar), a well-developed infrastructure (2nd pillar), a stable macroeconomic environment (3rd pillar), and a healthy workforce that has received at least a basic education (4th pillar). As a country becomes more competitive, productivity will increase, and wages will rise with advancing development. Countries will then move into the efficiency-driven stage of development, when they must begin to develop more efficient production processes and increase product quality because wages have risen, and they cannot increase prices. At this point, competitiveness is increasingly driven by higher education and training (5th pillar), efficient goods markets (6th pillar), well-functioning labor markets (7th pillar), developed financial markets (8th pillar), the ability to harness the benefits of existing technologies (9th pillar), and a large domestic or foreign market (10th pillar). Finally, as countries move into the innovation-driven stage, wages will have risen by so much that they are able to sustain those higher wages and the associated standard of living only if their businesses are able to compete using the

most sophisticated production processes (11th pillar) and by innovating new ones (12th pillar)' (WEF 2017, p. 319).'

Table 1 Subindex weights and income thresholds for stages of development

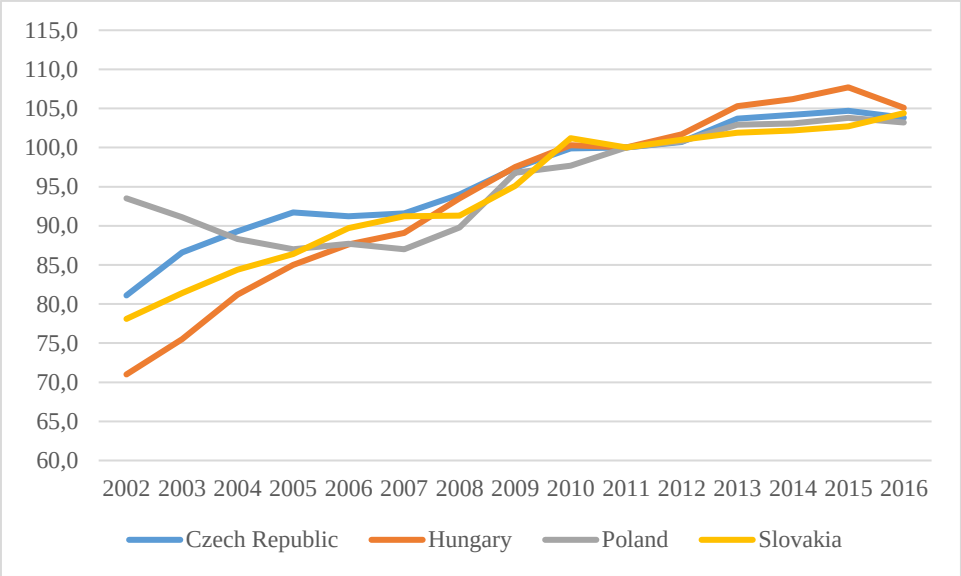
	Stage of development				
	Stage 1: Factor-driven	Transition from stage 1 to stage 2	Stage 2: Efficiency-driven	Transition from stage 2 to stage 3	Stage 3: Innovation-driven
GDP per capita (US dollar) thresholds	<2,000	2,000-2,999	3,000-8,999	9,000-17,000	>17,000
Weight for basic requirements	60	40 - 60	40	20 – 40	20
Weight for efficiency enhancers	35	35 - 50	50	50	50
Weight for innovation and sophistication factor	5	5 - 10	10	10 - 30	30

Note: The Czech Republic is an innovation-driven country, the other V4 countries stay between the 2nd and 3rd stage, therefore the weights of sub-indices are different. Poland 31.7; 50; 18.3; Hungary 30.6; 50; 18.3; Slovakia 21.3; 50, 28.7
Source: WEF (2017, p. 320)

The increased productivity promotes welfare due to economic growth. Competition encourages companies to improve their performance. If the performance improves, the productivity increases (Voszka 2011). Companies enhance their innovation activity, make the organization more cost-effective, and reduce their production costs by competition (Cincera–Galgau 2005). The productivity level could indicate the position of the different countries in international competition. Productivity can be measured by gross value added per worked hour, total factor productivity or GDP per employers (Losoncz 2015). In addition to productivity, the national competitiveness can be evaluated by market share, and costs. Furthermore, job creation, exports, FDI, low wages, stable unit labor cost, a balanced budget or exchange rate are specific local conditions which indicate and support competitiveness (Delgado et al. 2012).

The index of nominal unit labor cost based on person in V4 countries increased before the financial crisis (Figure 2). The dynamic increase was stopped by the financial crisis and after 2009, the data shows a slower increase in V4 countries.

Figure 2 Nominal unit labor cost based on person, index (2002–2016)



Source: Own construction based on EUROSTAT (2018)

The roles of a state are very different and various. One of them is the macroeconomic policy which can modify the fluctuation of a market economy in the short and long-run and can contribute to the prevention of crises. In addition, the extended functions of a state are maintenance of market imperfection and externalities and subservience of sustainable development (Chikán–Czakó 2009). In the long-run the sources of national competitiveness are expenditures on R&D activities, healthcare, education. The effects of expenditure on healthcare and education are visible after decades, but we have data only for the period 2002-2016 so we could not examine the effects on healthcare and education. We use the government's expenditure on economic affairs in the measurement of COFOG[15].

We demonstrate groups of 'economic affairs' (EUROSTAT 2011, p. 155):

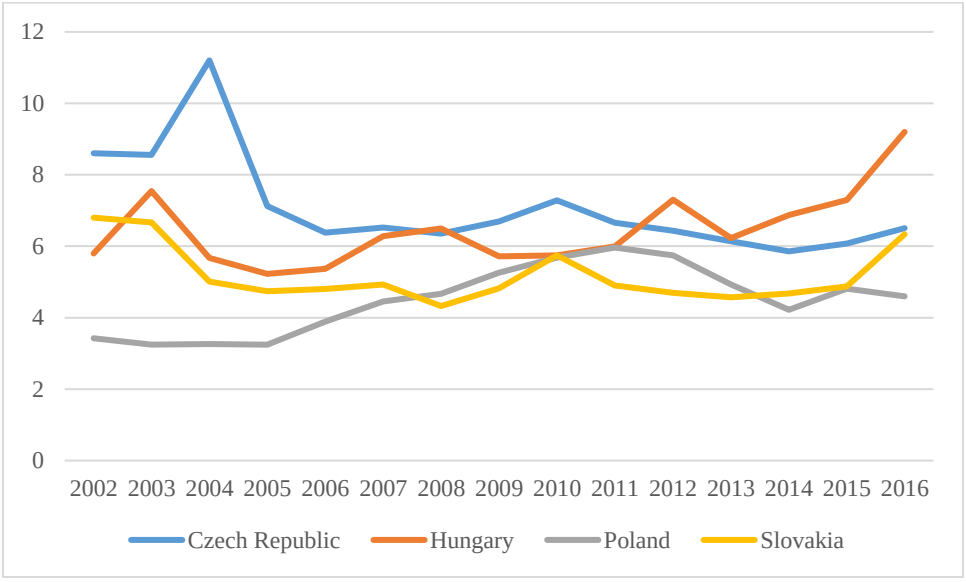
- general economic, commercial and labor affairs,
- agriculture, forestry, fishing and hunting,
- fuel and energy,
- mining, manufacturing and construction,
- transport,
- communication,
- other industries,
- R&D economic affairs,
- economic affairs n.e.c.

The government spending on economic affairs in national currency (nominal value) have increased year-by-year in V4. The time series of economic affairs per GDP shows volatility in the period 2002-2016 (Figure 3). Before the V4 countries joined the EU, the EU had provided pre-accession support for these countries which

[15] See EUROSTAT (2011) for more details.

led to an increase in their economic affairs. After accession to the EU the economic affairs levelled off in each country (except for Poland where it was increasing until 2011). The global financial crisis resulted in a decrease in GDP, therefore the values of this indicator decrease after the crisis.

Figure 3 Economic Affairs, 2002–2016 (% of GDP)



Source: Own construction based on EUROSTAT (2018)

Most of the empirical examinations of competitiveness focus on the micro level, because companies are sources of regional and national competitiveness. In the regional competitiveness aspect, the counties of V4 were categorized in four groups by Lengyel (2017). The first group was 'strong competitiveness counties', of which there were eleven Czech counties, and three Polish metropolitan regions. The second group was 'rising competitive counties' include five Czech, four Slovakian, five Hungarian and ten Polish counties. The third group was the 'weak competitive counties', of which there were two Slovakian, nine Hungarian and twenty Polish counties. The last group was the 'uncompetitive rural counties' and included four Hungarian and twenty Polish counties. Comparing the county competitiveness in V4 with the GCI rank of countries, we find that the Czech Republic is the most competitive country out of V4, followed by Poland, Hungary and Slovakia. As mentioned in the introduction, we have focused on macro level competitiveness, and analyzed the long-term relationship between national competitiveness and economic affairs. Table 2 shows the empirical literature review about national competitiveness which analyzed the relationship with other macroeconomic indicators.

Table 2 Selected papers about national competitiveness

Article	Sample	Time horizon	Indicators	Model
Bujanca and Ulman (2015)	40 countries over the world	2012	GCI and Economic Freedom	cross-sectional analysis, robust errors estimation
Ciocanel and Pavelescu (2015)	29 European countries	2008-2013	World Competitiveness Scoreboard and Innovation Union Scoreboard	Pooled-OLS
Clancy et al. (2016)	Ireland, Slovenia, US	1980-2010	Effective terms of trade and government expenditure,	DSGE model
Delgado et al. (2012)	130 countries	2001-2010	Output per potential worker and 120 indicators	Novel methodology for estimating
Despotovic et al. (2013)	European Union	2012	GCI and Global Innovation Index	Linear regression and correlation analysis
Makin and Ratnasiri (2015)	Australia	1998-2013	Non-tradables to tradables index, private spending and government expenditure	Co-integration with structural breaks
Rozmahel et al. (2014)	EU and CEE countries	2000-2012	Real labour productivity, nominal unit labour cost, real effective exchange rate	Cluster analysis

Source: Own construction

Based on the fact that the GCI is a familiar indicator of national competitiveness in most of the articles, the first theoretical model is

$$GCI_{it} = \alpha + \beta EA_{it} + \varepsilon_{it} \quad (1)$$

where GCI_{it} is the GCI ranking of countries, EA_{it} is the economic affairs of countries and ε_{it} is the error term.

Based on Rozmahel et al. (2014) the second theoretical model with control variables is

$$Unit\_cost_{it} = \alpha + \beta_1 EA_{it} + \beta_2 Patent_{it} + \beta_3 RDE_{it} + \varepsilon_{it} \quad (2)$$

where $Unit\_cost_{it}$ is the index of nominal unit labour cost based on person, EA_{it} is the economic affairs of countries, $Patent_{it}$ is the number of patents (resident and non-resident), RDE_{it} is the number of researchers and ε_{it} is error term.

3. Data and Methodology

The EU measure government spending with COFOG (Classification of Functions of Government), which categorizes government expenditures by functions. We used this database and chose the Economic Affairs (F04) group to analyze government

spending. The sub-items of F04 are general economic, commercial and labor affairs; agriculture, forestry; fishing and hunting; fuel and energy; mining, manufacturing and construction; transport; communication; other industries, R&D related to economic affairs; economic affairs n.e.c. The R&D and other major source of macro level competitiveness are measured by F04, and therefore we focused on this division of COFOG. If we had a time series spanning several decades, then we could also examine government expenditure on education (F09) and healthcare (F07).

For the measurement of macro-level competitiveness, we can use several indicators (see in Table 2). We chose two of them, Global Competitiveness Index (GCI) and nominal unit labor cost. We introduced these indicators in the theoretical background. The GCI is a composite indicator with qualitative factors, and the nominal unit labor cost is a simply quantitative indicator, and hence we found differences between measurements of national competitiveness.

As control variables we use patent applications, which summarize resistant and non-resistant patents in the countries. If the number of patents increases, then the country become more competitive. 'Patent applications are worldwide patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office' (World Bank 2018).' 'R&D personnel include all persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical staff. Those providing an indirect service, such as canteen and security staff, should be excluded' (OECD 2002, p. 92). 'Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.' (OECD 2002, p. 93). In the examination we used the following variables (Table 3).

Table 3 Variables and their sources

Variable long name	**Variable short name**	**Unit**	**Source**
Global Competitiveness Index	GCI	Rank	WEF
Nominal unit labor cost based on person	Unit Cost	Index (2010=100%)	Eurostat
Economic Affairs	EA	percent of GDP	Eurostat
Patent applications	Patent	number of resistant and non-resistant	World Bank
Total R&D personnel and researchers	RDE	number	Eurostat

Source: Own construction

Estimates with panel data are more effective than estimates with short time series thanks to a higher number of observations. In the time series data, the power of unit root tests and co-integration tests is weaker than that in the panel data (Shiller–Perron 1985, Otero–Smith 2000). Therefore, if we use panel data to test our theoretical models, the results of estimations will be more exact.

The evidence of long-run equilibrium relationship between competitiveness and economic affairs is demonstrated with co-integration examinations. The definition

of co-integration derives from Granger (1981) and Engle and Granger (1987). Based on this definition we can use co-integration models if two non-stationary processes are co-integrated, to be specific, there is a long-run equilibrium relationship between two non-stationary processes if they have a linear combination which is stationary.

As the unit root tests are sensitive, we used two tests to check robustness of the results: Fisher-ADF (augmented Dickey–Fuller) and Fisher-PP (Phillips–Perron). Fisher tests combine information based on individual unit root tests. They do not require a balanced panel and can use different lag lengths in the individual ADF regressions and can be applied to any other unit root tests. The disadvantage of Fisher tests is that the *p*-values have to be derived by Monte Carlo simulations (Baltagi 2008).

The autoregressive distributed lag bounds testing approach of co-integration (ARDL) has remarkable advantages, therefore it is a more popular method of panel estimations. Firstly, the ARDL procedure can be applied if the regressors are I(1) and/or I(0) and it allows different optimal lags of variables. Secondly, the results of the ARDL procedure are more statistically significant in case of small samples. Thirdly, a single reduced form equation is employed by the ARDL procedure, while the long-run relationships are estimated within a context of system equations by the conventional co-integration procedures (Ozturk–Acaravci 2010).

We use panel co-integration models to examine the long-run relationships between variables. The most popular panel co-integration models are PMG (pooled mean-group estimation) by Pesaran et al. (1999), MG (mean-group estimation) and DFE (dynamic fixed-effects estimation) by Pesaran and Smith (1995). The key difference between these models is whether they allow certain estimated parameters to vary in the cross-sectional units (Szabó 2017). The slopes are fixed and the intercepts are allowed to vary across countries with DFE. If both the slope and intercepts are allowed to vary across countries the MG estimator seems to be more consistent, while the PMG estimator is consistent under the assumption of long-run slope homogeneity. The long-run parameters are provided by the MG estimator for the panel from an average of the long-run parameters from ARDL models for individual countries (Lee–Wang 2015).

Assume an ARDL (p, q1, …qk) dynamic panel specification equation (Blackburne–Frank 2007, p. 198):

$$y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-1} + \sum_{j=0}^{q} \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} \qquad (3)$$

where the number of groups i=1,2,…, N; the number of periods t = 1,2,…,T; $\mathbf{X}_{it}$ is a $k \times 1$ vector of explanatory variables; δ_{it} are the $k \times 1$ coefficient vectors, λ_{it} are scalars; and μ_i is the group-specific effect. T must be large enough so that the model can be fitted for each group separately. Time trends and other fixed regressors may be included.

Hausman's (1978) specification test is commonly used to define efficiency and the fitting of panel co-integration models. An estimator $\hat{\theta}_1$ which is known to be consistent, is compared with an estimator $\hat{\theta}_2$ which is efficient under the assumption

being tested. The null hypothesis is that the estimator $\hat{\theta}_2$ is indeed an efficient (and consistent) estimator of the true parameters. Assuming this, there should be no systematic difference between the two estimators. If there is a systematic difference in the estimates, it is reasonable to doubt the assumptions on which the efficient estimator is based (StataCorp 2013).

The Hausman statistic is distributed as χ^2 and is computed as

$$H = (\beta_c - \beta_e)'(V_c - V_e)^{-1}(\beta_c - \beta_e) \quad (4)$$

where β_c is the coefficient vector from the consistent estimator, β_e is the coefficient vector from the efficient estimator, V_c is the covariance matrix of the consistent estimator and V_e is the covariance matrix of the efficient estimator (StataCorp 2013). See Baum et al. (2003) for more details.

All variables are transformed into natural logarithms to reduce heteroscedasticity. The annual panel data for Czech Republic, Hungary, Poland and Slovakia are obtained from the GCI database by WEF (2018) and EUROSTAT (2018) for the 2002-2016 period.

Assuming a long-run relationship between variables, the ARDL dynamic panel specification of the first theoretical panel model is

$$GCI_{it} = \delta_{10i} EA_{it} + \delta_{11i} EA_{i,t-1} + \lambda_i GCI_{i,t-1} \mu_i + \varepsilon_{it} \quad (5)$$

The error correction reparametrization of the previous equation is

$$\Delta GCI_{it} = \phi_i (GCI_{i,t-1} - \theta_{0i} - \theta_{1i} EA_{it}) + \delta_{11i} \Delta EA_{it} + \varepsilon_{it} \quad (6)$$

where ϕ_i is error-correction speed of the adjustment parameter and θ_{1i} is the long-run coefficient, θ_{0i} is non-zero mean of the co-integrating relationship and $\phi_i = -(1-\lambda_i), \theta_{0i} = \frac{\mu_i}{1-\lambda_i}, \theta_{1i} = \frac{\delta_{10i}+\delta_{11i}}{1-\lambda_i}$. If the variables exhibit a return to long-run equilibrium, ϕ_i is negative. The economic affairs effect θ_{1i} is negative according to theoretical assumptions, which means that if the government spends more on economic affairs, the GCI rank will be better.

4. Empirical Results

The summary of statistical results of the unit root test in real terms of GCI, economic affairs and unit labor cost are presented in this section. Fisher-ADF tests were conducted at level and at first difference. The Fisher-PP tests are more robust for measuring autocorrelation and heteroscedasticity, therefore we checked data with these tests. The Fisher-PP tests confirmed the results of Fisher-ADF (Table 4).

Table 4 Results of Fisher-ADF test

Variable	Level – I(0) t-statistics	1st Difference I(1) t-statistics
GCI	15.4639 (0.0507)*	
EA	5.9674 (0.6509)	57.5308 (0.0000)***
Unit_cost	10.8824 (0.2085)	32.0904 (0.0001)***
Patent	13.2143 (0.1047)	20.6266 (0.0082)***
RDE	1.2654 (0.9960)	27.2242 (0.0006)***
lnGCI	7.3895 (0.4952)	52.5748 (0.0000)***
lnEA	9.7538 (0.2827)	
lnUnit_cost	19.1983 (0.0138)	14.2305*
lnPatent	11.6322 (0.1684)	38.1121 (0.0000)***
lnRDE	0.8189 (0.9992)	27.2562 (0.0006)***

Note: p-values is parentheses, * Significant at 10% level; **Significant at 5% level, *** Significant at 1% level

Source: Own construction

We use the panel co-integration model because the assumptions of use were confirmed. Based on the unit root test the maximum order of integration can be concluded to be I(1). We used three different estimators in ARDL panel model PMG, MG and DFE. The error correction term was significant by MG and DFE estimators. The MG estimator was shown the most effective by the Hausman test (p-value is 0.8559). Table 5 presents the results of the MG estimation. In the long-term section the coefficient of economic affairs was not significant (p-value is 0.653) therefore the long-run relationship between competitiveness and economic affairs was rejected.

Table 5 Results of long-run and short run ARDL Approach (first model)

	Coefficient	***Std. Error***	***p-value***
Long-run ECT			
EA_L1	0.6584	3.1525	0.835
Short-run			
ECT	–0.4143	0.1736	0.017
EA_D1	–0.3452	0.6551	0.598
_cons	19.5997	12.0419	0.104

Note: dependent variable: GCI rank

Source: Own construction

We examined country level data by the extended model of MG estimation (Table 6). The results of the estimation rejected relationship between competitiveness

and economic affairs in the long-run for the whole panel data, except for Czech Republic and Poland where the results verify the assumptions of the theoretical background in the short run. The coefficient of EA is negative and significant (p-value 0.042 and 0.026). However, the long-run relationship between competitiveness and economic affairs was rejected for all countries, this means that the heterogeneity of countries causes different results and the panel model could not handle this problem.

Table 6 Results of long-run and short run ARDL Approach (extended version of first model)

	Coefficient	***Std. Error***	***p-value***
Czech Republic			
Long-run ECT			
EA_L1	1.6194	1.9068	0.396
Short-run			
ECT	–0.5419	0.2668	0.042
EA_D1	–0.1883	0.9580	0.844
_cons	13.1322	11.1786	0.240
Hungary			
Long-run ECT			
EA_L1	–4.2676	2.3631	0.071
Short-run			
ECT	–0.8468	0.3806	0.026
EA_D1	1.3076	4.5436	0.774
_cons	54.9144	20.1559	0.009
Poland			
Long-run ECT			
EA_L1	9.2065	9.1103	0.312
Short-run			
ECT	–0.1635	0.1243	0.189
EA_D1	–1.8647	1.5018	
_cons	0.9911	9.5672	0.917
Slovakia			
Long-run ECT			
EA_L1	–3.9249	28.7152	0.891
Short-run			
ECT	–0.1051	0.1238	0.396
EA_D1	–0.6353	2.8840	0.826
_cons	9.3608	17.4732	0.592

Note: dependent variable: GCI rank
Source: Own construction

The second theoretical model estimation confirmed the long-run relationship between competitiveness measured by unit labor cost and economic affairs. In this case the most effective estimator was DFE based on the Hausman test. In the section of short-run error correction model (ECT in the tables) the coefficient must be negative and significant, in order to verify a stable long-run relationship. Table 7 shows the results of estimation.

Table 7 Results of long-run and short run ARDL Approach (second model)

	Coefficient	***Std. Error***	***p-value***
Long-run ECT			
EA_L1	3.6415	1.3435	0.007
Patent_L1	–0.0026	0.0009	0.004
RDE_L1	0.0003	0.0001	0.019
Short-run			
ECT	–0.2107	0.0475	0.000
EA_D1	0.2144	0.2728	0.432
Patent_D1	–0.0004	0.0003	0.907
RDE_D1	–0.0001	0.0001	0.544
_cons	15.5585	4.1228	0.000

Note: dependent variable: nominal unit labor cost
Source: Own computation

The positive and significant coefficient of economic affairs might show that the governments support technology and knowledge-intensive sectors. Wages are high in these sectors therefore the nominal unit labor costs were increasing in the period under examination thanks to economic affairs. These ideas are strengthened by the Patent and RDE variable.

5. Conclusion

In the globalization framework, competition and competitiveness are general topics of theoretical and empirical studies. According to the Lisbon Strategy, the aim of EU was to become 'the most competitive and dynamic knowledge-based economy in the world'. The global competitiveness index is one of the most commonly used indicators of national competitiveness. The different levels of competitiveness (micro, macro and international) are linked to each other. Governments influence the national markets and competitiveness in the markets by regulation and support systems. This paper focused on analyzing the relationship between national competitiveness and government's economic expenditures. More specifically, in the first model we focused on the global competitiveness index and economic affairs in V4 countries. In the second model we measured the competitiveness with unit labor cost.

In the study we used panel data because we had a short time period (2002-2016). We had stationary and first difference data, so we used ARDL model. We analyzed panel data by three different estimators PMG, MG and DFE and chose the most effective model using the Hausman test. The MG approach was the most effective when we defined competitiveness with GCI rank. The results of the first ARDL model did not prove the long-run relationship between the GCI rank and economic affairs. When we define competitiveness with index of nominal unit labor cost based on person, DFE estimator was the most fitted approach based on the Hausman test. The results of estimation showed error correction in the long-term and a significant relationship between competitiveness and economic affairs in the long-term.

The results of estimations show that if we use a composite indicator which uses qualitative factors then the short run adjustment was verify. Whatever the reason for country heterogeneity, we might not find long run relationship between macro level competitiveness and economic affairs. These results strengthen the economic theory, which says that there is no practice which works for every country. Countries need different tools to development their competitiveness (in part because of different problems). If we analyze our data with purely quantitative indicators, we discover the long run relationship between macro level competitiveness and economic affairs.

We plan to extend our study with other reference groups which have longer time series then V4 countries, for example the core countries of the EU. The different reference groups may show different or similar results of estimations. We are also considering broadening the variables scale in the next study.

Acknowledgments: This research was supported by the EU-funded Hungarian grant EFOP-3.6.2-16-2017-00007.

References

Baltagi, B. H. (2008): *Econometric Analysis of Panel Data*. Chichester: John Wiley.

Baum, C. F. – Schaffer, M. E. – Stillman, S. (2003): Instrumental variables and GMM: Estimation and testing. *Stata Journal*, 3, 1–31.

Blackburne, E. – Frank, M. (2007): Estimation of nonstationary heterogeneous panels. *Stata Journal*, 7, 2, 197–208.

Boros, A. – Courrier, A-E. – Kristó, K. – Temesi, I. (2012): *Versenyképesség és közigazgatás*. Versenyképesség kutatások műhelytanulmány sorozat, 70, BCE.

Bujanc, G. V. – Ulmana, S. R. (2015): The impact of the economic freedom on national competitiveness in the main economic power centers in the World. *Procedia Economics and Finance*, 20, 94–103.

Chikán, A. – Czakó, E. (2009): *Versenyben a világgal*. Budapest: Akadémiai Kiadó.

Cincera, M. – Galgau, O. (2005): Impact of market entry and exit on EU productivity and growth performance. *European Economy*, 222.

Ciocanel, A. B. – Pavelescua, F. M. (2013): Innovation and competitiveness in European context. *Procedia Economics and Finance*, 32, 728–737.

Clancy, D – Jacquinot, P. – Lozej, M. (2016): Government expenditure composition and fiscal policy spillovers in small open economies within a monetary union. *Journal of Macroeconomics*, 48, 305–326.

Delgado, M. – Ketels, C. – Porter, M. E. – Stern, S. (2012): *The determinats of national competitiveness*. Nber Workin Paper Series, No 18249, NBER.

Despotović, D. – Cvetanović, S. – Nedić, V. (2014): Innovativeness and competitiveness of the Western Balkan countries and selected EU member states. *Industrija*, 42, 1, 27–45.

EC (2000): Presidency conclusion Lisbon 2000 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/00100-r1.en0.htm Accessed: 23/02/2018.

EC (2009): European comptetitiveness report 2008. Luxembourg: Office for Official Publications of the European Communities.

EC (2010): Communication from the Commission EUROPE 2020. A strategy for smart, sustainable and inclusive growth. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF Accessed: 23/02/2018.

EC (2014): HORIZON 2020 in brief. The EU framework programme for research & innovation. http://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/H2020_inBrief_EN_FinalBAT.pdf Accessed: 23/02/2018.

Engle, R. F. – Granger, C. W. J. (1987): Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55, 2, 251–276.

EUROSTAT (2011): Manual on sources and methods for the compilation of COFOG Statistics Luxembourg: Publications Office of the European Union.

EUROSTAT (2018): European Statistics. http://ec.europa.eu/eurostat/ Accessed: February 23, 2018

Granger, C. (1981): Some properties of time series data and their use in econometric model specification. *Journal of Econometrics*, 16, 1, 121–130.

Hausman, J. A. (1978): Specification tests in econometrics. *Econometrica*, 46, 1251–1271.

IMD (2016): Methodology and Principles of Analysis. Available: http://www.imd.org/uupload/imd.website/wcc/methodology.pdf Accessed: 23/02/2018.

Lee, Y-M. – Wang, K-M. (2015): Dynamic heterogeneous panel analysis of the correlation between stock prices and exchange rates, *Economic Research - Ekonomska Istraživanja*, 28, 1, 749–772.

Lengyel, I. (2003): *Verseny és területi fejlődés*. Szeged: JATEPress.

Lengyel, I. (2017): Competitive and uncompetitive regions in transition economies: the case of the Visegrad post-socialist countries. In Huggins, R. – Thompson, P. (eds): *Handbook of Regions and Competitiveness*. Edward Elgar–Cheltenham, 398–415.

Losoncz, M. (2005): A magyar versenyképesség forrásai nemzetközi összehasonlításban. In Rechnitzer, J. (ed.): *Átalakulási folyamatok Közép-Európában*. Évkönyv 2005. Széchenyi István Egyetem Jog- és Gazdaságtudományi Kar Multidiszciplináris Társadalomtudományi Doktori Iskola, Győr, 53–60.

Losoncz, M. (2015): A magyar versenyképesség forrásai nemzetközi összehasonlításban. In Ágh, A. – Tamás, P. – Vértes, A. (eds.): *Honnan hová? Tanulmányok a versenyképességről*. Stratégiai Kutatások – Magyarország 2015, MTA Szociológiai Kutatóintézet, 209–243.

Makin, A. J. – Ratnasiri, S. (2015): Competitiveness and government expenditure: The Australian example. *Economic Modelling*, 49, 154–161.

OECD (2002): Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development, The Measurement of Scientific and Technological Activities, OECD Publishing, Paris, https://doi.org/10.1787/9789264199040-en.

Otero, J. – Smith, J. (2000): Testing for cointegration: Power versus frequency of observation-further Monte Carlo results. *Economics Letters*, 67, 1, 5–9.

Ozturk, I. – Acaravci, A. (2010): CO2 emissions, energy consumption and economic growth in Turkey. *Renewable and Sustainable Energy Reviews*, 14, 9, 3220–3225.

Pesaran, M. H. – Shin, Y. – Smith, R. P. (1999): Pooled mean group estimation of dynamic heter-ogeneous panels. *Journal of the American Statistical Association*, 94, 446, 621–634.

Pesaran, M. H. – Smith, R. P. (1995): Estimating long-run relationships from dynamic heteroge-neous panels. *Journal of Econometrics*, 68, 1, 79–113.

Rozmahel, P. – Grochová, L. I. – Litzman, M. (2014): Evaluation of competitiveness in the European Union: Alternative perspectives. *Procedia Economics and Finance*, 12, 575–581.

Shiller, R. J. – Perron, P. (1985): Testing the random walk hypothesis: Power versus frequency of observation. *Economics Letters*. 18, 4, 381–386.

StataCorp (2013): *STATA Longitudional-data/ Panel-data reference manual release*. Texas: Stata Press.

Szabó, A. (2017): Egy lehetséges megoldás a vásárlóerő-paritási rejtélyre: panel kointegráció. *Statisztikai Szemle*, 95, 3, 256–277.

Szentes, T. (2012): A „nemzeti versenyképesség" fogalma, mérése és ideológiája, *Magyar Tudomány*, 173, 6, 680–691.

Voszka, É. (2003): *Versenyteremtés – alkuval. Demonopolizáció és állami támogatás az átalakulás idején*. Akadémiai Kiadó, Budapest.

Voszka, É: (2011): Erős állam: a verseny feltétele vagy torzítója? *Külgazdaság*, 55, 5–6, 3–30.

WEF (2016): The Global Competitiveness Report 2016–2017. http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf Accessed: 23/02/2018.

WEF (2018): The Global Competitiveness Index Historical Dataset. www3.weforum.org/docs/GCR2014-15/GCI_Dataset_2006-07-2014-15.xlsx Accessed: February 12, 2018

World Bank (2018): Data Catalog, Data Access And Licensing. https://datacatalog.worldbank.org/public-licenses#cc-by Accessed: February 12, 2018

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 125–137.

Role and contribution of different university models in designing and implementing smart specialization strategies

János Gyurkovics

Building on unique regional strengths, smart specialization focuses on fostering learning linkages within and between regions to facilitate the evolution of new activities, industries and to develop new growth paths. However, a mismatch between the demand for and supply of skills and knowledge in the local economy has often been observed which inhibits knowledge flows, the diffusion of new ideas, applications and the evolution of new technologies. Therefore, a proper matching between investments in knowledge and human capital and the present state of industrial development in the regions is required.

In this process universities may play a crucial part as key knowledge-producing institutions and central players of regional knowledge networks. However, different university models, because of their varying objectives, roles and levels of engagement, might contribute to the success of smart specialization strategies in very different ways. So, in this paper I identify the potential role and contribution of different university models in designing and implementing smart specialization strategies.

Keywords: university, smart specialization strategies, S3

1. Introduction

Universities are often perceived to play an important role in innovation processes and economic development of their regions. Thus, policy-makers around the world are increasingly urging them to become more valuable assets to their surrounding areas, and many policy documents deal with their potential role and contribution to regional development. This notion has also been integrated into the recently emerging research and innovation policies which have adopted the concept of smart specialization as a fundamental principle. Actually, smart specialization means a new way of thinking about and designing policy which involves the largest possible number of stakeholders to identify unique strengths in their region, upon which regional policy might be built. The aim of smart specialization strategies, based on regional strengths and opportunities, is to foster learning linkages within and between regions to facilitate the evolution of new activities, industries and to develop new growth paths.

However, different university models that coexist at the same time might contribute to the success of smart specialization strategies in very different ways because of their varying objectives, roles and levels of engagement. So, in this paper I try to identify the *potential role and contribution of different university models in designing and implementing smart specialization strategies.*

In the following sections I briefly introduce the concept of smart specialization, then sketch the main features of the five university models and finally, I try to identify their possible contribution and linkages to smart specialization strategies in three different dimensions.

2. Smart specialization: from sectoral to spatial approach

Reading scientific articles or policy documents, prepared in the past few years in connection with economic development and growth in Europe, one frequently comes across the concept of *smart specialization*. It has become a widespread buzzword since the Europe 2020 Strategy and its Innovation Union Flagship Initiative adapted the concept (CEC 2010). Further emphasis was placed on smart specialization when the preparation of National and/or Regional Research and Innovation Strategies for Smart Specialization were stipulated as ex-ante condition for the granting mechanism of European Regional Development Funds in the 2014–2020 programming period. All in all, this concept and its underlying theories has determined and influenced regional policies, research and innovation processes in the European Union between 2014 and 2020, so a deeper understanding of smart specialization might be essential.

The appearance of the smart specialization concept could have its origins in the decreasing share of R&D investment in Europe along with an increase in R&D investments in Asia and the US (Foray–van Ark 2007). The authors identified two main barriers that hinder the attraction of R&D investment in Europe: (1) fragmented and uncoordinated national science and technology policies which hamper the natural evolution of European centers of excellence (e.g. agglomeration of highly skilled human workforce, talents, ideas, developed infrastructure and other related services of some scientific field) by supporting a wide range of scientific areas instead of focusing on a merely a few; (2) overemphasizing one or two 'popular' fields of science (e.g. biotechnology, ICT) which leads to the uniformity of countries in terms of R&D and the neglecting of their endogenous strengths. To overcome these problems in R&D investments and to put Europe back in the global game of R&D, Foray and van Ark (2007) introduced smart specialization, which facilitates a European-wide specialization in different scientific fields. The original aim of smart specialization was twofold: facilitate unrestricted evolution of European centers of excellence and support a relatively balanced distribution of research capacities and capabilities across Europe (McCann–Ortega-Argilés 2011).

In their later work (Foray et al. 2009), they have shifted away from the strong R&D approach to the promotion of technological diversification and specialization in national economies (McCann–Ortega-Argilés 2011). They argue that policy-makers should encourage programs supporting the expansion of actual industrial facilities in the respective country to create comparative advantages (Foray et al. 2009). However, programs based on smart specialization should not be conceived of as top-down interventions, but rather as bottom-up methods where the *entrepreneurial process of discovery* is the main driving force. This process is understood as an identification process during which *entrepreneurs and other actors within their domain reveal and define smart specialization opportunities* that draw on existing assets and strengths on which (innovation) policies are meant to focus (McCann–Ortega-Argilés 2011). These smart specialization opportunities are described as exploitation, dissemination and adaptation of the so-called *general purpose technologies* (GPTs) in a particular domain.

Originally the fundamental idea of smart specialization was developed on a sectoral base. But in recent years *the term 'domain' has begun to be interpreted as region*, which has induced the spatial extension of smart specialization (McCann –

Ortega-Argilés 2011). This spatial extension was also underpinned by the "Barca Report" which has emphasized the necessity of place-based policy-making. Applying smart specialization in a regional policy context has led to changes in the phenomenon. In a spatial approach the entrepreneurial process of discovery focuses on the identification of science and technology areas (sectors) with distinctive market potential in a particular region to facilitate regional development and growth (Kempton et al. 2013). The actors of this process, based on their experience in the local economy, identify regionally prominent sectors among which knowledge could be transferred and spill-overs could be incurred in order to develop new growth paths. However, the objective is not to stimulate these sectors per se but to enhance interaction between different but related activities (Boschma–Gianelle 2014).

One of the key issues here is *embeddedness*, because these sectors have to be well embedded in the regional economy, in the regional industrial environment, otherwise the success of this specialized diversification policy may be less likely and the expected local impacts may not occur (McCann–Ortega-Argilés 2011). Furthermore, the size of these sectors should also be taken into consideration because they have to be large enough to generate significant benefits from knowledge spill-overs for the local economy. Another determining issue is *relatedness*. As Boschma and Gianelle (2014) claim, related variety within a region might facilitate the useful recombination of knowledge assets (GPTs included) by allowing knowledge to spill over between different but technologically related industries. In a regional context, it could be said that the higher the degree of relatedness in a region, the more learning opportunities are present, and the more it could contribute to regional growth (Frenken et al. 2007). Moreover, the higher the number of technologically related industries in a region, the more likely the actual industrial environment will expand in a sustainable way, because new industries will more probably be connected to existing ones (Neffke et al. 2011). However, unrelated diversification might be responsible for better regional resistance to external shocks; hence it might secure long-term regional development (Boschma–Gianelle 2014, Frenken et al. 2007) but the focus of smart specialization strategies is rather medium-term.

Finally, valuable sources of knowledge may also arrive from other regions, so the *connectedness* – or *connectivity* as proposed by McCann and Ortega-Argilés (2011) – of the domain (the region) is the third key element of smart specialization. Regions well connected with other regions have greater possibilities for learning and growth since the inflow of new knowledge may help to avoid negative regional lock-in and may facilitate the diversification of the regional industrial portfolio (Boschma–Iammarino 2009, McCann–Ortega-Argilés 2011). Naturally, the positive effects only occur if the extra-regional knowledge stems from related and not identical industries to the regional ones. Hence, making connections between technologically related activities within and across regions is equally important in order to fully exploit the potential of a region (Boschma–Gianelle 2014).

If we take a closer look at the abovementioned phenomena we notice that they are *well in line with the 'local buzz, global pipelines' theory* (Bathelt et al. 2004). While embeddedness and relatedness may be mainly responsible for a well-functioning local buzz, by making it possible for regional actors to interact and knowledge to flow unrestrictedly between them, connectivity may be related to the

creation of global pipelines and responsible for the acquisition of new ideas, competencies and knowledge.

All in all, smart specialization is a local knowledge and learning enhancement concept with the aim of fostering learning linkages within and between regions to facilitate the evolution of new activities, industries and to develop new, unique growth paths (McCann–Ortega-Argilés 2011). It proposes a new innovation policy design which involves different actors in the process of entrepreneurial discovery (Kempton et al. 2013). However, entrepreneurs have to be defined in a broader sense. Private and public organizations should also be involved in the process because the 'right' knowledge to design and implement regional smart specialization strategies does not exclusively stem from market-oriented organizations (Boschma–Gianelle 2014). In the following sections I will focus on the potential role and contribution of one particular type of organization – universities – in developing and implementing smart specialization strategies, since because of their nature, they are expected to have a prominent role in the process.

3. University models and economic development

According to the proponents of the smart specialization concept, one of the problems that many European regions have to face is the weak correlation between R&D, training specialization and the structure of local and regional activities (McCann–Ortega-Argilés 2011). There is often a mismatch between the demand for and supply of skills and knowledge in the local economy which can negatively influence the economic development and innovation potential of regions. Furthermore, the weak relationship between regional actors and the potentially large gaps between their knowledge bases can inhibit knowledge flows, the diffusion of new ideas, applications and the evolution of new technologies in local industry (McCann–Ortega-Argilés 2011). Therefore, *possible regional innovation policy aims* could involve fostering the proper matching between investments in knowledge and human capital and the present industrial and technological set-up of the regions (Camagni–Capello 2012), and furthermore, to facilitate the formation of learning networks. In these processes universities may play a crucial part as key knowledge-producing institutions and central players of regional knowledge networks, but their direct contribution to the formation of regional policies should also not be overlooked. Thus, a better understanding of their role in light of the smart specialization concept could be quite a relevant topic.

In general, the role and contribution of universities to the development of regional economies (and regional smart specialization strategies is a new policy instrument to do so) is a well-researched area in the academic literature. Besides their direct economic effects as huge employers and significant purchasers of local services, it is commonly accepted that they are one of the main sources of new knowledge, human capital and thus innovation in many economies. However, the roles they can fulfil in the economy have significantly changed over the years.

In previous centuries universities only performed educational activities and were also fewer in numbers (Goldstein 2010). Their connection with the (local) economy was slight or non-existent. The *integration of research functions into their*

missions led to the appearance of the first 'modern university', which also ensured the relatively broad financial and operational freedom its predecessor had enjoyed. Wissema (2009) categorizes these universities as second-generation universities. The fundamental purpose of this new type of university was to educate the elite of society and to achieve academic excellence; however, being intentionally practical and/or useful was missing from their educational or research agendas, which also hampered their relationship with the wider economy and society.

Until the end of 1980s the dominant view was that the educational and research activities of a university should not be constrained by financial restrictions whether these activities provided benefits to society or not (Breznitz–Feldman 2012). However, this approach has become problematic because of the enormous public financial support most of these institutions receive. Thus, lately, pressure has been put increasingly on universities to *create benefits* for the wider society as well (Goldstein 2010). In parallel, the decrease in public funds received from the central budget has incentivized universities to develop better connections with economic actors to complement their operational budget from other financial sources (Benneworth–Hospers 2007, Vilmányi 2011). Furthermore, universities have also begun to *actively participate* in the economic and social development of their surrounding areas (Goldstein 2010) and several triple-helix types of cooperation (Etzkowitz–Leydesdorff 2000) have appeared. Eventually, the above-mentioned processes together have led to the emergence of the third-generation universities (Wissema 2009) performing several new functions which could be characterized by intensive interaction between the university and economic and societal actors with the aim of intensifying the direct economic and societal contributions of universities to their regions.

However different types of universities could potentially interact with their regional economies in very different ways. Based on their wide range of functions and roles, Uyarra (2010) has distinguished five different university models which have evolved over the time, in relation to their contribution to regional development and innovation. Nevertheless, although these university models, adapting to the changing economic conditions and innovation theories, may have evolved separately from each other, they still co-exist because of varying institutional and regional contexts. The first university model, labelled the *knowledge 'factory'* (KF), has developed on the assumption that universities are the main producers of scientific knowledge and through knowledge spill-overs they could have an effect on regional innovation and growth. The main beneficiaries are mostly high-tech firms located in close proximity to universities, since it is perceived that geographical proximity facilitates the economic impact of academic research, and matters in the establishment of university-industry research partnerships (D'Este et al. 2013). Thus, the main mode of innovation could be considered to be science push. Since the key factors influencing their economic impact are geographical proximity, research intensity and excellence (because of the expected knowledge externalities) the co-location of firms and the availability of research funds, especially for basic research, are important.

The second type is the *relational university model*, which considers the exchange of knowledge as the main role of universities (Uyarra 2010). This more focused role on the establishment of collaborative linkages with industry has its origins in decreasing public funding and increasing expectations towards universities

to boost economic development. Furthermore, changes in the way of thinking about the process of innovation (breaking with the linear science push approach) also underpin this model. More emphasis has been placed on the channels through which knowledge flows between university and industry, but in this model the informal and more open or 'soft' channels are dominant (e.g. informal contacts, publications, conferences, contract research and consultancy activities, mobility of graduates, etc.). The more regulated, 'hard' channels are of lesser importance (e.g. patenting, licensing, spin-off activity). Their main partners are mostly larger manufacturing enterprises who choose their academic partners by excellence and not by geographical proximity. Relational universities establish few local linkages with smaller firms, who demand more routine activities.

The objective of an *entrepreneurial university* – as the third model in Uyarra's (2010) distinction – is to actively engage in the improvement of regional and national economic performance and to foster the financial success of the university by performing entrepreneurial activities (Etzkowitz et al. 2000). These types of universities conduct significant commercialization activities in an institutionalized way. They set up TTOs, introduce strict IP regulations, promote spin-off processes, and establish business incubators and science parks. So, in contrast with the relational universities, the more formalized and 'hard' channels of knowledge diffusion, which mostly rely on codified knowledge, are placed in focus. Accordingly, their innovation approach is rather linear and closer to the science push uptake. A frequent criticism in the literature about entrepreneurial universities is that they strive more towards maximizing their income and less to contributing to regional development, another is that many academic disciplines are unable to undertake such entrepreneurial activities (Philpott et al. 2011). Even if they are more committed to regional economic development in terms of their declared objectives, the activities they perform support it in only a very narrow sense.

The fourth university model introduced by Uyarra (2010) has evolved on the basis of innovation system theories, and is labelled the *systemic university model*. It is strongly connected to the regional innovation system approach, where the regional context, the localized, innovation-related and institutionally supported networks affect the process of innovation and the growth of a region (Uyarra 2010, Asheim and Coenen 2005). University-industry co-operations are seen as regionally embedded networks of universities, firms and other organisations (the relational model focuses on these links per se without their broader regional context). Thus, besides the aforementioned main partners, regional clusters and SMEs have also appeared among the universities' client base. Furthermore, systemic universities deliberately develop links and engage in discussions with governmental actors in contrast to the previously described types. Besides their broadened commercialization activities, they actively participate in the articulation of regional needs and the mobilization of local stakeholders in policy-making processes. On the whole the model of systemic universities has a greater focus on the regional contribution of the institution compared to the other types. However, this approach also over-emphasizes the importance of direct linkages and often implies that research, innovation and value creation would all take place in the same region, despite the fact that different university activities may have an impact on different spatial levels. In other words,

they presume that most of their activities have a direct and instantaneous impact on the regional economy.

The *engaged university* model views universities in the broadest and the most embedded sense (Uyarra 2010). They seem to be key players in economic development issues since they do not just engage in discussions about regional development but actively participate in regional policy formation. Defined in this way, these universities could be categorized as "fourth generation" universities because their main distinctive feature is proactivity. Instead of trying to meet the requirements of local economy and society, these institutions make an effort to shape their own local environment (Lukovics–Zuti 2014). Nevertheless, another frequent distinctive feature is that instead of introducing a separate third mission to contributing to regional growth and development they adopt a stronger regional focus in all of their activities (e.g. education and research) and align them better to regional needs. Regarding their partnerships, engaged universities tend to cooperate with all relevant regional stakeholders, they are more receptive to regional needs, thus they become central nodes in regional (knowledge) networks. Accordingly, their contribution is much wider than just facilitating direct knowledge transfer processes since they participate in the improvement of regional culture, society and environment in formal and/or informal ways. Furthermore, due to the stronger focus on regional context, engaged universities can be considered key channels between the global and local knowledge arenas, because they have the necessary competencies and capacities to harmonize global resources and local needs (Benneworth–Hospers 2007). However, several doubts have been raised whether engaged universities have the necessary capacity or funding to contribute to so many different fields, or how the centrally coordinated education policies, resource allocation and the relatively great autonomy of researchers affect their engagement.

4. Smart specialization in light of different university models

Based on the reviewed literature related to smart specialization, I have distinguished three essential elements of the concept, along which I have organized my ascertainments. These are: *the entrepreneurial process of discovery* which drives policy design by involving local actors to identify assets and strengths on which (innovation) policies should focus; *relatedness*, which refers to specialized diversification that enables regions to diversify into new but related industries in order to develop new growth paths; and *connectivity*, that links regions to provide external knowledge inflows related to their existing strengths and industrial structure. Then an examination of these elements was made based on the differing university models (Table 1).

Table 1 Role and contribution of different university models in designing and implementing smart specialization strategies

University models	Smart specialization elements		
	Entrepreneurial process of discovery	**Relatedness**	**Connectivity**
Knowledge factory	Passive contributor External environment: extensive knowledge Regional environment: partial knowledge	Indirect contribution Provides scientific knowledge for high-tech firms in its main research and teaching areas, irrespectively of regional needs	One-way, mostly outward knowledge flows
Relational	Passive contributor External environment: extensive knowledge Regional environment: partial knowledge	Selective contribution Exchange of knowledge based on excellence and not on geographical proximity or regional industrial needs	Bi-directional, but mainly outward knowledge flows
Entrepreneurial	Active contributor External environment: extensive knowledge in some disciplines Regional environment: extensive knowledge in some disciplines	Limited contribution Primarily provides knowledge related to 'hard sciences' with minor regional focus	Rather one-way, mostly outward knowledge flows
Systemic	Facilitator External environment: extensive knowledge Regional environment: extensive knowledge	Direct contribution Knowledge is produced and diffused in regionally embedded networks	Multi-directional, facilitates in- and outward knowledge flows Limited capabilities to align knowledge inflow and regional needs
Engaged	Committed facilitator or leader External environment: extensive knowledge Regional environment: extensive knowledge	Direct contribution Strong focus on regional needs in knowledge production and distribution	Multi-directional, facilitates in- and outward knowledge flows Key channels between global and regional knowledge arenas

Source: Own construction

The *knowledge 'factory' and relational types* of universities are able to participate in the identification *process of entrepreneurial discovery* in a very narrow and passive way. The former assumes that the knowledge it produces would automatically spill over into the surrounding area, mostly to co-located high-tech firms. So, its connections with the local actors are limited and the exploration of regional strengths is neglected. The latter, in turn, focuses on the establishment of linkages with a wider range of industrial actors but in a very informal manner and not necessarily in its host region. Thus, due to their stronger external focus, they may possess extensive knowledge about recent technologies and market opportunities but have only partial knowledge (limited to some actors/industries) in connection with their regional environment and so do not systematically participate in collaborations and discussions within the region. Accordingly, although they might be excellent in scientific terms, in the absence of proper place-specific knowledge and regional commitment they can only fulfil a passive, responding role in this process.

Because of their intensive commercialization actions *entrepreneurial universities* could be characterized by having extensive knowledge about the external and regional environment and market opportunities, but especially related to 'hard' sciences that are more closely linked to their entrepreneurial activities. This makes them an active contributor because they can (possess the 'right' knowledge) and will (included in their mission) participate in the process of discovery. The *systemic and engaged universities* possess the most extensive knowledge in connection with regional needs and non-regional trends. Their main added value to the process is their ability to identify regional strengths and weaknesses, link them to global expectations and translate these into policy recommendations. However, while a systemic university may fulfil a facilitator role and harmonizes interests between different stakeholders, an engaged university might be the leader of the whole process. And finally, the last two types can better exploit their knowledge generated by other scientific disciplines such as the arts or social sciences.

In connection with *relatedness* – specialized diversification – one could also identify differences between the contributions of different models. *Knowledge factory* type institutions can facilitate regional diversification in an indirect way. They follow a science push strategy, mainly towards high-tech industries, which often tends to overlook the existing regional industrial portfolio and only focuses on the distribution of scientific outputs. Hence there may be a mismatch between the knowledge production of universities (teaching and research) and regional needs, and KF universities mostly contribute to regional diversification if the co-located high-tech firms who benefit from the knowledge spill-overs are well embedded in the region. However, as Goddard et al. (2013) highlight in their work that the long-term adaptability of regional economies is dependent on the rarely emulated features of universities such as the wide basic and experimental research activities in which KFs are strong. *Relational universities* might contribute to specialized diversification in a very selective way. They participate in knowledge exchange processes mainly through their most excellent scientific areas, but the leading research areas of a university and the available regional assets, strengths and the regional industrial set-up or needs, do not completely corresponding (Goddard et al. 2013). Furthermore, relational universities do not have an explicit regional commitment, either.

In turn, *entrepreneurial universities* could contribute to diversification in a more direct yet rather limited way. They are able to produce and transfer the necessary complementary or related knowledge to local industries, but especially in connection with hard sciences. Thus, they are only able to provide a common scientific or technology base to a few industries. However, their entrepreneurial activities like establishing incubators or supporting spin-offs may expand the industrial structure of a region in a 'related' manner. According to Uyarra's (2010) typology, *systemic universities* are those which are embedded in their regional context the best, partly because this concept has been evolved from innovation system theories. They deliberately fulfil a boundary-spanning role which means creation, transfer and translation of knowledge between different actors embedded in the same regional (knowledge) networks. Due to their direct contribution, a wider scientific and technological platform can be developed. This common platform may be a help in building linkages between different but technologically related sectors, where intermediary industries might be weak or missing. With their stronger and more direct focus on regional context in their missions, *engaged universities* can contribute to this element of smart specialization in the most directed way. They are in a position to better align their research and teaching areas to regional needs, even if these are not necessarily their leading areas. Moreover, engaged universities can more strongly influence policies affecting their regional environment than the previously introduced models, which could also help focus priorities on the most embedded and related industries. Finally, their potential contribution is much wider than just providing technological development to their regions, since they can facilitate cultural and community development, too (Goddard et al. 2013). And these roles make it possible to facilitate diversification in lagging regions where the necessary R&D capacities are not available but social innovations could take place.

The last question is how different universities can facilitate the *interconnection of regions*, thus how they can support the inflow of external knowledge related to the existing regional industrial structure and knowledge base. Because of its strong orientation towards the exploitation of scientific outputs, a *knowledge 'factory'* type university might contribute to the outflow of knowledge and mainly provide new knowledge to other regions. Although such a university may have connections with co-located high-tech firms, because it is not necessarily embedded in the regional industrial structure, external knowledge barely reaches them from the side of university in the context of its weak regional engagement. High-tech firms, research institutions and other universities can be considered as its main partners, but they only offer a narrow and specialized external knowledge pool. A *relational type university* pays much more attention to the development of linkages with industrial actors compared to KFs, but in a very selective manner. It promotes collaboration with economic players within its excellent scientific areas. However, these areas are not always related to regional strengths, which can hinder the utilization of potentially inflowing knowledge and incite universities to look for partners in other regions. It breaks with the unidirectional approach of KFs and facilitates bi-directional channels, but the main direction of knowledge flow remains outward. So, a relational university might improve the connectivity of a region if the regional industrial structure is related to the university's excellent scientific areas. An *entrepreneurial university* can improve the connectivity

of a region in a manner similar to the aforementioned two models. It rather promotes one-way knowledge diffusion, mostly out from the region, although may facilitate the inflow of knowledge, but especially related to industries that rely on 'hard' sciences. Its external relations are much wider, and the university itself takes into account regional economic development issues, but being a central node between regional and global knowledge arenas is far beyond the scope of its activities.

Systemic and engaged universities both facilitate in- and outward knowledge flows because of their stronger regional focus and commitment. They do so with a multi-directional approach, since they tend to cooperate with a wide variety of stakeholders, within and across regions, from small and large firms to governmental actors. Moreover, engaged universities also develop close cooperation with the civil sphere. Although they understand regional needs well, they may have difficulties developing extensive external connections compared to other models because of their fragmented resources (fragmented between spatial levels and stakeholders). Nevertheless, these two types can better align regional needs and knowledge-inflows. However, the systemic model has limited capabilities to achieve this because it presumes that research, innovation and value creation can all take place in the same region, and thus to some extent it is 'locked-into' its own regional system, while engaged universities might more readily constitute integrative network nodes between global and regional knowledge arenas. Besides they scan the external environment for new, related knowledge sources, engaged universities are in a better position to translate and disseminate it between regional stakeholders.

5. Conclusion

In the 2014–2020 programming period, smart specialization has become a defining policy approach to develop regional economies in which process universities play an important role. However different types of universities contribute differently to the development of their surrounding region. Therefore, the aim of this paper was to identify the potential role and contribution of different university models in designing and implementing smart specialization strategies.

In order to do this, firstly, the concept of smart specialization was introduced and its three main elements were distinguished: entrepreneurial process of discovery, relatedness and connectivity. Subsequently, based on the work of Uyarra (2010), five different but coexisting university models were described: knowledge factory, relational, entrepreneurial, systemic and engaged. Finally, according to the distinguished elements of smart specialization, the contribution of each university model was described. Due to their objectives, roles and levels of engagement, the knowledge factory and relational types of universities can only participate passively in the entrepreneurial discovery process. Their contribution to the related diversification of the host regions is only indirect and selective, while their knowledge sourcing process are basically unidirectional. Although entrepreneurial universities can be considered an active participant in the discovery process, their contribution is still limited and tries to push knowledge and innovation onto the economy in a one-way manner. Finally, systemic and engaged universities can be the leaders of the entrepreneurial discovery process. These university types provide direct contribution

to the local economy with a strong focus on regional need, and hence, their connectivity is genuinely multidirectional. In conclusion universities are key players in smart specialization, but their role and contribution should be defined in line with their type.

Acknowledgement: This research was supported by the EU-funded Hungarian grant EFOP-3.6.1-16-2016-00008.

References

Asheim, B. T. – Coenen, L. (2005): Knowledge bases and regional innovation systems: Comparing nordic clusters, *Research Policy*, 34, 8, 1173–1190.

Bathelt, H. – Malmberg, A. – Maskell, P. (2004): Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, 28, 1, 31–56.

Benneworth, P. – Hospers, G. (2007): Urban competitiveness in the knowledge economy: Universities as new planning animateurs. *Progress in Planning*, 67, 105–197.

Boschma, R. – Iammarino, S. (2009): Related Variety, Trade Linkages and Regional Growth in Italy. *Economic Geography*, 85, 3, 289–311.

Boschma, R. – Gianelle, C. (2014): *Regional Branching and Smart Specialization Policy.* S3 Policy Brief Series no. 06/2014, Commission of European Communities, Brussels.

Breznitz, S. M. – Feldman, M. P. (2012): The engaged university. *The Journal of Technology Transfer*, 37, 139–157.

Camagni, R. – Capello, R. (2012): Regional Innovation Patterns and the EU Regional Policy Reform: Toward Smart Innovation Policies. *Growth and Change*, 44, 2, 355–389.

CEC (2010): *Europe 2020. A strategy for smart, sustainable and inclusive growth.* Commission of European Communities, Brussels.

D'Este, P. – Guy, F. – Iammarino, S. (2013): Shaping the formation of university–industry research collaborations: what type of proximity does really matter? *Journal of Economic Geography*, 13, 4, 537–558.

Etzkowitz, H. – Leydesdorff, L. (2000): The dynamics of innovation: from National Systems and „Mode 2" to a Triple Helix of university-industry-government relations. *Research Policy*, 29, 2, 109–123.

Etzkowitz, H. – Webster, A. – Gebhardt, C. –Terra, B. (2000): The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy*, 29, 313–330.

Foray, D. – van Ark, B. (2007): *Smart specialization in a truly integrated research area is the key to attracting more R&D to Europe.* Knowledge Economists Policy Brief No. 1., Commission of European Communities, Brussels.

Foray, D. – David, P. A. – Hall, B. (2009): *Smart Specialization – The Concept.* Knowledge Economists Policy Brief No. 9., Commission of European Communities, Brussels.

Goddard, J. – Kempton, L. – Vallance, P. (2013): Universities and Smart Specialization: challenges, tensions and opportunities for the innovation strategies of European regions. *Ekonomiaz*, 83, 2, 83–101.

Goldstein, H. A. (2010): The 'entrepreneurial turn' and regional economic development mission of universities. *The Annals of Regional Science*, 44, 83–109.

Frenken, K. – van Oort, F. – Verburg, T. (2007): Related Variety, Unrelated Variety and Regional Economic Growth. *Regional Studies*, 41, 5, 685–697.

Kempton, L. – Goddard, J. – Edwards, J. – Hegyi, F. B. – Elena-Pérez, S. (2013): *Universities and Smart Specialization.* S3 Policy Brief Series No. 03/2013, Commission of European Communities, Brussels.

Lukovics M. – Zuti B. (2014): Egyetemek a régiók versenyképességének javításáért: „negyedik generációs" egyetemek? *Tér és Társadalom*, 28, 4, 77–96.

McCann, P. – Ortega-Argilés, R. (2011): *Smart Specialization, Regional Growth, and Applications to EU Cohesion Policy.* Economic Geography Working Paper 2011, Faculty of Spatial Sciences, University of Groningen, Groningen.

Neffke, F. – Henning, M. – Boschma, R. (2011): How Do Regions Diversify over Time? Industry Relatedness and the Development of New Growth Paths in Regions. *Economic Geography*, 87, 3, 237–265.

Philpott, K. – Dooley, L. – O'Reilly, C. – Lupton, G. (2011): The entrepreneurial university: Examining the underlying academic tensions. *Technovation*, 31, 161–170.

Uyarra, E. (2010): Conceptualizing the Regional Roles of Universities, Implications and Contradictions. *European Planning Studies*, 18, 8, 1227–1246.

Vilmányi. M. (2011): Egyetemi-ipari együttműködések a kapcsolatmarketing nézőpontjából. *Vezetéstudomány*, 42, 1, 52–63.

Wissema, J. G. (2009): *Towards the third generation university. Managing the university in transition*. Edward Elgar, Cheltenham.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 138–154.

A Policy Perspective on the Future of Mobility and Regional Competitiveness

Bence Zuti

The presence of developed regional transport and telecommunication infrastructure is considered a factor that can directly or indirectly contribute to regional competitiveness, especially in the age of digitalization. Through this phenomenon, we embrace a world that is becoming more connected and complex than ever. With the new technological innovations and solutions becoming available, more advanced levels of mobility can be achieved: concepts of smart urban mobility and autonomous transportation systems are becoming a reality. These rapid changes require swift action both from the perspectives of society and economy. This action includes the re-examination of our currently effective policies, with the use of a multidisciplinary mindset considering the perspectives of policymakers, manufacturers, and consumers as well.

The goal of the paper is twofold: First, to explore why the concept of regional competitiveness is more relevant in the digital age and second, to explore how EU policies are nudging towards the future spread of self-driving cars; potential enhancers of regional competitiveness.

Keywords: regional competitiveness, digitalization, regional mobility, EU policy

1. Introduction

As the transition to the next stage of globalization and the phenomenon of digitalization continues, we are experiencing worldwide changes that affect our economies and the foundations of society itself. As a result of globalization, we are able to exchange knowledge and participate in value creation on a global scale. Data and information are the fuel in the engine we commonly refer to as digitalization. With novel technological solutions, we can reach more people at a much lower cost. This results in higher data flows and the accessibility of data, knowledge and ideas is increasing (Brynjolfsson–McAfee 2012, Manyika et al. 2016, EC 2017a).

There is also a notable transition in how global processes and flows of society and economy work and contribute to our everyday lives. As we aim towards the establishment of knowledge- and innovation-based societies, the emphasis on physical goods is declining relatively. Tangible flows of physical goods remain significant as well, but intangible flows like the generation and analysis of knowledge, data, and information are becoming far more crucial, as these inputs can boost economies exponentially (Leonhard 2016, Magruk 2016, Schwab 2017). Networks are becoming more intensely complex, and meanwhile connections between academia, industry, governments, environment and society are denser than ever (Dujin et al. 2014, Lee–Vivarelli 2006, Schwab 2017).

We are living in an environment with an abundance of smart devices and people who are constantly online and connected to the Internet. We can definitely state that our presence as an individual or as an organization has both physical and digital aspects and components (Manyika et al. 2016, Schwab 2017, Yoon 2017).

This incremental increase of complexity and density is due to the fact that through digitalization, emerging economies and even individuals can be notable contributors to global economic flows (Manyika et al. 2016, WEF 2017). Building on this idea, the role of a national economy is decreasing relative to sub-national aspects of the economy and society, as the region or city gains more emphasis (Lengyel 2010).

Digitalization brings us opportunities and great challenges as well in an environment characterized by radical change. It is contradictory but true that the challenges emerging due to the spread of technology can be only solved by applying novel solutions provided by technology itself (Room et al. 2018, WEF 2017). Currently it seems that there is no turning back from digitalization. The digital environment that supports the global economy and society in general is constantly evolving, and it acts as the main trigger of innovation, transformation and disruption (OECD 2017, Piccinini et al. 2016, WEF 2016a).

There is also a need for change in our mindsets, as digitalization requires a truly multidisciplinary approach. Academia, the government and also businesses need to take part in this mindset change, so we can increase our digital literacy and digital capabilities, harness digital assets, mitigate digital risks (Dean et al. 2012, GSMA 2017).

Digitalization can be seen as a catalyst of creative destruction, as is affects all industries and directly alters every single aspect of our everyday lives, from social, economic and environmental aspects as well. One significant and radical innovation in the era of digitalization are self-driving cars. Through this, the way we think about mobility and the core concept of transportation needs to be reconsidered.

Self-driving cars promise to be efficient and integral parts of our society and the global economy. According to existing preliminary studies, the introduction of this new method of transport will enable savings of billions of dollars by significantly decreasing the cost of labor, fuel, time, reducing congestion and the number of accidents (Lukovics et al. 2018, Montgomery 2018, WEF–BCG 2018, Groshen et al. 2018, CGPS 2017).

Self-driving cars not only affect regional competitiveness but are also affected by policies as well, hence it is necessary to explore both sides to reach a full understanding of the topic. Due to the significant differences in how societies perceive self-driving cars, conditions for the use or testing of these vehicles could vary from region to region (Lukovics et al. 2018).

The pace of change in the digital world is fast, and those who delay, stand to lose their competitive edge. This is why in this significantly digitally-driven environment it is first required that we re-evaluate how regional competitiveness is interpreted. The next chapter will focus on the fundamentals, core ideas and a possible recontextualization of competitiveness.

2. The Relevance of Competitiveness in the 21st Century

The logical arc of regional competitiveness naturally evolved in the previous decades and with digitalization it is necessary to rethink how we interpret this key concept of economics. Rivalry and broadly interpreted competition has always been a part of human society. The most fundamental categorization of this rivalry can be expressed as follows (Lengyel 2010, p. 100, Batey–Friedrich 2000, p. 4):

- Rivalry among living organisms for food, a place to live and the assurance of biological reproduction
- Social groups (e. g. communities, political parties, religions) compete with each other for authority
- Economic units also compete in order to acquire economic increment.

Indeed, the word competition, from a purely economic perspective can be only interpreted assuming the latter category (Lengyel 2010). The competition among economic units can be further divided into three subcategories (Lengyel 2010, p. 100, Siebert 2000, p. 3):

- The most talented individuals compete to get hired by the best companies
- Firms compete for resources, market share and profit
- Territorial units (e. g. cities, regions, nations) compete with each other in order to provide high levels of wellbeing for those who live there.

The interpretations of regional competitiveness can be grouped into two main categories (Huggins et al 2014a, Huggins et al 2014b). Through the interpretation of the first group, competitiveness cannot be defined in the case of territorial units, it can be recognized only in the case of enterprises (Polenske 2004, Dicken 2003, Krugman 1998, Krugman 1994). For those who agree with this statement, competitiveness is only discussed on a microeconomic level (Lengyel 2010). Through the interpretation of the second group, competitiveness is a valid definition related to territorial units as well (Porter 2008, Dahlman 2007, Chesire 2003, Camagni 2002, Malecki 2002, Lengyel–Rechnitzer 2004, Markusen 1996, Porter 1996). The popularity of the latter concept has risen thanks to the fact that by globalization, nations, regions, cities also compete on a global level for resources, capital or talent, as enterprises do. This latter group claims that competitiveness can be interpreted on micro- and macroeconomic levels as well (Lengyel 2010, Martin 2003).

Capello (2009) states that economic activity is present in a diverse way in space, as the necessary resources are scattered unevenly throughout the globe. Some resources are available, some are non-existent based on their geographical location, hence some regions can harness the advantages, while others may experience disadvantages due to the availability and scarcity of factors. This imbalance affects the economic potential of a territorial unit, the levels of attainable well-being and also the fundamental mechanisms of economic systems. From yet another aspect, the presence and exogenous (e. g. presence of companies that attract workforce, local practical implementation of innovative solutions, installation and accessibility of infrastructures) and endogenous (e. g. processes supporting innovation, the ability to adapt, the potential for knowledge creation, the professional preparedness of experts) elements that are able to catalyse the economic activities carried out in a region (Capello 2009). According to Capello (2009) the potential for economic development also relies on factors like human capital, social fixed capital and accessibility. Camagni (2009) builds on this concept and highlights the significance of territorial capital, which regions and cities should address as well when it comes to enhancing competitiveness. From this perspective, territorial capital can be built up by the following elements (Camagni 2009, p. 123):

- Public goods and resources
- Intermediate, mixed-rivalry tangible goods

- Private fixed capital and toll goods
- Social capital
- Relational capital
- Human capital
- Agglomeration economies, connectivity and receptivity
- Cooperation networks
- Relational private services.

In an era of digitalization, especially the endogenous elements of a region can become more valuable, in the case of knowledge-based societies and smart economies. The researches that relate closely to competitiveness cover a broad spectrum, and in terms of defining competitiveness, the scale is also wide, as there are numerous ways to define competitiveness. The standard definition is the following: "*competitiveness is defined as the ability of a region to generate, while being exposed to external competition, relatively high income and employment levels. In other words, for a region to be competitive, it is important to ensure both quality and quantity of jobs*" (EC 1999, p. 75). We can find other definitions as well, like "*regional competitiveness is the ability of a region to offer an attractive and sustainable environment for firms and residents to live and work*" (Annoni et al. 2017, p. 2). The WEF (2016b, p. 4) defines competitiveness in the following way: "*competitiveness as the set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can achieve*". The definitions cited above focus on four key elements, which are productivity, high levels of income, employment, the presence of attractive economic and social environment. These elements have much deeper context; however, it is crucial to emphasize a key point, namely that competitiveness is made up from a set of deeply interconnected dimensions of hard and soft factors (Huggins et al. 2014a, Huggins et al. 2014b, Lengyel–Rechnitzer 2013).

In connection with research related to competitiveness, we have reached a significant milestone. As it is clear that digitalization has a growing effect on economies and societies, it was only a matter of time for competitiveness as a concept to be explored from a digital point of view. The IMD embedded competitiveness in a digital context and came up with a definition of digital competitiveness, described as follows (IMD 2017, p. 19): "*digital competitiveness is defined as the capacity of an economy to adopt and explore digital technologies leading to the transformation in government practices, business models and society in general. In this way, firms increase the opportunities to strengthen future value creation*".

Table 1 represents the three main components, overall 9 sub-components and indicators that make up digital competitiveness (IMD 2017, p. 21). This re-evaluation focuses on the significance of adaptation in a world of constant change. Also, it addresses the significance of the ability to harness the potential in digital technologies. Compared to the traditional definitions, we can see that this digital competitiveness definition builds upon the original key elements like productivity, income and a supportive environment, with digital technologies acting as the foundations of potential economic and social development. The drivers of competitiveness become success factors inserted in a digital framework, hence there is a shift in the basic point of view. As a further expansion of the traditional competitiveness definitions, digital competitiveness also lists indicators that

can be directly tied to concepts like gender equality, internationalization or even legal aspects.

Table 1 Overall Structure of Digital Competitiveness

Knowledge		
Talent	Training and education	Scientific concentration
Educational assessments, International experience, Foreign highly-skilled personnel, Management of cities, Digital/Technological skills, Net flow of international students.	Employee training, Total public expenditure on education, Pupil-teacher ratio in tertiary education, Graduates in Sciences, Women with degrees.	Total expenditure on R&D (%), Total R&D personnel per capita, Female researchers, Scientific and technical employment, High-tech patent grants.
Technology		
Regulatory framework	Capital	Technological framework
Starting a business, Enforcing contracts, Immigration laws, Technological regulation, Scientific research legislation, Intellectual property rights.	IT & media stock market capitalization, Funding for technological development, Banking and financial services, Investment risk, Venture capital, Investment in telecommunications.	Communications technology, Mobile broadband subscribers, Wireless broadband, Internet users, Internet bandwidth speed, High-tech exports (%).
Future readiness		
Adaptive attitudes	Business agility	IT integration
E-Participation, Internet retailing, Tablet possession, Smartphone possession, Attitudes toward globalization.	Opportunities and threats, Innovative firms, Agility of companies, Use of big data services, Knowledge transfer.	E-Government, Public-private partnerships, Cyber security, Software piracy.

Source: own construction based on IMD (2017, p. 21)

The knowledge component can be divided into three sub-components, which are: talent, training and education, and scientific concentration. Digital transformation greatly builds on the availability of knowledge and how it is implemented in practical solutions. Proper education and digital literacy also affect how endeavors towards digital transformation are accomplished. Scientific concentration describes the structures and investment levels present that enable the creation and dissemination of knowledge (IMD 2017).

The technology component is made up of the following three sub-components: regulatory framework, capital, and technological framework. A well-established legal environment, the presence of supportive institutions can all act as drivers of innovative change. Capital flows and the quality of technology-related physical infrastructures can all account for the spread of digital technologies (IMD 2017).

The future readiness component comprises three sub-components, namely: adaptive attitudes, business agility, and IT concentration. The future readiness component explores, the opinions, attitudes and behaviors that relate to digitalization and also measures resilience and how well digital solutions are used (IMD 2017).

If we thoroughly examine the indicators and components of digital competitiveness, we can identify that most of them can be directly or indirectly related to self-driving cars, as one of the novelties of the digital age. It is also an accepted concept that regional transport systems and advanced mobility solutions can contribute to the effective operation of regions and cities (Camagni 2009, Capello 2009, Kiel et al 2014, Lengyel 2010). As mobility and transport solutions contribute to the flow of human and physical capital, they influence the level of competitiveness (EC 2017b). In the next chapter, the opportunities and challenges of future mobility will be in focus from the perspective of digitalization.

By exploring the fundamentals and the development of regional competitiveness it is clear that mobility is a key enhancing factor in this framework. The next chapter focuses specifically on how mobility can influence regional competitiveness.

3. Mobility in the Digital Age

The transportation and logistics sectors face radical changes ahead as a result of the spread of digital technologies. Smart and autonomous solutions are being researched and developed in order to maximize the potential in the automotive industry (Foulser 2017, Thorpe–Motwani 2017). The subject is important, as mobility is a foundational part of both rural and urban territorial units, and it is an enabler of access to resources and destinations (Piccinini et al. 2016). The main challenges that the deployment of smart and autonomous mobility solutions need to address are the following (Benevolo et al. 2016, p. 15–16, Lang et al. 2016, Lang et al. 2017, Piccinini et al. 2016, UN 2016):

- reducing pollution,
- reducing traffic congestion,
- increasing road and personal safety,
- reducing noise pollution,
- availability of public city space,
- increasing access,
- improving transfer speed,
- offering better, safer and more reliable services,
- secure collection and management of data,
- reducing transfer costs.

Tackling these potential challenges will have great benefits for society and individuals as well. One of the potential solutions to tackling the above challenges lies in autonomous vehicles. These vehicles are agile assets that are able to collect data on their physical and digital surroundings via sensor technology and connectivity solutions, furthermore based on the level of automatization, some vehicles will be capable of engaging in transport as an integral and secure element of mobility without any human intervention (ITF 2015, SMMT 2017a, SMMT 2017b, Yeomans 2014). The US-based Society of Automotive Engineers (SAE) defines six separate levels of automation (Table 2).

The list starts with no automation, where the human driver is responsible for all aspects of driving tasks. The highest level of automation means that the vehicle is fully capable of operating all driving tasks without any human action necessary. In its most valid meaning, autonomous cars are vehicles in possession of Level 5 autonomy based on the SAE classification.

Table 2 Levels of Automation defined by SAE International

Level	Name	Definition
Human driver monitors the driving environment		
0	No Automation	The full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems.
1	Driver Assistance	The driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task
2	Partial Automation	The driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task.
Automated driving system monitors the driving environment		
3	Conditional Automation	The driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene.
4	High Automation	The driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene
5	Full Automation	The full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver.

Source: own construction based on SAE (2014, p. 2)

The support of efficient and accessible transportation infrastructures is crucial in order to maintain a vital economy and society (Lang et al. 2017). As stated by Litman (2017), the overall goal is the potential increase of accessibility in mainly urban areas. Accessibility can be explained as "*the ease of reaching goods, services, activities and destinations, which together are called opportunities. It can be defined as the potential for interaction and exchange*" (Litman 2017, p. 6).

Jeekel (2017) highlights that mobility is a multidimensional concept built up by three core elements. Firstly, vehicle technology solutions are at the center of travel and transportation. Secondly, intelligent communication systems are responsible for the seamless and real-time flow of data which is analyzed and utilized in traffic situations effectively. Thirdly, business models provide the framework of mobility. The efficiency and success of the business model is dependent on the dominant consumer behaviors of a given territorial unit.

The existing transportation paradigm is shifting from the individual ownership and possession of products towards considering mobility as a service (MaaS) (Foulser 2017, Goodall et al. 2017). The MaaS paradigm identifies three key stakeholders (Foulser 2017, p. 8):

- Customers: They are integral and essential in transport systems and are mainly driven by user experience.

- Mobility services providers and operators: They are the companies or authorities who operate and maintain services. Companies tend to put emphasis on their financial returns, while authorities focus on the establishment of cost-efficient and widely accessible solutions.
- Authorities: They are actors who are empowered to intervene in the transportation system though legal actions and have regulatory supervision.

As the new era of mobility rapidly approaches, similar haste is necessary in the revision and redesign of policies so that the regulatory frameworks remain fully viable in a more and more digital economy and society.

Besides the identified advantages of the introduction of self-driving cars, Lukovics et al. (2018) identified a number of risks that can be directly connected to this radical innovation. Due to this, regulations are also undergoing change and also determine the main approach towards self-driving cars.

The next chapter focuses on the initiatives driven by the EU which aim at the reformation of regulatory frameworks to enhance the positive effects of digitalization.

4. Policy Perspectives related to Autonomous Vehicle Technologies and Digitalization in the EU

There is growing interest in investing in technologies related to autonomous vehicles. This solution in mobility can bring a radical change from an economic and social perspective as well. While the ongoing research progresses in quick fashion, the related policies also need to be redesigned and updated within a short timeframe. Policymakers, regulators and experts in the related industries need to take a future-oriented, proactive and practical approach so the effective policies can act as enablers of new technology (Raposo et al. 2017, ETSC 2016, Frisoni et al. 2016, Yeomans 2014).

As a result of the introduction of autonomous vehicles, the future of driving and mobility overall is expected be notably different from what we know today. The appearance of these self-driving vehicles will bring a revolutionary change in how we relocate ourselves, and policies should also need to change and develop in order to minimize the effect of unfavorable risks, and to maximize the potential inherent in this technology. The regulatory frameworks will also need to be revised (Raposo et al. 2017).

There are a number of currently existing and applicable legal regulations in the EU that can be connected with driving (Raposo et al. 2017, p. 7–8):

- Geneva Convention on Road Traffic 1949
- Vienna Convention on international road traffic 1968
- Directive 2006/126/EC on driving license
- Directive 2003/59/EC on training and initial qualifications of professional drivers
- Directive 2009/103/EC on motor insurance
- Directive 85/374/EEC on product liability
- Directive 2007/46/EC on vehicle approval
- Directive 2014/45/EU on roadworthiness
- ITS Directive 2010/40/EU
- Directive 95/46/EC on data protection
- Directive 2002/58/EC on privacy in electronic communications

- Directive 2008/96/EC on infrastructure safety management
- UN Regulation No. 116 on anti-theft devices
- UN Regulation No. 79 for steering equipment
- UN Regulation No. 131 laying down the technical requirements for the approval of Advanced Emergency Braking Systems (AEBS) fitted on trucks and coaches
- Declaration of Amsterdam
- C-ITS communication.

From the above listed regulations, the most significant from the perspective of autonomous cars are the Declaration of Amsterdam and the C-ITS communications. Also related to autonomous cars, the C-ART, and from the perspective of the whole digital economy and society, the GDPR initiatives should be addressed.

4.1 Declaration of Amsterdam

The Declaration of Amsterdam instantly acknowledges that the changes coming in the next decades to the automotive industry and mobility will be more radical than the changes happening in the last century. The aim is to enhance the economic potential of the EU by improving traffic flows, road safety, environmental performance (zero-emissions mobility) and efficiency in the transportation sector overall. Besides the economic benefits, the document highlights potential benefits that can be harnessed by society as well. Here the goal is to enhance social inclusion, develop accessible mobility services both in rural and urban regions and spread the concept of mobility as a service (MaaS) (DoA 2016). The Declaration of Amsterdam envisions five key shared objectives (DoA 2016, p. 5):

- The establishment of a coherent European framework that supports the deployment of interoperable connected and automated driving, with a projected completion by 2019,
- Collect innovations and developments in the broadest available perspective so connected and automated vehicle technology can reach their full potential and there is also a focus on mitigation of identified risks,
- The adaptation of a cross-border, experience-focused approach that supports the dissemination of knowledge in the topic,
- The support of innovation activities related to connected and autonomous technologies, while strengthening the position of EU industry;
- The establishment of frameworks that assure data flows are handled in a secure way.

The five shared objectives above are supported by a joint agenda which emphasizes that stakeholders within the EU have a crucial role in promoting the initiatives related to the future deployment of autonomous vehicles. The presence of a transparent legal framework, proper data protection, engagement in international projects, raising customer awareness and the deployment of convenient infrastructure are all matters that need to be addressed in the joint agenda. Besides the potential advantages, the economic and social challenges also need to be identified on the broadest spectrum (e. g. security, ethics, data usage, liability, legal aspects) possible (DoA 2016).

4.2 C-ITS

The report is a summary on the deployment of Cooperative Intelligent Transport Systems (C-ITS), which supports cooperative, connected and automated mobility throughout the EU (C-ITS 2017).

The document lists four main recommendations from a legal and organizational perspective that would promote visions of a new phase in mobility (C-ITS 2017, p. 10):

- It is necessary to build a legal and technical framework in the EU that acts as a foundational structure when it comes to the deployment of self-driving cars in the EU.
- The EU needs to take proactive and future-oriented actions, so the deployment of autonomous vehicles can occur in a relatively short timeframe. This mindset is necessary in a fast-paced digital environment and in a world characterized by radical changes. It is crucial that all new services and solutions related to mobility have backwards compatibility. This means new technology is compatible with already existing technology, frameworks or infrastructures.
- The first set of standards and profiles related to future mobility technologies need to be defined by the second half of 2018.
- Common definitions that will be utilized in future work and autonomous vehicle projects should be clearly determined, mainly in the areas of compliance assessment, privacy and data protection and security.

If we compare the C-ITS recommendations with the shared objectives of the Declaration of Amsterdam, we can highlight a few similarities. Both documents emphasize the need of a firm and unified legal and technical framework to be created in a short timeframe. Furthermore, both promote the need for investments and R&D&I activities related to autonomous vehicles. Finally, questions and measures regarding privacy and data security have a central role.

4.3 C-ART

The C-ART (Coordinated Automated Road Transport) document acknowledges the potentially radical changes lying ahead of us due to future deployment of autonomous vehicles in the EU. In the case of this deployment being completed, it will have huge economic and social impacts and a great number of challenges will need to be addressed. The study explores future-oriented approaches so autonomous vehicles can be deployed to their fullest potential, EU-wide (Raposo et al. 2017). The authors of the C-ART document identify three pillars that require attention when it comes to the introduction of autonomous vehicle in practice: technology, legislation and users (Raposo et al. 2017).

Building on this idea, seven fields are emphasized, where the EU will need to take firm action in order to answer the open questions, address the challenges presented, so the potential of autonomous technology can be maximized (Raposo et al. 2017, p. 95–96):

- Technology-related open questions (e.g. What operational issues may arise? Would the deployment of autonomous vehicles be feasible and sustainable by car manufacturers?
- Infrastructure-related open questions (e.g. Should related infrastructure be able to monitor and control traffic as well?)
- Human-factors-related open questions (e.g. How will the mix of autonomous and non-autonomous vehicles in traffic be managed? What is the opinion of the public on autonomous vehicle technology? Will the operation of autonomous vehicles require some sort of training?)
- Data-related open questions (What data is required for the smooth operation of autonomous vehicles? How will data flows be managed?)
- Ethics-related open questions (What ethical dilemmas may arise related to autonomous vehicles?)
- Insurance and liability-related open questions (Who is accountable for potential damage?)
- Political and legal open questions (Who is accountable when an accident happens?)

It is obvious that these are crucial questions and challenges that need to be answered so that the potential risks in autonomous technology can be minimized.

4.4 GDPR

On 25 May 2018 the EU's General Data Protection Regulation (GDPR) will go live, replacing the currently effective Data Protection Directive (Directive 95/46/EC). The new GDPR framework is a redesign of how data will be handled EU-wide. The GDPR was adopted in April 2016 and the aim of the regulation is to strengthen individual personal data protection rights within the EU (EC 2018). The GDPR is unambiguously a risk and data management framework designed for the age of technology and digitalization (Room et al. 2018). Though this regulation does not address autonomous vehicle technology relations directly, the document will be the foundation of the manner in which data is handled in the digital economy EU-wide.

Why is it necessary to introduce a new framework aimed towards strengthening data protection of individuals, companies and organizations? It is necessary due to the fact that data is becoming a truly valuable asset in the digital economy (Bughin et al. 2016, EC 2018, Rose et al. 2013). From a company perspective, a general set of transparent rules will be introduced so personal data is stored in a secure and authentic way. From an individual's perspective, they will be more empowered to control how personal and private data is handled by institutions (EC 2018).

As summarized by the GDPR communication, the core elements of the new data protection framework are the following (EC 2018, p. 2–4):

- A harmonized legal framework leading to a uniform application of rules to the benefit of the EU digital single market: The design of the framework and the establishment of data protection laws are fundamental steps, as in economies and societies strongly driven by digitalization the assurance of personal data protection is a crucial safety element (Room et al. 2018),

- A level-playing field for all companies operating in the EU market: Companies based in or outside the EU fall under the same regulations, in case the goods offered, or services provided relate to an EU individual. Concerned entities will need to reevaluate how they use technology and data (EC 2018, Room et al. 2018),
- The principles of data protection by design and by default creating incentives for innovative solutions,
- Stronger individuals' rights: Individuals will be assured of their rights related to information, like the 'right of access', the 'right to rectification', the 'right to erasure', the 'right to restriction of processing', the 'right to data portability' or the 'right to object'. With these rights effective, individuals will be able to connect with and categorize their personal data, or enable data deletion as well (EC 2018, Room et al. 2018),
- More control over personal data for individuals,
- Stronger protection against data breaches,
- The Regulation gives all data protection authorities the power to impose fines on controllers and processors: Related fines can reach EUR 20 million or 4% of the worldwide annual turnover in case of companies (EC 2018),
- More flexibility for controllers and processors processing personal data due to unambiguous provisions on responsibility (the accountability principle)
- More clarity on the obligations of processors and the responsibility of controllers when selecting a processor,
- A modern governance system to ensure that the rules are enforced more consistently and strongly,
- The protection of the personal data guaranteed by the Regulation travels with the data outside the EU ensuring a high level of protection: Currently, companies are taking the appropriate technical and organizational actions that are necessary for the appropriate implementation of the GDPR initiative. Addressing the risks that emerge related to personal data security are necessary for smooth operations from a data flow perspective (Room et al. 2018).

The proper application of the framework will be carried out by the so-called European Data Protection Board. This institution will ensure the regulations are understood throughout the EU in a unified way. The collation of experience related to the GDPR will commence in 2019 and a report will be published in 2020 as a review of the framework (EC 2018).

The document puts emphasis on the individual and organizational benefits that the new rules provide, however there are an enormous number of challenges that need to be tackled, hence the forthcoming years will surely keep complexities in store for individuals, companies, policymakers and regulators EU-wide.

Analyzing the referenced EU policies, we can clearly see that from the perspective of the EU the introduction of intelligent transportation systems and self-driving cars is a priority, and that policies currently both encourage the research and

development activities related to this technology, but also raise awareness and attract attention to the tackling of the upcoming challenges.

5. Conclusion

The changes that are driven by digitalization require focused attention. Industries and societies are becoming more complex and innovative processes, novel technological solutions require a multidisciplinary mindset. Developed regional transport and ICT infrastructure contribute to the quality of mobility in certain regions. With the solutions enabled by digitalization, even more advanced levels of mobility become available with R&D&I projects revolving around smart urban mobility and autonomous vehicles. Research has taken great strides and it is imperative that we ensure that our policies are appropriately updated and redesigned, so they are aligned with the changing environment. The goal of the paper was to provide key points of consideration for policymakers in the planning of regulations, legal frameworks related to smart mobility and digitalization itself. There is a vast number of challenges that need to be solved and this can be only achieved with a broad, future-oriented mindset and open discussions among policymakers and experts, while considering both the potential advantages and risks that reside in technological solutions.

Acknowledgments
Supported by the ÚNKP-17-3 New National Excellence Program of the Ministry of Human Capacities.

References

Annoni, P. – Dijkstra, L. – Gargano, N. (2017): The EU Regional Competitiveness Index 2016. Working Paper 02/2017. Brussels: European Commission.

Batey, P. – Friedrich, P. (2000): Aspects of Regional Competition. In Batey, P. – Friedrich, P. (eds.): *Regional Competition*. *Advances in Spatial Science.* Springer, Berlin, Heidelberg, 3–33.

Benevolo, C. – Dameri, R. P. – D'Auria, B. (2016): Smart Mobility in Smart City. In Torre, T. – Braccini, A. M. – Spinelli, R. (eds.): *Empowering Organizations*. Cham: Springer International Publishing, 13–28.

Brynjolfsson, E. – McAfee, A. (2012): *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity and Irreversibly Transforming Employment and the Economy*. MIT Center for Digital Business, MIT Sloan School of Management, Cambridge, MA.

Bughin, J. – Hazan, E. – Labaye, E. – Manyika, J. – Dahlström, P. – Ramaswamy, S. – Cochin de Billy, C. (2016): *Digital Europe: Pushing the Frontier, Capturing the Benefits*. New York: McKinsey Global Institute.

C-ITS (2017): *Cooperative Intelligent Transport Systems towards Cooperative, Connected and Automated Mobility*. Brussels: European Commission.

Camagni, R. (2002): On the Concept of Territorial Competitiveness: Sound or Misleading? *Urban Studies*, 13, 2395–2411.

Camagni, R. (2009): Territorial Capital and Regional Development. In Capello, R. – Nijkamp, P. (eds): *Handbook of Regional Growth and Development Theories*. Cheltenham: Edward Elgar, 118–132

Capello, R. (2009): Space, Growth and Development. In Capello, R. – Nijkamp, P. (eds): *Handbook of Regional Growth and Development Theories*. Cheltenham: Edward Elgar, 33–52.

CGPS (2017): *Stick Shift: Autonomous Vehicles, Driving Jobs, and the Future of Work.* Center for Global Policy Solutions, Washington, DC.

Chesire, P. C. (2003): Territorial Competition: Lessons for (Innovation) Policy. In Bröcker, J. – Dohse, D. – Soltwedel, R. (eds.): *Innovation Clusters and Interregional Competition.* Berlin: Springer, 331–346.

Dahlman, C. (2007). *Technology, globalization and international competitiveness: Challenges for developing Countries*. New York: Department of Economic and Social Affairs of United Nations.

Dean, D. – DiGrande, S. – Field, D. – Zwillenberg, P. (2012): The Digital Manifesto. How Companies and Countries Can Win in the Digital Economy. The Boston Consulting Group.

Dicken, P. (2003): *Global Shift. Reshaping the Global Economic Map in the 21st Century*. London: SAGE Publications.

DoA (2016): *Cooperation in the Field of Connected and Automated Driving*. Declaration of Amsterdam.

Dujin, A. – Geissler, C. – Horstkötter, D. (2014) (eds.): *Industry 4.0. The New Industrial Revolution. How Europe Will Succeed.* Munich: Roland Berger Strategy Consultants.

EC (1999): *Sixth Periodic Report on the Social and Economic Situation and Development of Regions in the European Union*. Luxembourg: European Commission.

EC (2017a): *Reflection Paper on Harnessing Globalization*. Brussels: European Commission.

EC (2017b): *European Urban Mobility. Policy Context*. Brussels: European Commission.

EC (2018): *Communication from the Commission to the European Parliament and the Council. Stronger protection, new opportunities - Commission guidance on the direct application of the General Data Protection Regulation as of 25 May 2018*. Brussels: European Commission.

ETSC (2016): *Prioritising the Safety Potential of Automated Driving in Europe*. Brussels: European Transport Safety Council.

Foulser, B. (2017): *Reimagine Places: Mobility as a Service*. KPMG UK.

Frisoni, R. – Dall'Oglio, A. – Nelson, C. – Long, J. – Vollath, C. – Ranghetti, D. – McMinimy, S. (2016): *Research for TRAN Committee – Self-piloted Cars: The Future of Road Transport?* Brussels: European Parliament.

Goodall, W. – Fishman, T. D. – Bornstein, J. – Bonthron, B. (2017): *The Rise of Mobility as a Service. Reshaping How Urbanites Get Around.* Deloitte Review, 20, 111–130.

Groshen, E. L. – Helper, S. – MacDuffie, J. P. – Carson, C. (2018): *Preparing U.S. Workers and Employers for an Autonomous Vehicle Future.* Study Prepared for Securing America's Future Energy. Washington, DC.

GSMA (2017): *Embracing the Digital Revolution. Policies for Building the Digital Economy*. GSM Association, London, UK.

Huggins, R. – Izushi, H. – Prokop, D. – Thompson, P. (2014a): *The Global Competitiveness of Regions*. London: Routledge.

Huggins, R. – Izushi, H. – Prokop, D. – Thompson, P. (2014b): Regional competitiveness, economic growth and stages of development. *Proceedings of Rijeka School of Economics*, 32, 255–283.

IMD (2017): *IMD World Digital Competitiveness Ranking 2017*. Lausanne: International Institute for Management Development World Competitiveness Center.

ITF (2015): *Automated and Autonomous Driving: Regulation under Uncertainty*. International Transport Forum Policy Papers, No. 7. Paris: OECD Publishing.

Jeekel, H. (2017): Social Sustainability and Smart Mobility: Exploring the Relationship. *Transportation Research Procedia*, 25, 4296–4310.

Kiel, J. – Smith, R. – Ubbels, B. (2014): The Impact of Transport Investments on Competitiveness. *Transportation Research Procedia*, 1, 77–88.

Krugman, P. (1994): Competitiveness: A Dangerous Obsession. *Foreign Affairs*, 2, 28–44.

Krugman, P. (1998): *Pop Internationalism*. Cambridge: MIT Press.

Lang, N. – Rüssmann, M. – Chua, J. – Doubara, X. (2017): Making Autonomous Vehicles a Reality. The Boston Consulting Group.

Lang, N. – Rüssmann, M. – Mei-Pochtler, A. – Dauner, T. – Komiya, S. – Mosquet, X. – Doubara, X. (2016): *Self-Driving Vehicles, Robo-Taxis, and the Urban Mobility Revolution.* The Boston Consulting Group.

Lee, E. – Vivarelli, M. (2006): *The Social Impact of Globalization in the Developing Countries. Discussion Paper No. 1925*. Bonn: Institute for the Study of Labor.

Lengyel, I. (2010): *Regionális gazdaságfejlesztés. Versenyképesség, klaszterek és alulról szerveződő stratégiák*. Budapest: Akadémiai Kiadó.

Lengyel I. – Rechnitzer J. (2004): *Regionális gazdaságtan*. Budapest and Pécs: Dialóg Campus.

Lengyel I – Rechnitzer J. (2013): Drivers of Competitiveness in the Central European Countries. *Transition Studies Review*, 20, 421–435.

Leonhard, G. (2016): *Technology vs. Humanity. The Coming Clash Between Man and Machine*. San Bernardino: Fast Future Publishing.

Litman, T. (2017): *Evaluating Accessibility for Transport Planning. Measuring People's Ability to Reach Desired Goods and Activities*. Victoria: Victoria Transport Policy Institute.

Lukovics M. – Udvari B. – Zuti B. – Kézy B. (2018): Az önvezető autók és a felelősségteljes innováció. *Közgazdasági Szemle*, 65, 949–974.

Magruk, A. (2016): Uncertainty in the Sphere of the Industry 4.0 – Potential Areas to Research. *Business, Management and Education*, 14, 275–291.

Malecki, E. J. (2002): Hard and Soft Networks for Urban Competitiveness. *Urban Studies*, 5–6, 929–945.

Manyika, J. – Lund, S. – Bughin, J. – Woetzel, J. – Stamenov, K. – Dhingra, D. (2016): *Digital Globalization: The New Era of Global Flows*. New York: McKinsey Global Institute.

Markusen, A. (1996): Sticky Places in Slippery Spaces: A Typology of Industrial Districts. Economic Geography, 72, 293–313.

Martin, R. (2003): *A Study on the Factors of Regional Competitiveness. A Draft Final Report for the European Commission Directorate-General for Regional Policy*. Cambridge: Cambridge Econometrics.

Montgomery, W. D. (2018): *Public and Private Benefits of Autonomous Vehicles.* Study Prepared for Securing America's Future Energy. Washington, DC.

OECD (2017): *Making Globalization Work: Better Lives for All.* Paris: OECD Publishing.

Piccinini, E. – Flores, C. K. – Vieira, D. – Kolbe, L. M. (2016): The Future of Personal Urban Mobility – Towards Digital Transformation. In Nissen,V. – Stelzer D. –Straßburger, S. and Fischer, D. (eds.): *Multikonferenz Wirtschaftsinformatik (MKWI) 2016*. Ilmenau: Technische Universität Ilmenau, 55–66.

Polenske, K. R. (2004): Competition, Collaboration and Cooperation: An Uneasy Triangle in Networks of Firms and Regions. Regional Studies, 9, 1029–1043.

Porter, M. E. (1996): Competitive Advantage, Agglomeration Economies and Regional Policy. *International Regional Science Review*, 1–2, 85–94.

Porter, M. E. (2008): *On Competition. Updated and Expanded Edition*. Cambridge: Harvard Business School Press.

Raposo, M. A. – Ciuffo, B. – Makridis, M. – Thiel, C. (2017): *The r-evolution of driving: from Connected Vehicles to Coordinated Automated Road Transport (C-ART). Part I: Framework for a safe & efficient Coordinated Automated Road Transport (C-ART) system.* JRC Science for Policy Report. Brussels: European Commission.

Room, S. – Almond, P. – Clark, K. (2018): *Technology's Role in Data Protection – The Missing Link in GDPR Transformation*. PwC Publications.

Rose, J. – Barton, C. – Souza, R. – Platt, J. (2013): *The Trust Advantage. How to Win with Big Data*. The Boston Consulting Group.

SAE (2014): *Automated Driving*. *SAE INTERNATIONAL STANDARD J3016*. Warrendale: Society of Automotive Engineers.

Schwab, K. (2017): *The Fourth Industrial Revolution*. New York: The Crown Publishing Group.

Siebert, H. (2000): *The Paradigm of Locational Competition. Discussion Paper 367*. Kiel: University of Kiel.

SMMT (2017a): *Connected and Autonomous Vehicles. Revolutionising Mobility in Society*. London: The Society of Motor Manufacturers and Traders.

SMMT (2017b): *Connected and Autonomous Vehicles. Position Paper*. London: The Society of Motor Manufacturers and Traders.

Thorpe, J. – Motwani, E. (2017): *Nudging People into Autonomous Vehicles*. PwC Australia.

UN (2016): *Smart Cities and Infrastructure*. Report of the Secretary-General. Geneva: United Nations Economic and Social Council.

WEF (2016a): *Digital Transformation of Industries: Digital Consumption.* Geneva: World Economic Forum.

WEF (2016b): *The Global Competitiveness Report 2016-2017. Insight Report*. Geneva: World Economic Forum.

WEF (2017): *Digital Policy Playbook 2017. Approaches to National Digital Governance.* Geneva: World Economic Forum.

WEF – BCG (2018): *Reshaping Urban Mobility with Autonomous Vehicles. Lessons from the City of Boston.* World Economic Forum and The Boston Consulting Group.

Yeomans, G. (2014): Autono*mous Vehicles. Handing Over Control: Opportunities and Risks for Insurance*. London: Lloyd's.

Yoon, D. (2017): What We Need to Prepare for the Fourth Industrial Revolution. *Healthcare Informatics Research*, 23, 75–76.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 155–172.

Considerations on the potential relationship between Regional Competitiveness and Responsible Innovation

Nikoletta Nádas

In the 21st century regional competitiveness has become a key concept. Although regarding the definition of regional competitiveness there is no consensus among experts, its main context, influencing factors and methods for measuring it seem to be clear. Among the influencing factors and main drivers, research, development and innovation (RDI) activities play a prominent role. The sources of literature have clearly demonstrated that there is a positive relationship between RDI and competitiveness. However, RDI has more frequently resulted in unintended, negative impacts. To overcome these negative side-effects the notion of Responsible Research and Innovation (RRI) has emerged, which addresses the challenges of the 21st century.

Thus, the question presents itself: how can RRI affect competitiveness? Does RDI have a positive relationship with regional competitiveness if the concept of RRI is applied? The purpose of this study is to trigger thoughts and explore fundamental questions and ideas about the potential relationship between responsible innovation and regional competitiveness. The main aim of improving competitiveness is to maintain long-term prosperity and a high standard of living, and for this purpose responsible innovation could possibly serve as an effective method.

Keywords: responsible innovation, regional competitiveness, RRI

1. Introduction

As a result of the accelerated globalization processes, territorial competition has become even more important than before. On the one hand, technical development (telecommunication, digital technologies) allows us to get in touch with anyone in the world by overcoming geographic constraints, and on the other hand, the limitations of trade and capital flow seem to cease. Thus, it is important to ask: how should companies and territories compete under these changed circumstances? Survival in the global competition, and the crisis in 2008 had a significant impact on the competitiveness of companies and regions. Because of the 21st century globalization tendencies, the economic role of the local space has appreciated (Lengyel 2012, Dicken 2015, McCann 2015). In knowledge-based economies, the role of innovation is unquestionable as the competitive environment requires participants to adapt to the changing environment as quickly as possible. Meanwhile, research, development and innovation (RDI) processes have been undergoing substantial changes, and have had a significant impact on almost every aspect of life. Its positive effects are usually immediately visible to the members of a society, and they contribute to its wellbeing as they promote development.

However, due to these accelerated innovation processes, besides positive effects, innovations have more frequently resulted in unintended, negative impacts, which affect a society, and in particular the welfare of society in a region. To prevent these impacts,

the concept of responsible research and innovation (RRI)[16] emerged. The main objective of responsible RDI processes is to do the best in the present ¬ to improve the standard of living ¬ for the sake of the future by reducing the intended or unintended negative side effects of research and innovations.

Literature sources have long highlighted that RDI has a positive effect on the competitiveness. However, it remains to be seen whether the same tendency is experienced when we apply responsible innovation tools in a region. *The main aim of this research is to explore the interactions between regional competitiveness and responsible innovation.* Regarding the central part of this research, the available literature sources are limited, as few scientific papers have dealt with this topic so far, so my research has significant novelty in this field.

Given that responsible innovation is a relatively new approach, it is difficult to find specific facts about its relationship with regional competitiveness. For this reason, the relationship between the two concepts can be predicted on a theoretical level. *It is important to emphasize that the main purpose of this research is to trigger thoughts about the possible relationship between responsible innovation and regional competitiveness.* Given that we are talking about a complicated relationship, it is difficult to deduce concrete conclusions at the current stage of implementation of responsible innovation.

2. The role of regional competitiveness

Regarding the nurturing of competitiveness and, particularly, territorial competitiveness, there is no consensus, this topic is frequently debated by experts of this field. Due to the challenges of economic life (such as crises), new perceptions and interpretations have emerged from time to time among researchers in the field of competitiveness. In many cases, the debate stems from the existence of competition between the territorial units themselves (Huggins–Thompson 2017, Lengyel 2012, Lengyel 2016a).

Krugman argues that competitiveness can only be interpreted among companies, and not at the level of countries or regions (Krugman 1994). Krugman's views have been confirmed by some experts, while others point out that competition between territorial units (countries, regions) can be also observed, but it differs from the competition experienced between companies (Camagni 2002, Gardiner et al. 2004). If we accept that territorial units also compete with each other in striving for a better position, then competitiveness can be interpreted at the level of companies, industries, regions and nations too (Chikán–Czakó 2009). Several approaches have come into being for defining competitiveness (Camagni 2002, Gardiner et al. 2004, Lukovics 2008, Lengyel 2012, Huggins el al. 2013). Among the various interpretations, the following concept of competitiveness has become widely recognized: *"The ability of companies, industries, regions, nations and supra-national regions to generate, while being exposed to international competition, relatively high income and employment levels"* (EC 1999, p. 75, Lengyel 2000, p. 974).

[16] Although most sources use the term Responsible Research and Innovation (RRI), for the sake of simplicity, in this study, we use the notion of responsible innovation, but it refers to research and development activities as well.

However, after the crisis in 2008, it has become an accepted view that the role of GDP is over-emphasized in measuring economic growth and competitiveness, and the role of social welfare and well-being have become more dominant in place of GDP (Stiglitz et al. 2010, Aiginger–Firgo 2015). As a result, the concept of competitiveness has been redefined in many cases.

Meanwhile social prosperity and sustainable development have been incorporated into the concept of competitiveness (Lengyel 2016b). Thanks to this, a new interpretation of regional competitiveness has emerged: *„place-based economic growth, which is the result of improved labour productivity and a high level of employment and which contributes to the prosperity and the standard of living of the inhabitants of the region"* (Lengyel 2016b, p. 74). This research is also based on this definition. During this study, competitiveness and territorial competitiveness always refer to the competitiveness of territorial units.

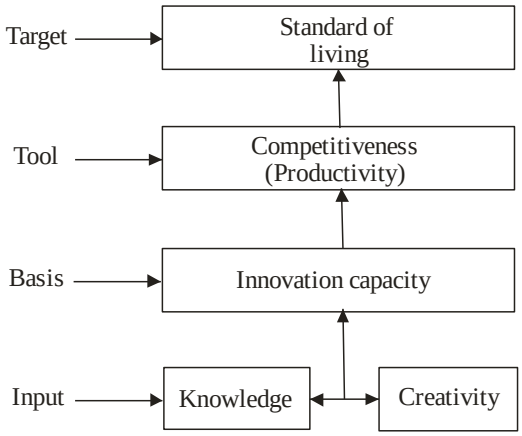
3. The relationship between innovation and competitiveness

It has become clear that innovation plays a significant role in improving the competitiveness of companies and regions. As innovation activity is part of complex competitiveness indices, it is important to gain a deeper insight into the characteristics of the direct relationship between competitiveness and innovation to serve as a basis for thoughts about the possible relationship between RRI and competitiveness.

3.1 Interactions of innovation and competitiveness

Innovation performance is the key to competitiveness and national development (OECD 2007). There is a positive relationship between innovation and competitiveness, as in order to maintain a high level of performance and competitiveness, innovation is necessary (Bayarcelik–Taşel 2012, Huang 2011, Petrakis et al. 2015). In economies with globally competitive companies, the road to competitiveness can be achieved through innovation (Ciocanel–Pavelescu 2015). Moreover, the standard of living of a region is largely determined by the productivity of the economy (Porter 2001). According to Porter (2001), productivity itself is not enough to improve competitiveness and the standard of living in a region. Developed regions need innovation to be able to produce products and services that can help them to maintain the benefit of their productivity that can result in higher wages. For the creation of innovation, both knowledge and creativity are needed. However, these are not enough in themselves for innovation, as the combination of them is necessary to create innovations that can increase competitiveness (Figure 1).

Figure 1 The logical structure of knowledge-based economic development

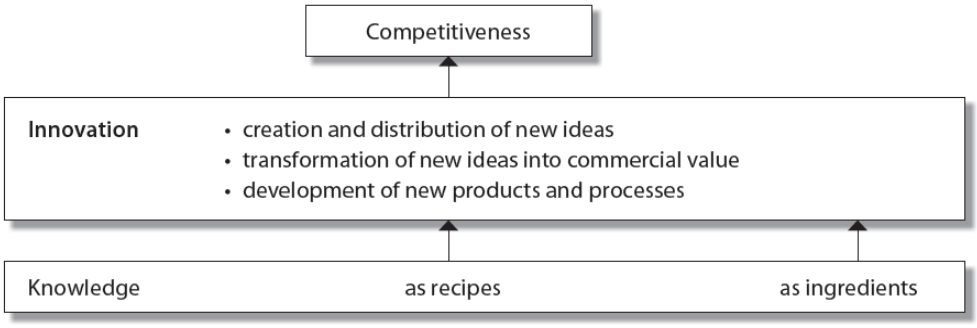


Source: Rittgasszer–Lukovics (2012, p. 221)

Innovation enables companies to adapt quickly to the pace of technological change to boost their competitiveness (Ciocanel–Pavelescu 2015). The relationship between innovation and competitiveness is correlated, as the competitive environment also influences the innovation process (Bayarcelik–Taşel 2012).

Over the last few years, many literatures have investigated the relationship between RDI and competitiveness (Ciocanel–Pavelescu 2015, Gocer 2013, Gulmez et al. 2012, Tiryakioglu 2006). Ciocanel and Pavelescu (2015) highlighted that RDI expenditures can play a significant role in increasing competitiveness. They examined the impact of innovation on competitiveness in analysing the competitiveness of 29 European countries, and their research confirmed that the "innovation paradigm" is sustainable, and innovation can improve competitiveness. Effective and successful application of existing technologies can therefore be a crucial tool for maintaining economic growth and development (Huggins Thompson 2015). Huggins et al. (2013) emphasized that knowledge, innovation and competitiveness are closely related concepts: knowledge is the building block of innovation, while innovation contributes significantly to increasing competitiveness (Figure 2).

Figure 2 The relationship between knowledge, innovation and competitiveness

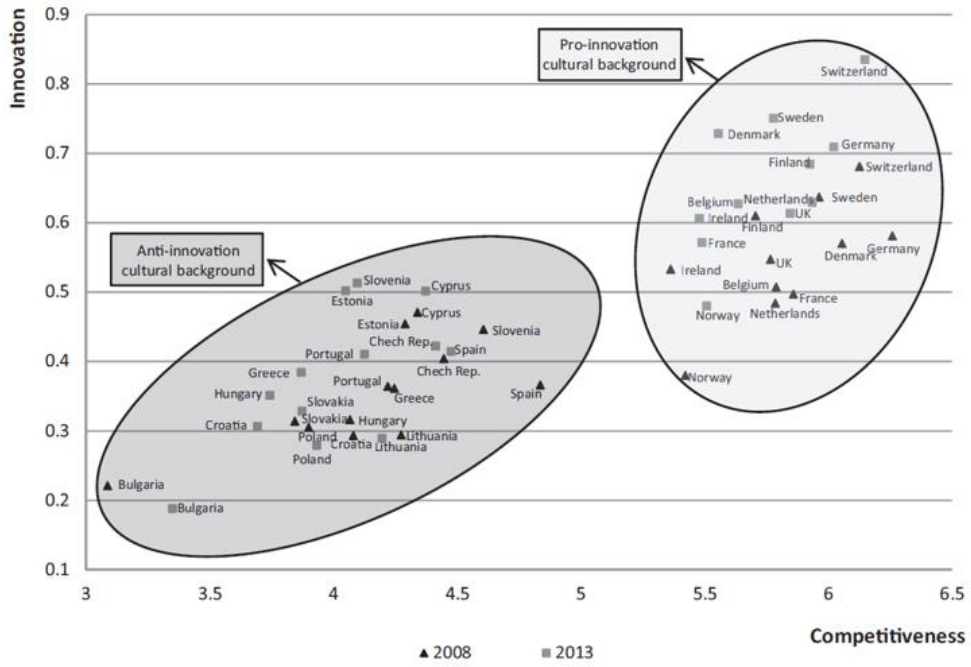


Source: Huggins et al. (2013, p. 159)

It is important for a country and a region to have competitive companies in order to be in a competitive position. The competitiveness of a company in the long term can be determined by technological advances and the ability to learn and innovate (Bernard et al. 2007). Innovation is significant in maintaining competitiveness on the long term, as the competitiveness of a country or region is increasingly determined by what kind of advanced technology is available within the region and the extent to which the regions are able to develop and apply these dominant technologies (Lengyel 2010).

Innovation and competitiveness depend directly on macro-level conditions too (Bayarcelik–Taşel 2012). At the national level, innovation can make a significant contribution to the development of the economy and can also speed up recovery from crises (Hausman–Johnston 2014). Culture is an integral part of innovation and it involves the acquisition and development of new ideas. Cultures that reward creativity and encourage people to reach their individual goals generally achieve better results in terms of innovation and their competitiveness can be improved too (Petrakis 2014). Petrakis et al. (2015) investigated the performance of 24 European countries during the Great Recession of 2008–2013. Their research shows how innovation and competitiveness performance is related to cultural background factors (Figure 3.).

Figure 3 Innovation and competitiveness in European countries (2008–2013)



Source: Petrakis et al. (2015)

In their study, they point out that an innovation-friendly environment enhances competitiveness even if macro conditions are not the most appropriate. Furthermore, if the society has an anti-innovation culture, the existence of the appropriate macro conditions will not lead to greater competitiveness.

3.2. The emergence of innovation in competitiveness indices

At the global level, as well as in the European Union, measuring competition between the various regions has a long history. From the different competitiveness reports it becomes clear that there are some relationships between competitiveness and innovation, as innovation capacity and innovation activity are part of the complex competitiveness indices, so we have to take a deeper look at the direct link between competitiveness and innovation. The most frequently used competitiveness reports are:

1. The IMD World Competitiveness Yearbook (WCY) which annually reviews and prioritises countries on how to manage their competencies for long-term value creation (IMD 2017a).
2. IMD established a new ranking in 2017, the World Digital Competitiveness Ranking. The rankings reveal the capabilities of countries that are needed to develop and apply digital technologies that transform government practices, business models and society in general (IMD 2017b).
3. The Global Competitiveness Index (GCI), which is published annually by the World Economic Forum, WEF (WEF 2016). It emphasizes the growing role of innovation and technological development, that can mostly be attributed to the Industrial Revolution 4.0.
4. Besides the indices and rankings that measure the competitiveness of countries, some indices have been developed that analyse competitiveness at the level of smaller territorial units and regions. We have also included in the analysis the Regional Competitiveness Index (RCI), that was created with the aim of measuring regional competitiveness (EC 2017a). RCI provides a European perspective on the competitiveness of all NUTS-2 regions in the EU.

The common features of these indices and rankings is that all of them regard innovation as a key factor for realizing competitiveness. In most of the rankings, the role of innovation is highlighted as being a separate sub-index. The rankings take into account the legal regulation of scientific research that promotes innovative activities. The protection of intellectual property rights and the quality of scientific infrastructure are also important aspects, and they assess the technological and economic value of patented inventions and the possible effects on technological development too. Furthermore, knowledge transfer between universities and business as one of the basic prerequisites for innovation can have a significant impact on the role of a given region in competition. WEF GCI puts emphasis on promoting creativity, assessing new ideas and assessing the proportion of risky and disruptive innovations. In the case of IMD WCY, the role of scientific research is also significant, and among the indicators there are factors that contribute to the attractiveness of a given region to researchers and scientists. The IMD Digital Competitiveness Ranking focuses on the role of the regulatory framework with regard to technology, which is an important factor in stimulating and facilitating the development of innovation. Preparations for the future also serve as a separate factor, as change in action affects the successful application of innovative ideas.

To sum up, the ability to innovate can increase the competitiveness of an area and thus play a significant role in increasing the standard of living of people living there. In general, innovation plays a major role in improving the competitiveness of regions, but the important question remains, of whether taking into consideration the notion of responsible innovation can result in similar tendencies?

4. Responsible innovation

Today, it has become obvious that global challenges (such as the depletion of the ozone layer, population growth) must be answered as fast as possible. The main question is no longer whether innovation is needed, but the question is more about how to conduct innovation that can help to adapt to the changing environment (Inzelt–Csonka 2014). The key role of innovation is to find solutions to the great challenges of the 21st century as fast as possible. Innovation is necessarily accompanied by unpredictable risks and uncertainties that may have a negative impact in the long term (Buzás–Lukovics 2015). Avoiding uncertain future events and possible negative consequences has given rise to one of the most significant recent scientific and practical approaches, the Responsible Research and Innovation (RRI). The guiding assumption of the concept is that research, development and innovation already include certain ethical and social aspects (Lukovics et al. 2017). This can help RDI participants to cope with the uncertainty and complexity associated with innovation (Lukovics et al. 2017). A new approach to innovation has emerged, but it does not mean that innovation has been irresponsible to date, but stresses that the negative effects of innovation on individuals, society and the environment have not been taken into account, as economic growth or profitability were more important (Blok–Lemmens 2015). Responsibility can be interpreted as an extension of the concept of innovation, where innovation is regarded as an integral part of innovation and stakeholder involvement while also taking into account ethical and social aspects (Blok–Lemmens 2015). Thanks to this extension, innovation processes may be able to find a balance between economic profit, social interests and environmental interests (Blok–Lemmens 2015).

The main aim of responsible innovation is to create innovations that contribute to the improvement of the standard of living of society while reducing the potential negative impacts of research and innovation. In the past few years several definitions of RRI has been offered for defining the concept (Owen et al. 2012, Sutcliffe 2013, Buzás–Lukovics 2015). However, the scientific community and the European Union most frequently rely on the definition of von Schomberg (2013, 60.): *"A transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)".* Accordingly, innovation can be responsible if it takes into account the social, environmental and ethical considerations during innovation processes, and if it is based on social needs and the involvement of the widest possible range of stakeholders from the earliest stage of the research (Forsberg et al. 2015). The 'Science with and for Society' slogan well illustrates that responsible innovation places great emphasis

on co-operation among the stakeholders involved in the innovation process (Fisher et al. 2006). As the theoretical background of the concept seems to be clear, the next challenge is to implement the concept into practice. In order to make implementation simpler and more comprehensible to the public, the European Commission has introduced six key elements (RRI keys) that can serve as a framework for attracting research and innovation (2014): public engagement, science education, governance, open access, ethics and gender equality. In addition, responsible innovation is characterized by transparency, interaction and mutual responsibility. These are the key factors for more effective cooperation and communication among stakeholders (Schomberg 2013, Sutcliffe 2013).

Pavie et al. (2014) highlighted that responsible innovation is a strategy for integrating responsible thinking at all stages of RDI processes. The main task of actors involved in innovation processes is to take into account potential social, environmental and ethical impacts, and if these effects appear to be negative, they should intervene and minimize the potential dangers. Responsible innovation builds on this fact and tries to increase the knowledge base and awareness to improve responsibility in decision making.

In RRI related studies from the business sector, the social responsibility of companies appears in several international publications (Gurzawska et al. 2017, Iatridis–Schroeder 2016, Pelle–Reber 2015). Many companies realised that they are responsible for society and the environment and most of the large companies have their own CSR strategies (Gurzawska et al. 2017). *The Corporate Social Responsibility (CSR) is a central issue for the practical implementation of RRI* (Pelle–Reber 2015). According to the European Commission CSR is "the responsibility of enterprises for their impacts on society" (EC 2011, 6.). *The concept of CSR can help to further develop the concept of RRI, providing a theoretical framework and practical standards (standards and principles of responsibility) for managing innovation* (Iatridis–Schroeder 2016).

However, Gurzawska et al. (2017) highlighted that responsible research and innovation and CSR show many differences, yet they are based on many similar principles. On the one hand the two concepts are quite similar in many aspects. Both concepts emphasise the companies' social responsibility and stakeholder engagement. Both CSR and RRI strategies are usually the results of a broad, multi-step consultation process with the involvement of different stakeholders (Pavie et al. 2014). CSR also regards stakeholder engagement as the main resource of profitability (Freeman 1984).

5. The possible relationship between responsible innovation and regional competitiveness

As a result of the main findings of the relationship between innovation and competitiveness, the question remains: if innovation has a positive impact on the competitiveness of a region, does it mean that the same tendency can be observed in the case of responsible innovation.

5.1. The impact of responsible innovation on regional competitiveness

The assumption of responsible innovation is that innovations are inherently good as they create prosperity and jobs and at the same time take into consideration societal challenges (von Schomberg 2013). However, research and innovation do not automatically lead to socially desirable and ethically acceptable profit combinations, social prosperity and environmental sustainability (de Hoop et al. 2016). Indeed, this assumption has been questioned in recent years, so responsible innovation came into being as a new approach for managing innovations.

Zadek et al. (2005b) pointed out that unmanaged economic growth itself is not capable of creating sustainable development. This requires a more responsible form of competitiveness, which is indispensable for achieving sustainable development in a globalized world. Disadvantages that go hand in hand with economic success (for example, contamination of the environment) have made more and more business leaders realize that they have to do business in a different, more responsible way for sustainability. As a result, businesses increasingly recognize the importance of their role in society (Fussler et al. 2004). The responsible vision and practice of globalization is widely acknowledged (Zadek 2006). However, the "invisible hand" of the market creates its own movement and direction, and the negative, often irreversible effects of global competition are not easily prevented (Zadek 2006). Although some companies take into account social and environmental risks, mostly the main objective is short-term profitability, and in this case these factors are negligible (Zadek et al. 2005a). The main challenge is thus to create a responsible concept for competitiveness (Zadek 2005a), where responsible innovation can be of paramount importance.

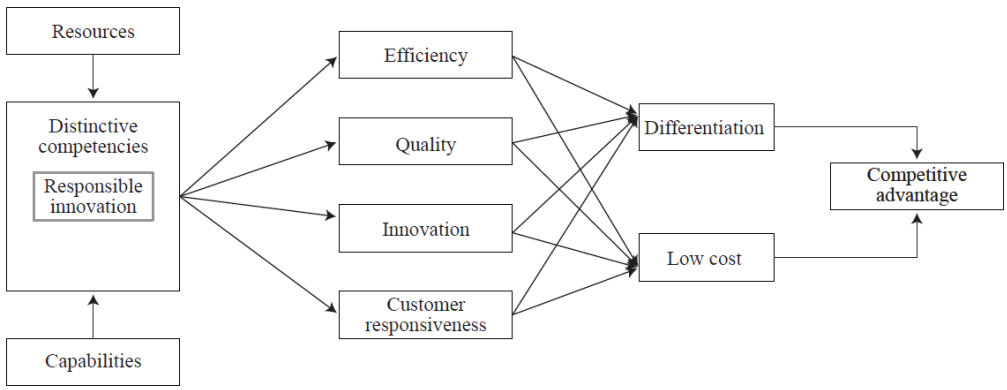
Researches have shown that partnerships with stakeholders can play a significant role in the innovation process. Innovation can be successful in an open innovation environment, as cooperation and interaction with different stakeholders can be a source of competitive advantage (Chesbrough 2003). Multi-stakeholder partnerships can result in innovative and responsible solutions (Blok–Lemmens 2015). As we mentioned previously, one of the key features of responsible innovation is transparency. However, according to some interpretations, the requirement for transparency in innovation processes is a naive concept (Blok–Lemmens 2015). Innovation is the main competitive advantage for a company, which advantage is based on the information asymmetries. This information may provide possibilities that can provide new or alternative solutions for existing or anticipated problems, thus information asymmetries should be regarded as a potential source of competitive advantage. In the context of responsible innovation, cooperation with stakeholders is expected, but in some cases particularly in the context of intellectual property and business secrecy, this cooperation is being reduced to maintain a competitive advantage (Flipse 2012).

Scholten and Van der Duin (2015) noted that taking into account RRI considerations could create a favourable environment for the development and improvement of competitive advantage, as consumers and stakeholders are more willing to cooperate with companies that are sustainable, ethical and associated with socially desirable production systems and products. Due to such cooperation, it is possible that stakeholders and consumers could apportion more value to the company's

products. According to Zadek (2006) if a business is reliable and socially accepted, it can provide greater possibilities to improve and maintain competitiveness. Based on this, responsible innovation can be a valuable source of competitive advantage (Lees–Lees 2017).

According to the resource-based view, competitive advantages derive from two main components of strategic capabilities: these are the capabilities and the resources (Johnson et al. 2008). Resources are the assets that the company owns, controls and uses for the purpose of creating value (Johnson et al. 2008). Responsible innovation can lead to valuable intangible resources such as brand value, reputation, or good relationships with stakeholders. Responsible innovation can thus be interpreted as a distinctive competency that consists of a unique combination of resources and abilities (Figure 5). To achieve competitive advantages, it is necessary to build on distinctive competences that will be implemented in terms of efficiency, quality, innovation and customer needs (Lees–Lees 2017). Recently some changes have been observed in innovation processes. By taking into consideration the social, ethical and environmental impacts of innovation, we can raise responsible innovation to a distinctive competency that can be a significant competitive advantage for a company or region.

Figure 5 The basis of competitive advantage



Source: Lees and Lees (2017)

This subchapter highlighted the importance of responsible innovation concerning its impact on competitiveness and the standard of living of a society. The following subchapter will detail the role of RRI and its elements, as well as key features in the different competitiveness indices and rankings.

5.2. The impact of responsible innovation on competitiveness in the light of competitiveness indices

We have already confirmed that innovation plays a significant role in the improvement of competitiveness, so it is worth examining the impact of RRI in competitiveness reports and rankings. In fact, we found that there is a kind of

transition in competitiveness indices and rankings that has already included the distinctive features of responsible innovation (Table 1).

The IMD Competitiveness Yearbook measures transparency, which is a key factor of RRI, however this indicator does not refer to research but to government transparency. Gender equality also appears among the indicators, but the ratio of female graduates, and not the ratio of female researchers is examined by the indicator. Corporate social responsibility can include social, environmental and ethical aspects. Scientific education, as one of the key elements of responsible innovation, is also an important aspect that contributes to the improvement of competitiveness.

Indicators of the IMD World Digital Competitiveness Ranking include scientific education, which measures the proportion of graduates in the natural sciences. Gender equality appears in the ranking as well, as a factor influencing digital competitiveness, by assessing the proportion of female researchers. The involvement of stakeholders also appears at a certain level in the field of cooperation between companies and universities. In addition, co-operation between the private and public sectors is also reflected in the indicators of technological development.

The WEF Global Competitiveness Index highlights the involvement of society as a crucial factor in improving competitiveness. For development we need to create an environment that fosters innovative activities, supported by both the public and the private sector. This means both appropriate RDI investments and the existence of high-quality scientific research institutes capable of producing the basic knowledge needed to build new technologies. Therefore, extensive cooperation between universities and industry is important in research and technological development. In addition, ethics as a key element of responsible innovation, also plays a key role in increasing competitiveness. GCI characterizes health and education as a factor affecting competitiveness. In terms of responsible innovation, these factors may appear indirectly as the role of innovation in the healthcare / pharmaceutical industry is significant, and there are serious ethical problems in this area, which already has an RRI focus. Furthermore, the role of education is significant in creating new RDI results. The education factor includes the quality of academic education, which is also one of the six key elements.

The Regional Competitiveness Index also addresses ethical and social aspects of competitiveness. Thus, ethical considerations also play a central role in improving competitiveness. Among the key elements of RRI, ethics, science education, and gender equality are among the indicators. The latter appears indirectly: it assesses gender equality in the field of higher education and measures the proportion of employed and unemployed women. By contrast, in terms of RRI, gender equality refers to the proportion of female researchers. RCI is different from the previous two competitiveness reports as the environmental factors do not appear as competitive advantages. The number of scientific publications is also one of the factors that improve competitiveness. If these publications are open to anyone, they can be interpreted as a key element of RRI, providing open access.

Table 1 The key aspects of responsible innovation in the competitiveness indices

	RRI keys	Direct aspects	Indirect aspects
IMD World Competitiveness Yearbook	Science education		Transparency Gender equality
IMD World Digital Competitiveness Ranking	Science education Stakeholder engagement Gender equality		
Global Competitiveness Index	Ethics Science education Stakeholder engagement	The degree of risky ideas Scientific Publications	Health Education RDI investments Existence of high-quality scientific and research institutions
Regional Competitiveness Index	Ethics Science education Stakeholder engagement	Scientific publications	Gender equality

Source: Own construction based on IMD (2017a), IMD (2017b), WEF (2016), EC (2017a)

In the three competitiveness reports reviewed, besides innovation, the key aspects of responsible innovation are also emphasized. In addition, at least three of the six RRI key elements, including ethics, science education, and stakeholder engagement are part of the indicators that contribute to the improvement of competitiveness. It is presumed that these elements should be taken into account as elements of responsible innovation.

6. Main findings

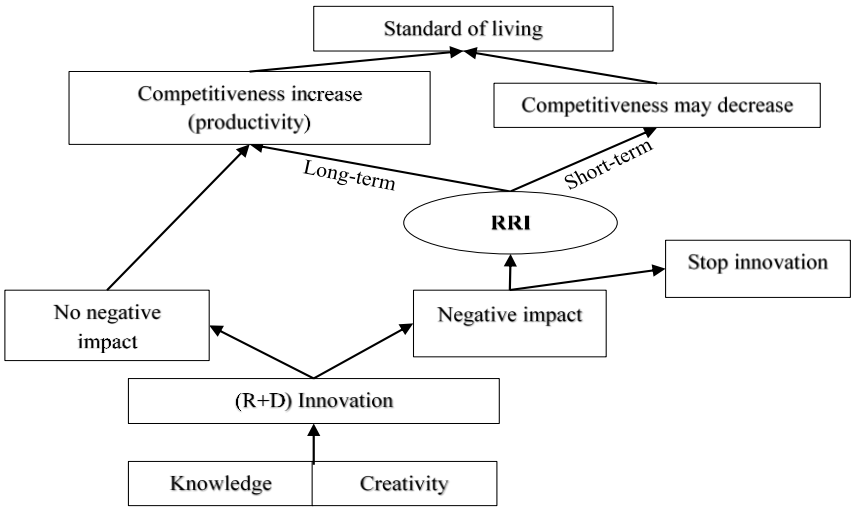
Literature sources have pointed out that a more responsible form of competitiveness is needed, thus more and more businesses perceive that they have to innovate in a different, more responsible ways. Those who do not take into account social and environmental concerns are mostly focused on short-term profit. Cooperation with members of society (stakeholders) is of particular importance, which can be the source of competitive advantage, these partnerships making it possible to create innovative and responsible solutions.

In addition, taking into account RRI considerations can create a favourable environment for the development and improvement of competitive advantage, as consumers and stakeholders are more willing to cooperate with companies that are sustainable, ethical and socially desirable. Reliable, socially-accepted RDI promotes competitiveness, so responsible innovation can be a valuable source of competitive advantage. By considering social, ethical and environmental impacts, RRI can become a distinctive competency that can be a significant competitive advantage for a company or region. Moreover, considering the different competitiveness indicators, we can conclude that there is a kind of transition to competitiveness indicators and rankings which already has the distinctive features of responsible innovation. Particularly

stakeholder involvement, ethics and science education appear as factors that can improve competitiveness.

Knowledge and creativity are essential for new ideas and thus innovation. However, at almost every phase of research, development and innovation, doubts about possible negative impacts may arise. Thus, for scientists and innovators who think responsibly, it is necessary to assess whether any negative impacts on the environment or society may arise. If the researcher realises that innovation can have a negative impact, then the concept of RRI emerge. In this case researchers may decide to stop the innovation process or to continue it, taking into account the interests of the different stakeholders, but also by examining the effects of the RRI on environmental, social and ethical considerations. The latter not only takes much time and energy, but it also costs more, so it is likely to reduce competitiveness in the short term. However, it may be profitable in the long run if a product / service is placed on the market that is ethical, environmentally and socially useful and thus socially accepted (Figure 5).

Figure 5 The logical structure of knowledge-based economic development in the light of RRI



Source: own construction based on Rittgasszer and Lukovics (2012)

During this research, some questions and possible limitations have arisen that suggest that the results of this research should be treated with reservation. The first question that arises in investigating the central issue of this research is how to measure competitiveness. There are countless reports and rankings to assess the competitiveness of regions. Though most of them make their final analyses with similar indicators, they apply very different methods, which may also have an impact on the results. This raises the question of the kind of indicators that should be involved in the analysis, and what kind of methodology should be used if we want to examine the competitiveness of an area? Considering these issues is a key point in terms of competitiveness, as even changing an indicator may also show discrepancies in the

outcome. Moreover, competitiveness is a rather complex phenomenon, with more indicators that can influence the results, so it is not possible to grasp a single element and consider its impact on competitiveness. It is worth considering all the indicators as a whole, instead of dividing them into their elements, since competitiveness cannot be interpreted as the sum of each element. Responsible innovation is a relatively new phenomenon. It has a decade-long history, and therefore it is difficult to predict what its effects in the future will be, and whether it has any added value to competitiveness compared to innovation. The application of responsible innovation is not widespread so far, so my research can be interpreted mostly at a theoretical level. To sum up, I would like to draw attention to the fact that, although we can draw the conclusion that the relationship between responsible innovation and regional competitiveness seems to be rather positive with regard to the main research results it is worth taking the results with the utmost caution.

7. Conclusion

In this study, we examined the interactions between regional competitiveness and responsible innovation. *The main purpose of our research was to trigger thoughts about the possible relationship between responsible innovation and regional competitiveness.* The background of our research derives from the fact that responsible research and innovation is becoming more and more common and widespread in the world. The literature sources highlighted that innovation has a fundamentally positive impact on the competitiveness of a region, but the question arises whether such impacts are evident in the case of responsible innovation too? Based on our preliminary assumptions, if innovation contributes significantly to the competitiveness of a region through the improvement of the standards of living of the people living there, we will experience this effect in the case of responsible innovation too.

The main conclusion to be drawn in this research is that supposedly responsible innovation can have a positive impact on the welfare of people in a region. Considering the main aspects of responsible innovation (environmental, social and ethical), RRI can make a significant contribution to the improvement of competitive advantages, as both consumers and stakeholders are more willing to cooperate with companies that are sustainable, ethical and socially desirable. Furthermore, stakeholder involvement can also make a significant contribution to the development of competitive advantages. It is important to mention that some types of indices and rankings used to measure and capture competitiveness also show that some elements and dimensions of RRI are already integral parts of these indices.

The results of the research raised further questions that we shall no doubt answer in the future. Given that we are talking about a complex relationship, it is difficult to deduct concrete conclusions at the current stage of the implementation of responsible innovation, and it puts a serious constraint on research. *The main purpose of this research was to trigger thoughts about the possible interactions between responsible innovation and regional competitiveness.* In the future, further research could be carried out with the aim of exploring more specific and concrete relationships between the two notions. In conclusion, the issues raised may create an appropriate basis for further research to explore the relationship between responsible innovation and regional competitiveness.

Acknowledgments: Supported By the UNKP-17-2 New National Excellence Program of the Ministry of Human Capacities

References

Aiginger, K. – Firgo, M. (2015): Regional competitiveness under new perspectives. *Policy Paper*, 26, Austrian Institute of Economic Research, Vienna.

Bayarcelik, E. B., – Taşel, F. (2012): Research and development: source of economic growth. *Procedia-Social and Behavioural Sciences*, 58, 744–753.

Bernard, A. B. – Redding, S. J. – Schott, P. K. (2007): Comparative advantage and heterogeneous firms. *Review of Economic Studies*, 74, 1, 31–66.

Blok, V. – Lemmens, P. (2015). The emerging concept of responsible innovation. Three reasons why it is questionable and calls for a radical transformation of the concept of innovation. In Koops, B. J. – Oosterlaken, I. – Romijn, H. – Swierstra, T. – van den Hoven, J. (eds.): *Responsible Innovation 2: Concepts, approaches, and applications*. Springer International Publishing. 19–35.

Buzás N. – Lukovics M. (2015): A felelősségteljes innovációról. *Közgazdasági Szemle*, 62, 4, 438–456.

Camagni, R. (2002): On the concept of territorial competitiveness: sound or misleading? *Urban studies*. 39, 13, 2395–2411.

Chesbrough, H.W. (2003): *Open innovation: The new imperative for creating and profiting from technology.* Boston, MA, Harvard Business School Press.

Chikán A. – Czakó E. (2009): *Versenyben a világgal: Vállalataink versenyképessége az új évezred küszöbén.* Akadémiai Kiadó, Budapest.

Ciocanel, A. B. – Pavelescu, F. M. (2015): Innovation and competitiveness in European context. *Procedia Economics and Finance*, 32, 728–737.

Dicken, P. (2015): *Global Shift. Mapping the Changing Contours of the World Economy.* The Guilford Press, New York.

EC (1999): *Sixth Periodic Report on the Social and Economic Situation and Development of Regions in the European Union.* European Commission, Luxembourg.

EC (2017): *The EU Regional Competitiveness Index 2016.* European Commission, Luxembourg.

Fisher, E. – Mahajan, R. L. – Mitcham, C. (2006): Midstream Modulation of Technology: Governance from Within. Bulletin of Science. *Technology and Society*. 26, 6, 485–496.

Flipse, S. M. (2012): *Enhancing socially responsible innovation in industry. Practical use for considerations of social and ethical aspects in industrial life science & technology.* Delft.

Forsberg, E. M. – Quaglio, G. – O'Kane, H. – Karapiperis, T. – Van Woensel, L. – & Arnaldi, S. (2015): Assessment of science and technologies: Advising for and with responsibility. *Technology in Society*, 42, 21–27.

Freeman, R. E. (1984): *Strategic Management: a Stakeholder Approach.* Pitman Series in Business and Public Policy. Boston: Pitman.

Fussler, C. – Cramer, A. – van der Vegt, S. (2004): *Raising the Bar: Creating value with the UN Global Compact*. Greenleaf Publishing, Sheffield.

Gardiner, B. – Martin, R. – Tyler, P. (2004): Competitiveness, productivity and economic growth across the European regions. *Regional Studies*, 9, 1045–1068.

Gocer, I. (2013): *Effects of R&D expenditures on high technology exports, balance of foreign trade and economic growth*. Maliye Dergisi, 165, 215–240.

Gulmez, A., – Yardımcıoglu, F. (2012): *The relationship between R&D expenditures and economic growth in OECD countries: panel cointegration and panel causality analyses (1990–2010).* Maliye Dergisi, 163, 335–353.

Gurzawska, A. – Mäkinen, M., – Brey, P. (2017): Implementation of Responsible Research and Innovation (RRI) practices in industry: Providing the right incentives. *Sustainability*. 9, 10, p. 1759.

Hausman, A. – Johnston, W. J. (2014): The role of innovation in driving the economy: Lessons from the global financial crisis. *Journal of Business Research*. 67, 1, 2720–2726.

Hoop, E. de – Pols, A. – Romijn, H. (2016): Limits to responsible innovation. *Journal of Responsible Innovation*. 3, 2. 110–134.

Huang, K.F. (2011): Technology competencies in competitive environment. *Journal of Business Research*. 64, 2, 172–179.

Huggins, R. – Izushi, H. – Thompson, P. (2013): Regional competitiveness: Theories and methodologies for empirical analysis. *Journal of CENTRUM Cathedra*, 2, 155–172.

Huggins, R. – Thompson, P. (2015): Entrepreneurship, innovation and regional growth: a network theory. *Small Business Economics*. 45, 1, 103–128.

Huggins, R. – Thompson, P. (2017): Introducing regional competitiveness and development: contemporary theories and perspectives. In Huggins, R. –Thompson, P. (eds): Handbook of Regions and Competitiveness. Contemporary Theories and Perspectives on Economic Development. Edward Elgar, Cheltenham, 1–31.

Iatridis, K. – Schroeder, D. (2016): *Responsible Research and Innovation in Industry. The Case For Corporate Responsibility Tools.* SpringerBriefs in Research and Innovation Governance, London.

Inzelt, A. – Csonka, L. (2014): Responsible Science in Societies. In Buzás, N. - Lukovics, M. (szerk.): *Responsible innovation*. JATEPress, Szeged, 57–72.

Johnson, G. – K. Scholes – R. Whittington. (2008): *Exploring corporate strategy: text and cases.* Pearson Education. Upper Saddle River, NJ, USA.

Krugman, P. (1994): Competitiveness: A dangerous obsession. *Foreign Affairs*, 2, 28–44.

Lengyel I. (2000): A regionális versenyképességről. *Közgazdasági Szemle*, 47, 12, 962–987.

Lengyel I. (2012): Regionális növekedés, fejlődés, területi tőke és versenyképesség. In Bajmócy Z. – Lengyel I. – Málovics Gy.(szerk.)(2012): *Regionális innovációs képesség, versenyképesség és fenntarthatóság*. JATEPress, Szeged, 151–174.

Lengyel I. (2016a): A megyék versenyképességének néhány összefüggése a megújult piramismodell alapján. In Lengyel I. – Nagy B. (szerk.): *Térségek versenyképessége, intelligens szakosodása és újraiparosodása.* JATEPress, Szeged, 143–161.

Lengyel I. (2016b): A kutatás fejlesztés és a versenyképesség térbeli összefüggései a visegrádi országokban. *Tér és Társadalom*, 30, 4, 71–87.

Lees, N. – Lees, I. (2017): Competitive advantage through responsible innovation in the New Zealand sheep dairy industry. *International Food and Agribusiness Management Review*, 1–20.

Lukovics M. (2008): *Térségek versenyképességének mérése*. JATEPress, Szeged.

Lukovics, M. – Flipse. S. – Udvari, B. – Fisher, E. (2017): Responsible research and innovation in contrasting innovation environments: Socio-Technical Integration Research in Hungary and the Netherlands. *Technology in Society*, 51, November, 172–182.

McCann, P. (2015): *The regional and urban policy of the European Union: Cohesion, results-orientation and smart specialization.* Edward Elgar Publishing, Cheltenham.

OECD (2007): Innovation and growth: Rationale for an innovation strategy. Statistical Office of the European Communities. Luxemburg

Owen, R. – Macnaghten, P. – Stilgoe, J. (2012): Responsible research and innovation: from science in society to science for society, with society. *Science and Public Policy*, 39, 6, 751–760.

Pavie, X. – Scholten, V. – Cathy, D. (2014): *Responsible Innovation: From concept to practice*. World Scientific Publishing, Singapore.

Pelle, S. – Reber, B. (2015): Responsible innovation in the light of moral responsibility. *Journal on Chain and Network Science,* 2, 107–117.

Petrakis, P. E. (2014): *Culture, growth and economic policy.* New York and Heidelberg, Springer.

Petrakis, P. E. – Kostis, P. C. – Valsamis, D. G. (2015): Innovation and competitiveness: Culture as a long-term strategic instrument during the European Great Recession. *Journal of Business Research*, 68, 7, 1436–1438.

Porter, M. E. (2001): *Clusters of innovation: Regional foundations of US competitiveness.* Council on Competitiveness, Washington.

Rittgasszer I. – Lukovics M. (2012): A versenyképesség és a kreativitás területi szintű kapcsolatrendszere. In Bajmócy Z. – Lengyel I. – Málovics Gy. (szerk.): *Regionális innovációs képesség, versenyképesség és fenntarthatóság*. JATEPress, Szeged, 207–224.

Schomberg, R. von (2013): A Vision for Responsible Research and Innovation. In: Owen, R. – Bessant, J. – Heintz, M. (szerk.): *Responsible Innovation*. John Wiley, London, 51–74.

Stiglitz, J. – Sen, A. – Fitoussi, J. P. (2010): A Bizottság jelentése a gazdasági teljesítmény és a társadalmi fejlődés méréséről. *Statisztikai Szemle*, 88, 305–320.

Sutcliffe, H. (2013): *A Report on Responsible Research and Innovation.* Matter, London.

Tiryakioglu, M. (2006): Research and development-relationship of economic growth: Application on selected OECD countries. Afyon Kocatepe University Instute of Social Sciences, Afyon.

WEF (2016): The Global Competitiveness Report 2016-2017. World Economic Forum, Geneva.

Zadek, S. (2006): Responsible competitiveness: Reshaping global markets through responsible business practices. *Corporate Governance: The international journal of business in society.* 6, 4, 334–348.

Zadek, S. – Merme, M. – Samans, R. (2005a): *Mainstreaming Responsible Investment*. WEF, Geneva.

Zadek S. – Raynard P. – Oliviera C – Tello R., – do Nascimento E. (2005b): *Responsible Competitiveness: Reshaping Global Markets Through Responsible Business Practices.* AccountAbility UK, London.

Chapter III
Social issues

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 174–194.

International student expectations, perceived HEI quality, satisfaction and loyalty – A proposed conceptual model

Anita Kéri

Internationalization is widely considered to be the most important issue in higher education in recent decades. International student expectations, satisfaction and loyalty have become central in understanding and satisfying international students' needs. This paper sheds new light on these factors by developing a conceptual model of international student expectations, satisfaction and loyalty. Based on the literature review and the results of previously carried out primary research, a new conceptual model is proposed. This paper aims at introducing secondary and primary findings and the steps of building and defining the new conceptual model. The investigations revealed that there is a connection between the researched factors: school-related expectations have an effect on school-related satisfaction and on the perceived quality of the institution, perceived quality affects school-related satisfaction, while non-school-related expectations affect non-school-related satisfaction. The overall satisfaction of students with the study-abroad experience is affected by school-related and non-school-related satisfaction, and this overall satisfaction, it is proposed, leads to loyalty. These results further our knowledge of internationalization and international students at a Hungarian higher education institution and could conceivably be used to better understand international students' needs in general. The new model could be tested in future research.

Keywords: higher education, expectations, perceived quality, satisfaction, loyalty, WOM

1. Introduction

There is a growing body of literature that recognizes the importance of higher education's internationalization. Investigating internationalization is a continuing concern within higher education. Recently, a considerable body of literature has grown up around the theme of international student motivation, expectations, HEI perceived quality, satisfaction and loyalty.

Motivation of international students is a widely researched concept, but fails to provide a deep insight into the study-abroad process and experience of international students. It is only concerned with the reason why students chose a certain HEI, but in itself fails to present why students stay at a HEI. Therefore, this paper only discusses the importance of motivation briefly and concentrates on the study-abroad experience in depth.

Existing literature recognizes the critical role of motivation, expectations, satisfaction and loyalty. However, the major problem is that these factors are mainly investigated separately (Byrne–Flood 2005, Carvalho–Mota 2010). Surprisingly, these factors are seldom studied together (Alves–Raposo 2007, 2009). The search of the literature also revealed that most studies focus on quantitative measures and only few studies apply qualitative analysis (Gallarza et al. 2017, Roman 2014, Sultan–Wong 2013a, Sultan–Wong 2013b, Templeman et al. 2016) or longitudinal qualitative

analysis (Patterson et al. 1998). So far, very little attention has been paid to the role of examining the school-related and non-school-related aspects of the above-mentioned factors (Byrne–Flood 2005, Carvalho–Mota 2010). This indicates a need to understand international student expectations, satisfaction, HEI perceived quality and loyalty from a different viewpoint.

The central aim of this paper is the development of a new conceptual model of international student school-related and non-school-related aspects of expectations, satisfaction and HEI loyalty. The specific objective of this study is to highlight the main theoretical concepts behind the model and to introduce the previously conducted primary research results that contributed to the creation of the new conceptual model. A combination of quantitative and qualitative methods was used in the pilot research. However, in this paper, only the main results are introduced briefly and the theoretical aspects are explained in more detail.

This is among the first studies to differentiate between school-related and non-school-related expectations and satisfaction. This paper also undertakes to study the expectations, perceived quality of the institution, satisfaction and loyalty together. Therefore, this study makes a major contribution to the research on international students at a Hungarian HEI. However, it is beyond the scope of this study to examine the effects of motivation and perceived value of HEIs, and the specific differences between the nationalities and faculties of the international students.

This paper is composed of five main sections. After the introduction, the second section determines the key definitions of motivation, expectations, satisfaction, loyalty and WOM and investigates the relevant literature. Section 3 introduces the pilot studies and their main results and explains how they contributed to the creation of the new conceptual model. Section 4 introduces the new conceptual model and its main concepts, and determines the hypotheses. The final section draws together the key findings and identifies future research directions.

2. Definition of key terms

The following chapter lays out the theoretical dimensions of the research and looks at how the key terms are defined. This section investigates the main and most influential theories behind the studied concepts.

2.1. Motivation

Even though the final model does not include motivation as a separate factor, it is crucial to understand the study-abroad process and its beginning. Therefore, the main theories and findings are discussed briefly first.

Research into motivation has a long history. Motivation is defined as the underlying reasons of the behavior of people (Guay et al. 2010). Mitchell (1982, p. 81) defines motivation as "*those psychological processes that cause the arousal, direction, and persistence of voluntary actions that are goal directed*". In the classical human-specific self-determination approach, the behavior of people can be categorized. Vallerand et al. (1997) researched the factors that could have an influence on motivation. In his study, he concludes that different social factors influence the

motivational types. Motivation types – extrinsic and intrinsic – are distinguished by Deci and Ryan (1985).

Many theories have emerged throughout the years in connection with motivation. One seminal study in this field is by Maslow (1987), according to whom different motives are followed by each other based on their biological strength. A hierarchically higher need can arise when a lower need is satisfied. According to Hull's drive approach (Hull 1943), our behavior is driven by drives. People's behavior can reduce the drive, because a person aims at being in an ideal state of mind and reducing the stress by acting upon a certain drive. The continuing motivation theory of Maehr (1976) focuses on the motivation and long-term ability of people to concentrate on studying for a period of time, with no apparent and visible reward in exchange (Kaplan et al. 2009). The Perceived Control theory of Skinner (1995) states that our behavior is driven by the feedback that we get. Depending on whether it is positive or negative, the aim of a person would be to get a reward or to avoid a negative feedback again.

Based on the evidence provided in the literature, we can see the large number of different approaches to the identification of different motivational types. In the present study, the motivation of international students is only studied as the basis of their study-abroad experience. The final conceptual model does not include motivation as a separate factor.

2.2. Expectations

The field of expectations is a widely researched area. Oliver (1980) has produced seminal works connected to expectations which can be used in marketing research (Oliver 1980, Oliver – Bearden 1985). He formed the Expectation Confirmation Theory (ECT), according to which expectations are defined as those relevant attributes or characteristics that are thought to be connected to a certain product or service (Elkhani–Bakri 2012, Oliver – Bearden 1985, Oliver–Winer 1987).

The categorization of expectations has been subject to considerable discussion in the literature. Some scholars differentiate between forecast, normative, ideal and minimum tolerable expectations (Oliver 2015, Woodruff et al. 1983). These refer to expectations prior to purchase (Oliver 2015, Woodruff et al. 1983). Therefore, they are not relevant in the current study.

As seen above, expectations can be categorized based on the time of research enquiry (Higgs et al. 2005). If a customer is asked of their expectations prior to purchase, that is called forecast expectation. If they are asked after purchase to remember the expectations beforehand, that is termed recalled expectation (Higgs et al. 2005). Evidently, forecast expectations seem a better choice to study, because then the customer is not biased by the purchase itself. However, in the current study, I am going to focus on recalled expectations, due to the limited access to international students.

2.3. Satisfaction

Studies over the past decades have provided important information on the research of satisfaction. Churchill and Surprenant (1982, 493) define satisfaction as the result of usage and purchase, which is based on the customer's comparison of cost and benefit analysis. According to Oliver et al. (1997), satisfaction is a pleasurable fulfilment of certain needs, desires or goals.

Throughout the years, different theories in the field of satisfaction have emerged in the literature. The above-mentioned Expectation Confirmation Theory (ECT) (Oliver 1980, Oliver–Bearden 1985) is considered a core work. According to this theory, customers have certain pre-purchase expectations and their experience of the desired product or service is the determiner of satisfaction (Oliver 1980, Oliver – Bearden 1985). Later the Expectation Confirmation Theory of Oliver (1980) was expanded and named the Expectancy Disconfirmation Theory (EDT) (Elkhani–Bakri, 2012). This new theory differentiates between pre- and post-purchase satisfaction based on whether the customer's expectations are met or not. The consumer compares expectations to perceived performance, which leads to a subjective disconfirmation (Yi 1990). In their studies, Yi (1990) distinguishes between process-oriented and result-oriented satisfaction. Result-oriented satisfaction refers directly to the experience after consumption. According to process-oriented satisfaction, the consumption process is the most important. In the current paper, I define international student satisfaction as the combination of process- and result-oriented satisfaction. Both the satisfaction during the time of their studies and the satisfaction after graduation is important for this research.

The area of interest of the present study is higher education and higher education is viewed as a service in the current paper. Therefore, service satisfaction should be discussed, as it has features different to those of product satisfaction. Zeithaml (1981) argues that customers employ certain criteria to a higher extent, when it comes to services, namely experience and trust. Parasuraman et al. (1991) created a method which measures service quality based on the difference between consumer expectations and experience. It is called SERVQUAL and measures the tangibles, reliability, responsiveness, assurance and empathy.

To sum up this chapter, in the current paper, higher education is viewed as a service that international students receive. In the pilot study regarding satisfaction, and during the development of the new conceptual model, I base my hypotheses on the work of Oliver (1980) and Zeithaml (1981).

2.4. Loyalty and word-of-mouth

In the field of higher education, scientists have shown an increased interest in the study of loyalty. Mostly, it is studied together with satisfaction and student retention rates (Alves–Raposo 2007, 2009, Elliot–Healy 2001, Giner–Rillo 2016, Oliver 1999, Reichheld et al. 2000, Reichheld 2003). Therefore, it is safe to assume that there is a connection between satisfaction and loyalty. Reichheld et al. (2000) states that satisfaction is a key element to growth, but argues that satisfaction is not always enough to retain customers or gain their loyalty (Reichheld 2003). In order to be

successful, a company or institution should create and provide value for its customers, its employees and its stakeholders as well (Reichheld et al. 2000).

There are different approaches to the definition of loyalty. In the early phases of studying loyalty, some scientists argued that loyalty can be measured by retention and satisfaction of customers (Reichheld–Sasser 1990, Reichheld 1996), while other stated that a good indicator of loyalty is re-purchase (Neal 1999, Oliver 1999, Reichheld et al. 2000, Tellis 1988). Re-purchase is thought to be weak in itself and Newman and Werbel (1973) argue that brand deliberation is needed to create a satisfied and loyal customer. Nowadays, there is a more current view stating that satisfaction and re-purchase are not enough, but that the customer's willingness is needed to advocate and promote the product or service. In other words, recommendation or word-of-mouth (WOM) is needed (Reinartz–Kumar 2002, Reichheld 2003).

One of the most widely-used definitions belongs to Oliver (1999), who defines loyalty as "*a deeply held commitment to rebuy or re-patronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior*" (Oliver 1999, p. 34). However, from the perspective of the current study, this definition lacks an important element. That is why, in this research, I use the loyalty definition of Reichheld (2003). He states that loyalty is "the willingness of someone – a customer, an employee, a friend – to make an investment or personal sacrifice in order to strengthen a relationship." (Reichheld 2003, 46). Additionally, he also claims that "customer loyalty is about much more than repeat purchases" (Reichheld 2003, p. 46). He determines recommendation as a key element to loyalty.

Consequently, it is apparent that WOM has significant importance in satisfaction; therefore, a definition of WOM is necessary for use in this study. Word-of-mouth is interpersonal communication (Arndt 1967) that is informal and about a product, its usage or its characteristics (Bughin et al. 2010).

As repurchase is not a good determiner of loyalty in terms of higher education, I must define what this study means by loyalty. In the current model, loyalty is comprised of the retention of a student and WOM together.

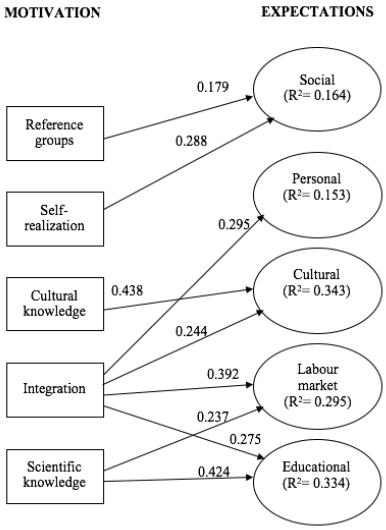
3. Pilot studies and their results

To better understand international students' expectations, satisfaction and loyalty, pilot studies have been conducted. In three different pilot studies, I have investigated international student motivations, expectations, satisfaction and loyalty at the University of Szeged. The subjects of the research were international students studying at the University of Szeged.

Firstly, based on the results of an online questionnaire (N=128), I determined the main factors influencing international student motivation at the University of Szeged. For the motivation questions, a Likert scale was applied. Factor analysis was used on the data to determine the main motivation of international students for coming to the University of Szeged to study. The five main factors influencing international student motivation are reference groups, self-realization, getting to know the culture, integration and knowledge gained by the Hungarian degree (Kéri 2016).

Even though understanding the motivation of international students is crucial, it does not give deep enough insight into the process of HEI choice among international students. Therefore, in a quantitative pilot study, I investigated a connection between international student motivations and expectations related to their studies at the University of Szeged (N=121). For the questions, a Likert scale was applied. With the help of PLS-SEM analysis, the connection between different types of motivation and expectations was revealed. The results of the model can be seen on Figure 1.

Figure 1 Model of international student motivation and expectations



Source: Kéri (2018, p. 175)

The study revealed that reference groups' motivation has an effect on social expectations (β = 0.179) and the motivation of self-realization also has an effect on social expectations (β = 0.288). Cultural motivation affects cultural expectation of international students (β = 0.438). The motivation of integration into the Hungarian community has an effect on four expectation types. Its weakest effect is on cultural expectations (β = 0.244), which is followed by its effect on educational expectations (β = 0.275), personal expectations (β = 0.295), and it has the biggest effect on labor market expectations (β = 0.392). The motivation of gaining scientific knowledge in Hungary has an effect on labor market expectations (β = 0.237) and on educational expectations as well (β = 0.424). The strongest effect in the model are the effects of cultural knowledge motivation on cultural expectations (β = 0.438) and the motivation of gaining scientific knowledge on educational expectations (β = 0.424).

Even though the motivation of international students is not included in the final model, it provides a good foundation for exploring international student expectations of their desired higher education institution.

Further investigating the HEI choice of international students and their study-abroad experience, it became necessary to research their satisfaction and loyalty as well. In order to get an overall insight, I conducted longitudinal in-depth interviews with a panel of international students (N=17). It takes three academic years to complete the whole study program. Two phases of the research have already taken place and the third and last phase is also completed with those Master's students (N=6), who finished their degrees. The longitudinal interviews were analyzed manually.

The results indicate that word-of-mouth advertisement is one of the most influential factors when international students choose the University of Szeged and Hungary. It already appeared at the very first stage of interviews and almost every respondent mentioned it as an influencing factor for coming to Hungary ('*I have someone here and he told me that Szeged is the best place in Hungary to study.' –* student from Tunisia). Therefore, I conclude that WOM has a crucial influence on the choice of international students in terms of location and HEI.

In terms of expectations, most students had school-related expectations ('*My expectations are a little bit about myself. I will have some competencies here, so I can use it in my country.*' *– Student from Turkey),* but non-school-related aspects were also highlighted. Students' loyalty is projected through the fact that most of them are satisfied with the school-related and the non-school-related aspects ('*It went better than expected in some ways. My teachers speak very good English. I am satisfied with them.' – Student from Colombia),* and would suggest studying at this specific HEI to other students (*'Yes, absolutely. It is a no-brainer.'- Student from Colombia*). Some of them have already recommended it to others, who started or will start their studies at the University of Szeged. Therefore, I conclude that WOM plays an active part in the loyalty of international students and I determine WOM to be a factor of international student loyalty.

Based on the results of the previously mentioned primary research and the literature review, a conceptual model of international students' expectations, satisfaction and loyalty was developed. In the next chapter, the model is introduced and hypotheses are defined.

4. Hypotheses and the new conceptual model

When considered separately, neither expectations, satisfaction nor loyalty are sufficient for understanding differences across groups in student HEI choice. Therefore, in the following section, I propose a new conceptual model that includes all the above-mentioned factors and proposes hypotheses connected to these factors.

4.1. Expectations

There is no unified categorization of expectations in relation to international students. Mostly an arbitrary selection of different expectations applies, or a higher education quality measurement method is selected, but mostly, the aim of the research determines the categories. Anderson (2007) divides international student expectations into nine categories (e.g.: personal development, social environment, study success, etc.). However, the division of international student expectations is not so detailed in

many other studies, because these studies mainly focus on one category of expectations. Social expectations of international students are examined by Ding and Hauzheng (2012), and Dewey et al. (2013), personal expectations are studied by Firmin et al. (2013), cultural expectations are investigated by Czerwionka et al. (2015), while Bryla (2015) focused on labour-market expectations and Cheng (2014) on educational expectations. Interestingly, DeBacker and Routon (2017) focused on parental expectations of their children's education.

If service quality is measured, usually only the school-related aspects are researched. There is very little research in which non-school-related and school-related aspects appear and are studied separately (Byrne–Flood 2005, Carvalho–Mota 2010). The study of Carvalho and Mota (2010) focuses solely on the institution-related expectations, while the questionnaire of Byrne and Flood (2005) already includes school-related and non-school-related elements as well. Consequently, there is a gap in the literature examining international students' school-related and non-school-related expectations separately under the same framework.

In the qualitative pilot research, I investigated international student expectations. Respondents claimed that they had heard good reports about learning and had related expectations of the university (*'I saw the university's rank'– Student from Turkey*), about themselves, ('*My expectations are a little bit about myself. I will have some competencies here, so I can use it in my country.' – Student from Turkey*), and about the living conditions in Hungary as well ('*I was curious to discover Hungary.' – Student from Columbia*). Conversely, their expectations could be divided into two different categories, non-school-related expectations ('*I want to teach my children about life here'– Student from Laos*) and school-related expectations ('*I want to be a good doctor'– Student from Tunisia*). This is the reason, why I assign utmost importance to the differentiation between these two aspects of expectations.

In conclusion, there is a lack of studies that examine school-related and non-school related expectations mutually. These aspects have also rarely been investigated separately before under the same framework (Byrne–Flood 2005, Carvalho–Mota 2010, Martin et al. 1995). Consequently, I propose that expectations should be divided into two separate categories, when researching study-abroad experience of international students. The current study and theoretical model focus on both school-related and non-school-related expectations.

4.2. Expectations and satisfaction

Several recent studies have been carried out about the expectations of international students regarding the international university and country they applied to, as we could see above. Based on the literature review (Oliver 1980, Oliver – Bearden 1985) we can conclude that expectations are also key elements of determining satisfaction.
The satisfaction of international students with the chosen HEI is a widely researched area. However, most studies typify satisfaction differently. Among these pieces of research, several focus solely on school-related satisfaction (Alves–Raposo 2007, 2009, Cardona–Bravo 2012, El-Hilali et al. 2015, Elliot–Healy 2001, Lenton 2015, Lee 2010, Owlia–Aspinwall 1996, Roman 2014, Wiers-Jenssen et al. 2002). Most often, they enlist the following factors as the source of international student satisfaction: available

study-programs, location, size, complexity of the institution, quality of teaching (Huybers et al. 2015), feedback from teachers, communication with teachers (Jager–Gbadamosi 2013), appropriate study schedule, supporting facilities for students, physical environment and equipment (Wiers-Jenssen et al. 2002).

Although there is a study (Yang et al. 2013) in which scientists distinguish classroom factors from non-classroom factors, non-classroom factors are strongly related to the school (e.g.: location of school, GPA, year of higher education studies). The research of Ostergaard and Kristensen (2005) differentiates between the hardware and software elements. Hardware elements are related to the study programs, courses, and several support facilities, while the software elements are related to behavior of the people participating in the service and to the service environment. If student's expectations are met in this model, it has an effect on their satisfaction. Doña-Toledo et al. (2017) also concentrated on school-related quality aspects. If quality expectations are met, then students are satisfied.

Non-school-related satisfaction is rarely investigated in connection with international students. However, I think that it is extremely important. There are certain studies, though, which investigate school-related and non-school-related factors. Yet, most of these studies focus solely on local students, not international ones. Schertzer and Schertzer (2004) uncovered why students leave a certain HEI. They found that transition and financial problems are the most common non-school-related reasons. They also claim that the happiness of students depends on the life outside the classroom excessively. Evans (1972) followed the same logic and stated that student satisfaction is highly dependent not only on the quality of education and recognition, but also on social life, living and working environment and the compensation for study-pressure.

The qualitative pilot research results also showed a connection between international student expectations and satisfaction. Some students claimed that their expectations were met, so they were satisfied (‘*It went better than expected in some ways. My teachers speak very good English. I am satisfied with them.’ – Student from Colombia*), while others said they had different expectations, so they are not completely satisfied (‘*I was expecting something else’ – Student from Turkey*). Respondents differentiated between school-related expectations and satisfaction and non-school-related expectations and satisfaction too (‘*I was expecting more experienced teachers, but for student activities, yes, I am satisfied.’ – Student from Turkey)*.

Regardless of categorization, international student satisfaction is usually researched in tandem with international student expectations (Alves–Raposo 2007, 2009, Cardona–Bravo 2012, El-Hilali et al. 2015, Elliot–Healy 2001, Lenton 2015, Lee 2010, Ostergaard–Kristensen 2005, Owlia–Aspinwall 1996, Roman 2014, Wiers-Jenssen et al. 2002). However, in previous research, school-related and non-school-related satisfaction are not separated and this study aims to fill this research gap. I propose a distinction between school-related and non-school related satisfaction in the model of international students' study abroad experience. Based on the secondary literature and the results of the pilot research, I assume that expectations and satisfaction are also closely related and propose the following hypotheses:

H1a: School-related expectations influence school-related satisfaction.
H1b: Non-school-related expectations influence non-school-related satisfaction.

4.3. School-related expectations, perceived quality, and school-related satisfaction

School-related expectations and satisfaction constitute a widely-researched area in contrast to non-school-related aspects. Previous research has highlighted the importance of perceived quality of the HEI and found links between school-related expectations and perceived quality (Alves–Raposo 2007, 2009, Brown–Mazzarol 2009, Pinto et al. 2013, Zhang et al. 2008). These studies are mostly based on the CSI model of consumer satisfaction (Fornell et al. 1996). In the CSI model, customers' expectations are proven to have a positive effect on the perceived quality.

The CSI model has been successfully applied in the higher education sector (Alves–Raposo 2007, 2009, Brown–Mazzarol 2009, Pinto et al. 2013, Zhang et al. 2008). Alves and Raposo (2007, 2009) proposed that international students' expectations influence the perceived quality of the institution. Zhang et al. (2008), Brown and Mazzarol (2009) and Pinto et al. (2013) also found that expectations have an effect on the perceived quality of a HEI.

Based on the secondary literature, perceived quality is a key aspect in international students' study abroad experience. Conversely, a definition of perceived quality is needed. Zhang et al. (2008) defines perceived quality in the higher education as "*students' judgments to education service offered by the college*" (Zhang et al. 2008, 47). In the current research I base my proposed theoretical model on this definition. In the proposed conceptual model, my hypothesis regarding school-related expectations and perceived quality is as follows.

H2: School-related expectations have an effect on perceived quality.

The literature also demonstrates evidence that there is a connection between perceived quality and school-related satisfaction (Alves–Raposo 2007, 2009, Brown–Mazzarol 2009, Pinto et al. 2013, Zhang et al. 2008). Based on the CSI theory, numerous pieces of research have proven a positive effect of the HEI perceived quality on the school-related satisfaction of international students (Alves–Raposo 2007, 2009, Brown–Mazzarol 2009, Pinto et al. 2013, Zhang et al. 2008). Therefore, my hypothesis is as follows.

H3: Perceived quality has an effect on school-related satisfaction.

4.4. The definition of loyalty and the importance of WOM

Reference group influence and WOM are proved to be significant on student willingness to study abroad and choice of HEI (Cubillo et al. 2006, Hackney et al. 2013, Nyaupane et al. 2011). Reference groups include family members, friends and acquaintances. There is an extremely influential fragment of reference groups that includes those people, who already participated in a study program at a desired university. These people are the WOM advocates of the university and based on their

recommendation, a new international student can choose the university at hand (Alves–Raposo 2007, 2009). In this case, these recommending students are the WOM advocates of the university, therefore considered loyal to the university.

In terms of measuring loyalty, in his study, Reichheld (2003) uses a one-question method of determining customer loyalty. They use a simple question of "How likely is it that you would recommend (X) to a friend or colleague?". They found that the answer to this one question could be the sole determiner of company success and customer loyalty. Conversely, growth by WOM is the key.

Even though most papers use quantitative measures for getting to know international student motivation (Chirkov et al. 2007, Guay et al. 2000, Hanousek–Hegarty 2015, Stover et al. 2012, Utvaer–Haugan 2016), qualitative (Roman 2014, Sultan–Wong 2013a, 2013b, Templeman et al. 2016) and longitudinal (Sasaki 2011) research types have also been applied. Therefore, based on the one-question method of Reichheld (2003), in the longitudinal pilot study, I also asked students if they would recommend the institution to others and got the result that most of them would (*'Absolutely. I have already done it.' – Student from Colombia*). The pilot studies also revealed a connection between international student loyalty and WOM. WOM appeared at the very early stages of longitudinal interviews and student mentioned WOM as one main influencing factor ('*I have someone here and he told me that Szeged is the best place in Hungary to study.'* – student from Tunisia).

As previous studies and the pilot research show, loyalty is usually studied together with WOM, as it is considered to be the result of it. There seems to be a link between the two notions (Alves–Raposo 2007, 2009, Giner–Rillo 2016, Gronholdt et al. 2000, Kandampully 1998). However, in the research of Ostergaard and Kristensen (2005), loyalty is considered to be equal to WOM recommendations. In their scale, they apply questions regarding repurchase and WOM together, which together constitute loyalty. Therefore, based on secondary research articles and the applicability of qualitative results, my proposal is as follows. In terms of higher education, loyalty comprises the students' willingness to stay at the university for the total length of the study program and their WOM recommendations, as the re-purchase behavior is not a valid determinant and does not provide enough feedback on students' loyalty.

4.5. Satisfaction and loyalty

Student satisfaction and loyalty have been subject to recent scientific research. Based on the findings of the literature review and pilot research, it is now essential to differentiate between school-related and non-school-related satisfaction.

Previous studies have attempted to explain the loyalty of international students to their HEI and usually handled loyalty and WOM as separate elements (Alves–Raposo 2007, 2009, Giner and Rillo 2016, Ostergaard–Kristensen 2005). According to this research, student satisfaction can lead to WOM and loyalty. The importance of WOM in international student satisfaction has been explored by Alves and Raposo (2007). They concluded that if a student was satisfied with the education, they would recommend the institution by WOM. Conversely, WOM (loyalty) is the result of their satisfaction. Other researchers define several other factors or needs, such

as commitment to the institution, international student mobility options and co-creation, which, if satisfied, can lead to loyalty (Bryla 2014, Giner–Rillo 2016, Schertzer–Schertzer 2004). Ostergaard and Kristensen (2005) also indicated that if an international student is satisfied with the specific elements of the service they receive, they would be loyal to the institution and would recommend the institutions or study-program to others. Douglas and Davies (2008) and Zhang et al. (2008) found that some quality variables can also lead to satisfaction and then loyalty. Concluding the secondary research, several studies focused on determining the relationship between satisfaction and loyalty (Bryla 2014, Giner–Rillo 2016, Schertzer–Schertzer 2004), while others revealed that loyalty can result in international student WOM recommendations (Alves–Raposo 2007, 2009, Ostergaard–Kristensen 2005).

In the pilot qualitative research, it became evident that if a student was satisfied, they recommended studying at the HEI to others (*'Sure, yes. One of my friends, he is now in Szeged, yeah. I recommended him to study in the same major.' – Student from Laos*) and would choose the same program under similar circumstances (*'Yes, absolutely. It is a no-brainer.'- Student from Colombia*). It is an interesting finding, that even if a student was not completely satisfied, they would also recommend studying at a specific HEI (*'I already recommended for some points and I already warned for some points. At least three people now (came to Szeged because of my recommendations)' – Student from Turkey*), but in terms of re-purchase, they were uncertain (*'It is a hard question. For masters yes, but for PhD no. I don't know if I can survive in Szeged.' – Student from Turkey*).

On the basis of the above-mentioned evidence from the literature and the pilot study, my proposal for hypotheses regarding international student satisfaction and loyalty are as follows.

H4a: School-related satisfaction can lead to overall satisfaction.
H4b: Non-school-related satisfaction can lead to overall satisfaction.

H4c: School-related satisfaction can lead to loyalty.
H4d: Non-school-related satisfaction can lead to loyalty.

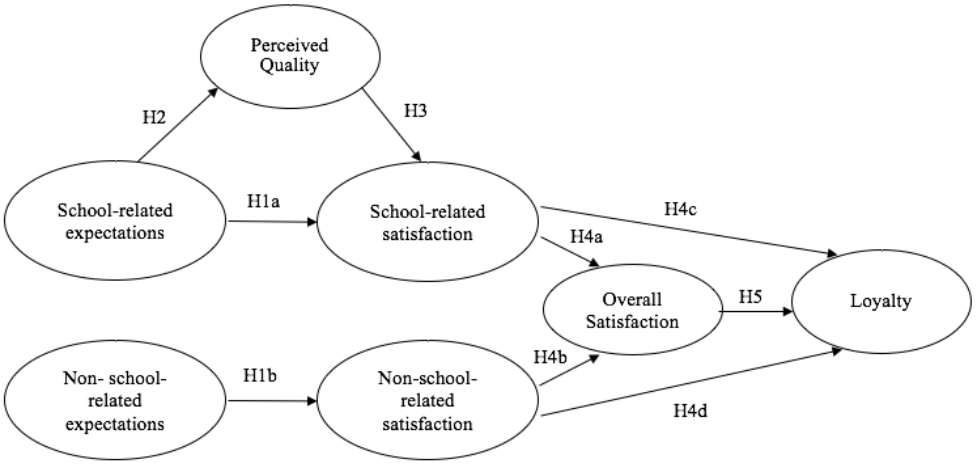
Taking the CSI-based models into consideration, numerous studies have found that HEI satisfaction is the determinant of loyalty (Alves–Raposo 2007, 2009, Brown–Mazzarol 2009, Pinto et al. 2013, Zhang et al. 2008). Consequently, the final hypothesis is the following.

H5: Overall satisfaction leads to loyalty.

This study set out to propose a new conceptual model of international student expectations, HEI perceived quality, satisfaction and loyalty. The study has found that it is essential to differentiate between school-related expectations and satisfaction, and non-school-related expectations and satisfaction of international students if we look at their study-abroad experience, as these categorizations provide a more accurate feedback on international students' experience. The study also found that WOM also has a key role in understanding international student loyalty. In the proposed conceptual

model, WOM is considered to be an essential element of loyalty and is not handled as a separate element in the model. The present investigation proposes 5 main hypotheses. The proposed hypotheses and the new conceptual model are shown in Figure 2.

Figure 2 Hypotheses and the proposed conceptual model



Source: Own construction

In summary, the secondary research results show that there has been a significant effort by researchers to gain insight into the expectations, HEI perceived quality, satisfaction, and loyalty of international students. The pilot research phases revealed that both motivation, expectations, satisfaction, loyalty and WOM have significant importance in the decision-making process of international students. However, the literature lacks enough evidence regarding the division of expectations and satisfaction into school-related and non-school-related aspects. Overall, this study aimed at highlighting a need for the development of a conceptual model and proposes the new conceptual model of international student expectations, HEI perceived quality, satisfaction and loyalty.

5. Summary

This particular study intended to introduce the theoretical background and pilot research steps that lead to the creation of a new conceptual model. After the literature review, pilot research results are introduced briefly. Then, the new conceptual model and hypotheses are defined.

As we could see, the studied concepts of motivation, expectations, HEI perceived quality, satisfaction, loyalty and WOM are usually investigated separately and only a small number of studies deal with all the notions together (Alves and Raposo 2007, Alves and Raposo 2009). Expectations and satisfaction have not been separated into well-defined categories. The present study aims to fill this gap.

Based on the secondary research and primary research results, I can conclude, that there is a gap in the literature in terms of the categorizations of expectations and satisfaction of international students with the study-abroad process. In the new conceptual model, I propose to differentiate between school-related and non-school related expectations and satisfaction. If we consider the school-related aspects, the perceived quality of the HEI also has a crucial role. School-related expectations affect the perceived quality, while perceived quality has an effect on school-related satisfaction. School-related and non-school-related satisfaction together lead to overall satisfaction. Finally, school-related, non-school-related and overall satisfaction lead to loyalty. WOM is a result of student satisfaction. However, due to the nature of the service students buy at an international university, they cannot repeat the same purchase again (with the same program at the same faculty – otherwise yes). Therefore, their loyalty can only materialize in WOM, not in repurchase. Conversely, I conclude that international student loyalty is equal to word-of-mouth recommendations. If an international student recommends the studied HEI to their friends or acquaintances, it means they are loyal to the HEI. Based on the findings, I propose the following hypotheses:

H1a: School-related expectations influence school-related satisfaction.
H1b: Non-school-related expectations influence non-school-related satisfaction.
H2: School-related expectations have an effect on perceived quality.
H3: Perceived quality has an effect on school-related satisfaction.
H4a: School-related satisfaction can lead to overall satisfaction.
H4b: Non-school-related satisfaction can lead to overall satisfaction.
H4c: School-related satisfaction can lead to loyalty.
H4d: Non-school-related satisfaction can lead to loyalty.
H5: Overall satisfaction leads to loyalty.

The current study establishes the basis for further research. The proposed theoretical model should be tested, the measurement items can be found in Appendix 1. Quantitative research is strongly recommended to investigate the proposed hypotheses. The results of a quantitative study would enable us to gain a better insight into the expectations, HEI perceived quality, satisfaction and loyalty of international students. Therefore, school- and non-school-related expectations, HEI perceived quality, school- and non-school-related satisfaction and loyalty should be studied together under the same theoretical framework, as it would provide an essential insight into the study-abroad process of international students.

References

Alves, H. – Raposo, M. (2007): Conceptual model of student satisfaction in higher education. *Total Quality Management*, 18, 5, 571–588.

Alves, H. – Raposo, M. (2009): The measurement of the construct satisfaction in higher education. *Service Industries Journal*, 29, 2, 203 –218.

Anderson, B. D. (2007): Students in a global village: The nexus of choice, expectation, and experience in study abroad. Texas, Austin: The University of Texas at Austin, PhD dissertation.

Arndt, J. (1967): Role of product-related conversations in the diffusion of a new product. *Journal of Marketing Research*, 4, 291–295.

Bryla, P. (2014): Self-reported effect of and satisfaction with international mobility: a large-scale survey among polish former Erasmus students. *Procedia Social and Behavioral Sciences*, 191, 2074–2082.

Bryla, P. (2015). The impact of international student mobility on subsequent employment and professional career. a large-scale survey among polish former Erasmus students. *Procedia, Social and Behavioral Sciences*, 176, 633–641.

Bughin, J. – Doogan, J. – Vetvik, O.J. (2010): A new way to measure word-of-mouth marketing. McKinsey Quarterly, April 2010. Retrieved Oct 8, 2018, from http://www.mckinseyquarterly.com/A_new_way_to_measure_word-of-mouth_marketing_2567

Brown, R. M. – Mazzarol, W. (2009): The importance of institutional image to student satisfaction and loyalty within higher education. *Higher Education*, 58, 81–95.

Byrne, M. – Flood, B. (2005): A study of accounting students' motives, expectations and preparedness for higher education. *Journal of Further and Higher Education*, 29, 2, 111–124.

Cardona, M. M. – Bravo, J. J. (2012): Service quality perceptions in higher education institutions: the case of a Colombian university. *Estudios Gerenciales*, 28, 23–29.

Carvalho, S. W. – Mota, M. O. (2010): The role of trust in creating value and student loyalty in relational exchanges between higher education institutions and their students. *Journal of Marketing for Higher Education*, 20, 1, 145–165.

Cheng, A. Y-N. (2014). Perceived value and preferences of short-term study abroad programmes. A Hong Kong study. *Procedia, Social and Behavioral Sciences*, 116, 4277–4282.

Chirkov, V. – Vansteenkiste, M. – Tao, R. – Lynch, M. (2007): The role of self-determined motivation and goals for study abroad in the adaptation of international students. *International Journal of Intercultural Relations*, 31, 199–222.

Churchill, G. A. – Surprenant, C. (1982): An investigation into the determinants of customer satisfaction. *Journal of Marketing Research*, 19, 491–504.

Cubillo, J. M. – Sánchez, J. – Cerviño, J. (2006): International students' decision-making process. *International Journal of Educational Management*, 20, 2, 101–115.

Czerwionka, L. – Artamonova, T. – Barbosa M. (2015). Intercultural knowledge development: Evidence from student interviews during short-term study abroad. *International Journal of Intercultural Relations*, 49, 80–99.

DeBacker, J. M. – Routon, P. W. (2017): Expectations, education and opportunity. *Journal of Economic Psychology*, 59, 29–44.

Deci, E. L. – Ryan, R. M. (1985): *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Ding, L. – Hauzheng, L. (2012): Social networks and study abroad: The case of Chinese visiting students in the US. *China Economic Review*, 23, 580–589.

Dewey, D. P. – Ring, S. – Gardner, D. – Belnap, R. K. (2013): Social network formation and development during study abroad in the Middle East. *System*, 41, 269–282.

Doña-Toledo, L. – Luque-Martínez, T. – Del Barrio-García (2017): Antecedents and consequences of university perceived value, according to graduates: The moderating role of higher education involvement. *International Review of Public Nonprofit Marketing*, 14, 535.

Douglas, J. – Davies, J. (2008): The development of a conceptual model of student satisfaction with their experience in higher education. *Quality Assurance in Education*, 16, 1, 19–35.

El-Hilali, N. – Al-Jaber, S. – Hussein, L. (2015): Students' satisfaction and achievement and absorption capacity in higher education. *Procedia Social and Behavioral Sciences*, 177, 420–427.

Elkhani, N. – Bakri, A. (2012): Review on Expectancy Disconfirmation Theory (EDT) model in B2C e-commerce. *Journal of Information Systems Research and Innovation*, 2, 95–102.

Elliot, K. M. – Healy, M. A. (2001): Key factors influencing student satisfaction related to recruitment and retention. *Journal of Marketing for Higher Education*, 10, 4, 1–11.

Evans, C. M. (1972), "A Study of Personality Need Factors with Respect to College Student Satisfaction in a Small Church Related College Located in a Southern State. Western Interstate Commission for Higher Education. Boulder, Colorado.

Firmin, M. W. – Holmes, H. J. – Firmin, R. L. – Merical, K. L. (2013): Personal and cultural adjustments involved with an Oxford study abroad experience. *Procedia, Social and Behavioral Sciences*, 89, 555–558.

Fornell, C. – Johnson, M.D. – Anderson, E. W. (1996): The American Customer Satisfaction Index, Nature, Purpose and Findings. *Journal of Marketing*, 60, 7–18.

Gallarza, M. G. – Seric, M. – Cuadrado, M. (2017): Trading off benefits and costs in higher education: A qualitative research with international incoming students. *The International Journal of Management Education*, 15, 456–469.

Giner, G. R. – Rillo, A. P. (2016): Structural equation modelling of co-creation and its influence on the student's satisfaction and loyalty towards university. *Journal of Computational and Applied Mathematics*. 291, 257–263.

Gronholdt, L. – Martensen, A. – Kristensen, K. (2000): The relationship between customer satisfaction and loyalty: Cross-industry differences. *Total Quality Management*, 11, 4-6, 509–514.

Guay F. – Vallerand R. J. – Blanchard C. (2000): On the Assessment of Situational Intrinsic and Extrinsic Motivation: The Situational Motivation Scale (SIMS). *Motivation and Emotion*, 24, 3, 175–213.

Guay, F. – Chanal, J. – Ratelle, C. F. – Marsh, H. W. – Larose, S. – Boivin, M. (2010): Intrinsic, identified, and controlled types of motivation for school subjects in

young elementary school children. *British Journal of Educational Psychology*, 80, 4, 711–735.

Hackney, K. – Boggs, D. – Kathawala, Y. – Hayes, J. (2013): Willingness to study abroad: An examination of Kuwaiti students. *Journal of International Education and Leadership*, 4, 1, 1-16.

Hanousek, R. L. – Hegarty, N. (2015): The measurement of student motivation: Does one scale do it all? *Journal of Higher Education Theory and Practice*, 15, 1, 11–18.

Higgs, B. – Polonsky, M. J. – Hollick, M. (2005): Measuring expectations: forecast vs ideal expectations. Does it really matter? *Journal of Retailing and Consumer Services*, 12, 1, 49–64.

Hull, C. L. (1943): *Principles of Behavior*. New York, Appleton-Century-Crofts.

Huybers, T. – Louviere, J. – Islam, T. (2015): What determines student satisfaction with university subjects? A choice-based approach. *Journal of Choice Modelling*, 17, 52–65.

Jager, J. – Gbadamosi, G. (2013): Predicting students' satisfaction through service quality in higher education. *International Journal of Management Education*, 11, 107–118.

Kandampully, J. (1998): Service quality to service loyalty: A relationship which goes beyond customer services. *Total Quality Management*, 9, 6, 431–443.

Kaplan, A. – Karabenick, S. – DeGroot, E. (2009): Culture, Self and Motivation. *Essays in Honor of Martin L. Maehr.* Information Age, Charlotte.

Kéri, A. (2016): A Magyar felsőoktatásban tanuló külföldi hallgatók motivációjának vizsgálata = The study of foreign students' motivation about learning in Hungary. *E-CONOM*, 5, 36–50.

Kéri, A. (2018): The PLS-SEM path analysis of foreign students' motivation and expectations at a Hungarian university. Udvari, Beáta; Voszka, Éva (szerk.) *Challenges in national and international economic policies.* Szeged, JATEPress, 176-197.

Lee, J-W. (2010): Online support service quality, online learning acceptance, and student satisfaction. *Internet and Higher Education*, 13, 277–283.

Lenton, P. (2015): Determining student satisfaction: An economic analysis of the national student survey. *Economics of Education Review*, 47, 118–127.

Maehr, M. L. (1976): Continuing motivation: An analysis of a seldom considered educational outcome. *Review of Educational Research*, 46, 3, 443–462.

Martin, J. N. – Bradford, L. – Rohrlich, B. (1995). Comparing predeparture expectations and post-sojourn reports: A longitudinal study of U.S. students abroad. *International Journal of Intercultural Relations*, 19, 1, 87–110.

Maslow A. H. (1987): *Motivation and Personality*. Harper & Row, New York.

Mitchell, T. R. (1982): Motivation: New Directions for Theory, Research and Practice. In *The Academy of Management Review*, 7, 1, 80–88.

Neal, W. D. (1999): Satisfaction is nice, but value drives loyalty. *Marketing Research*, 11, 1, 21–23.

Newman, J. W. – Werbel, R. A. (1973): Multivariate analysis of brand loyalty for major household appliances. *Journal of Marketing Research*, 10, 404–409.

Nyaupane, G. – Paris, C. – Teye, V. (2011): Study abroad motivations, destination selection and pre-trip attitude formation. *International Journal of Tourism Research*, 13, 3, 205–217.

Oliver, R. L. (1980): A cognitive model of the antedescents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17, 460–469.

Oliver, R. L. – Bearden, W. O. (1985): Disconfirmation processes and consumer evaluations in product usage. *Journal of Business Research*, 13, 235–246.

Oliver, R. L. – Winer, R. S. (1987): A framework for the formation and structure of consumer expectations: review and propositions. *Journal of Economic Psychology*, 8, 469–499.

Oliver, R. L. – Rust, R. T. – Varki, S. (1997): Customer delight: foundations, findings, and managerial insight. *Journal of Retailing*, 73, 3, 331–336.

Oliver, R. L. (1999): Whence consumer loyalty? *Journal of Marketing*, 63, 33–44.

Oliver, R. L. (2015): *Satisfaction: A behavioral perspective on the consumer*. Routledge, NY.

Ostergaard, D. P. – Kristensen, K. (2005): Drivers of student satisfaction and loyalty at different levels of higher education (HE) – cross-institutional results based on ECSI methodology. In New perspectives on research into higher education: SRHE Annual Conference; 2005; Edinburg: University of Edinburgh.

Owlia, M. S. – Aspinwall, E. M. (1996): A framework for the dimensions of quality in higher education. *Quality Assurance in Education*, 4, 2, 12–20.

Parasuraman, A. – Berry, L. L. – Zeithaml, V. A. (1991): Perceived service quality as a customer-based performance measure: An empirical examination of organizational barriers using an extended service quality model. *Human Resource Management*, 30, 3, 335–364.

Patterson, P. – Romm, T. – Hill, C. (1998): Consumer satisfaction as a process: a qualitative, retrospective longitudinal study of overseas students in Australia. *Journal of Professional Services Marketing*, 16, 1, 135–157.

Reichheld, F. F. – Sasser, W. E. (1990): Zero defections: quality comes to services. *Harvard Business Review*, 68, 5, 105–111.

Reichheld, F. F. (1996): Learning from customer defections. *Harvard Business Review*, 74, 56–69.

Reichheld, F. F. – Markey Jr., R. G. – Hopton, C. (2000): The loyalty effect – the relationship between loyalty and profits. *European Business Journal*, 12, 3, 134–139.

Reichheld, F. F. (2003): The one number you need to grow. *Harvard Business Review*, 81, 12, 46–54.

Reinartz, W. – Kumar, V. (2002): The mismanagement of customer loyalty. *Harvard Business Review*, 2002/July, 86–94.

Roman, I. (2014): Qualitative methods for determining students' satisfaction with teaching quality. *Procedia Social and Behavioral Sciences*, 149, 825–830.

Sasaki, M. (2011): Effects of varying lengths of study-abroad experiences on Japanese EFL students' L2 writing ability and motivation: a longitudinal study. *Tesol Quarterly*, 45, 1, 81–105.

Schertzer, C. B. and Schertzer, S. M. B. (2004): Student satisfaction and retention: A conceptual model. *Journal of Marketing for Higher Education*, 14, 1, 79–91.

Skinner, E. A. (1995): *Perceived control, motivation and coping*. Sage

Stover, J. B. – Iglesia, G. – Boubeta, A. R. – Liporace, M. F. (2012): Academic motivation scale: adaptation and psychometric analyses for high school and college students. *Psychology Research and Behavior Management*, 5, 71–83.

Sultan, P. – Wong, H. Y. (2013a): Antecedents and consequences of service quality in a higher education context: A qualitative research approach. *Quality Assurance in Education*, 21, 1, 70–95.

Sultan, P. – Wong, H. Y. (2013b): Service quality in a higher education context: an integrated model. *Asia Pacific Journal of Marketing and Logistics*, 24, 5, 755–784.

Tellis, G. J. (1988): Advertising exposure, loyalty and brand purchase: a two-stage model of choice. *Journal of Marketing Research*, 25, 134–144.

Templeman, K. – Robinson, A. – McKenna, L. (2016): Learning and adaptation with regard to complementary medicine in a foreign context: Intercultural experiences of medical students from different cultural backgrounds. *International Journal of Intercultural Relations*, 55, 55–65.

Utvaer, B. K. S. – Haugan, G. (2016): The academic motivation scale: dimensionality, reliability, and construct validity among vocational students. *Nordic Journal of Vocational Education and Training*, 6, 2, 17-45.

Vallerand, R.J. – Fortier, M.S. – Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology*, 72, 1161–1176.

Wiers-Jenssen, J. – Stensaker, B. – Grogaard, J. B. (2002): Student satisfaction: towards an empirical deconstruction of the concept. *Quality in Higher Education*, 8, 2, 183–195.

Woodruff, R. B. – Cadote, E. R. – Jerkins, R. L. (1983): Modeling consumer satisfaction processes using experience-based norms. *Journal of Marketing Research*, 20, 3, 296–304.

Yang, Z. – Becerik-Gerber, B. – Mino, L. (2013): A study on student perceptions of higher education classrooms: Impact of classroom attributes on student satisfaction and performance. *Building Environment*, 70, 171–188.

Yi, Y. (1990): A critical review of Consumer Satisfaction. *Review of Marketing*, 68–123.

Zeithaml, V. (1981): How consumer evaluation processes differ between goods and services. *Marketing Services, AMA*, 39–47.

Zhang, L. – Han, Z. – Gao, Q. (2008): Empirical study on the student satisfaction index in higher education. *International Journal of Business and Management*, 3, 9, 46–51.

Appendix 1. Initial measurement items

Initial measurement items

- School-related expectations
    - I expected the university equipment and facilities to be of high quality.
    - I expected the teachers to be experts in their fields with extensive knowledge.

  - I expected that students' needs would be understood.
  - I expected the curriculum to be well-developed.
  - I expected to get effective education with feedback.
  - I expected trustworthy teachers and support staff.

- Non-school-related expectations
  - I expected many different accommodation opportunities.
  - I expected many leisure time facilities, such as restaurants, cafés, bars, clubs, etc.
  - I expected many non-school-related leisure programmes.
  - I expected a lively European city.
  - I expected an international environment.
  - I expected a reasonable cost of living here in Szeged.

- Perceived quality: How would you rate the following? (1-5, 1 – Poor, 5 – Excellent)
  - The overall quality of the structure and selection of courses offered in the programme.
  - The overall quality of the facilities and framework.
  - The overall quality of the lecturers/tutors teaching and contribution in general.
  - The overall quality of service rendered by the administrative staff.

- School-related satisfaction: How much do you agree/disagree with the statements below? (Strongly disagree, disagree, neutral, somewhat agree, strongly agree)
  - Tangibles:
    - The overall equipment available for students is in a good condition.
    - The computers students are allowed to use are sufficient.
    - The learning environment at the University is modern.
  - Competence
    - Teachers are well-prepared for foreign students.
    - Teachers have excellent theoretical knowledge.
    - Teachers have the ability to convey their knowledge to students.
  - Content
    - Most classes are interesting.
    - The study material is easily available for foreign students.
    - Courses are pleasure to attend.
    - The study material is well-developed.
  - Attitude
    - University teachers understand students' needs.
    - University administrators understand students' needs
    - Most University employees have positive attitude towards foreign students.

        - University staff seem comfortable around foreign students.
    - Reliability
        - Teachers are reliable.
        - Students can trust their teachers.
        - Students can turn to the administration of the university with their problems.
    - Delivery
        - The material is presented effectively by teachers.
        - Teachers present the course material in a clear and informative way.
        - Foreign students always know the evaluation criteria of a subject.
        - Students always get relevant feedback to their work.

- Non-school-related satisfaction
    - How much do you like living in Szeged?
    - How much are you satisfied with the living conditions? (living costs, housing situation, accommodation, etc.)
    - How much are you satisfied with the international environment in the city?
    - How much are you satisfied with the different facilities in Szeged? (cafés, restaurants, bars, pubs, etc.)

- Overall satisfaction
    - My experience of university and the city Szeged is/was very satisfactory.
    - Overall, I am satisfied with my university and the city Szeged.
    - I made the right decision when I chose this university and this city.
    - I am satisfied with the service provided by my university.

- Loyalty
    - How much would you recommend studying in Szeged to others?
    - How much would you recommend studying at the University of Szeged?
    - Would you choose this city for studies again, if you were to start higher education today?
    - Would you choose the University of Szeged for studies again if you were to start higher education today?

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 195–207.

Importance of experience among young consumers

Dalma Vincze

It is difficult to understand motives behind the consumption of young consumers. Understanding the function of consumption is considered to be one of the most important tasks in the field of Consumer Behavior. The different functions of consumption have become a central issue in consumption studies. This paper tries to shed new light on the phenomenon of experience consumption as a new function of consumption, besides fulfilling needs and demonstrating status. The chosen method for this investigation was to conduct a netnography on a group of 18-22 years old Facebook and Instagram users. This 3-month-long investigation revealed that these young consumers mainly post pictures that made them happy or proud. These results further our knowledge of experience since our subjects want to feel themselves unique, and want to consume goods and services that have the capacity to provide fun. We think that our findings might be useful for understanding one more aspect of the consumption of young people.

Keywords: consumer behavior, consumption, Generation Z, experience, netnography

1. Introduction

Consumption is one of our daily tasks, so that is why we really what to obtain and understand an answer to our main question: *'Why (from what motivation) we consume, and what motivation can be discerned behind the consumer decision?'*

The disciplines which have investigated the phenomenon of consumption, have always more or less agreed about there being a main motivation behind buying goods or services, and that was fulfilling needs. After some decades, status consumption became the focus of investigation. There was a lot of basic discussion about the symbolic aspect of goods and services. To a large extent, status consumption was raised to the main motivation behind the phenomenon. Meanwhile a new idea has come into focus, we have to take into consideration that the aesthetic, intangible and subjective elements of consumption should pertain to a phenomenon: hedonic consumption. In fact, we need to recognize experience gained as the motivation of hedonic consumption.

According to the results of my previous research – deep interviews and focus group investigations – it is clear that 18-22-year-old consumers are not motivated only by fulfilling need. Similarly, they are do not feel the importance of communicating their – non-existent – high social status. On the contrary, they feel the concrete need to have fun either alone or in community, and want to take part in some kind of experience consumption. To get acquainted with this phenomenon, I needed more details and I needed to use such methods that were able to give me more and special insights. My investigation focused on the appearance of experiments in young consumers' online-social media activities. My research question was: '*How can we notice experience (or the communication of experience) in social media posts of young consumers'*

That explains why I chose photo collage combined with interview, and on the basis of findings, subsequently to conduct a 3-mounth-long netnography. In point of netnography I observed altogether 20 people's (13 female and 7 male) profiles (born from 1995 to 1999) including the profiles of photo collages as a subject. The photo collages interviews were conducted in May 2017, and the netnography compiled from the 1st of June to the 31th of August 2017.

Consequently, I have to say that according to the visible posting activities on Instagram, it is one of the main channels for communicating experience. On the contrary Facebook is rather for organizing events and information gathering or communication. Basically, the focus of Facebook is '*staying in touch with each other'* and '*I'll let you see what I am doing'* is the function of the Instagram posts.

2. History of consumption – Experience consumption as a third level

According to Corrigan (1997) the primary function of consumption was to solve a problem, satisfy a need. This is the first level of consumption (Simányi 2005), but we came a long way to modern consumption nowadays. Scientists from the field of sociology of consumption, and the disciplines that have investigated consumption, have more or less agreed that the main and primary function of this phenomenon was indeed fulfilling needs. In traditional societies, there is a finite (limited) number of needs to be filled, and any wants and desires anyone might have would relate quite directly to this rather narrow sphere. Traditional consumer would regard with surprise instances of consumption outside the boundaries determined by tradition. In contrast, the modern consumer considers with alarm anyone who does not want to consume more and more, who does not seem to be interested in new want and desires (Corrigan 1997).

The stasis of traditional societies meant that one could learn the exact pattern of consumption, such as the finite number of things that enter into consumer consciousness. This way one could learn the proper modes of consuming relatively easily. In industrial societies, consumption is not a matter of rational calculation or of irrational impulse, but a strong sense of duty, an obligation to engage in want satisfaction as an end in itself. In modern societies a general orientation to consuming is required – what may be consumed is not fixed in number or kind, and may be undergoing rapid change. '*There is not much that we desire very particular things, although it happens, but it is rather that we want to want, we desire to desire, and we want new and different things in an endless pattern of discontent (Campbell 1983, p. 282).'* In modern societies there is a crucial feature of the role of the modern consumer. The primary obligation is to want to want all the time, under all circumstances. In the case of consumers, there is no innate disposition to want to want, but it is something to do with the effect of a particular form of civilization. Campbell says there is an ethic underlying consumption, such as for Weber there was an ethic underlying production, so if production can be linked to the Protestant work ethic, then consumption can be linked to Romanticism. Romanticism was a reaction against industrial societies and all it stood for, such as materialist and rationalist philosophies and the role of science, which were important during the period of the Enlightenment. Romanticism was also able to provide a new way of experiencing the world for the masses.

Like there was a first level of consumption, there was a second level as well. While this fulfilling needs-conversation was dominating scientific discussions, a whole new finding came to light: The idea that consumers and their objects communicate positions in the social world, and that that is more fundamental than any idea of simply fulfilling a particular concrete need. During the 1950s there was a substantial discussion concerning the symbolic aspects of products (Gardner–Levy 1955). That was the so-called status consumption. The typical symbols of social status were a big house or a fancy car. According to these findings, scientists also claimed that demonstrating consumption was actually equal with status consumption. We have to make a distinction between necessities and luxuries at this point. The main difference is that necessities derive us satisfaction by giving us we what we need for existence, relieving discomfort, filling the lack of discomfort. For the feeling of pleasure, we do not actually need to have luxuries for real. Although of course we may have them. In fact, these are two contrasting models of human action: satisfying needs and pursuing pleasures.

While scientists were claiming that fulfilling need and communicating social status were the main motivation behind consumption, meanwhile another new point of view has appeared, that could be called the third level of consumption. Hereby, the esthetic, intangible and subjective aspects of consumption pertain to a phenomenon that we shall refer to as 'hedonic consumption' – with experience in its focus (Hirschman–Holbrook 1982). How does pleasure-seeking operate? Campbell says there are two different kind of hedonism which can be discovered in the field of consumption (Corrigan 1997).

Let us compare traditional and modern hedonism: Traditional hedonism means searching for pleasure, it is the search for sensations. Traditional hedonism was common among the wealthy elite whose satisfaction could be guaranteed. In this situation they tried special practices to gain pleasure, for example, in form of eating, or drinking, and in general, they sought to control objects and events in the world in order to gain pleasure from them. On the other hand, modern hedonism can be found in all or any experiences, so from this point of view, the experience of life itself seems to have become the seat of pleasure. Mainly it means finding pleasure in control over the meaning of things (Corrigan 1997).

Experience has become the keyword of modern marketing solutions and thinking, and that is why it could also become one of the most widely investigated research topics in service marketing among other fields (Pavluska 2014). As a result, several disciplines have started to discover experience by many methods in many situations, and with the help of their findings solve a concrete problem, or understand a situation. At this point we have to mention Maslow (1964), who was the creator of Peak experience, and Csíkszentmihályi's (1990) Flow Experience from the field of psychology. According to Flow theory, there is a so-called perfect experience, when the subject changes her/his attitude and feels the ability to control his or her own life. The author also thinks that happiness and searching for happiness could be the main motivation in the case of Flow experience and behind experience consumption.

While psychology was investigating and sociology was creating the conception of experience economy, economics created its own approach, and experience has appeared in its searching focus. The marketing scientists and researchers

were starting to deal with experience in an explicit way and its economic value aspect in the 1980's (Holbrook–Hirschman 1982). At the end of the 1990's economics created experience economy (Pine–Gilmore 1999) and a new product category was created namely the experience good.

The economic value of experience was investigated by Hirschman and Holbrook (1982) in their basic study about experience economy and experience consumption. According to the authors, the kernel of consumption could be the possession of the meaning or potential of the concrete goods. The authors also introduce 'hedonic viewpoint' as an important extension of traditional consumer research. They have argued that consumption besides fulfilling needs could give joy, could be free-time activity, can offer aesthetic joy and spur the imagination, and can cause emotive responses. So, in this way, consumption can be described with symbolic aspects, hedonistic response, the aesthetic aspect, and so consumption is a special state of mind. These factors could lead us to name this special state of mind as experience consumption.

According to the traditional marketing point of view, the focus consumption is the service or the particular good. In contrast, the hedonistic viewpoint says we can find the experience in the process of consumption everywhere, any point of the service could be an essential element of experience giving. In brief, the supply is not the product, but the promise of the experience by possessing the product or service. For these reasons, the experience – consumer experience – is a kind of mental or emotive phenomenon that is created inside the consumer (Pavluska 2014).

To understand the consumer experience, we have to acknowledge that Consumer Experience is the part of the hedonistic viewpoint. Thus, hedonistic consumption – besides fulfilling needs – should be defined as those elements of consumer behavior that relate to the multisensory, fantasy and emotive aspects of product use (Hirschman–Holbrook 1982). According to Pavluska (2014) consumption, and this way the whole consumer experience, contains functional – rational and emotional aspects as well. Kotler and Keller (2012) agree that the holistic marketing viewpoint could be a good foundation for creating experience marketing, and that experience-focused consumer behavior needs a broader and deeper perspective.

3. Method and Subjects

Because of the fact that young people could spend hours on different online platforms – even 10-12 hours (Guld–Maksa 2015) – and use these forums to reveal their consumption to others, I presumed that the pictures and videos that we can see on their social media profiles are able to communicate something about their consumption. I believed that an online observation form, namely netnography could give me valuable information. Before conducting netnography I used photo collage technique interviews with 3, 20-21-year old female subjects.

Collaging is a projective technique in which participants are required select images that represent how they think or feel about a particular topic. The participants then explain to the interviewer the reason they chose each image. The collage becomes a tool through which participants are able to express needs and feelings that they might not otherwise have been able to articulate verbally (Landgarten 1993). Photo collage

investigation was necessary because I wanted to be sure what dimensions, feelings, and motivations I could expect to observe during the process of netnography. According to Horváth and Mitev (2015) photo collage technique could be suitable for investigating the thinking process of today's consumers, because the systems to classify this volume of stimulus – like these pictures – are able to represent the voluntary self-representation of participants. This information enabled me to better understand the posting method and to look for typical patterns in this process. So in conclusion, I think the private profile of each subject on any social media application they use – and the collage is given by all the photos they post – could be a special form of voluntary self-representation.

The photo collage interviews were conducted in May 2017. The photos were collected from 'average' photos as commonly seen in social media posts, and I looked for very similar shots among Google pictures. The original photo collage technique says that the collage is made from magazines and newspapers pictures, but in this context, there were ready, purposefully selected photos, and it made the technique similar to the online collage version of this technique. One limitation to be mentioned was the fact that these pictures were external to the original context and became one of many others the subject could choose from. I think it was not a huge problem, because the focus here was on the result and the complex meaning of the creation and not the source of these pictures or photos. Finley (2001) says that there is another advantage to this technique, namely the picture became part of another new story, and helped the subject to recall memories, feelings, emotions, experiences that had hardly been articulated until now.

Netnography is ethnography adapted to the study of online communities (Kozinetz 2006). This method is almost 15 years old, even though it has hardly been used in consumer behaviour researches. The great advantage of this technique is that the researcher is able to observe the thinking structure and decision- making pattern of a particular online groups in their natural surroundings via publicly available online communication channels. In fact, the research conducted in this way was able to gather a lot of information about these groups. As a disadvantage, we have to take into consideration typical ethical dilemmas, such as the permission of the subject to publish results. In my paper there will be not any citation, our aim was only to discover the main tendencies and average consequences. My subjects allowed me to use their summarized posting activities, but I am not able to show the original photos or exact texts, only the # categorization and associated feelings. I will use nicknames and the real age of the subject.

There are other disadvantages to this technique. One of these is the researcher has to know the observed group well. This was the aim of the photo collage interviews conducted. I never reacted to any of the posts and never got involved in any of the conversations. Another disadvantage is simultaneously one of the biggest advantages: this method is quite flexible. At the explanation of the results we have to take into consideration that this is an observation and we have only very few subjects. Consequently, we cannot make general statements, but the process was suitable for exploratory, pilot research. According to Kozinetz (2002) the first step to conduct a netnography is the so-called Cultural Entrée. It means that the researcher needs to collect more and more information about the channels he / she will use for data gathering, and about what kind of information is acceptable. According to Gál et al.

(2016) and Kozinetz (2002) there are many channels for this gathering process, and to mention some typical forms, there are boards, which function as electronic bulletin boards (also called newsgroups); independent web-pages as well as web-rings composed of thematically linked World Wide Web pages; multi-user dungeons and chat rooms tend to be considerably less market-oriented in their focus; and online social media communities. I chose this last one because my previous results and desk research identified them as the most promising form. The netnography was conducted from the 1st of June from the 31st of August in 2017.

Photo collage interviews gave us insight into 3 subject's posting activity, and let us to know a little bit more about the attitudes and feelings behind posting a particular picture. During this interview I asked the subject to choose from the pictures and create a big collage with 3 different groups of pictures with in.

1. group was the pictures they would post in any of her profiles either on Instagram or in Facebook.
2. group was one they liked, but would not post because of some reason.
3. group was the pictures they would not post in any circumstances, and even had some bad feelings toward.

According to netnography the first group and its motivations were relevant, but the subject were talking about the second and third one as well. Besides these 3 subjects, during the netnography I was observing the Instagram and Facebook posting activity of another 17 subjects (18–22 year-old). All of my subjects were users of both social media platforms. The observed dimensions were the following:

- Posted pictures and videos: the average posting time, frequency (time between two posting), common themes: family, friends, holiday, food or drink, music festivals, extreme sports etc.
- hashtag use: mainly on Instagram: average number, and frequency, typical forms,
- Other forms of posting on Facebook: what kind of any other form of post can we see during the observation period

4. Photo collage insights

In this chapter I would like to present the three photo-collage-subjects (Letti 20, Detti 21 and Etelka 20) posting activity according to what they said during the interview. And after that I will introduce the summarized netnography results as well.

As I have mentioned, each photo collages subject had to choose photos that they had some feelings towards. The 3 categories are signed with green, blue and red frames:

- In the green frame are the pictures they would post or the pictures that are similar to what the subject would post on their profile either on Instagram or on Facebook.
- In the blue frame are the pictures the subject likes but would not post because of some reason,
- And finally, in the red frame are those pictures that the subject would not post in any circumstances.

While selecting the pictures, subjects said consumption had changed and nowadays people buy a lot only for fun or pleasure, even if the purchase is not necessarily because of any functional aspect.

Letti 20 years old female subject. During the photo collage interview, she said she preferred to post on Instagram. Accordingly, she chose only one photo to post in Facebook. You can see it in Figure 1. Marked with the Facebook icon.

Figure 1 Letti's Photo collage

Source: Own construction

In the green frame can be seen pictures which make her think about her journeys with friends and family or participation in family events. She claimed to use Instagram as a photo album to remember these memorable moments.

'…If I would post these on Instagram these would be like in a photo album with all of my very best moments and memories…'

'… I like Insta because I can see all of my pictures in big version …'

According to her Instagram posts during the netnography, we can see family vacation pictures – they went fishing and camping, family trips to Szeged – and some cocktails, coffees with signs of having fun. Commonly used #s are, *#nature, #fishing, #happiness #Szeged and #holiday.*

About Facebook use, she said it is much more rare for her to post pictures there, because there is not a good filter for friends, and she does not want everyone to know what is she doing right at that moment.

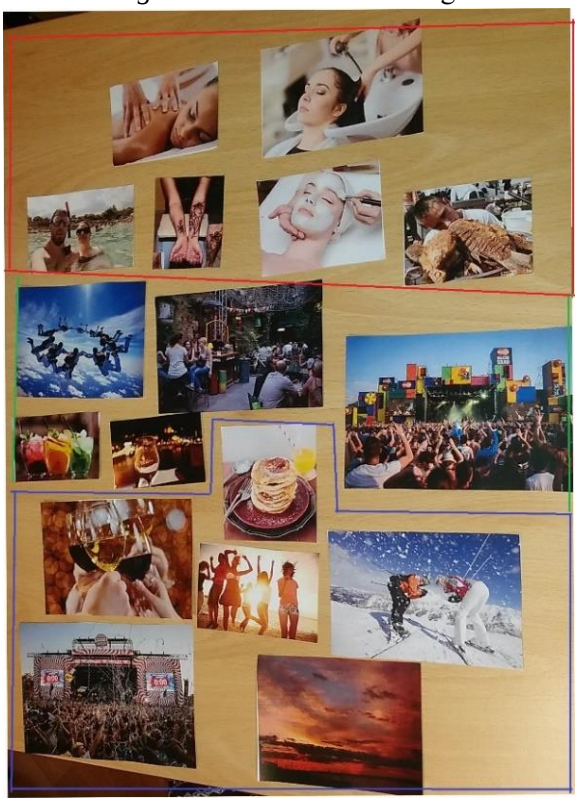
The blue framed pictures she would not post even though she likes these activities, she considered as a 'to do list' – and she does not want them to be seen by everyone. She said attending particular music festivals was her big aim, and to try sky-diving.

'...Balaton sound is one of my biggest dream to get there, because I would like to hear concerts in air. '

In red frame there are 2 pictures, a Louis Vuitton shop and a line in front of it, and a pair of YSL high heels. Letti thinks these are totally waste of time and money and she is also envious of the shoes.

Detti 21-year old female subject during the creation of her collage (Figure 2) said that she is not a big 'posting person', posting only one or two pictures and preferring to 'live the experience of joy'. She downloads the pictures for herself, but did not use Instagram or Facebook so often. She said Instagram and Facebook and social media platforms in general were for information gathering from others, and letting everyone know where you were and what a good time you were having.

Figure 2 Detti's Photo collage



Source: Own construction

As you can see, Detti would choose activities like bungee jumping, sky diving, having a cocktail or a coffee together with friends, going to a music festival, or having a girls' night out with family or friends.

'…I am not a big posting person in the world of these pages but I would post only the very memorable moment. … Bungee jumping or skydiving would be a huge experience for me and I think it would be posted…'

Analysing her Instagram posts, actually we can see very few pictures with her boyfriend and family in parallel of what she said during the interview. Commonly used #s are *#cocktail #sexonthebeach; #waffles #blueberry #sweethome.*

The subject said about the blue framed pictures that they made her feel good, they were good to get some inspiration, but she would not post them because she does not what others to see this kind of information about her.

In the red frame you can see the pictures which are *'too intimate'* or *'silly'* according to the subject.

Etelka 20 years old female subject during the photo collage interview also said she would post mainly on Instagram and in just very few cases on Facebook because she did not want all her friends to see them, only the closest ones.

In the green frame (Figure 3) there are pictures that mean mainly memories of family and friends for her, and wanting to do things like these. We can see e.g. summer and winter sports, extreme sports, girls' nights, vacation at a lake, paintball – free time activities, i.e. all things people can do with family and friends, so in community.

According to her Instagram post she posted the same theme: family and relationship. Commonly used #s are *#mylove #balcsi #6.5év #exams #twoweeksbalaton #family #relax #happy.*

Figure 3 Etelka's photo collage

Source: Own construction

She said about the blue framed pictures, that if she saw one, she would like it, or save it for herself. The messenger icon symbolizes that there is a possibility that she would send it for her friends to see but only in private mail.

The red-framed-pictures were chosen because of bad feelings toward them. It is interesting to see the pictures of music festival photos in this collection. It was because the subject lives near one of them, and does not like to hear the loud music and the crowds. Another main feeling behind the red framed collection is that she does not want everyone to know where she currently is and that is the explanation of why she does not post about any restaurant or catering venue.

'I do not want to know everyone where I am, if I'm having fun there, and when I came home, maybe I will post one or two pictures. Or not…'

5. Netnography results according to photo collage insights

I observed 13 more subjects and their posting activities on Facebook and on Instagram. They were all of my friends on both platforms, so I could draw connections between the picture to the situation and vice versa. I made a table to summarize what kind of obvious posting activity can be seen in these cases (Table 1).

The most popular theme was family photos, and accordingly the photo collage subjects mentioned it. I would like to underline the fact that the motivation behind Instagram posting seems to be consistent –namely that people post there more often and more intimate posts (mainly pictures and videos can be seen). In contrast, on Facebook we can see only a few posted pictures and videos. According to the summarized data:

- I observed 7 male and 17 female objects,
- and their profiles on Instagram and on Facebook,
- on Instagram the subjects follow an average 307 people, and are followed by 244 people,
- during this 3-month-long period there were 202 pictures and videos posted,
- Meanwhile on Facebook there were 281 posts but only 74 were personal videos or pictures. The other posts were memes, music videos, events, game links.

The subjects were trying to post pictures they are proud of or made them happy. The most popular themes of the posts were family activities and events, food and drinks – such as cocktails and waffles or pancakes – feelings, extreme sports – bungee jumping, surfing, windsurfing– , free time activities – camping, sporting, fishing, having a trip or having a day on Lake Balaton, music festivals – Young Days of Szeged so SZIN, Balaton Sound, VOLT and Sziget music festivals were also mentioned and posted. In hashtag use (a tool for making content – centered groups) and the associated texts, we can imagine the experience behind the activity, and the desire to preserve this feeling by posting it on profiles. It is general, these kinds of posts are to be found on Instagram rather than on Facebook. In contrast, on Facebook we can see group-pictures of friends and families or selfies and landscapes, even more memes and funny videos or music videos. There are some more pictures that are linked from Instagram. For these reasons Facebook profiles look more depersonalized than Instagram profiles.

Table 1 Some interesting data about the posting activity of subjects

Subject' name	Year of birth	Gender	Pictures / videos on Instagram	All used #	Common used or interesting #	Pictures / videos on FB
Letti	1996	F	64	35	ZIN #fesztivál:) #Balaton #Siófok #lakodalom	25
Detti	1996	F	4	6	coctail #sexonthebeach; #waffles #blueberry #sweethome	2
Etelka	1995	F	2	16	#mylove #balcsi #6.5év #exams #kethetbalaton #family # pihi #happy	3
Laura	1995	F	6	22	#summer #nemakarokhazamenni #balaton #hajókázás	4
Gábor	1996	M	13	30	#piknik summer #budapest #mik #afternoonwalk	2
Jácint	1997	M	6	0	-	2
Mercédesz	1996	F	13	7	#ilovenyc #warsaw #travel #budapest #hungary #mutimiteszel	3
Kamilla	1996	F	10	25	#sweet20 #sightseeingday #familyholiday museum #amphiteatre	6
Dalma	1995	F	19	22	fun #friend #crazy #girls #coctail	4
Stella	1999	F	2	0	-	2
Dominik	1997	M	4	4	#langolnivagyom #smoke #forpresident	2
Bence	1995	M	1	5	#cat #catlover #meow kings #pegasus	2
Rebeka	1996	F	6	5	#voltfestival #vegreszin #chill #suncity	2
Kornél	1995	M	3	2	#light #nice	2
Bianka	1995	F	18	17	#lastnight #wassogood #elegant #mom #love #engagement #traccsparty	3
Anton	1995	M	10	13	oppegyesküvő #sziget #bp #tenger	2
Anikó	1996	F	1	1	#ujvagyokitt	2
Dorina	1998	F	12	26	est #love #friendship #happy #sun #blackismycolour	2
Tamás	1995	M	3	3	#nicebulilding #somethingclear	3
Veronika	1996	F	5	5	#beginningofanewlife #concert #music #szin #havefun	1
Total	-	-	202	244	-	74
Average	1996	-	10	12	-	3

Source: Own construction

6. Conclusion

In my research I was investigating the symbolical consumption of generation Z (born from 1995 to1999). Previously I was conducting focus group investigations and deep semi-structured interviews, and the results let me suppose that I will need to use another method capable of analyzing content. For these reasons I chose netnography.

Firstly, I conducted 3 photo collage interviews in May 2017. It was necessary because I wanted to be sure of the dimensions I would observe, what the main keywords were, and on which platform I should focus my research. I also sought to get some information about the attitudes, feelings toward social media posts and wanted to learn more about posting activity in general.

While we were conducting the photo collage interviews, the subjects said they were sure that there were typical goods and services, which were designed for giving people joy and making them to want to have more. In this category they mentioned: manicure, pedicure, music festivals, culinary festivals, concerts, cinema and theatre, exit games, and art pubs, extreme sports and travelling. They emphasized that it was very important to make people happy, i.e. selling them things they did not exactly need, but would make them feel joy, valued and competent. Furthermore, it was very important to take a photo of these and post it online, letting other people know about it. In the photo collage making process the subjects had to form 3 different groups of pictures. The first was of those they would post, in the second group were pictures they liked but would not post, and the third was what they would not post in any circumstances. The first-group-pictures were typically memories of events involving family and friends, food and drinks, and sometimes leisure activities. The subjects said it was important for them, that only a narrow range of their friends could see their post, maybe only the closest ones. This was much easier to effect on Instagram than on Facebook.

Between 1st of June and 31st of August in 2017 I was conducted netnography research. I observed the 3 photo collage subjects and 13 other people's Instagram and Facebook profiles. During these 3-month-long observations I saw altogether 202 pictures and videos on Instagram, together with 244#s. The main themes of the photos and posted explanatory texts were family events, vacation photos, free time activity videos – such as bungee jumping and videos from music festivals. VOLT, SZIN and Balaton Sound were also mentioned in the post. On the other hand, we noted a lot of attention paid to food and drinks. Meanwhile, on Facebook profiles we saw numerous links, memes and funny content and events but only 74 pictures and videos about the subjects.

Consequently, I have to say that in light of the visible posting activities on Instagram, it is one of the main channels for communicating experience. In contrast, Facebook is more for organizing events and information gathering or communication. We can see a lot of links, memes, funny content and events, but only 74 pictures and videos about the subjects. Briefly, the focus of Facebook is 'staying in touch with each other' and 'I'll let you see what I am doing' is the focus of the Instagram posts.

Finally, on the basis of these findings, I would like to build a model to help me measure experience consumption among young consumers. It seems like communities and social connections could play a huge role in pleasure seeking and experience consumption. On the other hand, the self-representing elements of this process and the opportunities for self-representation in the case of consumption at this age, should also be taken into consideration. I would like to prove my findings to date by quantitative methods. As I see it now, the three levels of consumption could also be an inspiration for my model, because I think behind experience consumption, we can discover third-level motivation.

References

Campbell, C. (1983): Romanticism and The Consumer Ethic: Inimations of a Weber-style Thesis. *Sociological Analysis*, 44, 279–96.

Corrgian, P. (1997): The sociology of consumption. Sage, London.

Csíkszentmiályi, M. (1990): *Flow. The Psychology of Optimal Experience*. Harper Collings Publishers, New York

Finley, S. (2001): Painting life histories. *Journal of Curriculum Theorizing, Summer,* 123–162.

Gál, T. – Soós, M. – Szakály, Z. (2016): Online fogyasztói csoportok azonosítása az egészségtudatos táplálkozás terén netnográfiai kutatással. In: EMOK XXII. Országos Konferencia – Hitelesség és Értékorientáció a Marketingben Konferenciakötet, Debreceni Egyetem, Gazdaságtudományi Kar, Marketing és Kereskedelem Intézet, 119–127.

Gardner, B. – Levy, S. J. (1955): The product and the brand. *Harvard Business Review*, 33, March–April, 33–39.

Guld, Á. – Maksa, Gy. (2015): Fiatalok kommunikációjának és médiahasználatának vizsgálata. In: Törőcsik Mária (szerk.) A Z generáció magatartása és kommunikációja. Pécsi Tudományegyetem, 52–65.

Hirschman, E. C. – Holbrook, M. B (1982): Hedonic consumption: emerging concepts, methods and propositons. *Journal of Marketing,* 46 (3), 9–101.

Holbrook, M. B. – Hirschman, E. C. (1982): The experimental expects of consumption: Cunsumer fantasies, feelings and fun. *Journal of Consumer Research*, 9, 2, 132–140.

Horváth, D. – Mitev, A. (2015): Kollázstechnika, képasszociációk. In Horváth, D. – Mitev, A. (eds.): Alternatív kvalitatív kutatási kézikönyv. 337–356.

Kotler, P. – Keller, K. (2012): *Marketingmenedzsment.* Akadémiai Kiadó, Budapest.

Kozinets, R. V. (2002): The Field Behind the Screen: Using Netnography For Marketing Research in Online Communities. *Journal of Marketing Research*, 39, February, 61–72.

Kozinetz, V. R. (2006): Click to Connect: Netnography and Tribal Advertising. *Journal of Adverising Research*, September, 279–288.

Landgarten, H. B. (1993): *Magazine photo collage: A multicultural assessment and treatment technique.* Brunner/Mazel, New York.

Maslow, A. H. (1964): *Religions, Values, and Peak-Experiences*. Ohio State University Press, Columbus USA.

Pavluska V. (2014): *Kultúra marketing, Elméleti alapok, gyakorlati megfontolások*. Akadémiai Kiadó, Budapest.

Pine II, J. B. – Gilmore, J. H. (1999): *The Experience Economy: Work is Theatre & Every Business a Stage: (Goods and Services are No Longer Enough).* Harvard Business Press, Boston.

Simány L. (2005): Bevezetés a fogyasztói társadalom elméletébe. *Replika*, 51–52, 165–195.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 208–216.

An exploratory study of the choice of unhealthy foods of young adults

Dalma Pető – Szabolcs Prónay

Health conscious nutrition has become a popular topic of discussion, but the awareness to pursue its inherent objectives has not followed suite. This is especially true for the younger generation. In our research, we wanted to understand why young people choose unhealthy foods rather than healthy ones. During the course of the study, we tried to cast light on the phenomenon and the underlying problems of self-control for the choice of unhealthy foods. The study presents three focus groups and five in-depth interviews with young people between the ages of 12 and 23. The research has uncovered five controversies in the nutrition of young people.

Keywords: healthy nutrition, young adults, self-control problems

1. Introduction

Nutrition affects our whole life from childhood. Our eating habits evolve early and affect our health. Incorrect nutrition can impair or even shorten our lives. Therefore, it is important to pay attention to the development of proper nutrition habits in children (Huszka–Dernóczy 2015).

Healthy nutrition, if we ensure proper consumption of fruit and vegetables, helps to supply our bodies with enough nutrients and vitamins. Consumption of some types of vegetables and fruits may reduce the possibility of developing certain diseases (US Government Printing Office 2010). However, unfortunately the eating habits of all age groups differ markedly from what is recommended: to varying degrees, they all consume too little fruit and vegetables, but consume a lot of energy-rich, poor quality food (Black et al. 2017).

Inadequate nutrition can be a source of many illnesses, such as cancer or cardiovascular diseases, especially when it is combined with an unhealthy lifestyle. Children, who are poorly nourished at an early age, will be more likely to become susceptible to these diseases later on. Young people coming from low income households are inclined to eat food with low nutritional content. Parents are forced to put cheap and quickly-prepared meals on the table, which are often high in calories and fat. The growth of fast foods with low nutrition content contributes to today's growing rates of obesity - beginning in childhood - the treatment of which is becoming an increasing challenge worldwide (Khatoon et al. 2017, Vazquez–Torres 2012). Comparing the current and the data two decades ago, shows that the number of overweight children has doubled, while the number of obese adolescent teenagers has plummeted (Vazquez–Torres 2012). The first signs of many chronic diseases (such as cardiovascular diseases, diabetes, obesity) can be detected in childhood (Black et al. 2017). In addition, psychological diseases such as depression are associated with obesity, which means even worse quality of life for the person (Vazquez–Torres 2012).

Looking at data on health spending, we can see that households spend more and more money on health, including medicines, medical aids and other therapeutic

goods (KSH 2017). Nutrition related consumer decisions would be rational actions if the individual's consumption decisions took the long-term health consequences of his decision into account, thereby avoiding illnesses caused by unhealthy eating, and with that, saving future medical expenses. Additionally, it is important to note that dropping out of work also entails significant costs both at the individual and social level, which may also be reduced by healthy eating. From a national economic point of view, the health of a society is also important as it affects social security and health expenditures.

Examining the healthy eating among young people is therefore of great importance, as they will be the workers and consumers of the future. Even though they are legally minors, they still make their own decisions about their daily nutrition and are even old enough to cook for themselves. In our research, we wanted to understand why young people choose unhealthy foods over healthy ones. Focus group discussions and in-depth interviews have raised several controversies about the nutrition of young people. As a theoretical framework for studying this topic, a particular area of behavioral economics, namely intertemporal bias was chosen, including the effect of limited self-control consumption (Prelec–Loewenstein 1991).

2. The role of consumer self-control in nutrition

In order to examine the contradictions in the nutrition of young people, we should definitely address the concept of rationality. By assuming a rational consumer, everyone would choose healthy foods, as this decision largely determines their future health status. Classical economic models also assume rational consumers who try to maximize their benefits. This is true of homo oeconomicus, who satisfies only the means of sustenance, but the motives of a "well-to-do" man's actions are more from the realms of emotion (Székely 2003).

Behavioral economics examines the consumer phenomenon of rationality often being absent from real economic decisions. The reason for this is essentially in the decision process, which consists of many factors such as perception, influence, motivation and preference (McFadden 1999). Consumers often do not choose the optimum because they make mistakes, are uninformed or do not have sufficient self-control for rational decision-making (Mulvaney–Lee 2017). Herbert Simon, who won a Nobel Prize for proposing the theory of limited rationality, says that we do not have to deal with how the actors of the economy should behave, but how they actually act (Simon 1986). The theory of limited rationality does not want to abolish the models of rationality of neoclassicals but rather complement them (Simon 1986, Golovics 2015), since limited rationality also presupposes that people act rationally, but that their cognitive and emotional propensities influence their decisions (Jones 1999). *"We do not look at emotions and other unconventional attitudes against ration, but we try to prove that these additional motivations - which also have their role in economic processes and events - do not make impossible inquiry based on intellect, do not derange the basic relationships, only modify them, color them. These colors can, however, become very important in examining certain economic phenomena*" (Hámori 1998, p. 25).

In the case of nutrition, rational behavior would be the choice of healthy alternatives, but consumers rarely do so. As one can see from the discussions above,

they do not necessarily act irrationally, they only decide on the limits of their cognitive and emotional attributes. Such a limit may be by choosing unhealthy food as the problem of consumer self-control, as unhealthy food is often finer, more desirable, or even cheaper and easier to access. Thus, the benefits of eating unhealthy food are immediately realized by the consumer, while related expenditures (problems) occur only in later years. "*Intertemporal situations are often formulated in economic research as a choice between "attractive in short-term/ hurtful in long-term "and" hurtful in short-term/ useful in long-term" alternatives.*" (Lippai 2008, p. 6).

Many researchers have dealt with the relationship between nutrition and self-control, focusing mainly on obesity (Lakdawalla–Philipson 2002; Finkelstein et al. 2005). Looking at the past 50 years, we can see that, thanks to the development of technology, food prices have declined, while the intensity of physical activity has decreased due to the rise of office work. It is mainly these changes that have caused obesity (Lakdawalla–Philipson 2002). Thanks to the technology, work has also become more productive, with lower physical intensity and calorie burning, which also redounds obesity (Finkelstein et al. 2005). Although obesity can be a health-related problem, the main factor influencing obesity is the lifestyle of the individual. Consequently, "*the variable of self-control can play a very important role in the evolution of a behavior where consumers who are fully aware of the benefits of physical activity and the disadvantages of unhealthy eating, yet they have an unhealthy lifestyle*" (Lippai 2010, p. 77).

Examination of consumer self-control and consumer motivation can help to create a preventive health policy that enhances self-control in consumers about healthy eating. In this way healthcare spending along with the taxpayers' burden could be reduced in the future.

In our study, we consider the choice of unhealthy foods as a special form of expression of the limited rational consumer choice among an especially vulnerable age group, young people.

3. Nutrition of young people

People generally know what the basic forms of preventive health are (good nutrition, regular exercise, avoiding smoking, avoiding stress, etc.) but many do not follow them. This is partly due to the fact that adverse effects do not occur immediately, prevention (behavior change) involves both material and time expenditure, and people do not know the techniques of changing behavior.

Preventive health behavior is "*any activity that an individual pursues to preserve his health ...*" (Kasl–Cobb 1966, p. 246). Health behavior can not be explained merely by referring to rational "objective" knowledge. Cognitive and health psychology and the behavioral sciences have long been looking for why (and why not) people perform health-preserving activities. Young people have a vision of health conscious lifestyles, but they are not aware of all the elements and have no motivation to implement it.

There are many factors influencing the nutrition of young people, one of which is the effect of the parents. There is a strong correlation between the parents' and their children's nutritional attitudes, as the children of parents who are eating

healthy are more health conscious and are more interested in this subject (Kiss–Szakály 2016). Kiss and Szakály (2016) found that the role of mothers is much stronger, they are seen as a person who supports healthy lifestyle, while the father's role is much weaker, yet positive. However, only 1/3 believe that their questions about healthy lifestyle and nutrition are answered reliably by their parents. For them, authorities and doctors are the authentic sources of information. In addition, the internet has become the third most important information channel for young people (Kiss–Szakály 2016).

According to some domestic research (Kotor et al. 2016), the appearance and taste of the food is important for youngsters between the ages of 14 and 18, while the others between 19 and 25-year-old are already interested in food health criteria such as low sugar, carbohydrate content and food additives. According to the study, healthcare professionals and doctors count for this age group as a credible source of information on a healthy lifestyle (Kotor et al. 2016). In addition, the information on food packaging and restaurant menus are an important factor in healthy choices, because people prefer the healthier alternatives, if they can see the ingredient list and nutrition ratios (Kozup et al. 2003).

It is an important question, how we can influence the eating behavior of young people in the early stages of their lives? Since the family is still at the center of life for young people at this time, convincing parents is a must for sustainable and healthy nutrition. According to research, family-focused nutrition programs, which provide nutrition information to parents, have proven to be much more successful than school-based programs. In the first case, fat intake was significantly reduced, and fruit and vegetable consumption increased, while in the latter, only a slight increase was observed in fruit and vegetable consumption (Black et al. 2017).

4. Primary research

In our research, we examined the main factors influencing the nutritional attitudes of young people and the basic norms and values related to eating habits and lifestyle. During the course of the study, we tried to highlight the phenomenon and the underlying explanation of self-control problems behind the choice of unhealthy foods.

The study presents three focus group discussions between 18 and 23-year-old university students and five in-depth interviews with primary and grammar school students between the ages of 12 and 16.

The three focus groups were conducted in the fall of 2016 at a university. Participants were recruited among university students. Each time, the focus groups consisted of 10 young people. During the focus groups, two age groups were formed. In two focus groups there were young people between the ages of 18 and 20, while the third focus group included between 21 and 23. Although these two age groups are not distinct from each other, we considered it preferable to treat BA and MA students separately for the sake of homogeneity. Students in the younger age group are at the beginning of their university years, they have just left grammar school, so most of them are still heavily dependent on their parents. On the other hand, between 21 and 23-year-olds are already working part-time beside attending university, so they have financial resources to make a completely independent decision about their nutrition.

The in-depth interviews were made with primary and grammar school students in December 2017. The guideline of the interviews was based on the examination of eating habits. Due to the exploratory nature of our research, we were looking for quality information about their image of healthy eating, so we did not pursue representativeness due to both the small sample size and the aim of the research.

5. The results

When analyzing the interviews and focus group studies, we identified five controversies related to limited rationality and self-control problems in the nutrition of young people. The first important motive that emerged during the research is that they emphasize the importance of healthy nutrition and lifestyle, which is in contrast to their own actions. According to the second contradiction, vegetables and fruits are considered to be very healthy, yet they do not consume enough of them. The third important motive is that, according to the young people surveyed, only unhealthy foods are delicious, so the question arises why should they not choose unhealthy but delicious food? The fourth controversy was related to parents who often say what they should eat but they do not set this example with their actions. The fifth motif is about sharing photos of food in social media. In this section we will present our results along these five opposing pairs.

5.1. It is important to eat healthy, but they do not do it

The young people interviewed were aware of the benefits of a healthy lifestyle and nutrition and the potential consequences of lacking it, but they do not follow it. According to Anna (16) "*so many diseases can be prevented by eating healthy, ... we can also pay attention to our bodies so we do not get fat."* Matyi (16) also explained the effects of a healthy lifestyle on the general well-being, and referred to them as a "*health spiral*" for the components of a healthy lifestyle, which reinforce one another and follow the transition to a healthy lifestyle: "*And then you feel a lot better when you eat healthier. You feel like you live healthy. And this is one of those things, if you eat healthy, then you start to do more good things. So if you eat well, you do more things. For example you start to do sport… it might be such a turning point for you and then the rest will come along with it.*" (Matyi 16).

Intertemporal decisions requiring self-control also appeared during the conversations. Young people feel that they are "*immortal, invulnerable, and the consequence of unhealthy eating does not affect them*" (Viki, 20), and according to Eszter (21) "*as long as you do not experience it on your own skin, you will not believe it*". Additionally, sport came up as a factor in healthy lifestyle. However, sport often becomes a regular action only when the consequences of its absence have already appeared: "*People usually begin to move when they have a couple of pounds plus."* (Ádám 23).

Respondents believe that they are healthier than the younger generation, who eat a lot at fast food restaurants, but also live better than their parents' age group who "*eat bacon and sausage. It is the most unhealthy thing*" (Gergő, 23). However, they do not eat healthily as well, and explain this with the high prices of quality meals: "*I do not have the money to buy healthy food forever, because let's see, it's very*

expensive. So I just have to take something and get ready. The other one is, as Simon also said, that we often have no time. There must be something to spur you on in the run." (Andor, 22).

They think that they are healthy, so they do not feel they need to change their way of life, though they are aware of the unhealthy lifestyle they are living. They reassure themselves that many old people live in their environment who do not live healthy and think that the diseases have a genetic background as well: "*My grandfather is 90 years old and eats bacon every day and has no problem at all. Every morning pálinka and bacon.*" (Tamás, 22).

During their university years they indulge themselves in unhealthy eating characterized by the lack of daily, warm food cooked by parents and the stochastic lifestyle, while primary school students have no sense of the seriousness of the problem.

5.2. Vegetables and fruits are healthy (due to their vitamin content), but they do not consume enough

Their image of healthy foods and lifestyles is not yet mature, they are not fully aware of the elements of a healthy lifestyle, they think in extreme examples about healthy eating. Many of them think about home-made foods as a healthy option, because they know what is in it. Some people identify healthy nutrition with diet and slimming cure, but they all agree that vegetables and fruits are particularly healthy. According to Anna (16), vegetables and fruits are healthy, because there is "*a lot of vitamin in them."* According to Hédi (12) it does not matter if we eat vegetables raw or cooked.

Others can differentiate healthy foods from the unhealthy: "*We do not eat greasy foods in KFC, McDonald's, but salads and vegetables. If you have bread or pastry, you buy either half-brown or brown* " (Klarissza, 19).

Respondents stated that they only eat fruit occasionally, but have them always at home at their own discretion. They eat little vegetables, sandwiches, Fornetti and other pastries often. For them healthy lifestyle and nutrition are not important at all, they are not aware of their elements and can not completely separate diet from healthy eating.

5.3. They know that fast food is unhealthy, but they eat a lot at places like that

Every respondent finds fast food meals unhealthy, but they often eat in such places. Anna (16), for example, at the beginning of the conversation explains that "*McDonald's whole range of offer is unhealthy and similar fast-food restaurants too*". Later she came up with fast food restaurants again as an example of the place they go with her friends, but they are aware of the unhealthiness of it: "*sometimes it comes into our mind, that maybe we should not go*". Hédi (12) also points to this: she refers to McDonald's as an example of unhealthy food, and later explains that sometimes they go to this restaurant with the family, because she begs for it.

Fast food restaurants serve as a social place for young people beside meals. They sit there to talk to their friends. Anna thinks about fast foods restaurants as an easily accessible alternative, "*This is the nearest to us. And these normal restaurants, where they have more normal food, are far from school.* "(Anna 16). The university

students did not identify with eating in fast food restaurants, which is more of a characteristic of the younger age group: "*Usually, I think it's cool for them to sit in KFC or McDonald's and then they'll have such fast food."* (Réka 21).

Fast food meals are considered unhealthy by all respondents, but they often eat in such places. Respondents explained this behaviour by the speed, comfort and the delicious flavors offered by these types of restaurants. The lack of consumer self-control and the problem of intertemporal decisions can also be observed in this case, because they choose the long-term harmful foods for the momentary pleasures.

5.4. Parents say they should eat healthily, but parents do not eat like that, so they are showing a bad example

The influence of parents on the diet of young people plays an important role (Kiss–Szakály 2016). It came up several times during the interviews and focus group discussions that parents are trying to draw young people's attention to healthy eating. The main patterns of their recommendations are eating more fruits and vegetables, as well as fewer sweets. However, in a number of cases, conversations have shown that parents do not set this example with their actions. Matyi (16), for example, said that it is important for parents to have a healthy diet, but they often do not have time to eat: "*They are trying to eat healthy meal as well. But they return home after a hard day and just want to give us something to eat, and then go to sleep. And the worst thing is that they can not pay attention because they have no energy to watch us for eating healthy.*" (Matyi, 16)

Young people also drew attention to the opposite judgment of the two parents. "*...when the chocolates are tucked away and we search for them in the larder with dad and then we find some and eat them, and mom is angry because she bought it for Christmas*" (Réka 12).

As most of the young people interviewed still live at home, parents have a strong influence on their diet. However, it would be important to show an example of healthy eating, as they lose credibility in the eyes of young people without any implied conduct. This, in itself, does not refer to the limited rational nature of young people's consumer choices, but indicates in what a contradictory environment they are expected to make the right choices.

5.5. They share "fancy" dishes on Instagram, although this does not necessarily reflect their real (daily) meals

Young people share a wide spectrum of food on social media. This can be either self-made or restaurant meal, but the focus is always on the food itself in the picture. It is to be noted that the younger age group between 18 and 20 unanimously condemned the sharing of photos on social media. According to their own statements, they have never share content like this, at most 1 or 2 times. According to them, young people consciously choose what they share on social media, and only pictures that will receive a lot of positive feedback will be published. Matyi (16) said the purpose of posting food is exhibitionism: "*they share healthy food to show how healthy they are eating. And*

usually, if someone goes to some good restaurant, they usually share what they eat there to show other people that they can go to such a fancy restaurant" (Matyi, 16).

In contrast, older 21-23 year-olds have a negative attitude to social media sharing but assume that they often share such content, although these images are not for the outside world but for themselves: "*I do not necessarily share it because I think it's cool to eat that, but to keep it for myself. If I eat only a bit of that, I will kill that beautiful composition for which the chef fought, but in this case it can be an eternal memory with the help of social media*" (Blanka, 22).

The youngsters between 12 and 14 do not have Instagram yet, because their parents do not allow it. Social media is used consciously by young people, seeking to create a positive image of themselves and to collect positive feedback. They share photos of food from this motivation, be it their own cooked food or meals made at the restaurant.

6. Conclusions

In our research, we wanted to understand why young people choose unhealthy foods against healthy. Our results have shown that healthy eating is not important at all for young people. To research this, we conducted three focus group discussions between 18 and 23-year-old university students and five in-depth interviews with primary and grammar school students between the ages of 12 and 16.

For the young people we studied, healthy lifestyles and nutrition are not important at all, they are not aware of what constitutes the same, and can not completely separate diet from healthy eating. They feel they are still too young to experience the consequences of improper nutrition. Sport and regular exercise are considered more important than balanced nutrition, and in their opinion, it is a substitute for a healthy diet. Choosing unhealthy foods is explained by the lack of time and its convenience.

They think they are healthy today, so they do not have to deal with the possible negative future consequences. This result is related to the problem of intertemporal decisions and consumer self-control, as it requires self-control to choose healthy food from the many alternatives currently available on the market and the negative or positive effects of current decisions appear only later in time. However, our research cannot be considered closed. Further exploratory research to investigate the problem of self-control is needed to advance knowledge in the subject.

References

Black, A. – D'Onise, K. – McDermott, R. – Vally, H. – O'Dea, K. (2017): How effective are family-based and institutional nutrition interventions in improving children's diet and health? A systematic review. *BMC Public Health*, 17, 1, 818.

Finkelstein, E. – Ruhm, C. J. – Kosa K. M. (2005): Economic Causes and Consequences of Obesity. *Annual Review of Public Health*, 26, 239–257.

Golovics J. (2015): Korlátozott racionalitás és altruizmus: behaviorizmus a közgazdaság-tudományban. *Hitelintézeti Szemle*, 14, 4, 158–170.

Hámori B. (1998): *Érzelemgazdaságtan. A közgazdasági elemzés kiterjesztése*, Kossuth Kiadó, Budapest.

Huszka P. – Dernóczy-Polyák A. (2015): Táplálékod legyen egészséged – élelmiszer fogyasztási szokások vizsgálata a fiatalok körében. In: *EMOK – XXI. Országos Konferencia Tanulmánykötet – Marketing hálózaton innen és túl.*

Jones, B. D. (1999): Bounded Rationality'. *Annual Review of Political Science*, 2, 1, 297-321.

Kasl, S.V. – Cobb, S. (1966): Health Behavior, Illness Behavior and Sick Role Behavior. *Archives of Environmental Health*, 12, 4, 531–541.

Khatoon, S. – Ahmed, A. – Zubair, M. (2017): BMI; Dietary Practics Of School Going Children And Their BMI May Predict Future Health Hazards. *Professional Medical Journal*, 24, 9, 1392–1397.

Kiss V. – Szakály Z. (2016): A szülők hatása a középiskolás diákok egészségtudatos táplálkozására. In *EMOK – XXII. Országos Konferencia– Hitelesség és értékorientáció a marketingben.*

Kotor E. – Szakály Z. – Soós M. – Kiss M. (2016): Egészségtudatos magatartás a 14-25 év közötti fiatalok körében. In *EMOK – XXII. Országos Konferencia– Hitelesség és értékorientáció a marketingben.*

Kozup, J. C. – Creyer, E. H. – Burton, S. (2003): Making Healthful Food Choices: The Influence of Health Claims and Nutrition Information on Consumers' Evaluations of Packaged Food Products and Restaurant Menu Items. *Journal of Marketing*, 67, 2, 19–34.

KSH (2017): *Statisztikai Tükör.* Az egészségügyi kiadások alakulása Magyarországon 2010–2015. Központi Statisztikai Hivatal.

Lakdawalla, D. – Philipson, T. (2002): The Growth of Obesity and Technological Change: A Theoretical and Empirical Examination. *NBER Working Papers*

Lippai, L. (2010): *Az önkontroll szerepe és jelentősége az intertemporális fogyasztói döntésekben*. Doktori Értekezés, Szegedi Tudományegyetem, Közgazdaságtani Doktori Iskola.

McFadden, D. (1999): Rationality for Economists? *Journal of Risk and Uncertainty*, 19, 1–3.

Mulvaney, S. – Lee, J. (2017): Motivating Health Behaviors in Adolescents Through Behavioral Economics. *JAMA Pediatrics*, 171, 12, 1145–1146.

Prelec, D. – Loewenstein, G. (1991): Decision Making over Time and under Uncertainty: A Common Approach. *Management Science*, 37, 7, 770–786.

Simon, H. A. (1986): Rationality in Psychology and Economics. *The Journal of Business*, 59, 4, S209–S224.

Székely, M. (2003): A fogyasztói magatartás alapjai: a lélek- és a gazdaságtan alapfeltevései a fogyasztásról. In Hunyady, Gy. – Székely, M. (eds.): *Gazdaságpszichológia*. Osiris Kiadó, Budapest, 131–175.

US Government Printing Office (2010): *Nutrition and Your Health: Dietary Guidelines for Americans*, 7, Washington, DC.

Vazquez, F. – Torres-Iglesias, A. (2012): Behavioral and Psychosocial Factors in Childhood Obesity. *Childhood Obesity*. Sevil Ari Yuca, IntechOpen, Available from: https://www.intechopen.com/books/childhood-obesity/behavioral-and-psychosocial-factors-in-childhood-obesity

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 217–227.

The contradictions of the desegregation-policy in Szeged

Boglárka Méreiné Berki

In 2017, the local government of Szeged started to eliminate the largest segregate (ghetto) of the city. According to the anti-segregation plan of Szeged, this process will have been finished by 2029. The aim of the process is to remove the affected families into an integrated environment. Several studies and policy papers also emphasize the negative effects of the enduring ethnic and/or social/economic-based spatial concentration of households (negative neighborhood effect). This is the underlying rationale for implementing mixing-policies, which are frequently applied planning strategies. However, in practice and according to recent studies, these processes seem to be more complicated and contradictory.

The aim of the present paper is to reveal how segregation and policy-led desegregation influence the social mobility of the affected families. We apply qualitative (e.g. individual and group interviews) and long-term participatory methods (participatory action research – PAR). We have worked together with the inhabitants of the above-mentioned segregate since 2015, and therefore our main data set was mostly acquired from this PAR-process. We found that segregation can provide important resources for families through the internal relations of community members. These can be damaged by displacement. Furthermore, the artificial social mix is not in itself enough to create favorable conditions for social cohesion and social mobility. Thus, without appropriate monitoring and facilitation, the affected families may be unable to replace these resources after their displacement. In this way desegregation may generate more external and internal social tensions, contribute to re-segregation, and/or further deprivation and exclusion.

Keywords: segregation, displacement, social capital, mixing-policy

1. Introduction

Ethnic-based spatial segregation is generally considered an undesirable state by policy makers, and in several respects by the related literature. Therefore the anti-segregation plans of Hungarian cities (which are the obligatory parts of the City Development Strategies in Hungary) argue that spatial segregation is a destructive anomaly associated with a low level of life-quality and the lack of social mobility, thus the aim of local planning should be to curtail the existence of these segregates (Méreiné 2017a).

The writers of the anti-segregation plan of Szeged also agree with this view. In 2017 the local government of Szeged started to eliminate the largest segregate of the city. According to the anti-segregation plan this process will have been finished by 2029. In addition, the plan defines that families should be removed into an integrated environment.

Mixing-policy is a frequently applied strategy in political planning. Apart from political planning the related literature also emphasizes the negative effects of an enduring ethnic and/or social-economic based concentration of households (Bolt

et. al 2010). It is usually called 'negative neighborhood effect' (Massey–Denton 1989, Friedrichs et. al 2003). Basically, it means one of the most important concerns about poverty trap: cumulative disadvantage and social exclusion. These approaches frequently argue that social diversification policies are able to provide significant new resources for the displaced families, and in parallel they could strengthen social cohesion between different social groups.

According to these arguments the role of social capital is essential for achieving these results. They usually attribute an exclusively positive impact to the role of social capital, and it is considered a significant instrument of social mobility. Briefly, spatial segregation has a negative effect on upward mobility and social capital can play an effective role in countering the factors which interfere with this mobility through the segregated condition. Therefore policy-makers often have positive expectations of mixing-policy.

However, these overwhelmingly positive effects are not supported by empirical evidence. Furthermore, in some cases we can find evidence of displacement to an integrated environment meaning the loss of considerable resources of these families (Bolt et. al 2010, Kearns et al. 2013; Mugnano–Palvarini 2013).

Through our case-study we tried to reveal the real effects of displacement. Thus firstly we investigated the visible and hidden mechanisms which influence the consequences of desegregation. Secondly, we analyzed the impact of desegregation on the opportunity for upward mobility for the affected families. Finally, we tried to collect those factors which should be considered during the decision-making process on desegregation and its implementation.

The applied methodology through the long-term participation enabled us to reach the families from the segregate, furthermore, due to common learning we have had an opportunity to reveal the hidden mechanisms of the vulnerable and closed life-world of segregates, and the hidden effects of the displacement.

2. Integration, the role of social capital, social cohesion and mixing policy

Despite the fact that the urban development concept puts considerable emphasis on the role of social capital, an in-depth analysis of the Hungarian anti-segregation plans revealed that the significance of social ties is discussed only to a limited extent. Furthermore, if social capital is dealt with at all, it is attributed a simplified, mainly instrumental role as it is mostly considered as a common resource (Méreiné 2017b).

In contrast, the related literature has been dealing with the term of social capital for a long time (Hanifan 1916, Ben–Porath 1980, Putnam 1993, Bourdieu 1986, Coleman 1998, Fukuyama 2001, Woolcock–Narayan 2000, Burt 2000, Granovetter 1973), however, it has not been possible to place it in a comprehensive theoretical framework so far. In the social sciences, the analysis of social capital is primarily inter- and multidisciplinary. It could appear as an individual or collective resource, furthermore it is investigated not only in sociology, but also in economics and political science, and in the field of political planning as well. Therefore, we ought to move beyond the strict sociological framework, and try to interpret the term in a much wider context.

Social capital is able to have an influence on many other forms of capital. Its neglect might lead to impolitic development interventions (Méreiné et al. 2017b), as social capital is the key for the operability of democracy (Putnam 1995). It might play a bridging but also a bonding role: it might encourage or set back the social integration of individuals and groups or social cohesion in general, and it can even give a new meaning to these notions (Lockwood 1964, Putnam 1995, Castel 2000, Woolcock–Narayan 2000).

Therefore, social capital is extremely relevant in understanding extreme poverty and segregation. In order to examine the role of social capital in the alleviation of segregation and extreme poverty, we first examine how notions of solidarity and integration relate to the concept of social capital.

In the alleviation of segregation and extreme poverty, integration is a primary goal, however, in the related literature the notion of integration has several interpretations (Lockwood 1964, Castel 2000, Lin 1990). In order to fully understand how social capital operates, it is important to reflect on the different theories about integration. Lockwood distinguishes two forms of integration, system integration and social integration. It is system integration which usually appears in the communication of policy-makers. It is realized through participation in different social institutions, primarily in the division of labor, the educational system, etc. On the other hand, social integration is about the natural milieu of individuals through being members of smaller communities (relatives, family members) who support them, and provides significant resources towards their daily survival (Lockwood 1964, Archer 1996). Social integration might be especially strong in the case of the segregated and marginalized, extremely poor communities, mainly in the Central and Eastern European context (Creţan–Turnock 2008, Farkas 2012).

Castel (2000) distinguishes three degrees on the scale of integration. Lack of integration means "disaffiliation", the partial presence of integration means belonging to a "disaffiliation zone", while full integration means belonging to the "integration zone". Integration is realized through performance in three dimensions: work, community embeddedness, and culture. These function in different areas such as our place in the division of work, family or school, and they are strongly related to the social capital acquired in these areas.

There have been further integration theories which can draw strong analogy from these typologies. Nan Lin (1990) also distinguished macrointegration and microintegration. Basically macrointegration follows the concerns of Lockwood's system integration, while the type of microintegration described has parallels with social integration. Lin basically argues that macrointegration is mostly connected with instrumental actions, and microintegration is connected with expressive actions.

Durkheim (1893) aimed to address these questions by distinguishing two types of social solidarity. While mechanical solidarity is based on the feeling of belonging together because of similarity (we belong to the same family or ethnic group, we have a similar social status, we do the same work etc.), organic solidarity is based on differences: despite our differences we still have to cooperate with each other (most of all because of the division of work).

According to the social network theory of Granovetter (1973), societies are interwoven by strong and weak ties. Strong ties are usually closed and appear within communities. These are potentially able to provide security and resources for the

members of the given group. Weak ties span social groups, and these are the ones which are able to significantly contribute to upward social mobility and social integration (understood here as system integration) through connecting otherwise disconnected social groups.

The earlier interpretations of solidarity, integration and social ties show eye-catching parallels with those social capital theories which aim to classify social capital by understanding and interpreting the direction and strength of social connections (Putnam 1993, Gittel–Vidal 1998, Woolcock–Narayan 2000). These theories distinguish either two or three types of social capital. Bonding social capital is based on inner ties (Granovetter 1973) and most of all on mechanical solidarity (Durkheim 1893). Bonding connections are based on trust, solidarity and reciprocity (Messing– Molnár 2011). For the extremely poor, these closed and homogenous relations contribute to their everyday survival and they function as resources, on the one hand, but they reduce the opportunities to break out from poverty and they might be of a limiting nature, on the other hand, since group solidarity is often based on opposition to the mainstream society (Fehér–Virág 2014). Therefore, these factors are also able to contribute to the conservation of extreme poverty for generations (Méreiné et al. 2017b).

Mobility among social groups and system integration is supported by bridging and linking social capital, which are most of all based on weak ties (Putnam 1993, Woolcock–Narayan 2000, Messing–Molnár 2011, Füzér 2015). Bridging social capital means weak ties that span different social groups and thus provide access to the resources of other social groups. Linking social capital '*describes the ability of groups to engage with external agencies, either to influence their policies or to draw on useful resources*' (Pretty 2003, p. 1913). Therefore, linking capital is related to formal organizations (institutions) having relative power over a given social group, including the provision of access to services or jobs (Hawkins–Maurer 2010, Messing–Molnár 2011). Social capital, solidarity and integration strongly influence and could be influenced by urban segregation which is a spatial appearance of social distances and inequalities among different social groups (Ladányi 2007).

The related policies that argue for generating heterogeneous neighbourhoods through the mixing policy emphasize that spatial proximity is able to generate social cohesion between different social groups (Van Kempen–Bolt 2012). Nonetheless, there have been several investigations which reveal that merely spatial proximity and artificial neighborhood between different social groups rarely lead to real social cohesion. (Bolt et al. 2010; Kearns et al. 2013; Mugnano–Palvarini 2013).

Therefore, the positive effects of mixing-policy regarding social cohesion have yet to be proven. Furthermore, it has often been the experience that the subjective well-being of the affected residents decreases and the tensions between different social groups rise significantly after displacement. The above-mentioned literature on social capital, social ties and the different considerations about solidarity and integration could provide a potential explanation for these phenomena.

Taking all these considerations into account, it seems that a professionally supported mixing policy could be one of the possible ways to establish bridging social capital among these different social groups and in parallel support upward mobility. Although, the segregated families in extreme poverty (who are targeted by these policies in particular) usually base their daily survival on their bonding social capital

which establishes special norms and rules, habits and sometimes inner sanctions against the rise and well-being of families. These elements also impose a serious limitation on upward mobility, and on the formation of social cohesion with the majority society when they are displaced to a (system)integrated environment as a result of mixing-policy (Bolt et al. 2010).

3. Context and methodology

We implemented our research in one of the most populous Hungarian cities, in Szeged with approximately 160,000 inhabitants. There are two areas which are mentioned as segregates in the anti-segregation plan of the city. The Hungarian Central Statistical Office defines areas as segregates, where the rate of the residents whose highest level of education is elementary education, and who do not have regular work, is higher than 50%. The main employment and educational data were the following in 2011 for the larger segregate of Szeged (Table 1).

Table 1 Employment and educational data of the larger segregate of Szeged

The rate of residents who do not have regular income from work	74.4%
The rate of residents with maximum elementary education	75%
The rate of residents with maximum elementary education and who do not have regular income from work (segregation index)	**54.4%**
The rate of economically non-active population in the segregate	68.2%
The rate of long-term unemployed	30.4%

Source: Own illustration based on the 2011 census data from Central Statistical Office

This notion can mainly be determined by quantitative data, although, the related literature is more sophisticated. The international literature uses the notion slum or ghetto instead of segregate to describe the spatial concentration of poverty. According to Wacquant (2012), ghettos have further characteristics. In addition to the spatial concentration, educational and activity rates, families in ghettos suffer from stigmatization by the majority and they usually have parallel norms and institutional systems. Thereby they reproduce the 'culture of poverty' (Lewis 1961), the concept of which was published even in the classical literature of sociology. We consider Wacquant's definition as our theoretical basis, however, and in the present study we use the expression 'segregate' because this term is applied to the concept in Hungarian policy making and regulations. The local government started measures to eliminate of the larger segregate in spring 2017. According to the anti-segregation plan it will have been finished only by 2029, but the process of displacement has recently been accelerated. This process and its impacts were in the focus of our investigations.

As reported by the 2011 census, the largest segregate had 211 residents. By the beginning of the summer of 2018 the number of residents had declined to 130 due to displacement. In 2017 six houses (that contained 24 flats) were demolished. Six out of the 24 flats were privately owned and four flats were inhabited by renters. The rest of the apartments were occupied by squatters.

According to the anti-segregation plan, it is extremely important to carry out the desegregation process in a way which makes it possible to avoid the formation of

new spatial concentrations of extreme poverty in the city. The policy-makers claim that spatial-based interventions should be made during the process, on the one hand by moving the affected families to different parts of the city in order to prevent spatial concentration, and on the other hand by attracting social groups with higher status to the area concerned.

However, in practice the strategy of the local government is rather ad hoc. They try to displace the owners and the tenants as soon as possible. The implementors of the anti-segregation process hardly take into account the new environment of the displaced families. It seems that for the decision-makers, the temporal factor is cardinal because they want to carry out the process as quickly as possible and with as few media reports as they can.

The complexity of the context is extraordinary and the analysis of social capital presents several difficulties as well. It is usually determined by hidden mechanisms which can hardly be 'grabbed' by snapshot-methods. Furthermore, the life-world of a segregate is a highly sensitive field, therefore we preferred to use qualitative and participatory methods.

Our methods are grounded in a participatory action research (PAR) cooperation among the local Roma underclass, local Roma representatives, NGOs and local middle-class scholar-activists. This cooperation started in 2011. PAR *„is a research paradigm within the social sciences which emphasizes collaborative participation of trained researchers as well as local communities in producing knowledge directly relevant to the stakeholder community"* (Coghlan 2016, Brydon-Miller p. 583.) The intention of the PAR-process is to generate a social change besides contributing to the theoretical corpus of the social sciences. Thus, this process is based on long-term cooperation of the academic and non-academic participants and on actions serving both social change and scientific observation and understanding (Reason–Bradbury 2008, Málovics et al. 2014, Málovics et al. 2018a, Málovics et al. 2018b). The PAR-process means common learning for all of the participants and attempts to abolish the asymmetrical relationship between scholars and laics. PAR is arguing for the validity of laic knowledge.

Our preliminary results are based on the research diary-notes of the scholar-activists who are also the authors or the contributors of the present study as well. Furthermore, we are planning to carry out semi-structured interviews with the displaced inhabitants and with those who are still living in the segregate. Our further aim is to reveal the real intention of the local government, therefore we would like to conduct interviews with local policy-makers as well.

During the data-analysis of the research diaries, firstly we directly investigated the codes referring to the role of social capital and the effects of the displacement. In addition, we tried to remain open about further characteristic codes and these also contributed to the preliminary results of the present study.

4. Preliminary results

The status of the inhabitants of the larger segregate is particularly heterogeneous. Basically, three types of residential statuses exist here: owners, renters and squatters.

Therefore, the local public property (housing) company[17] and the local government treat their displacement differently. Renters are provided with other accommodation to rent, the local government buys up the owner's flats (usually above the market price), but the squatters are forced to move without any form of compensation. Hence these different treatments generated tensions between the inner community of the segregate. Some (especially the owners and the renters) are interested in the implementation of displacement, preferably as a matter of urgency, while others (mostly the squatters) are in a particularly vulnerable position, since they could easily lose their place of residence if the local government continues the demolition process. These tensions and insecurities have left a strong impression on the social capital of the inhabitants.

Table 2 Preliminary results regarding to the displacement

Process	Consequences
For the families in the segregate it is almost impossible to appreciate the whole process, because the local government negotiates with the families separately. Therefore, they try to gain relevant information from each other, but in parallel they consider each other as rivals. Thus, the information is often stalled and distorted.	These events are largely fragmenting the community, disrupt the bonding social capital, thus raising distrust and uncertainty.
There are different interests regarding the demolition and displacement because the inhabitants have three different residential statuses (owners, renters, squatters).	The community has been definitely fragmented along the lines of residential status, as a result of their different interests. There are more and more conflicts among the different groups within the segregate.
No appropriate facilitation of the displacement during the desegregation process on the part of the relevant institutes.	Not only is distrust among those living in the segregate intensifying, but also distrust of the institutes.

Source: own construction

During our research the strong presence of bonding connections clearly became evident. It provides significant material and non-material resources for the families in the investigated communities in terms of their daily survival. In parallel, their upward mobility is largely limited because of the specific norms and laws of the isolated community (Tóth et al. 2017, Málovics et al. 2018a, Méreiné et al. 2017b). According to the anti-segregation-plan, the families should be removed into an integrated environment, however, there were difficulties in carrying out this process in practice. Unfortunately, the decision-makers are not properly monitoring the process, they hardly analyze the consequences of displacement, or the later lives of the displaced families. Through our involvement we have been able to collect several significant pieces of background information in connection with the displacement. The following table shows the identified processes and their consequences (Table 2).

[17] IKV Zrt.

In the framework of the PAR process, due to regular and interpersonal relationships, we were able to follow up the affected families. According to our research diary notes we distinguished 4 types of inhabitants with regard to the changes in their social capital because of the displacement.

(1) **Pseudo-movers**: Despite the fact that they moved out of the segregate, they were not able to create new social connections with the majority society, therefore they mostly spend their time in the segregate. Bonding social capital is still dominant in their lives.

(2) **Re-segregating inhabitants**: They moved out of the segregate, and they were able to create new relationships, but only with Roma families who have similar characteristics to them (e.g. norms, values, economic status etc.). Although they have broken out of the segregate, they have found new homes in „mini-segregates" (gypsy-houses). This phenomenon is strongly connected to the social housing policy in Szeged. Gypsy houses represent lower value on the real estate market, therefore the local government cannot sell them at competitive prices. They often offer them to gypsy families, and other 'voiceless' inhabitants with low levels of negotiating power. Bonding social capital is still dominant in their lives, and upward mobility through bridging connections with the majority society is still unavailable.

(3) **Real-movers:** They have access to bridging social capital which has been continuously increasing since the displacement. The desegregation can improve their real chance of upward mobility. However, it is important to note that they already had bridging connections even before the displacement. Only two families belong to this category.

(4) People getting into a vacuum of social relations: The desegregation damaged their bonding connections, and they could not create new bridging connections. They have got into the most desperate situation due to the displacement, their daily survival is often endangered. Many inhabitants have become homeless and victims of the desegregation policy of the city.

The displacement-process has been going on for only one and a half years, therefore it is still in an initial stage. In connection with the movers, we have had only „before" experience of their situation for now. Despite the fact that we also paid attention to the socio-economic statuses of the affected people by using the database created by the Hungarian Central Statistical Office, based on quantitative data we could not find any determining factor. It made our investigation more difficult that only little data is available regarding the segregates of Szeged (e.g. employment, educational level), furthermore these are usually not able to show the real state of the households (referring to the squatters, illegal job opportunities, etc.). We do not claim that social capital is the only aspect which can provide the chance of social mobility for the affected families, or facilitate the success of the displacement process, although, even at this early stage, it is clear that social capital could play an extremely important role during the process. Other factors are likely to emerge in the future, thus we strive to analyze them comprehensively.

5. Conclusions

The desegregation policy should put more emphasis on the role of the bonding social capital. It usually provides significant resources for the affected families and it contributes to their daily survival. If unwise decisions are taken, social integration will continuously invalidate system integration aspirations. Therefore, the gap between the underclass and majority society will increasingly expand. The factors which construct and sustain these bonding connections can be alleviated by bridging and linking connections, however, if the presence of these connections is limited and if their nurturing is not provided considerable resources, upward mobility will be unrealizable for the displaced families.

As a result of resegregation, isolation is often reestablished, for example numerous Hungarian anti-segregation decisions have led to this. Furthermore, at worst the affected people can find themselves in a social relations vacuum. Thus, an extreme consequence may well be that their situation becomes more desperate and they become victims of the desegregation policy.

The decision-makers should keep in mind that the establishment of bridging and linking social connections has a crucial role in poverty alleviation and desegregation. The trust-based, interpersonal, and long-term relationships between different social groups on the one hand can contribute to promoting solidarity and social cohesion, and on the other hand they can improve the affected families' chances of real upward-mobility. Therefore, the artificial-establishment of social capital would be worth considering, even though institutes (linking social capital) and in other less formal ways (e.g. social awareness raising programs, NGOs, voluntary-based networks, related social initiatives) which could help the formation of bridging social capital.

References

Archer, M. (1996): Social Integration and System Integration: Developing the Distinction. In *Sociology*, 30, 4, 679–699.

Ben-Porath, Y. (1980): The F-connections: Families, Friends, and Firms, and the Organization of Exchange. *Population and Development Review*, 6, 1-30.

Bolt G. – Phillips D. – Van Kempen R. (2010): Housing Policy, (De)segregation and Social Mixing: An International Perspective. *Housing Studies*, 25, 2, 129–135.

Bourdieu, P. (1986): 'The Forms of Capital', in J.G. Richardson (ed.) *Handbook of Theory and Research for the Sociology of Education*, New York: Greenwordpress, 241–59.

Burt, R. S. (2000): The Network Structure of Social Capital. In Sutton, R. I. – Straw, B. M. (eds.): *Research in Organisational Behaviour*. JAI Press. Greenwich.

Coleman, J. S. (1988): Social Capital in the Creation of Human Capital. *American Journal of Sociology*, 94, 94–120.

Castel, R. (2000): *The Roads to Disaffiliation: Insecure Work and Vulnerable Relationships*. Blackwell, London.

Coghlan, D., Shani, A.B. and Roth, J. (2016): Insitutionalizing insider action research initiatives in organisations: the role of learning mechanisms. *Systemic Practice and Action Research*, 29, 1, 83–95.

Cretan, R. – Turnock, D. (2008): Romania's Roma population: from marginality to social integration. *Scottish Geographical Journal*, 124, 4, 274–299.

Durkheim, E ([1893] 1969): The Division of Labor in Society, trans. G Simpson. New York: Free Press.

Farkas Zs. (2012): Hidak és sorompók. A telepfelszámolásban, a településeken végzett terepmunka tapasztalatai és integrációs hatásai. *Társadalmi együttélés interdiszciplináris e-folyóirat.* 2012/4.

Fehér K. – Virág T. (2014): Élet egy kisváros peremén. *Tér és társadalom*, 3, 50–65.

Füzér K. (2015): A bizalom társadalomelmélete és a társadalmi tőke szociológielmélete. *Századvég (Társadalmi tőke különszám),* 78, 4, 5–18.

Fukuyama, F. (2001): Social capital, civil society and development. *Third World Quarterly*, 22, 1, 7–21.

Friedrichs, J. - Galster, G. - Musterd, S. (2003): Neighbourhood effects on social opportunities: the European and American research and policy context, *Housing Studies*, 18, 6, 797–806.

Gittel, R. – Vidal, A. (1998): *Community organizing: Building social capital as a development strategy*. CA: Sage Publications.

Granovetter, M. S. (1973): The strength of weak ties. *American Journal of Sociology*. 78, 1360–1380.

Hanifan, L. J. (1916): The Rural School Community Center. *Annals of the American Academy of Political and Social Science* 67, 1, 131–138.

Hawkins, R.L – Maurer, K. (2010): Bonding, Bridging and Linking: How Social Capital Operated in New Orleans following Hurricane Katrina. *British Journal of Social Work*, 40, 1777–1793.

Kearns, A. – McKee, M. J. – Sautkina, E. – Cox, J. – Bond, L. (2013): How to mix? Spatial configurations, modes of production and resident perceptions of mixed tenure neighbourhoods. *Cities*, 35, 397–408.

Ladányi J. (2007): Az antiszegregációs programok szükségességéről és lehetőségeiről. *Kritika*, 36, 10, 2–4.

Lewis, O. (1961): *Children of Sanchez. Autobiography of a Mexican Family.* Random House. New York.

Lin, N. (1990) Social Resources and Social Mobility: The Structural Theory of Status Attainment. In Breiger, R. L. (ed.): *Social Mobility and Social Structure*, NY: Cambridge University Press, 171–247.

Lockwood D. (1964): Social Integration and System Integration. In Zollshau, K. G. – Hirsh, H. W. (eds.)*: Explorations in Social Change*. Houghon Mifflin. Boston, 370–383.

Massey, D. & Denton, N. (1989) Hyper-segregation in US metropolitan areas: black and hispanic segregation along five dimensions, *Demography*, 26, 3, 373–393.

Málovics Gy. – Mihók B. – Pataki Gy. – Szentistványi I. – Roboz Á. – Balázs B. – Nyakas Sz. (2014): Részvételi akciókutatással a társadalmi kirekesztés ellen: egy szegedi példa tanulságai. *Tér és Társadalom*, 28, 3, 66–83.

Málovics Gy. – Cretan, R. – Méreiné Berki B. – Tóth J. (2018a): Mapping Place Attachment of Segregated Urban Roma Communities through Participatory Action Research in Szeged, Hungary. *Area*, 2018, 1–12.

Málovics Gy. – Judit J. – Méreiné Berki B. – Mihók B. – Szentistványi I. – Pataki Gy. – Nagy M. – Tóth J. (2018b): Confronting espoused theories with theories-in-use: Challenges of participatory action research with marginalized communities in contributing to social change and theory building. *Action Research,* 2018, 1–22.

Méreiné Berki B. – Málovics Gy. – Juhász J. (2017a): A hazai antiszegregációs tervek értékelése Amartya Sen képességszemlélete alapján. In Bajmócy Z. – Gébert J. – Málovics Gy. (szerk.) *Helyi gazdaságfejlesztés a képességszemlélet alapján*. JATEPress, Szeged, 137–160.

Méreiné Berki B. – Málovics Gy. – Tóth J. – Cretan R. (2017b): The role of social capital and interpersonal relations in the alleviation of extreme poverty and spatial segregation of Romani people in Szeged. *Journal of Urban and Regional Analysis (JURA)*, 9, 1, 33–50.

Messing V. – Molnár E. (2011): Bezáródó kapcsolati hálók: szegény roma háztartások kapcsolati jellemzői. *Esély,* 5, 47–74.

Mugnano, S – Palvarini, S. (2013): 'Sharing space without hanging together': A case study of social mix policy in Milan. *Cities,* 35, 417–422.

Pretty J. (2003): Social capital and the collective management of resources. *Science,* 302, 5652, 1912–1914.

Putnam, R. D. (1993): *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.

Putnam, R. D. (1995): Bowling alone: America's declining social capital. *Journal of Democracy,* 6, 1, 65–78.

Reason, P. - Bradbury-Huang, H. (eds) (2008): *The SAGE Handbook of Action Research: Participative Inquiry and Practice. Second Edition*. London, UK: Sage.

Tóth J. – Méreiné Berki B. – Málovics Gy. – Juhász J. – Boros L. (2017): „Ha csak úgy kiköltöztetjük az embereket, egymás nélkül elvesznek." Erőforrások, korlátok és ezek térbelisége a roma szegregátumokban lakók számára: egy hazai város példája. *Tér és Társadalom*, 31, 3, 62–84.

Van Kempen, R. – Bolt, G. (2012): Social Consequences of Residental Segregation and Mixed Neighbourhoods. In Clapham, D. – Clark, W. (eds.): The SAGE Handbook of Housing Studies, 439–460.

Wacquant L. (2012): A Janus-faced institution of ethnoracial Closure: A Sociological Specification of the ghetto. In Hutchinson, R. – Haynes, B. D. (eds.): *The ghetto. Contemporary global issues and controversies.* Westview Press, 1–32.

Woolcock, M. – Narayan, D. (2000): Social Capital: Implications for Development Theory, Research and Policy. *World Bank Res. Obs*, 15, 225–249.

Chapter IV
The European Union and global issues

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 229–246.

Layers of integration: recent evolution and the current state of the four freedoms in the EU

Éva Kuruczleki

The Single European Act, signed in 1986 as the first major revision of the Treaty of Rome, proposed steps towards the realization of the single market, as the next level of European integration. The four freedoms – free movement of the factors of production (labor and capital), as well as free movement of goods and services – are the true essence of the whole integration process and with the single market, the vision of the four freedoms became reality. The process of European integration started decades ago and in light of recent events it seems that the integration process has arrived at a crossroads: earlier continuous deepening of integration may have come to a halt, as may have convergence. In my assessment I use statistical methods and graph theory in order to show the level of integration and the closeness of relations, all in a dynamic way.

Keywords: European integration, four freedoms, networks

1. Introduction

European integration began on 9th May 1950 when Robert Schuman made his notable speech on how important it is to rebuild Europe after all the disasters the continent had to suffer in the first decades of the 20th century. Schuman emphasized the need for cooperation between countries, which soon resulted in the ECSC Treaty (1951) and the Treaties of Rome (1957), founding what we know today as the European Union.

Considering recent events, such as the 2008 financial crisis and the currently ongoing withdrawal process of the United Kingdom from the European Union, integration has arrived at a halt: European decision-makers have been forced to assess their progress and rethink the strategy they have been following over the years. The main decision they had to make was choosing either the path of enhancing further convergence or giving rise to so called differentiated integration or a multi-speed Europe. As a commemoration of the 60th anniversary of the Treaties of Rome, leaders of European Union member states made a declaration in 2017 called the Rome Declaration choosing differentiated integration (European Council 2017).

However, assessing probable future scenarios and further convergence or divergence in the European Union is out of the scope of this study, as I am looking into the past instead of the future. In my study, I am analyzing the recent evolution of European integration from an aspect which is considered the greatest achievement of the European project: the free movement of people, capital, goods and services, namely the four freedoms. I have chosen a methodology that can best suit the nature of flows between member states which is network studies. Graph theory and network studies, even though emerging at the beginning of the 20th century (Barabási 2016), have really gained momentum in recent years as a result of developments in information technology.

My main research aim in this study is to highlight the most important steps that lead to the realization of the four freedoms, and with the help of network analysis, I am

aiming at uncovering the networks and most important flows in the European Union. Due to the lack of data in certain cases, I am focusing mostly on the free flow of persons, however, I am including results on the free flow of goods and services together and some results for the free flow of capital, however I faced the most difficulties while looking for data on the flow of capital.

The study is structured as follows: in *Section 2*, I take a brief look at the milestones of European integration with special attention on those events that contributed most to the realization of the four freedoms. In *Section 3*, I introduce the chosen methodology and data sources used in making the study. Finally, in *Section 4*, I present my main findings in connection to the recent evolution of the four freedoms in the EU.

2. Milestones of European integration

European integration started at the beginning of the 1950s with the Schuman Declaration and the ECSC Treaty (1951). We regard the Treaties of Rome (1957) as the starting point of the current state of European integration, and the Single European Act (1986) as the treaty consolidating the four freedoms through the realization of the single market.

Despite the integration process being under way for nearly seven decades now, we can see that it has not been following a linear path. In this chapter I highlight the most notable events that helped further ensure the four freedoms in the European Union, for each of the freedoms separately.

2.1. Free flow of goods

Title I of the Treaty of Rome (1957) is addressed at the free movement of goods. As Article I says, the aim of the European project is to create a common market in which all goods can circulate freely among member states without facing any obstacles or customs duties at the borders. As the primary objective of creating the Community was the creation of a customs union, at the early stages of European integration, most emphasis was put on abolishing barriers to trade and prohibiting customs duties and tariffs, as a result of which the Customs Union entered into force on 1st July 1968.

European economic integration processes followed the "classic" stages of economic integration, moving from more liberal stages of customs union or common market, towards a deeper level of economic integration, creating stronger bonds between the member states (Balassa 1961). During this deepening of integration, many European Court of Justice decisions contributed to the abolishment of barriers to trade, such as the 1974 ECJ decision on prohibition of trading rules hindering trade within the community, or the 1979 establishment of the principle of mutual recognition, meaning that goods can be recognized equally in all member states regardless of which member state that good has been manufactured.

The Single European Act, signed on 17th February 1986 was the first major revision of the Treaty of Rome, establishing the single market which became effective on 1st January 1993. This treaty is regarded as having finalized the realization of the four freedoms, however many smaller directives and agreements fine-tuned the free movement of goods, such as the Maastricht Treaty (1992) , that eliminated barriers to trade and harmonized product standards, and the European Economic Area

Agreement, effective since 1st January 1994, which expanded the single market to non-member countries as well, or the Single Market Act of April 2011 (European Commission 2011), making further amendments in order to boost the growth and competitiveness of member states (NBT, 2015).

2.2. Free flow of persons

On the 25th March 1957 the six founding members of the European Economic Community signed the Treaty Establishing the European Economic Community (EEC) and the Treaty Establishing the European Atomic Energy Community (Euratom). The first mention of the free flow of persons, services and capitals is in Title III of the EEC treaty, and instructions aimed specifically at workers can be found in Articles 48 to 51 of the treaty, aiming at the free flow of workers between the member states of the Community, prohibiting discrimination against them, and providing them with public rights regardless of which member country they are from (EEC Treaty 1957).

The free movement of workers was therefore established as early as 1957, at a time when nothing and no-one else had the right to circulate freely within the Community. Families of workers had to wait until Council Directive 68/360/EEC of 15 October 1968 which abolished restrictions on the free flow of workers and their families (Council of the EEC 1968).

The upcoming decade was characterized by the enlargement of the Community and deepening monetary integration, as a result of which less emphasis has been put on the free movement of people until 14th June 1985, when leaders of the members signed the Schengen Agreement, making a pact on gradually abolishing border control between each other and thus removing obstacles to the free movement of citizens.[18] The Schengen Agreement became effective in 1995 and even though in 1985, only five of the at that time ten member states signed the Agreement, currently the Schengen Area is comprised of 26 countries who share open borders, including both European Union member stated and non-member states as well, such as Switzerland, Norway and Iceland.

After the signing of the Schengen Agreement and the 1986 Single European Act established the single market, the process of ensuring the free movement of persons gained new momentum: the next major event providing more opportunities to learn and travel within the Community was none other than the Erasmus program. 2017 was a memorable year in a sense that apart from the 60th anniversary of the Treaties of Rome we celebrated the 30th anniversary of the setting up the Erasmus program. Despite being a small fraction of the EU budget (currently set at 16.4 billion EUR for the period between 2014 and 2020), the program is considered to be "*one of*

[18] EUR-Lex (2018). The Schengen acquis - Agreement between the Governments of the States of the Benelux Economic Union, the Federal Republic of Germany and the French Republic on the gradual abolition of checks at their common borders. Online: http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:42000A0922(01)&qid=1526318684121&from=EN, Accessed: 07.05.2018.

the European Union's most successful and iconic programmes" (European Commission 2017). Just to emphasize how important this program is, in 2016 on a budget of 2.24 billion EUR, the program supported more than 725,000 mobility programs all around Europe (European Commission 2017).

To benefit other groups of people beyond workers and their families, in 1990 the principle of the free flow of economically non-active individuals was implemented, establishing the free movement of students and retirees in the Community as well. Even though previous treaties and directives aimed at the free movement of specific people, the Maastricht Treaty signed on 7th February 1992 and effective since 1993, brought another notable milestone, establishing the notion of EU citizenship, that treated all groups of people equally, providing everyone with the same rights to travel and work freely in any member state of the new European Union, the successor of the European Economic Community.

The latest achievement to mention is the 2004 Free Movement Directive (2004/38/EC), further consolidating the rights of EU citizens to move and reside freely in any member states of the European Union.

2.3. Free flow of services

Articles 59 to 66 of the EEC treaty (1957) contain instructions on the free flow of services in the Community, ensuring the freedom of providing services in the Community, however in the case of banks and insurance companies, whose services are bound to capital movements, liberalization had to be implemented in harmony with the progressive liberalization of capital movements, described by Articles 67 to 73 of the Treaty of Rome.

Such as in the case of goods, European Court of Justice decisions and Community directives contributed greatly to the liberalization of the provision of services in all member states: the 1974 ECJ decision prohibited discrimination against citizens setting up businesses and/or providing services within the community, while the 1989 directive on mutual recognition ensured the recognition of different professions in order to provide services. Mutual recognition of those professions that were not covered by the 1989 directive were ensured by the 1992 directive on mutual recognition.

Similarly to the case of the free movement of persons, even though many minor regulations have already existed in the EU to ensure the free movement of services providers, the 2006 Directive 2006/123/EC, or the Services Directive as many know it, brought all services together, establishing a Single Market for services as well, already implemented by all member states no later than 2009 (European Parliament 2006).

2.4. Free flow of capital

The free movement of capital also originates from the Treaty of Rome (1957), as Articles 67 to 73 contained instructions on the free circulation of capital to help countries engaged in economic integration, and to enhance cooperation between economies. The free flow of capital has been mentioned in directives, regulations or

agreements less frequently than the other freedoms, however we can easily recognize those events that contributed the most to the realization of this freedom even without directly specifying this among their aims.

The Barre Plans (1968) by Raymond Barre were the first major plans aimed at the coordination of national economic policies and driving monetary convergence, followed by the 1969 summit in the Hague, where European leaders agreed on the first steps towards establishing economic and monetary union, which resulted in the Werner Report of 1970. As Pierre Werner said:

"*Economic and monetary union will make it possible to realize an area within which goods and services, people and capital will circulate freely and without competitive distortions, without thereby giving rise to structural or regional disequilibrium*" (Commission of the EEC 1970, p. 9).

Despite it not being possible to implement the Werner Plan on time, Pierre Werner has since then been regarded as the person who gave rise to the euro. In 1979, the European Monetary System and the European Currency Unit were introduced, the latter as the reserve currency of the Community (Bates 2002). Then the 1992 Maastricht Treaty eliminated barriers to capital flow, realizing the complete freedom of capital to circulate within the European Union.

As we can see from the above, many larger and smaller events contributed to the realization of the four freedoms of the European Union, step by step. Even though I have mentioned only the most notable ones, many smaller directives and regulations served to amend those mentioned previously, enlarging the scope of the free movement of persons, goods, services and capital.

3. Methodology

In my study I focus on illustrating the flows of those enjoying the benefits of the four freedoms. Due to the lack of data, I shall concentrate mainly on the free movement of persons, as data is available for several groups of European citizens from various sources. In the case of other factors, data was either problematic in itself or hard to acquire.

To illustrate the movement of persons, goods and services and capital, I have chosen graph theory to analyze underlying networks in the European Union. With the help of network studies, I have been able to show in a visually pleasing way the origins and destinations, the strength of flows, and I also discovered certain groupings of countries that might have stronger relations with each other. In this chapter I am introducing my methodological tools and the data sources used.

3.1. Graph theory and network studies

Graph theory and network science is currently quite a popular area, scientist in many fields apply the tools of network studies and graph theory to assess economic, social, and biological phenomena etc. (Roverato 2017). Graph theory first originated in the early 18th century with Euler's 1736 study entitled the Seven Bridges of Königsberg. The foundations of graph theory originate from this year, however for real break-throughs the scientific world had to wait until the early 20th century. Many Hungarian

mathematicians and scientists contributed to the emergence of graph theory and network studies, such as Kőnig, Erdős, Rényi and Barabási (Barabási 2016).

In my study I have chosen to visualize and analyze the flow of persons, goods and services with the help of network study tools. I have used the Gephi 0.9.2 software as the analytic tool at my disposal, creating directed graphs in which the nodes are the different countries and the edges between them indicated the flow of the above-mentioned factors. Apart from simply visualizing these flows, I aimed to analyze certain indicators:

- *Degree*: the degree of nodes can show how many countries a given country is connected to, the higher degree a country has, the more connection it has with other member states. In-degree and out-degree of nodes can also be analyzed: in the case of in-degree we can see from how many countries the flows are coming, and in the case of the latter, we see to how many countries the persons, goods and services flown.
- *Average degree*: average degree shows how many connections countries have on average in a given year.
- *Weighted degree*: the weighted degree shows the intensity of the different flows, in the case of weighted in-degree we can analyze the strength of inflows to a given country, while in the case of weighted out-degree, we can analyze the strength of outflows from a given country. Degree and weighted degree can help to uncover the greatest actors of the system.
- *Average weighted degree*: it shows the average intensity of flows between member states.
- *Graph density*: the density of the graph shows the connectedness of the constituents of the network, the higher the density, the more relations nodes have on average, which can also be understood as European Union member states being more deeply integrated.
- *Modularity*: with the help of the Gephi modularity tool, I was able to uncover homogeneous subsets of countries showing similar characteristics within their own groups, however having more distant relationships with countries outside of their "club".

As the title of my study says, I aimed at examining the recent evolution and current state of the four freedoms, hence I have chosen to examine the past 20 years as data is mostly available for this period. Apart from that, I would like to emphasize that during my analyses, even though non-member European countries were included in numerous datasets, I omitted them from the analyses, as I wanted to focus purely on European Union processes.

3.2. Data sources

For my analyses I obtained data from various sources such as the Eurostat, the European Commission, the United Nations or World Bank, and for some specific datasets, I reached out to the Erasmus+ website, the COMEXT database and the UN Comtrade dataset.

To analyze the free movement of persons, I assessed the following indicators:

- migration in general, expressed as the number of persons migrated in a given year, dataset obtained from the UN Population Division
- student mobility, expressed as the number of students having taken part in mobility programs, data obtained from the EU Open Data Portal
- profession recognition, the number of professions recognized in another member state, dataset obtained from the European Commission
- posted workers, expressed as the number of workers posted from one member state to another, data also obtained from the European Commission.

In the case of goods and services, I relied on trade datasets and assessed trade relations of countries. In trade databases, goods and services could not be separated clearly as many international datasets only comprises aggregated data, thus I decided to analyze the flow of goods and services together. I have assessed trade relations by creating export-import networks based on the methodology of Zhu et al. (2014) and Ermann-Shepelyansky (2015), analyzing export flows obtained from the COMEXT dataset. Even though it was not analyzed in this current study, I obtained data from the ResourceTrade.Earth website[19], which relies on UN Comtrade data in visualizing trade flows of natural resources, and also some data on the international trade of services between member states, obtained from the Eurostat website.

Analyzing the free movement of capital was where I faced most obstacles, as data was either hard to acquire or non-existent, or in many cases highly insufficient. I tried to obtain data on direct investment flows, including inward and outward FDI, however even though data is available at the member state level, a break-down into the sources and origins of FDI flows is hard to find in official statistical databases.

4. Main findings

In this chapter I introduce my main findings on the recent evolution of the four freedoms with special attention to the free movement of persons. During my analyses, I was hoping to see some major events in the history of the EU (such as the 2004 enlargements, the 2008 financial crisis and the 2016 Brexit referendum) as perturbations in the flow of integration and even though my results are nothing out of the ordinary, it was pleasing to see how similar my results were to previous studies such as Farkas (2016) by analyzing the same integration process from a different aspect and with different tools.

To highlight my main findings, I found that European integration intensified after the Eastern enlargement and slowed down in the aftermath of the crisis, and the same can be said about intra-EU migration. Concerning the free movement of persons, Erasmus is a highly successful mobility program whose participants tend to grow gradually in number. However, it is also affected by economic shocks, even though shocks have a lagged effect on Erasmus mobility numbers.

The main message of my research is that core-periphery distinction holds for all the aspects examined. Despite in some cases being geographically distant from each other, countries who share common historical ties tend to have stronger bonds,

[19] Chatham House: ResourceTrade.Earth, Online: https://resourcetrade.earth

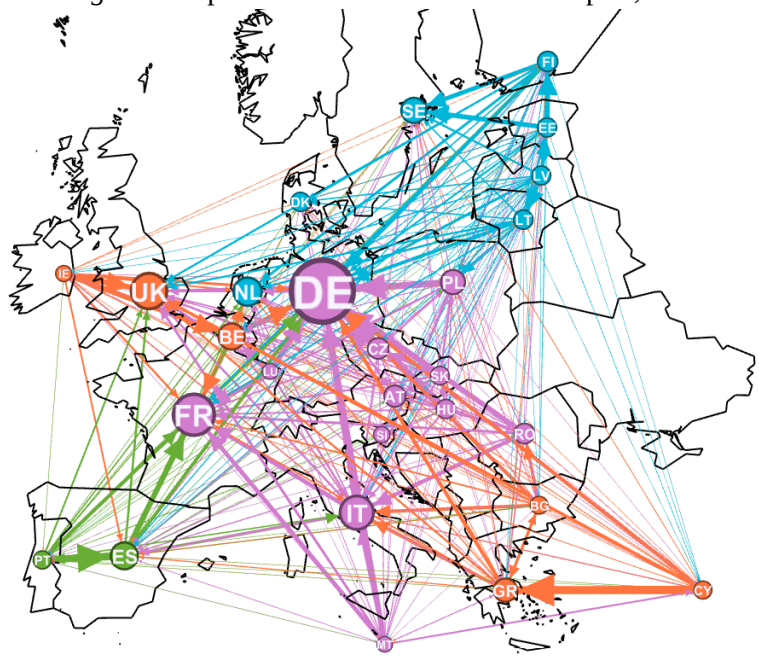
which does not necessarily help in deepening integration between European Union member states.

4.1. Free flow of goods and services

Based on the methodology proposed by Zhu et al. (2014) and Ermann-Shepelyansky (2015) to examine the free flow of goods and services, I obtained intra-EU trade data from the Eurostat COMEXT Database. By assuming that export from one country is an import in another, I created trade network graphs with the help of export volumes expressed in EUR. Even though the COMEXT Database contained detailed data on trade flows, I faced two difficulties: firstly, in the case of intra-EU trade volumes, data is only available for the years 2010 and 2016, hence I could not make a longer time series analysis, despite it being one of my aims, and secondly, data could not be separated for goods and services, as a result of which I could not analyze solely the free flow of goods or services.

The graphs below show the distribution of exports as a percentage of each country's total intra-EU trade. This means that the weight of edges reflects how exports are distributed among member states, the higher weight an edge has, the higher the share of a given country's export is flowing to another country. As an example, in 2010, the highest percentage of Italian exports were flowing to Germany, and the same can be said about Polish exports as well, while the main trading partner of Ireland was the UK, the main partner of Portugal was Spain, and the main partner of Cyprus was Greece. Trade patterns did not really change in the period examined.

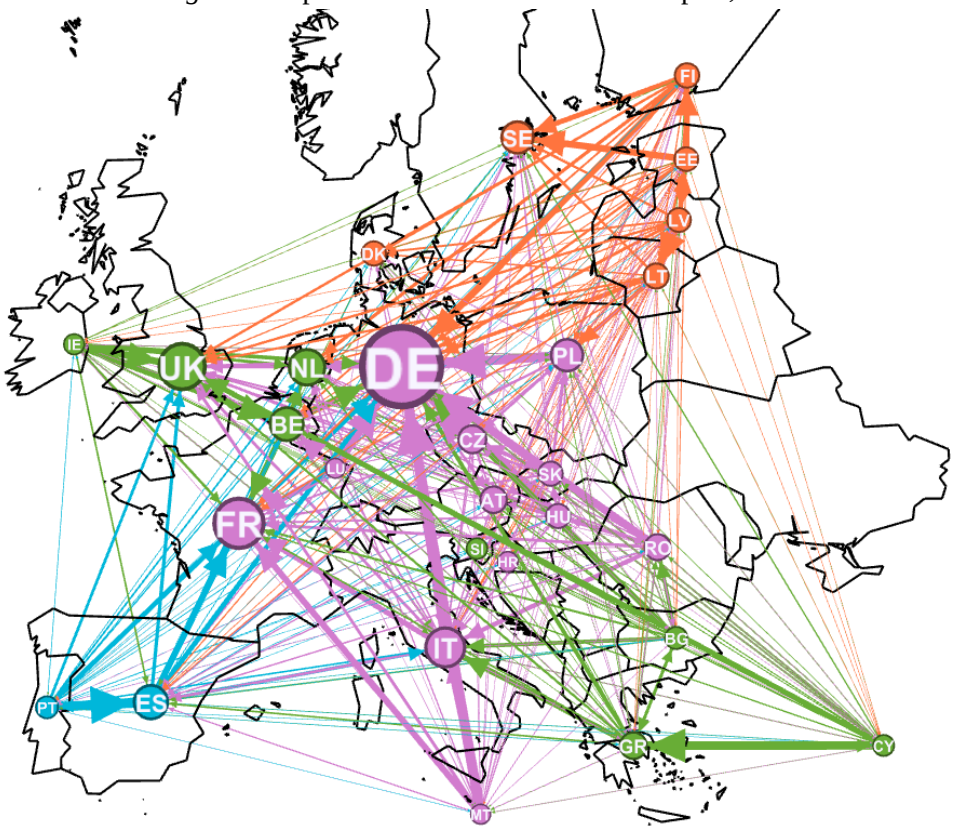
Figure 1 Exports as a % of total intra-EU export, 2010



Source: own edition based on Eurostat COMEXT data

For both of the years examined, I was able to identify four clusters: Hispanic countries, Central Europe, Nordic and Baltic countries, and finally, a cluster whose members are geographically less integrated, however are strongly connected economically, composed of the UK, Ireland, Belgium, Greece, Bulgaria and Cyprus. By examining trade networks for both 2010 and 2016, we can see that patterns have not changed, with regards to trade, countries tend to connect more with such members that are historically and geographically closer to them, as the example of Central Europe or the Baltic countries shows quite well.

Figure 2 Exports as a % of total intra-EU export, 2016



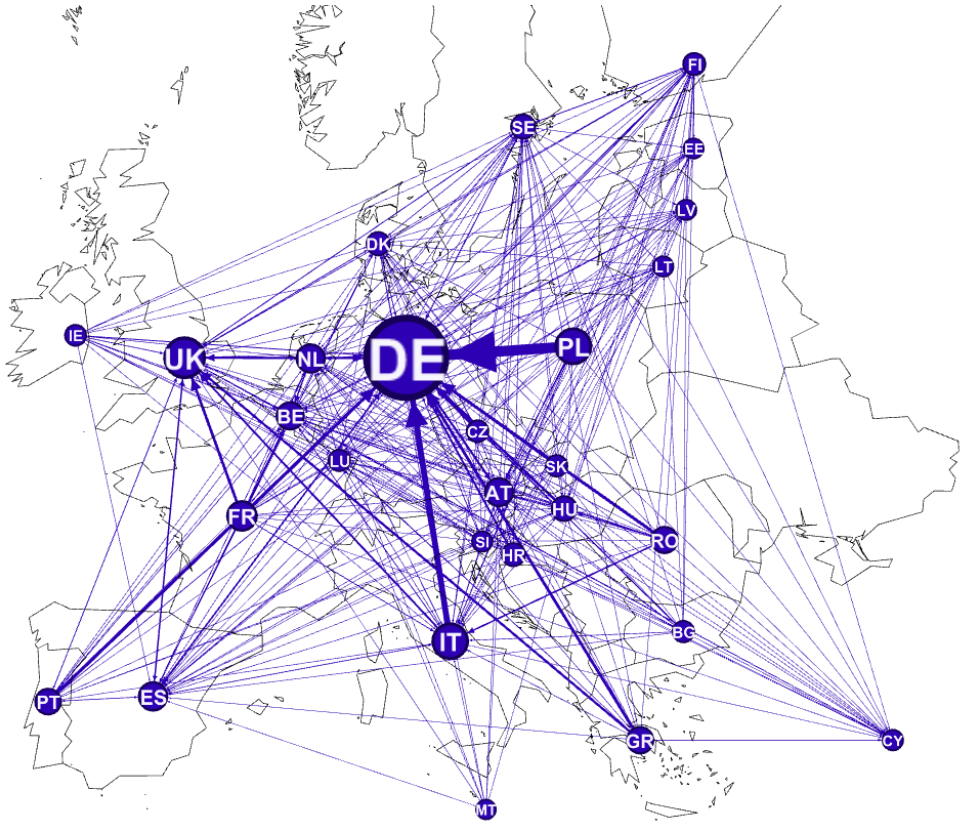
Source: own edition based on Eurostat COMEXT data

To summarize my findings on analyzing trade flows, I determined that with regards to export relations, the behavior of countries had not changed in such a short time period, and that clusters were more or less identical in both of the years examined, meaning that countries favored trading with the same member states. With regards to the free movement of goods and services, we can see from the numerous edges that even though the share of exports between different member states are not equal, countries are trading with more distant partners as well, suggesting that the free movement of goods and services is also well-established in the European Union.

4.1. Free flow of persons

The area I put the most emphasis on during my analyses has been the free movement of persons. To analyze migration in general, I assessed the number of persons migrated intra-EU in the selected years, 1998 and 2013. *Figure 3* shows the 1998 movement of persons in the EU. The nodes of the graph are the member states, and the directed edges show the origins and target countries of people migrating between member states. The weights of the edge indicate the number of people migrating, the thicker an edge, the more people were moving from one country to another. The sizes of the nodes reflect the weighted degree, reflecting on the number of both leaving and arriving people. According to these findings, Germany has been both the greatest recipient and sending country, followed by the UK, Poland and Italy. These countries are among the top sending countries, however in the case of Poland, in 1998 its in-degree was close to zero, indicating that its place among the top most mobile country was due to the fact that many people were leaving for Germany.

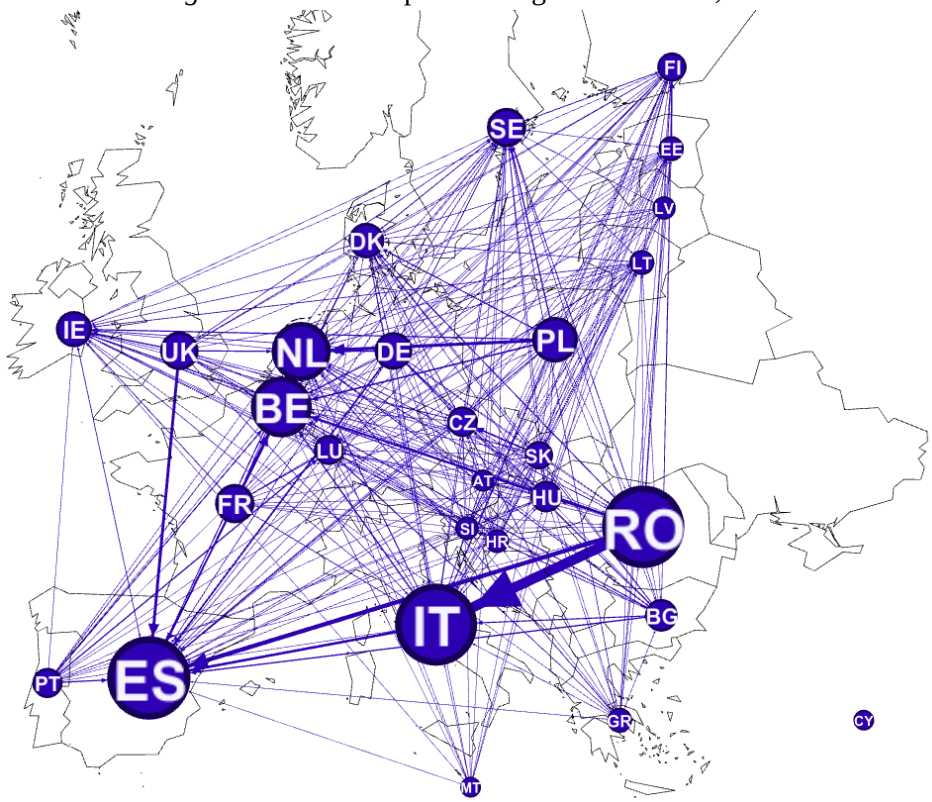
Figure 3 Number of persons migrated intra-EU, 1998



Source: own edition based on UN DESA Population Division data

Figure 4 shows the same indicator for a much later year, 2013. 15 years after the above graph, migration flows seem to have changed to a system characterized by intensive flows in the southern member states and much lighter flows in Northern Areas. In 2013, the top member states who had the most intensive flows were Italy, Romania and Spain, while Germany is nowhere to be seen among the top mobile countries.

Figure 4 Number of persons migrated intra-EU, 2013



Source: own edition based on UN DESA Population Division data

To see how major events affected integration processes, I calculated the average degree, average weighted degree, and density of such networks for 1998, 2003, 2008 and 2013. The average degree indicated that in 2003 a strengthening was present in migration flows which was due to the fact that new member states had started preparing for the accession to the EU long before it came into effect. This strengthening peaked in 2008, countries having connections with on average 19.75 countries, and in the aftermath of the crisis, countries returned to pre-crisis levels, and indeed, it can be seen from the average weighted degree of the nodes, that intensity of migration flows also slowed down significantly.

The density of the network shows how deeply embedded countries are in the system we call the European Union. The slight increase and then fall process follows the same pattern that we were able to see in the case of the average degree, indicating

that even though integration gained momentum after the Eastern enlargement, the financial crisis hampered further integration and thus, caused divergence (*Table 1*).

Table 1 Indicators of economic integration (1998–2013)

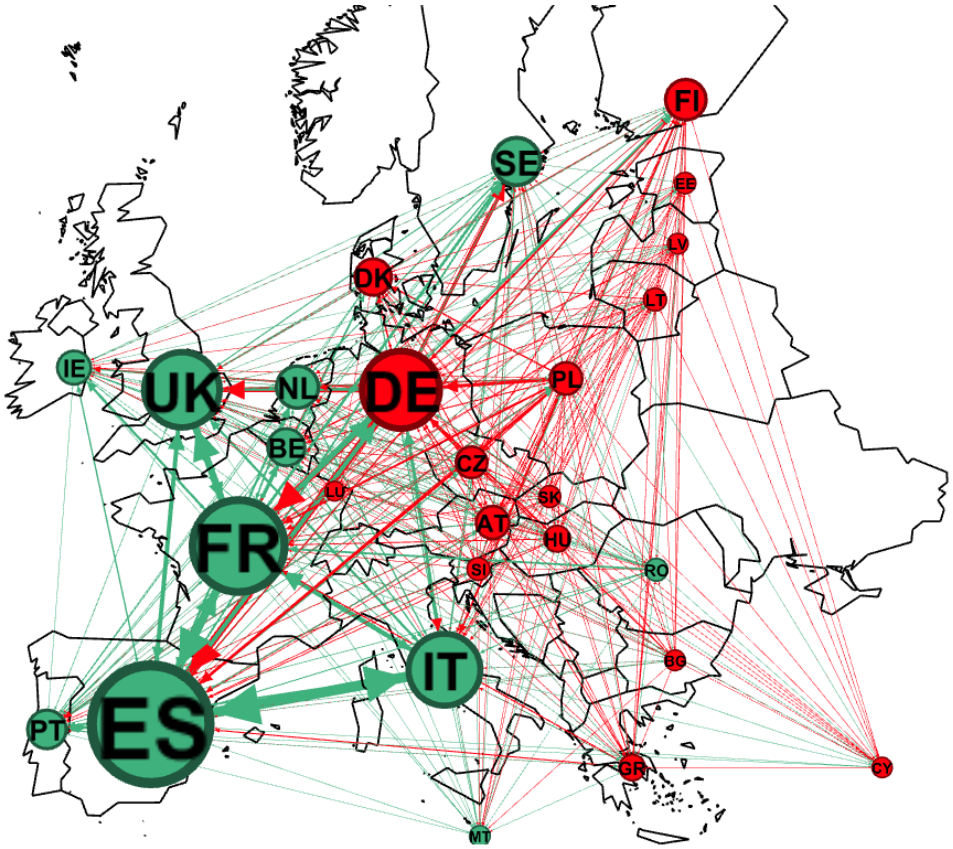
	1998	**2003**	**2008**	**2013**
Average degree, number of countries	13.607	16.786	19.75	16.074
Average weighted degree, number of persons	18444.607	30520.929	38955.393	15287.074
Graph density	0.504	0.622	0.731	0.618

Source: own edition based on UN DESA Population Division data

Unfortunately, Erasmus datasets are not as widely available as general mobility data, however I was able to obtain detailed data that contained more than the simple sum of mobility from as early as the 2008-2009 academic year. As *Figure 5* shows, the flow of students has been the strongest between the Western member states, and the weakest between Northern member states and the Baltic countries. However, we cannot make far-reaching conclusions, as in the case of Germany, Spain, France or Italy, the large numbers of student mobilities are due to these countries having larger populations, while those with significantly smaller populations cannot send as many students to participate in mobility programs.

Node sizes represent the most popular destination countries, Spain was the most visited member state in 2008-2009, followed by France, the UK and Germany, meaning that most of the students went to these countries to participate in exchange programs. This graph is colored in two colors: after running the modularity analysis, I was provided with two clusters dividing the European Union into two clubs: Eastern and Western. The western club contained Spain, France, Ireland and most of the Western European countries. The red cluster contained Germany, as it has been a popular destination of students from Central and Eastern Europe.

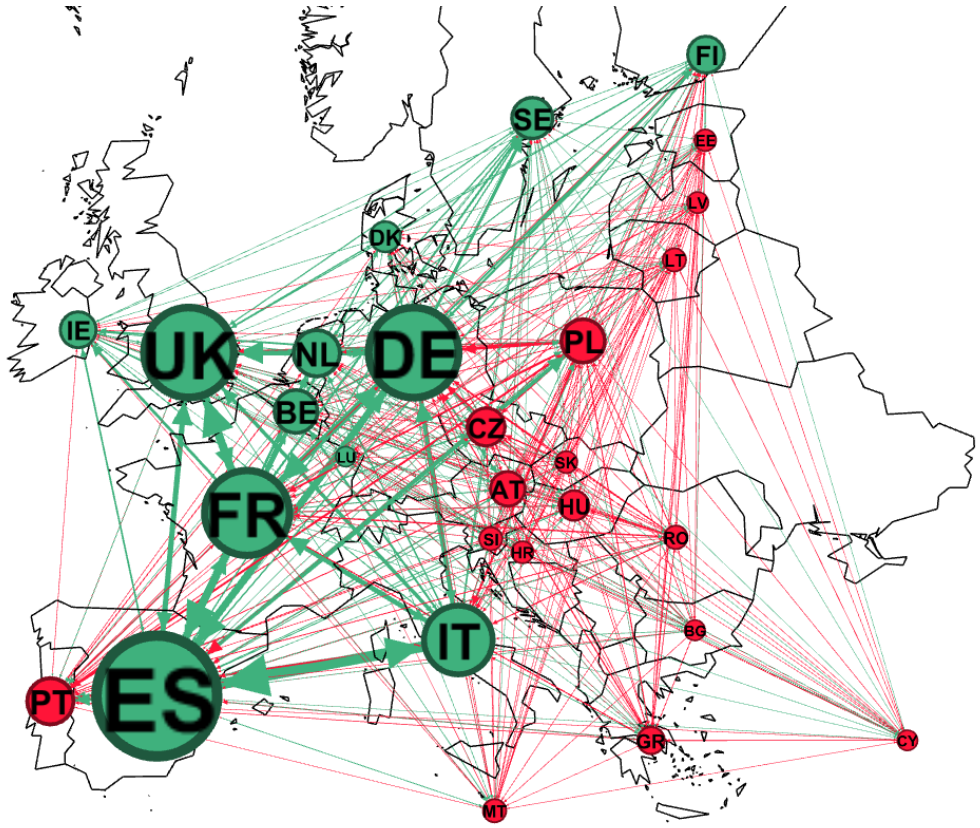
Figure 5 Number of students taking part in Erasmus mobility programs (persons), academic year 2008-2009



Source: own edition based on EU Erasmus mobility statistics

By running the same analysis on data for the 2015-2016 academic year, the situation remained unchanged in as far as the core area was characterized by stronger student flows, more students were taking part in mobility programs in Western-Europe. Running the cluster analysis again, it turned out that Portugal and Germany had changed places: Germany has become rather a destination for Western-European students, while Portugal changed to becoming a possible destination for their Eastern-European counterparts (Figure 6).

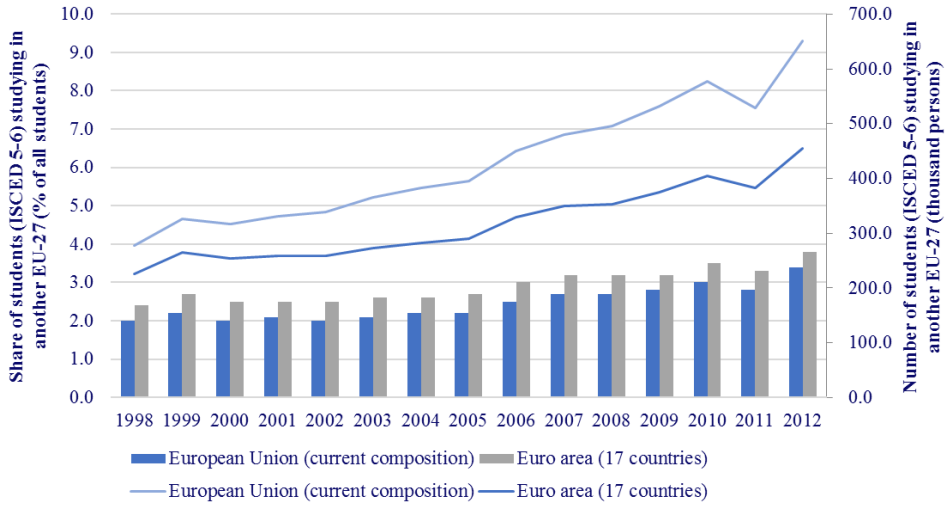
Figure 6 Number of students taking part in Erasmus mobility programs (persons), academic year 2015-2016



Source: own edition based on EU Erasmus mobility statistics

While analyzing the movement of students in the EU, I noticed something interesting in how the number of students taking part in mobility programs increased. *Figure 5* shows the share and number of students studying in another Member State. We can see a few major breaks in the time series. The less noticeable break is in 2005-2006, when the number and share of students studying abroad increased greatly, probably due to EU enlargement. Mobility programs require a lot of administration and it seems that as administration and preparation delays the starting point of mobility programs, economic events and shocks have a lagged or delayed effect on the number of students studying abroad. The second notable break in the time series seem to be the lagged effect of the 2008 financial crisis visible in 2011 (Figure 7).

Figure 7 Number and share of students studying in other EU-27 member states



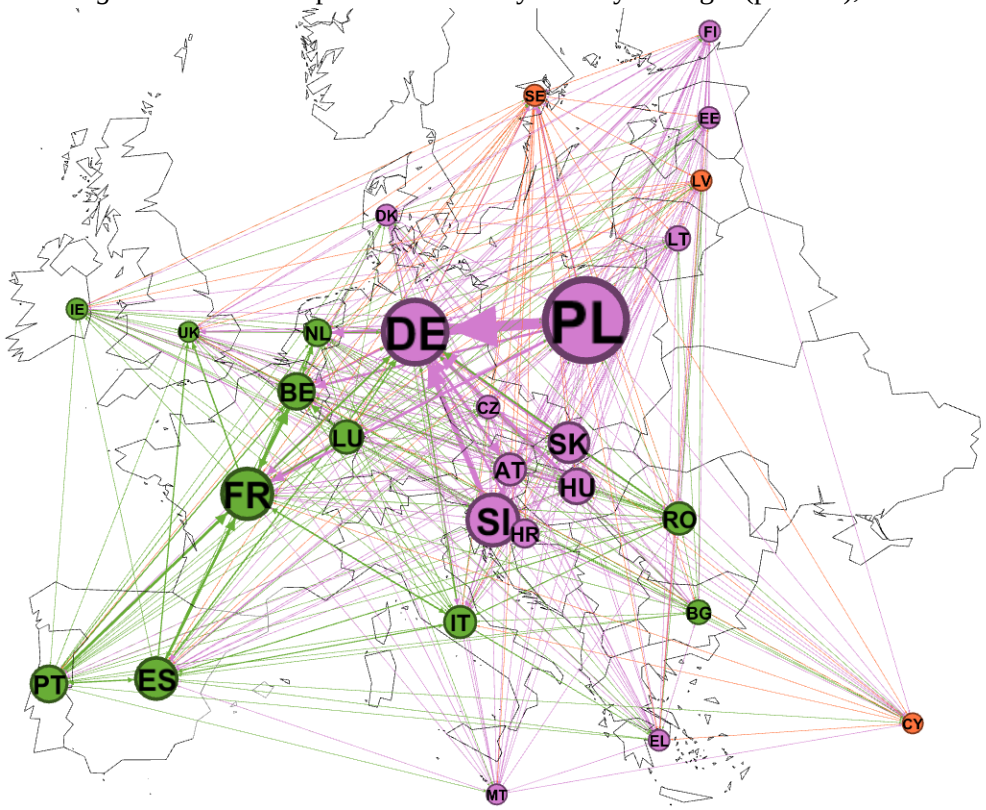
Source: own edition based on Eurostat data

Concerning another group of persons, I assessed the number of posted workers. A posted worker, according to Directive 96/71/EC of the European Parliament is a "*a worker who, for a limited period, carries out his work in the territory of a Member State other than the State in which he normally works*" (European Parliament 1996). Posting of workers is a relatively new phenomenon, hence I assess only recent data on the posting of workers, the latest available data is for 2015.

Figure 8 shows the flow of posted workers based on countries of origin, the larger node indicating most workers being posted out of the country, while on *Figure 9* below, node sizes reflect the most notable target countries. In 2015, more than two million European workers were sent abroad, the four main sending countries being Poland, Germany, France and Slovenia, accounting for nearly half of the posted workers, while the three main receiving countries were Germany, France and Belgium. The most notable flows were from Poland, Slovenia, Slovakia and Hungary to Germany, from Italy to Switzerland and from France to Belgium (European Commission 2016).

The strongest worker migration flow thus can be identified as being between Poland and Germany, highly contributing to Germany being the most popular destination country and Poland being the greatest sending country. The core-periphery distinction also stands in this case with regards to the patterns countries show in the posting of workers. Two large clusters and a third, much smaller one could be identified in the case of posted workers. The Western one comprised of Western European countries, Romania and Bulgaria, while Central-Eastern European and Baltic countries compose the same cluster with Germany that can be explained by the strong flows to Germany.

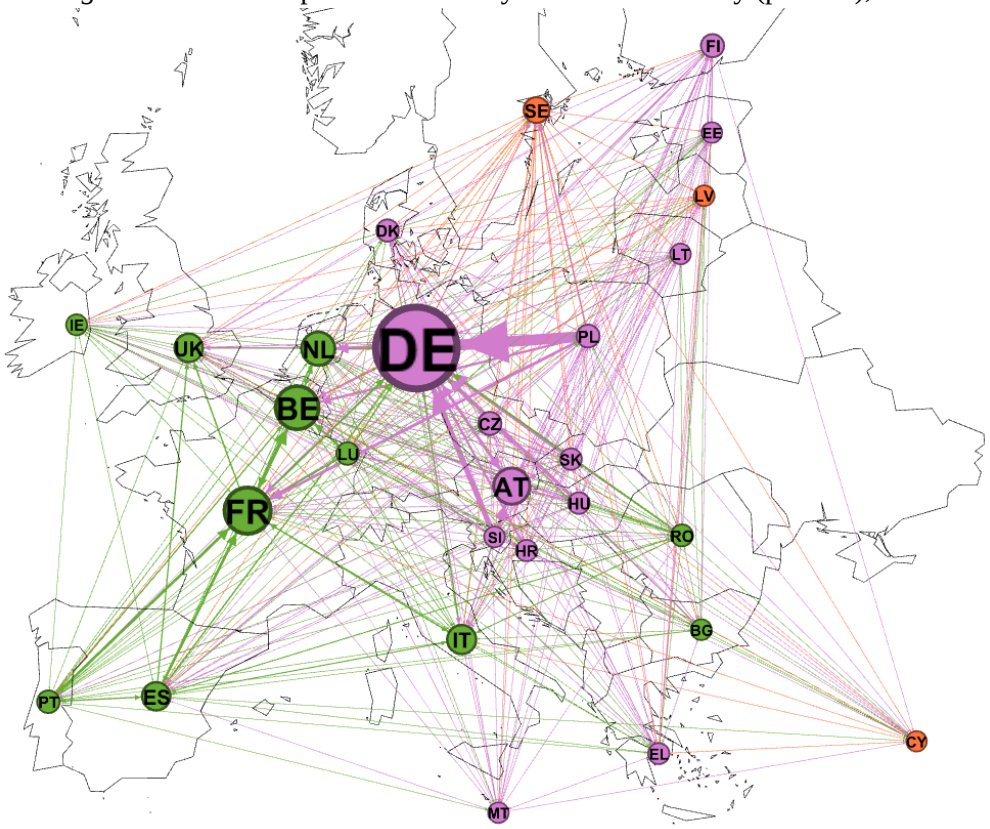
Figure 8 Number of posted workers by country of origin (persons), 2015



Source: own edition based on European Commission data

As a result of deepening European integration, European citizens became more mobile, and after the Eastern enlargements, intra-EU migration flows intensified. In the aftermath of the financial crisis, as people faced economic and financial difficulties, migration flows fell back to pre-crisis levels, but recovery can be seen, as for several groups intra-EU movement again seems to be a favorable option. Meanwhile, the number of posted workers and students continuously increasing in the European Union. To conclude, the free movement of persons is a freedom all citizens can benefit from and the European Union succeeded in creating an environment that promotes the free movement of people of all ages and professions.

Figure 9 Number of posted workers by destination country (persons), 2015



Source: own edition based on European Commission data

5. Conclusion

In my analysis I was aiming at highlighting the most important steps that lead to the realization of the four freedoms with the help of network analysis. I succeeded at uncovering sub-networks and the most important flows of persons, goods and services in the European Union. In the first part of my study, I briefly summarized the most important events of the previous six decades that contributed to the realization of the four freedoms, and in the second part I conducted an analysis using network science tools to best suit the nature of different flows within the European Union.

My results show that the freedom of persons to reside, work and study in any member state of the European Union has been consolidated through decades of gradually abolishing borders to workers, students and other societal groups, and a result of which internal migration intensified greatly between member states, even though certain shocks and crises perturbed the movement of persons, sometimes affecting the flow of people after several years' delay.

Regarding trade networks in the European Union, based on the available data, four main country groups could have been distinguished, that share both strong historical and geographical ties, geopolitical proximity still accounting for stronger

trade relations these days as well. To conclude, the four freedoms are well and truly in place, accounting for intensive movements in the European Union, which are best visualized in a complex, yet easy to understand way with the tools of network science and graph theory.

References

Balassa, B. (1961): Towards a Theory of Economic Integration. *International Review for Social Sciences*, Volume 14, Issue 1, February 1961, p. 1–17.

Barabási, A. L. (2016): *Network Science.* Northeastern University, Boston.

Bates, S. (2002): Pierre Werner: The man who dreamed up the euro. Online: https://www.theguardian.com/news/2002/jun/28/guardianobituaries.euro, downloaded: 09.04.2017.

Commission of the EEC (1970): *Report to the Council and the Commission on the realisation by stages of Economic and Monetary Union in the Community.* Luxembourg, Commission of the European Economic Community.

Council of the EEC (1968): *Council Directive 68/360/EEC of 15 October 1968 on the abolition of restrictions on movement and residence within the Community for workers of Member States and their families.* Brussels, Council of the European Economic Communities.

Ermann, L. - Shepelyansky, D. L. (2015): Google matrix analysis of the multiproduct world trade network. *The European Physical Journal B*, 88, 84, 1–19.

European Commission (2011). *Single Market Act: Twelve levers to boost growth and strengthen confidence. "Working together to create new growth"*. Brussels, European Commission.

European Commission (2016): *Posting of workers - Report on A1 portable documents issued in 2015*. Brussels, European Commission.

European Commission (2017): *Erasmus+ Annual Report 2016*. Brussels, European Commission.

European Council (2017): *Declaration of the leaders of 27 member states and of the European Council, the European Parliament and the European Commission (The Rome Declaration)*. Brussels, European Council.

EEC Treaty (1957): *Treaty Establishing the European Economic Community*. Rome, European Economic Community.

European Parliament (1996): *Directive 96/71/EC of the European Parliament and of the Council of 16 December 1996 concerning the posting of workers in the framework of the provision of services*. Brussels, European Parliament.

European Parliament (2006): *Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market.* Brussels, European Parliament.

Roverato, A. (2017): *Graphical Models for Categorical Data*. Cambridge University Press.

Zhu, Zh. - Cerina, F. - Chessa, A. - Caldarelli, G. - Riccaboni, M. (2014): The Rise of China in the International Trade Network: A Community Core Detection Approach. *PLoS ONE*, 9, 8, e105496.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 247–262.

Competition regulation challenges in internet-based industries

Boglárka Fekete

Both the fast rising and the existing global market structures are changing radically. Multi-sided platforms induce relevant changes in many fields. At present the regulatory framework and competition authorities also appear to be puzzled by them. Regulators are still lacking new robust models, and thus they are constrained to using traditional methods in the course of their investigations, which raises the risk of reaching false conclusions. Many web-based businesses generate revenue from attracting eyeballs and selling access to advertisers. Many websites pursue advertising sales as well. In this context the current research addresses the issues behind these challenges to competition regulation in Internet-based industries. We observe that traditional competition regulation has been circumvented by these platforms. Their inherent and analyses must be redrafted.

Keywords: multi-sided market, competition regulation, platform, Internet-based industry

1. Introduction

Due to rapid growth in technological development, new types of markets are emerging which are referred to as two-sided or multi-sided markets. Multi-sided markets are those in which there are two or more, clearly distinguishable groups of users whose demands are interdependent, and therefore either or both groups produce positive externalities. Several economically important industries interact via platforms (e.g. Internet-based industries, advertising-supported media, and financial exchanges). By this interaction, positive externalities are created at one group or another, and cross-group network effects arise as well. Platforms have a crucial role in reducing transaction costs. In these markets the standard definitions are changed.

According to the literature, there are many differences between traditional markets. The examination of markets is part of the Industrial Organization (I / O) field in which different market models are investigated by market participants during the introduction of a change. This field of science is only familiar with the new types of markets from the 2000s, so the range of research and the available literature is not too extensive. Even if we go further and explore these markets in the field of competition regulation, the amount of available literature is significantly reduced. Thus, the exact formulation of concepts has been a major challenge during our research.

In the study, we do not make specific hypotheses because the literature review is incomplete. The economic change generated by digital technology had been expected to be slow, and regulatory authorities are only beginning to deal with a business when it has already abused its market power. Examination of anti-competitive behavior is a very long process, but in the meantime, the cause of digitalization is becoming uninteresting. The law and economics for analyzing the multi-sided platforms that dominate the Internet sector are considered to be not well (co-)developed. Our main question is: can we use traditional

investigation in two- or multi-sided markets? If we use traditional methods in the course of our investigation, could it raise the risk of false conclusions or not?

We present how two- or multi-sided platforms are formed, we illustrate the innovation and technological achievements. We define the two new markets and show traditional competition regulation. Last but not least, we analyze some deficiencies in the competition and regulatory policy in field of multi-sided markets, mainly in internet-based industries.

2. Innovation and technological achievements

Technological developments in market economies are primarily due to the innovative activities of companies. Many economists (Aghion et al. 2005, Halpern–Muraközy 2011, Nagy et al. 2014) deal with the idea that competition has an impact on innovation. Competition and innovation describe a reverse U case, in which innovation intensifies competition to a certain extent, but the winners that have emerged as a result of innovation competition have enormous market advantage. Their market power is enormous compared to their competitors, making it easier for them to abuse their dominant position. The intellectual roots of competition and innovation go back to Joseph Schumpeter who, in the context of dynamic efficiency, believed that the incentive to innovate is the possibility of monopoly, but this can only take place in the short term because other traders enter the market over time (Whish 2010). He considered dynamic efficiency to be more important than consumer well-being, since by gaining more profit for the producer, he could access to costly R&D investments (Tóth 2014).

2.1. Fourth Industrial Revolution

In January 2016, at the Davos World Economic Forum (WEF), Klaus Schwab (2016), founder and CEO of WEF, put the fourth industrial revolution at the heart of the summit. He explained that it is necessary to talk about the phenomenon because innovation and the new technological advances are developing new production tasks, sales, and corporate governance. He also mentions that the Fourth Industrial Revolution is different than those that came before. There are a number of new technologies that characterize the revolution, affecting science, economics, and even industry. Taking into account all these factors, humanity faces a great challenge, as it is possible to "twist" the world and thus billions of people on the Internet.

The new acquis may also be an opportunity to find solutions to the problems of the age and help revive the natural environment. But there are some threats as well. Schwab puts forward various concerns such as the fear that organizations will not be able to adapt, and that regulatory authorities will not be able to use existing rules to emerging new situations (Kuruczleki et al. 2016, Schwab 2016).

2.2. Digital Single Market Strategy

One of the key pillars of the Europe 2020 strategy is the creation of a digital single internal market. In May 2015, the European Commission issued a Communication on the Digital Single Market Strategy for Europe. Jean-Claude Juncker's says: "*we must make much*

better use of the great opportunities offered by digital technologies, which know no borders. To do so, we will need to have the courage to break down national bastions of telecoms regulation, copyright and data protection legislation, management of radio waves and application of competition law." (EC 2015 2)

By digitizing the world economy, the Info-Communication Technologies emerged from a separate sector and became the basis of the modern economic system. By transforming the internet and digital technologies, we are transforming our lifestyle. The scale and speed of change have many innovative and growth-promoting opportunities, but there are major challenging policy issues in regulation. "*A Digital Single Market is one in which the free movement of goods, people, services and capital is ensured and where individuals and businesses can seamlessly access and exercise online activities under conditions of fair competition, and a high level of consumer and personal data protection, irrespective of their nationality or place of residence. Achieving a Digital Single Market will ensure that Europe maintains its position as a world leader in the digital economy, helping European companies to grow globally.*" (EC 2015 3.) The Digital Single Market Strategy is based on three pillars: (EC 2015)

- Making internet products and services more accessible for European consumers and entrepreneurs - breaking down the most important differences between the internet and the physical world
- Creating conditions to promote the expansion of digital networks and services - this pillar involves the creation of a regulatory environment that promotes innovation and investment, providing a level playing field
- Maximizing the growth potential of the European digital economy - increasing industrial competitiveness and the level of public services.

With regard to the subject of the study, the second pillar should be examined more closely. In order for innovative investments to take place, the market must be built on reliable, high-speed, affordable networks. The strategy highlights the fact that the telecommunications sector is responsible for developing these networks, using innovative solutions such as cloud computing and big data technology. With rapid technological development, internet platforms are emerging that are concerned with their market power.

"Online platforms (e.g. search engines, social media, e-commerce platforms, app stores, price comparison websites) are playing an ever more central role in social and economic life: they enable consumers to find online information and businesses to exploit the advantages of e-commerce. Europe has a strong potential in this area but is held back by fragmented markets which make it hard for businesses to scale-up… include a lack of transparency as to how they use the information they acquire, their strong bargaining power compared to that of their clients, which may be reflected in their terms and conditions (particularly for SMEs), promotion of their own services to the disadvantage of competitors, and non-transparent pricing policies, or restrictions on pricing and sale conditions." (EC 2015 11.)

The strategy states that, besides the application of specific competition rules to concrete situations, further analysis is needed, but these analyses are not elaborated any further.

3. The impact of digitalization on the transformation of the market structure

As a consequence of digitalization, the structure of the market has changed, and two / multi-sided markets have emerged. The digital economy has gone through the hype of the 1990s. The digitalization of tangible books, music and toys has opened a new world for us. With the rise of the internet, the limit on physical goods has ceased and more and more people have started using the internet to buy individual products. As a result of the rapid innovation, software has also been created that allows us to store vast amounts of files on the Internet. With the rapid development of the digital economy, changes in the structure of industrial sectors have also occurred.

With the change in market structure, modern market theory (Industrial Organization) is also facing challenges, as the digital economy operates differently than traditional industries. Illing and Peitz (2006) note the following differences:

- *The emergence of two-sided markets*: where indirect network effects between different sides of the markets are typical and the two sides are mutually dependent.
- *Changes in intellectual property rights*: One of the biggest challenges in the digital economy is the regulation of patent and copyright.
- *The emergence of new marketing and sales strategies*
- *The emergence of e-commerce and the existence of a buyer power*: like in the world of the internet, through the various search channels, customers can choose from a wealth of options.

Technological pressure not only affects markets, but also has a major impact on regulators. The new situation in a rapidly evolving world can only be monitored by the regulatory authority, but it is extremely important that this tracking is timely and fast, and analyzing an individual case at the time of the investigation may be out of the question. Thus, it is highly likely that regulators will use the case-by-case approach as in the case of liberalization when a lawyer draws attention to regulatory failure, after which the authority examines certain aspects of the case, places the results of these in public consultation, then the Commission proposes a legislative proposal followed by Community legislation, in most cases following guidance (Pelle 2009).

3.1. Two-sided and multi-sided markets

Generally most of the network's externalities are generated by markets, two or multi-sided markets that create a medium where two or more sites interact with each other. This medium is called a platform. Rochet and Tirole (2003) emphasize that platforms have only an intermediary role as a link between the two sides of the market. Hagel (2015, p. 80) defines the concept of platform as "*platforms help to make resources and participants more accessible to each other on an as-needed basis*". Some aspects of well-functioning platforms:

- It is necessary to create a management structure that defines a wide collection of protocols: who can participate and under what conditions and also providing for dispute settlement
- Creating additional protocols and standards that facilitate collaboration.

Hagel (2015) distinguishes between three different platform types:

- *Aggregation Platforms*: Help resources and their users find each other, such as broker-based platforms such as eBay or App Stores.
- *Social / community platforms*: they are similar to aggregation platforms because their goal is to connect individuals. Perhaps the most well-known platforms are Facebook and Twitter. The difference to aggregation platforms is that community platforms take up a longer period of time, while in aggregation platforms only one transaction is pursued by the operators.
- *Mobilization platforms*: these types of platforms not only connect individuals but also drive them to act together to achieve shared goals.

Many diverse industries are populated by businesses that operate *two-sided platforms*, such as: advertising-supported media, software platform, financial exchanges, e.g. Jean-Charles Rochet and Jean Tirole (2004, p. 26) gave us a definition about two-sided markets: *"A market is two-sided if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other side by an equal amount."*

So the conditions of two sided markets result from the following shared features: (1) there are two distinct groups of users who need each other in some way; (2) the platform is to provide a common meeting place and to allow interactions between members; (3) the platform plays an important role by minimizing transaction costs between users who can benefit from getting together; (4) and pricing and other strategies are strongly affected by the indirect network effects between the two sides of the platform. For example, a video game console is a platform (Play Station) and the two distinct users are game developers and video game users, or the software market is a platform (Windows) and the two distinct users are application developers and the software users.

According to Filistrucchi et al. (2013) the demand from one group of users depends on a demand from other group of users, so demand is linked by indirect network effects. If users' tendency to pay for a product depends on the number of other users of the same product, it will be direct network effect, but if it depends on the number of other users of another product, it will be indirect network effect. When a firm acts as a platform, the market will be two-sided (Evans 2003).

As a matter of theory, profit-maximizing prices may entail below-cost pricing to one group of users, and as a matter of fact, many two-sided platforms charge one sided prices that are below marginal cost. For example, print media is often provided to readers at something close to or below the marginal cost of printing and distribution. Evans and Schmalensee (2013) and Wright (2004) deal with these and other aspects of the effects two-sided platforms, which are connected to antitrust analyses – from market definition, to the analyses of cartels, single firm conduct and efficiencies.

Evans and Schmalensee (2013) gave further thought to the definition of two-sided markets, which they named as *multi-sided markets*. In terms of the literature, we see the term of two-sided markets in most places, however we use the term multi-sided markets here as it is a larger category.

There are two or more distinct groups of users who may be different only for the purpose of the transaction. For example, eBay users are sometimes buyers, but sometimes they are sellers. There are externalities associated with users and the externalities created by one group for the other group. Internet based commerce, credit cards, operating

systems, shopping centers and mass media are all governed by the economics of multi-sided platforms.

Most two-sided or multi-sided markets set traditional prices, which are below marginal costs, so it is very important to select a good pricing strategy in these markets. With regard to two-sided markets, Rochet and Tirole distinguished four different types of platforms (Evans–Schmalensee 2013):

- *Exchanges*: includes all platforms that are engaged in brokerage (e.g. rent, travel agency, ticket office, auction houses, stock exchange ...)
- *Media market*: indirect network effect appears on this market as the number of advertisers depends on the number of viewers (e.g. newspapers, television, websites ...)
- *Transaction system*: all payment methods that only work if the seller or buyer uses it (e.g. credit card, credit card)
- *Software platform*: this platform provides application developers, but users can run applications only if they use the same platform (e.g. Apple, Microsoft, Xbox, PlayStation ...)

Generally, in multi-sided markets small companies appear but they can grow multinational within a relatively short period of time. Due to the growing internet-based trade, these platforms will become more important in the economy.

3.2. Internet-based platforms

Web-based businesses are one of the most important and interesting part of multi sided platforms. There are four different types of web-based businesses:

1. *E-commerce* includes auction sites such as eBay, Aliexpress, and some massive shopping malls like eBay, Amazon and Baidu. It also includes retailers such as walmart.com.
2. *Online publishing* includes everything from portals such as Yahoo and, MSN. We could mention print publishers like Nytimes.com, CNN.com, hvg.hu etc. It also includes video publishers like YouTube, Vimeo and some kinds of blogs.
3. *Social networking* is a new dimension of web. Almost every person has a Facebook account, and if you want to find an international profession you are on LinkedIn.
4. *Online advertising* is a huge part of the internet. Many web-based businesses make money from attracting eyeballs and selling access to advertisers. Many websites run advertising sales as well. There are some firms which dominate this platform, such as Google, iPhone and also Facebook.

There are four key features of the web-based businesses:

1. These platforms have to face a *critical mass* problem. When these kinds of firms want to enter into the platform, they try to get enough users on board. Instagram is an example of tackling the critical mass problem. It had to figure out how to get enough people to upload pictures and how to get enough people to view those pictures.

2. Many of the web-based businesses are *free* for one group of users. For example Facebook is free for users, but if you want to advertise your firm you have to pay for it. Microsoft provide most of its services for free to the software developers. But these users (developers) get a lot of value from Microsoft.
3. In this kind of market there is an *invisible engine*, the software. If you want to start a new business, first of all you have to write software code. Some of these firms open up their code to the developers to encourage them to create new applications or software. In fact, Farmville and Google Maps were born by this way.
4. We can see a lot of *mashups* on the web, when the firm creates new services by combining things. For example, the founders of Twitter create a new software application that works with the iPhone. But this conduct is really important to analyze market definition and market power.

4. Network externalities

Starting from the definition of Tirole – Rochet and Evans (2003), two-sided and multi-sided markets are characterized by network externalities, which describe the network's externality as a product will be more valuable for the buyers if used or consumed by other individuals. The more individual consumers there are using the product, the more attractive it will be on the market. The more users the network has, the more valuable it is.

Kiss and his co-authors (2011) examine the effects of network externalities. They have a hypothesis (Kiss et al. 2011, p. 7): "*Suppose the price of the product is low. What conclusions can we draw from this? In "traditional", network-free markets, the low price (among other things) would indicate that relatively many people are looking for the product, so the last buyer who is still willing to buy is no longer appreciated too much - so sellers can not raise the price higher. However, if the market is characterized by network externalities, the price is low because few people are looking for the product - therefore, because of the network externalities it is appreciated lower by everyone, so the sellers will not try to raise the price.*" Externalities can come from membership or use (Rysman 2009).

We can distinguish two types of externalities (Kiss 2009):

- *Positive externalities are* generated when individuals gain the benefit of a network effect for which they do not pay.
- *Negative externality* arises when individuals suffer damage for which they are not compensated. For example, spam.

Evans (2011) points out that one of the key factors in multi-sided markets is the indirect network effect. Katz and Shapiro (1994) investigate indirect and direct network effects. Clements (2004) adds indirect and direct network effects to a model. It introduces two complementary products for hardware and software. As part of a large network consumers are to manifest a value by using an example, a consumer will choose the technology that many other consumers are using. This is called a *direct network effect*. This means that by increasing the number of consumers, the usefulness of former consumers increases directly (Bodoky–Urbán 2011).

Consumers use hardware technologies if there is a lot of software available. If more consumers are using this hardware, more hardware companies will associate with more software companies. This phenomenon is called an *indirect network effect*

(Clements 2004). Thus, if the usefulness of innovation is due to business success we can talk about indirect networking. More people use a page, more people are starting to develop apps (Bodoky–Urbán 2011), think Android.

The indirect impact on multi-sided markets means consumers realize which platforms they will make them more benefit from most if more consumers are present on the other side. Consumers will use search engines where they find the most appropriate ads for them, while companies will use search engines that more and more consumers will use (Evans 2011). The biggest search engine is Google. While there are other search engines, if they can not attract as many consumers as possible to attract company advertising, they will be excluded from the market by larger search engine platforms such as Google.

5. Competition regulation in traditional markets

According to European Union law, the competition authorities start their investigation with market definition, it being used to calculate market shares in the relevant market, then they analyze market power including the existence of barriers to entry.
In the practice of European competition law, the definition of the relevant market plays a decisive role. Competition regulation is a tool that identifies substitute products or services. Market definition can be derived theoretically, but in practice it is a much more problematic area. (Lipczynski et al. 2009)

5.1. Relevant market

According to the European Commission notice (European Commission 1997) the relevant market combines the product market and the geographic market, defined as follows:

- "A *relevant product market* comprises all those products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use" (7)
- "The *relevant geographic market* comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighboring areas because the conditions of competition are appreciably different in those area." (8)

Demand substitutability, supply substitutability and potential competition are the three basic principles for market definition. From an economic front of view, *demand substitutability* is the most significant.

- "One way of making this determination can be viewed as a speculative experiment, postulating a hypothetical small, lasting change in relative prices and evaluating the likely reactions of customers to that increase. (15)
- The question to be answered is whether the parties' customers would switch to readily available substitutes or to suppliers located elsewhere in response to a hypothetical small (in the range 5 % to 10 %) but permanent relative price increase in the products and areas being considered. If substitution were enough to make the price increase unprofitable because of the resulting loss of sales, additional substitutes and areas are included in the relevant market." (17)

- The test calls SSNIP test (small significant non-transitory increase in price), also known as "hypothetical monopolist test" (HM test)

5.2. Market share

According to the DG Comp discussion paper (DG COMP 2005), an indicator of market power is very important when examining market share, as this analysis gives us an insight into market structures and the level of competitiveness of companies in the market. If an undertaking has a large market share on the relevant market, it is likely to be in a dominant position compared to its competitors. If the undertaking has a huge market share it looks like it has a dominant position and it is able to limit the competition in the relevant market. Due to the dynamically changing technological evolution, there are new players on the market who belong to the category of "winner-takes-all". Hence, the huge innovation chase encourages rivals to launch a new achievement as quickly as they can, and then they are overwhelmingly successful. If that happens, the undertaking will have a huge market share in the relevant market, but this is constantly being threatened by parallel developments by competitors who are able to restructure the market in a short time. (Boytha– Tóth 2010)

Therefore, it is important for regulatory authorities to be up-to-date, to shorten their response time, because the rapidly changing technological advances render conventional investigations after a market situation emerges too time-consuming. Overall, it is important to examine the market share of an enterprise, but it is always necessary to examine other market conditions such as market entry barriers and consumer power.

6. Regulation challenges in two- multi-sided markets

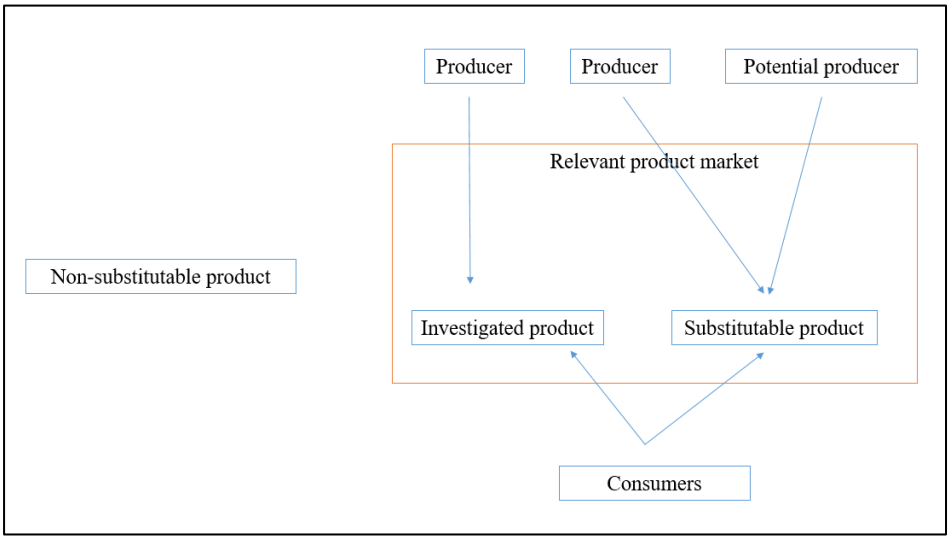
According to Evans (2011) the most complicated dilemma of platforms is to define the relevant market. The traditional investigation does not produce results; it is rather about relying on qualitative research, which refers to the nature of competition in the corporate ecosystem. The main aim of the platforms is to involve the critical mass, which can also lead to conduct that is anti-competitive. Most companies try to enforce the ecosystem as a whole, for example, Google has developed the Android application for mobile phones. Binding and predatory pricing are typical forms of behavior on these platforms. There is a huge competition in the market, but there are very few people who can stay there. Generally speaking, the market share of the remaining companies is high, and they tend to behave unlawfully in order to maintain their monopolistic position.

These ecosystems have created challenges for the regulators to develop policies that protect the public interest and keep up with innovation. However, changes resulting from innovations are coming quickly, resulting in the shortening of a regulation's assigned life cycle. Thus, it is necessary to support self-regulation and the role of real-time feedback. New business models emerge at the expense of existing regulation, which is why the regulatory system needs to be overhauled (Chew at al. 2015).

6.1. Relevant market and market share in two-sided platforms

In defining the relevant market, we are examining the market situation in which competitors are present and taking into account the products that those companies could produce which are not yet on the market (Szilágyi 2012). In Figure 1 we will see a traditional market in which we can clearly identify demand and supply substitutability.

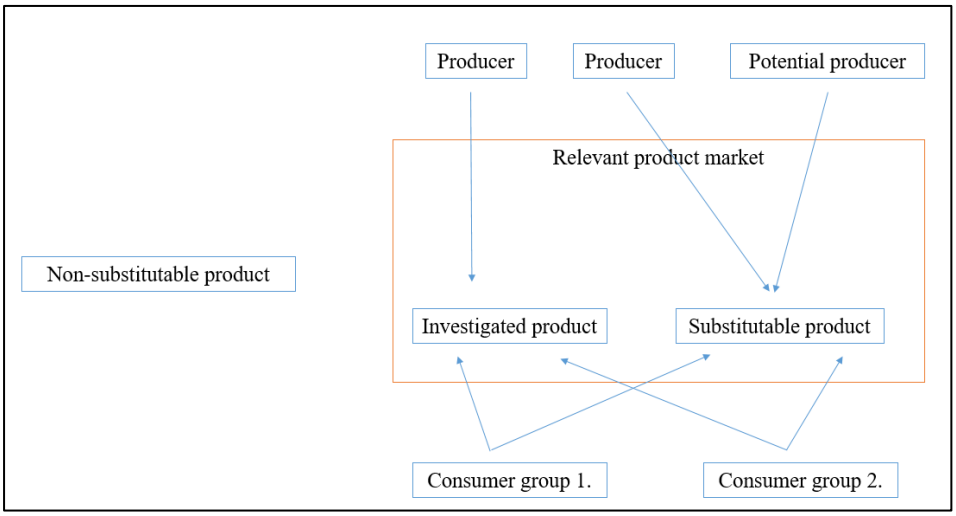
Figure 1 Demand and supply substitutability in traditional market



Source: own construction based on Szilágyi (2012)

Figure 2 shows the demand and supply substitutability in two sided markets. As the two-sided markets consist of two distinct groups of users, both groups show demand for the investigated product, as in the figure. The usefulness will depend on the use of the product.

Figure 2 Demand and supply substitutability in two-sided market



Source: own construction based on Szilágyi (2012)

We showed how we could define relevant market with SSNIP test. Could we use this test for two- or multi-sided markets, too? Fillistrucchi (2008) analyzed the test for two sided markets. He argues that in two or multisided markets the traditional SSNIP test cannot be applied. In two or multisided platforms the firms offer two or more products and services for two or more distinct groups of users. Demand for one consumer group depends on the demand of the other consumer group and vice versa. But consumers on both sides of the market do not realize these indirect network effects. Since there is a link between the two-side demand, it is questionable which price the hypothetical monopolist should be thought of as raising. In the two-sided markets, hypothetical monopolistic profits are determined by the price level (in this case, the sum of the prices paid by both sides) and the price structure (roughly the ratio of the prices paid by both sides).

One of the typical features of two-sided markets is that one group of consumers has free access to the product or service. Here, however the hypothetical monopoly test becomes meaningless. Because of the network effect, the value of the products does not mean price but the number of consumers in the market. Thus we can conclude that in terms of substitutability we cannot clearly decide which other products are considered as substitutable products by a consumer group, the non-price effects in the two-sided markets being much more significant than in traditional markets. However, if there is a price effect it is useful to look at the benefits of the other consumer group (Szilágyi 2012).

6.2. Regulation challenges in internet-based industries

It is imperative to control the world's leading internet-based companies. These checks are mostly carried out by the European Union's competition law, thanks largely to the Commission's own powers of scrutiny and to complaints from competitors. Internet-based platforms cover a large segment of the markets. From the European Union's guidelines, we could see that businesses that do not reach 40% market share are unlikely to hold a dominant position. In the internet-based markets, mainly one or just a few companies have a market share of nearly 80%. These leading companies are more likely to commit restrictive practices in order to gain more profits and go to great lengths to dispel their competitors from the market. Thus, the authorities, such as the Commission and the Court, have a difficult task in distinguishing the competitive and anti-competitive conduct of such firms (Evans 2011).

With the increasingly dynamic development of the internet-based economy, in the coming years a growing emphasis will be placed on rethinking competition and regulatory issues. At present the regulatory framework and even competition authorities appear to be puzzled by them. Regulators are still lacking new robust models, so they are constrained into using traditional methods in the course of their investigations, which raises the risk of false conclusions. There is a growing consensus among economists (Evans 2003, 2011, Evans–Schmaleness 2013, Fillistrucchi 2008, Haucap–Stühmeier 2015, Thépot 2012) that the current tools for market definition show several deficiencies. The main question is to identify market definition and define market power. One of the most problematic types is the internet-based business (Evans 2011). The following issues are:

(1) These platforms create *impregnable monopolies* like Google or Facebook. In many cases the firm has near-monopoly position in certain segments. Based on the European Union competition policy the conduct is essentially prohibited per se if the firm is dominant; the market share is higher than forty percent.

Figure 3 Search Engine Market Share in Europe March 2018

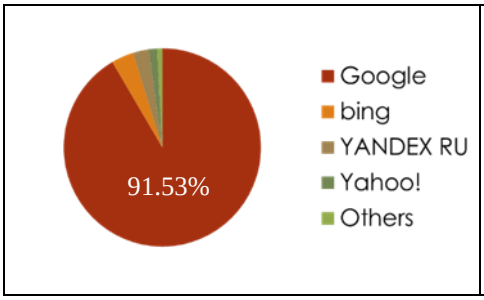
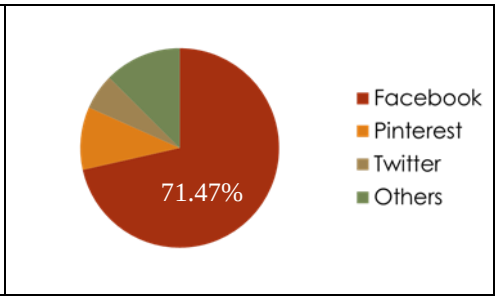


Figure 4 Social Media Market Share in Europe March 2018



Source: own construction based on www.statcounter.com

(2) *Leveraging into adjacent markets*. Most web-based businesses have a dominant position and are based on software platforms. They are in an easy position to move into related markets for complementary products or services. For example Google developed its Google Checkout payment service in competition with PayPal.

(3) *Access to facilities, the opportunity to interoperate*. For example, the *Microsoft Windows Media Player Case* (COMP/C-3/37.792). In 2000 the European Commission investigated Microsoft's anticompetitive conduct under two main issues:
   a. lack of interoperability information and
   b. incorporation of Windows Media Player

In 2004 the Commission ended its investigation by way of a formal decision. It found that Microsoft had abused its dominant position in PC operation systems by refusing to provide interoperability information necessary for competitors to be able to effectively compete in the work group server operating system market; and tying its Windows Media Player with Windows. (Banasevic et al. p.1.) So, the dominant firm, Microsoft had a possibility to establish monopolies across other segments.

(4) *Envelopment and predation*. Multi-sided businesses may crush competitors internationally like Firefox wanted to depress Internet Explorer.

In the Microsoft case described above, we can see that the Commission reached a decision over four years. After the Commission' decision, Microsoft appealed to the European Court to annul the decision. And only in 2007 did the Court confirm the legality of the decision. After that, in 2008, the Commission fined Microsoft for non-compliance with the 2004 decision, upon which Microsoft also

appealed this judgment, and in 2012 the Court upheld the fine and closed the case. Obviously, the most critical point of this case was the time involved.

6.3. Investigating the two- or multi-sided markets as traditional markets

Wright (2004) deals with what happens when we investigate two- or multi-sided markets as a traditional, one-sided market. It mentions various misconceptions that explain the example of heterosexual nightclubs. Nightclubs are typically two-sided markets, which have already been formulated by Rochet and Tirole (2004). The Night Club is a platform to help you get in touch with women and men. Naturally, the indirect network effect is also fulfilled, as the utility of both consumer groups depends on the demand of the other consumer group. Nightclubs usually have a differing entry fees, typically women are free to enter, while men have to pay for the service. This is the reason why the clubs can involve many more female guests, so more people from the other consumer group and the group of men are searching the platform. Wright (2004) sets up eight deficiencies, we just mention a few:

1. *Effective price structure reflects relative costs*: because of the competitive position of nightclubs, men's demand is higher than cost, while women are realized under costs. Hence the effective price structure is not necessarily based on the marginal cost.
2. *Bargaining below the marginal cost causes predatory pricing*: as in most cases women do not have to pay an entry fee, so pricing is clearly below the marginal cost. Nevertheless, such a pricing structure is clearly aimed at increasing the market share of an enterprise.
3. *In developed markets, costs do not justify costs that are no longer justified*: to remedy the "chicken and egg" problem. The subject is discussed in detail by Caillaud and Bruno (2003). The very first problem of a newly formed company is how to get enough consumers to make the most of the consumer group on the other side interested in using the product or service.

As previously mentioned, these multi-sided platforms are evolving rapidly from time to time, and fast decision-making is essential to making a right and timely decision. Currently the law and economics are not sufficiently (co-)developed for analyzing the multi-sided platforms that dominate the internet sector. We have to allow for alternative regulations.

7. Conclusion

This paper wanted to show the regulation challenges in two-sided and multi-sided markets. Currently there are many important businesses that operate two-sided and multi-sided platforms. There are also old markets such as advertising supported media or transaction payments, but there are also some new platforms like internet-based businesses.

We live in an era of technological development, new achievements are generated, which fundamentally change the structure of the economy. Such an extraordinary change is the emergence of new markets, the emergence of two-sided and multi-sided markets. Digitalization has been present since the 1990s, but is now

developing with immeasurable speed. The emergence of new markets poses many challenges to regulatory authorities.

The correct economic analyses of multi-sided platforms are more complicated than analyses of one-sided markets. We could commit serious errors if we ignore this complexity. In particular, traditional approximations of demand tend to underestimate the size of the relevant market and thus overestimate market distorting effects.
This kind of business is evolving rapidly and in ways that are sure to leave competition and regulatory policy in its wake. Consequently, it is necessary to find some alternative solution. The European Union is drawing attention to it, but the competition authorities have not been expanded.

We could say that there are a lot of challenges before the regulatory authorities, if they intend to investigate these markets properly. First of all, they use traditional methods in the course of their investigations, which raises the risk of false conclusions. We observe that traditional competition regulation has been circumvented by these platforms. Furthermore, the definitions and analyses must be redrafted. What is more, the examination of anti-competitive behavior involves a very long process for the authorities. In general, we can doubtless say that the law and economics for analyzing the multi-sided platforms that dominate the internet sector are not well (co-)developed. For the future we would like to look at several further cases to test our hypothesis.

References

Aghion, P. – Bloom, N. – Blundell, R. – Griffith, R. – Howitt, P. (2005): Competition and Innovation: An Inverted U Relationship. *The Quarterly Journal of Economics*, 120, 701–728.

Banasevic, N. – Huby, J. – Pena Castellot, M – Sitar, O. – Piffaut, H. (2004): Commission adopts Decision in the Microsoft Case. *Competition Policy Newsletter*, 2, 44–48

Bodoky, T. – Urbán, Á. (2011): A Facebook hatása a hírfogyasztásra: közönségépítés helyett közösségépítés. *Információs Társadalom*. 11, 1–4, 121–135.

Boytha Gy. – Tóth T. (2010): *Versenyjog*. PPKE JÁK. Budapest.

Caillaud, B. – Bruno J. (2003): Chicken & Egg: Competition among Intermediation Service Providers. *Journal of Economics*, 34, 2, 309–328.

Chew, B. – Derosby, D. – Kelly, E. – Miracky B. (2015): Regulating ecosystems. In Canning, M. – Kelly, E. (eds.): *Business ecosystems come of age*. Deloitte University Press, Westlake, TX, USA, 43–49.

Clements, M. T. (2004): Direct and Indirect Network Effects. Are they equivalent? *International Journal of Industrial Organization*, 22, 5, 633–645.

DG COMP (2005): *DG Competition discussion paper on the application of Article 82 of the Treaty to exclusionary abuses.* European Commission, Brussels.

European Commission (1997): Commission Notice on the definition of relevant market for the purposes of Community competition law. *Official Journal of the European Communities*. (97/C 372/03)

European Commission (2015): *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and*

the Committee of the Regions. A Digital Single Market Strategy for Europe. COM(2015) 192 final. 6.5.2015. Brussels

Evans, D.S. (2003): The Antitrust Economics of Multi-Sided Platform Markets. *Yale Journal on Regulation*, 20, 2, 325–381.

Evans, D. S. (2011): Antitrust Issues Raised by Global Internet Economy. In Evans, D. S. (ed.): *Platform Economics: Essays on Multi-Sided Businesses*. Competition Policy International, Boston, MA, USA, 261–280.

Evans, D.S. – Schmalensee, R. (2013): The Antitrust Analysis of Multi-sided Platform Businesses. Working Paper, 18783, NBER working paper series.

Filistrucchi, L – Geradin, D. – van Damme, E. – Affeldt, P. (2013): Market Definition in Two-sided Markets: Theory and Practice. *TILEC Discussion Paper*, DP 2013-009.

Hagel, J. (2015): The power of platforms. In Canning, M. – Kelly, E. (eds.): Business ecosystems come of age. *Deloitte University Press*, Westlake, TX, USA, 79–90.

Halpern L. – Muraközy B. (2011): A verseny és a K+F összefüggései - elméleti megközelítések és számszerű eredmények. In Valentiny P. – Kiss F. L. – Nagy Cs. I. (eds.): *Verseny és szabályozás*. MTA KRTK Közgazdaság-tudományi Intézet, Budapest, 13–37.

Haucap, J. – Stühmeier, T. (2015): Competition and Antitrust in Internal Markets. ECONSTOR Working Paper, *DICE Discussion Paper*, No. 199.

Illing, G. – Peitz, M. (2006): *Industrial Organization and the Digital Economy*. The MIT Press Cambridge, Massachusetts, London, England.

Katz, M. L. – Shapiro, C. (1994): Systems Competition and Network Effects. *Journal of Economic Perspectives*, 8, 2, 93–115.

Kiss, F. L. (2009): Külső gazdaságosság (externália) a fogyasztási folyamatban. In Valentiny, P. – Kiss, F. L. – Nagy, Cs. I. (eds.): *Verseny és szabályozás* 2009. MTA Közgazdaságtudományi Intézet, Budapest, 3–67.

Kiss, K. M. – Badics, J. – Nagy, D. K. (2011): *Hálózat gazdaságtan*. Jegyzet. Pannon Egyetem Közgazdaságtani Tanszék.

Kuruczleki, É. – Pelle, A. – Laczi, R. – Fekete, B. (2016): The Readiness of the European Union to Embrace the Fourth Industrial Revolution. *Management*, 11, 4, 327–347.

Lipczynski, J. – Wilson, O.S. J. – Goddard, J. (2009): *Industrial Organization. Competition, Strategy, Policy.* Third edition. Pearson Education Limited. England.

Nagy, B. – Pelle, A. – Somosi, S. (2014): A szellemitulajdon-védelem hatása a versenyre és a versenyképességre – az Európai Unió esete. In Kovács, P. – Kovács, B. O. (eds.): *Gazdasági és társadalmi elemzések és fejlesztési lehetőségek: Az ELI társadalmi, gazdasági megalapozása és multiplikátor hatása.* (Abstract book) SZTE GTK, Szeged, 52.

Pelle, A. (2009): A szolgáltatások EU-beli áramlásának előmozdítása versenypolitikai eszközökkel. In Hetesi, E. – Majó, Z. – Lukovics, M. (szerk.): *Szolgáltatások világa*. JATEPress, Szeged, 74–87.

Rochet, J-Ch. – Tirole, J. (2003): Platform Competition in Two-Sided Markets, *Journal of the European Economic Association*, 1, 4, 990–1209.

Rochet, J. – Tirole, J. (2004): *Defining Two-sided Markets*. An Overview Accessed:https://pdfs.semanticscholar.org/9d55/abbe84b48ee8d102da14fd32053d84a76cad.pdf

Rysman, M. (2009): The Economics of Two-Sided Markets. *Journal of Economic Perspectives*, 23, 3, 125–143.

Schwab, K. (2016): The Fourth Industrial Revolution. Geneva: *World Economic Forum*. Accessed: https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab

Szilágyi P. (2012): A kétoldalú piacok versenyjogi megítélése a médiapiacokra tekintettel. *In Medias Res*, 1, 5, 80–89.

Thépot, F. (2012): Market Power in Online Search and Social-Networking: a Matter of Two-sided Markets. *CLES Working Paper Series*. 4/2012.

Tóth, T. (2014): *Az Európai Unió versenyjoga*. Wolters Kluwer Complex Kiadó, Budapest.

Whish, R. (2010): *Versenyjog*. HVG-ORAC Lap- és könyvkiadó Kft, Budapest.

Wright, J. (2004): One-Sided Logic in Two-Sided Markets. *Review of Network Economics*, 3, 1, 44–64.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 263–277.

Community relevance and built-in escape clauses in health policy implementation

Sarolta Somosi, Ph.D.

Getting to the roots of divergence among EU Member States (MSs) will inevitably involve the field of competitiveness, which is first of all determined by the human and social capital of the MSs themselves. From this perspective – beyond the traditions, cultural heritage and some other determining factors – the role of health policies, the way they are organized on a national level, the extent of market mechanisms and their exposure to competition regulation all have a remarkable impact on the final success of creating competitive human capital with which a country is able to catch up with leader societies. Within the EU the internal differences among Member States perhaps has a spill-over effect. There are differences in how a publicly financed healthcare market can cope with EU level competition regulation, and it has an impact on the possible integration of these markets as well. But it seems that the leeway is provided by the EU itself, and with the built-in gates, the more market actors does not necessarily mean the more instances of competition in this sector.

Keywords: health policy, healthcare, EU, competition regulation, SGI

1. Introduction to the role of health policy and the aims of the study

Arora (2001) examined the economic development of the last century and found that improving health conditions in the population are responsible for a 30-40 per cent potential growth in the economy. The latest data also indicates that countries with higher welfare expenditure to GDP ratio fill the top positions of economic competitiveness rankings e.g. Sweden, Germany and Denmark. Such data prove that a population's productive capacity is more robust than all other forms of wealth combined, as was the case earlier as well (Schultz 1961). Several studies have been published on labour force as a resource of productivity (Maudos et al. 1999, Hendricks 2002), or in general, about the relationship between health conditions and the aggregate output and future prosperity (Bloom et al. 2004, Orosz et al. 2013, Tzeremes 2014). With the latest technological developments, and revolutionary shifts to Industry 4.0, the relationship or balance between health and competitiveness is likely to change – it is becoming even more important (WEF 2017), so the human factor is holding its position. It is the responsibility of education to ensure people are capable and ready to adopt the technological revolution; but a highly advanced health status is a prerequisite for all that. In this context it is easy to understand why an advanced healthcare system[20] that is well budgeted and puts prevention first is not only indirectly a factor of economic prosperity but has a far broader meaning and outcome as well. '*…given parallel developments of increased longevity,*

[20] In this study, a health system is understood as a system that aims to deliver healthcare services to patients: preventive, diagnostic, curative and palliative – as it was laid down in EC (2014a).

rising expectations and constant innovation, health care is at the heart of modern society.' (Sauter–van de Gronden 2010, p. 33).

Evidence of the depth of the relationship between health and economy is provided by the numerous indicators and studies developed by different international institutions. The series of Global Competitiveness Index indicators for example, published by the World Economic Forum, show the competitiveness of a country or a region on an international level. To measure well-being and development, the OECD has also established its own conceptual framework. This framework reconsiders the relationship between human capital and economic prosperity (OECD 2013). Currently, the concept of well-being has two components: the "Quality of life" where health status has high significance and "Material conditions". These two components determine future well-being and competitiveness prospects as well.

The European Union is also developing its own system, the European Community Health Indicators (ECHI). The work is being undertaken on behalf of the European Commission (EC) – Directorate General for Health & Consumers (DG SANCO). The two-year survey of the European Commission about the *State of Health in the EU* provides policy makers, interest groups, and health practitioners with factual, comparative data and insights into health and health systems in EU countries. The cycle is being developed in cooperation with the Organization for Economic Co-operation and Development (OECD) and the European Observatory on Health Systems and Policies.

Beyond the obvious determinative role of health status on productivity, other objectives are laid out. In its 2014 Annual Growth Survey, the EU emphasizes the need to improve the efficiency and financial sustainability of healthcare systems, meanwhile enhancing their effectiveness and ability to meet social needs and ensure essential social safety nets. Introducing market principles, increasing interdependence and common challenges call for closer EU-level cooperation. The extent of this Community relevance and one of its possible fields – namely competition regulation – will be examined in this study. The questions of the broader research will focus on the following questions:

- Do Member States (MSs) have the possibility to choose whether they refer to their healthcare services as Services of General Economic Interest (SGEI), and does this decision depend on the extent to which they let private actors enter the market?
- Does the longer and broader possibility on the part of the EU to get involved in and influence healthcare markets necessarily mean
  - higher exposure of national health system participators to competition regulation and as a consequence
  - an increase in the number of competition distorting actions?

The present descriptive study's aims are a bit narrower and only to provide a review of the basic determinants of how healthcare systems are being implemented throughout the EU. Still in a descriptive way, it will show how the familiar, earlier models of healthcare (HC) systems have changed recently. Then the attention will be turned to the Community's relevance in the health sector; first as an almost direct regulator (internal market perspective) and then as the controller (competition regulator) over the intended

competition in health sector. Finally, conclusions will be drawn with reference to the original aims of the study.

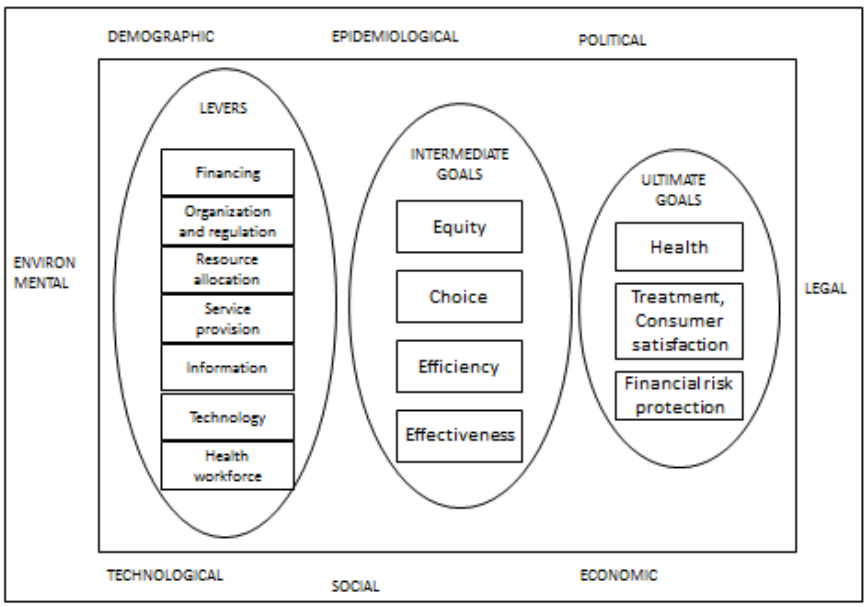
2. The determinants of implementing healthcare in the European Union

The EU is divided internally along both social and economic lines. Today the most powerful of these lines are the level of economic development, the competitiveness divide (structural or costs based) and health status – as this latter condition is observed by means of the European Core Health Indicators (ECHI). And of course, all these conditions determine the way MSs organize their national healthcare systems.

2.1 Basic determinants of the systems

When MSs are being surveyed by the type of national healthcare system they manage, it should be emphasized that, as Atun and Menabde (2008) claim, these systems are dynamic frameworks. The authors take the *wider context* into account within which health systems function. This context covers – what is referred to as DEPLESET – the demographic, economic, political, legal and regulatory, epidemiological, sociodemographic, environmental and technological contexts. Moreover, with healthcare system management, the authors' systems framework identifies *four levers/opportunities for influence* in the hands of policymakers: (1) stewardship and organizational arrangements; (2) financing; (3) resource allocation and payment systems provider; and (4) service provision (Figure 1).

Figure 1 Conditions and goals structure of national healthcare systems



Source: the author's own work based on Atun and Menabde (2008) and WHO (2000).

There are also four *intermediate goals identified* in the framework (equity; efficiency (technical and allocative); effectiveness; and choice) and three *ultimate goals* (health improvement; consumer satisfaction; financial risk protection). MSs run different systems, expectantly in line with the four levers and altogether seven goals, in accordance with their DEPLESET. During the comparison of the various healthcare systems, the above-mentioned four levers, or basic functions, that contribute to the success of a system, were later amended with the following factors: (5) information, (6) technology and (7) health workforce (WHO 2000).

From the above-mentioned levers, only financing and service provisions are highlighted now, because the way a member state manages its healthcare system is expected to be determined by its financing background and the way a member state refers to the services provided within this framework. This is expected to have a direct effect on how much member states have to respect competition regulations.

Due to these levers, health systems in EU Member States differ, reflecting different societal choices. However, despite organizational and financial differences, they are built on common values, as recognized by the Council of Health Ministers in 2006[21]: universality, access to good quality care, equity and solidarity (EC 2014b). One of the most important distinctions compared to other developed capitalist economies is that European countries have a well-constructed, inclusive welfare system protecting fundamental values such as universality, accessibility and quality, with active social policies pursued by governments (Farkas 2016).

The relationship between development and health status has been observed by Kuruczleki and Pelle (2017)[22]. On the basis of institutional background, competitiveness and health status 4 'groups' were created:

- Romania, Latvia, Croatia, Bulgaria, Hungary, Lithuania, Slovakia, Portugal, Estonia and Poland
- Italy, Czech Republic, Slovenia, Cyprus, Spain, Malta and Greece
- Finland, United Kingdom, Austria, France, Belgium, Germany, Denmark and the Netherlands and finally
- Sweden as an outlier.

2.2 From organization models to convergence?

Numerous studies – Atun and Menabde (2008), Thomson et al. (2009), Goddard (2015), Meheus and McIntyre (2017) – cover health sector regulations in general. The recent publications agree that present healthcare systems of the MSs cannot be explained with just one model. Each country devises its own set of arrangements to meet the three basic (or as it was described earlier: ultimate) goals of a healthcare system: keep people healthy (1), treat the sick (2) and protect families from huge medical expenses (3). The present twenty-eight MSs are countries of the developed world, where,

[21] Council Conclusions on Common values and principles in European Union Health Systems, OJ C 146, 22.06.2006

[22] The work in progress by Kuruczleki and Pelle (2017) was presented on the Italian Health Economics Association (AIES) conference in October 2017.

although local variations exist, the various healthcare systems follow some general patterns from which some basic models could be drawn up.

Traditionally three models existed: the Beveridge Model, the Bismarck Model and the Semashko Model (Kulesher–Forrestal 2014, Ecorys 2016). Since their introduction, health systems in MSs have undergone considerable changes in recent decades, so the differences between these systems have diminished and overlaps or similarities surfaced. This happened due to demographic conditions, namely, increasing life expectancies and the dramatic change in the shape of population pyramids over the past century. Experts[23] assume that the above-mentioned three former models may change by the determinants of the healthcare markets and leave only limited possibility for the functioning of the Beveridge Model, for example (HCP 2018). Beyond the diminishing of the markets where certain models may be able to work, the models are also expected to converge in some aspects, and they are likely to merge into a mixed one with some local specialties. For example, in many Beveridge type countries market mechanisms have also been introduced as an attempt to move towards (regulated) competition and increased efficiency (Ecorys 2016). This outcome is likely considering the efforts the EU puts into the integration of this special market as well.

The main sub-markets of the MSs' health sector show different levels of private and public involvement and budgeting. On the details of the differences in national health policies and healthcare management see Joumard et al. (2010), Kulesher and Forrestal (2014), Ecorys (2016), and ECR (2017). The variations are mainly due to national decisions, although the EU can have an impact on them.

3. Community relevance in the health sector

The EU has a powerful legal system, and it is able to enforce even "constitutional" provisions. Even so, lately its budget has had a cap of about 1% of the whole GDP produced within the EU (Greer 2014). Moreover, there are policies where the EU does not even have exclusive authority in introducing actions and measures. Despite these facts, based on its earlier experience in other sectors for developing sectoral regulation, the EU is trying to introduce positive integration first by liberalizing the sector in question (i.e. energy) and then creating common regulation on a Community basis. It is presumed that in the case of healthcare this template is a bit too simple as Guy (2017) found it.

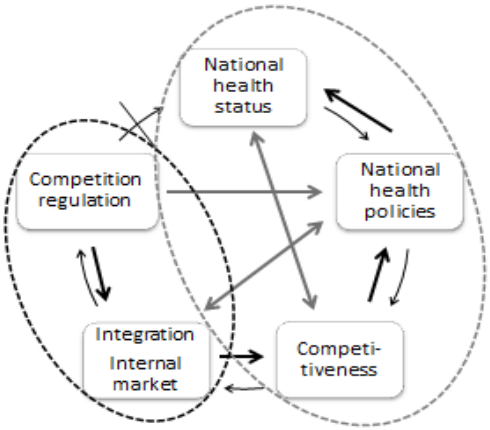
There is a two-fold strategy in the EU's role in the contribution to national health policies: one is a weak, cheap but effective public health intervention focusing on cooperation, and the other is the more powerful, but sometimes unpopular extension of internal market laws on healthcare services, and with that the European competition regulation (Greer et al. 2013). In setting up a European cross-border healthcare market, one arm is the legislation, but the other arm can be the active role of competition regulation.

[23] On a public event in Bruegel opinions were expressed on the topic: *Innovation and sustainability of European healthcare systems* (27 January 2016). http://bruegel.org/wp-content/uploads/2016/01/Sustainability-of-European-Healthcare-Systems-Bruegel-Event-Notes.pdf

3.1. The European Union's room for regulations

Health policy is a typical example for a field where national governments organize healthcare and ensure that it is provided in such a way that it facilitates – although indirectly – the future competitiveness of the state. The EU is without significant (let alone exclusive) authority, as written above. Moreover, national level healthcare management, due to its sensitive characteristics, has long been subject for debate. From these basics the EU is challenged to implement any kind of integrative actions within the healthcare systems of EU MSs. As shown in Figure 2 it has two possibilities, intervening within the framework of Internal Market legislation, and the other is the influence – by liberalization and competition control – of the contemporary state of competition on the relevant healthcare markets.

Figure 2 the fields of EU-level intervention and their interactions with national policies and national health status



Source: own construction

Healthcare policy belonged to the sole competency of the MSs, as it was decided decades ago in line with the Treaty of Rome. Furthermore, at the beginning of the 1980s, the EEC also demonstrated that opening the market for competition may not threaten social welfare (Anchini 2016). Although the Treaty of Maastricht and the Treaty of Amsterdam have brought *some legislature changes* e.g. the shared competencies between the different actors of regulation from local/national and Community level, the *neutrality principle* (Article 345 TFEU) against EU law intervention in public services has been kept intact. In the meantime, with the introduction of the free movement of workers and, later, of citizens, a need for a more flexible cross-border social system has increased. With the acceptance of services directive (2006/123/EC; EC 2006), market processes have been introduced into the social systems and covered some parts of social services as well.

Another factor that placed the issue of healthcare (within the social protection argument) on the European political agenda was a *push from finance ministers* (through ECOFIN) who, at the end of the 1990s, raised their voices in their reports on serious cuts in healthcare spending implemented in order to be able to cope with the

financial burdens of welfare spending (Greer–Vanhercke 2010). These circumstances also posed challenges because the de-regulation process causing negative integration was faster on the national level, and this outperformed the consolidating efforts of an EU-level regulation (positive integration) that was to become a substitute. This resulted in a vacuum for public policy decision-making. Parallel with the above-mentioned events, at the beginning of the new decade, a new type of governance, the so-called *Open Method of Coordination (OMC)* was introduced by the European Council in order to assist MSs in jointly progressing towards the goals of the Lisbon Agenda. OMC encourages learning and collaboration through the sharing of best practices, and an increase in policy governance between actors in areas that are primarily the responsibilities of the national governments, but with implications all across the EU (Papanicolas–Smith 2013). Most new governance processes in healthcare came into effect only after 2005. From the perspective of the MSs, the OMC, with its position outside traditional, hierarchical and legal mechanisms of Community method, has some positive characteristics. The first is that MSs can enter into dialogues with the Court and the Commission, while the second points to the fact that instead of a command-and-control mechanism there is a less rigid regulatory approach in place (Greer–Vanhercke 2010).

Today, for a relevant background, the EU relies on the TFEU, Article 168 which states that a "*high level of human health protection shall be ensured in the definition and implementation of all Union policies and activities'* and *'Union shall encourage cooperation between the Member States in the areas referred to in this Article and, if necessary, lend support to their action;*". The EU's present shared competence in public health means that the EU shall complement national policies, and according to the 2nd paragraph of Article 168: "*It shall in particular encourage cooperation between the Member States to improve the complementarity of their health services in cross-border areas.*" This may mean the achievement of their shared objectives, realizing positive outcomes through economies of scale and pooling their resources. The EU has a Health Strategy that helps to solve some possibly arising shared health challenges, like the impact of an increased life expectancy on healthcare systems. In the meantime, all "*Union action shall respect the responsibilities of the Member States for the definition of their health policy and for the organisation and delivery of health services and medical care*" which covers the management of health services and medical care and the allocation of the resources assigned to them.

MSs are responsible for how their healthcare services are organized, financed and how healthcare priorities are set; these countries also having to cope with the pressure that they have to correspond with the basic, constitutional principles of EU law (Greer 2014). The Solidarity Title of the Charter of the Fundamental Rights of the European Union states that everyone has the right of access to healthcare and (the) "*Union recognises and respects access to services of general economic interest as provided for in national laws and practices, in accordance with the Treaties, in order to promote the social and territorial cohesion of the Union.*" This is an important factor when European competition regulation, more precisely state aid regulation meets MSs' measures in financing their health care systems.

Although nations are huge stakeholders in their health sectors, this sector is not excluded from the freedom of movement of goods, services, capital and people.

From an *Internal Market perspective*, the organization, the setting of the priorities and the financing of healthcare services are all the responsibilities of the MSs, but with the pressure to comply with the basic, constitutional principles of EU law (Greer 2014). Although there are huge national interests involved, the health sector is not excluded from the freedom of movement of goods, services, capital and people. In an internal market for health care, stronger cooperation between health systems could be beneficial when facing the increasing mobility of patients and healthcare professionals. The pressure that the four freedoms exert is substantial: there is an underdeveloped internal market for health care because these health systems could develop for decades in the relatively safe harbor of different norms, funding, levels of liberalization, and of course how "success" is measured in the context of health status. Due to the relatively fast recent advancement of the four freedoms, the EU health systems increasingly interact with each other. The increased mobility of patients and healthcare professionals also puts pressure on the internal market for healthcare. Although the Services Directive (2006/123/EC) has been adopted, health care services were removed from the draft Directive, and a separate instrument was announced. Due to the special nature of health care, it was regarded as inappropriate to treat this area in the same way as other services (Pennings 2011). Article 2(2)(a) of the Services Directive now provides that the Directive does not apply to "non-economic services of general interest" (NSGI) – discussed in detail later – and according to (f) it does not apply to health care services, whether or not they are provided through health care facilities, and regardless of the ways in which they are organized and financed at a national level, or whether they are public or private. Later the Directive on the application of patients' rights in cross-border healthcare (2011/24/EC) entered into force with more focus on this special market, and the EU health systems started to interact with each other increasingly within the internal market. Due to this, nowadays, healthcare services are even flourishing, and cooperation between health systems has grown stronger as well.

Besides this regulatory environment, the latest fiscal crisis of the EU again brought a push from outside the relevant market, because the crisis increased the need for re-focusing and re-shaping public services in line with economic interests.

Altogether, having seen the Community's relevance in the regulation of healthcare markets on an EU level, and despite this last-mentioned possibility that has been brought about by the two directives cited, one can assume that this segment of the MSs' economies still has huge national competences.

3.2. The crossroads of EU-level competition regulation and healthcare

The means by which MSs organize their health care systems determine how far EU-level competition policies may "go" in their surveillance of those actions that are delivered by actors of national markets to distort market/competition. From the opposite perspective, the most important issue is whether competition laws leave room for national health policies or rather competition laws exert a massive impact on the healthcare sector (Sauter 2013). The question can be asked in a different way: which regulatory method seems to be more effective or harder: principles of solidarity and

citizenship in healthcare – characteristics of public services – or maybe the competition principles and a new regulatory method may overtake and gain more importance.

Considering the first above-mentioned issue about the room for domestic interests allowed by Community level competition regulations, even though MSs are all in the same internal market, where competition policy acts as cement, due to the differences in their healthcare systems, there are different outcomes in relation to their exposure to EU competition authority measures and processes. As Guy (2017) expressed it, the varying extent to which competition is possible within an insurance-based model and a taxation-funded model arguably outweighs even Enthoven's model of "managed competition" from 1993.

Today, with the latest amendments, the EU competition law controls the behavior of undertakings with its cartel prohibition (Article 101 TFEU, the prohibition on dominance abuse (Article 102 TFEU) and controls the structure of a certain market with merger control regulation (139/2004).[24] In a broader – and from the point of the present article maybe even more important – sense the law also includes state aid regulations (Article 101 and 102 TFEU). Compared to the previously described Article 168 of the TFEU on public health, and Article 345 on the neutrality principle, more attention is paid to Article 56 TFEU on the free movement of services, and Article 107 of the EC TFEU that prohibits MSs from distorting competition within the Common Market by giving state aid to undertakings. The law also acknowledges categories that are exceptions in this prohibition of state aids, but due to conceptual differences in defining 'health expenditures', they are not listed among them.

Compared to the narratives of its sensitive characteristics and narratives of the many national interests, the regulation of HC systems, and the view of it from a competition regulation perspective, has a relatively old history. Court rulings such as the Kohll and Decker[25] cases were important triggers as well; and so were a number of other landmark cases with regard to the application of competition law to pension funds during the second half of the 1990s. Together, these cases made it clear to the Member States that social welfare services may fall under internal market rules (Greer–Vanhercke 2010). The enforcement of EC competition laws by the European Court of Justice (ECJ) and the national courts has been a significant driver pushing health policy onto the European Union agenda (Lear et al. 2010). During the practice of the ECJ, there is always a balance on a triangular relationship between patients, healthcare providers and the State(s) (Anchini 2016). This triangular view could be further enlarged with an EU perspective, since some decisions of the ECJ have also supported the opening up of the national healthcare service systems, as liberalization trends have become more and more general in the internal market.

[24] About the contemporary analysis of EU competition law's effect on health care sector see the article of Sautner and van de Gronden (2010).

[25] In Case C-158/96 - Kohll v Union and Case C-120/95 – Decker v Caisse the Court has stated that the national regulation about the reimbursement of healthcare services that appear in a different MS should not be bound to preliminary permission, because they may cause uncertainties among patients in relation to their possibilities to access healthcare services in a neighboring MS. Such decisions could be seen as an incentive to enhance access to cross-border health care at least in border areas.

3.3. The built-in gates in meeting competition regulations

In 2003, in harmony with the creation of an internal market for services and the liberalization of public services, the ECJ ruled on the assessment of public service compensation in the context of EU state aid rules[26] as a first possibility of exception. In 2003 criteria were laid down called the Altmark-criteria that must be met to avoid prohibitions to state aids. The Court stated that in case of Public Service Obligation (PSO) these funds do not constitute state aid. Therefore any compensation that meets the obligation to provide universal coverage is not state aid if it fulfils four conditions: (1) the public service should be clearly defined; (2) the parameters of the compensation should be objective and established in advance; (3) the compensation cannot exceed costs; and as (4) the company in charge of the mission should be either chosen through public procurement "which would allow for the selection of the tenderer capable of providing those services at the least cost to the community", or, if not, the costs of providing the public service must be based on the costs of a "typical, well-run undertaking".

Since this decision, a so called 'public service compensation' has been granted to certain undertakings entrusted with the operation of Services of General Economic Interest (SGEI).

The two ways that define how aids (investment/support/financial execution) within healthcare systems may be exempted from EU-level state aid rules are stipulated in the Article 107 (3) and in Article 106 (2) of the Treaty dealing with SGEI. The Commission adopted the first *SGEI package* which entered into force in 2005 and specified the conditions under which state aid in the form of public service compensation is compatible with the EC Treaty (now the TFEU). The ESIF states that the SGEIs represent economic activities that are identified by public authorities particularly important to the citizens and which would not be supplied if there were no public intervention. The SGEI provides the link between economic interest that comes with competition and the universal service obligation that arises from the social characteristic of healthcare. As Sauter and van de Gronden (2010) describe it, the possibility for MSs to define SGEI provides space for them to take into account technical, economic and socio-political developments.

It is no small matter that there is a *lack of clear terminology for the expressions:* "services of general interest" (SGI), "services of general economic interest" (SGEI), "non-economic services of general interest" (NSGI) and "social services of general interest" (SSGI) (Lenaerts 2012, Anchini 2016). Lenaerts (2012) says that it is accepted that the expression SGI is a general concept which contains both SGEI and NSGI. SGEI may be distinguished from NSGI in a way that only the former involves economic activities. In contrast to SGI, SGEI and NSGI, the expression SSGI is not even mentioned in primary EU law. The reason for that must be that healthcare services seem to have more economic relevance and thus they are closer to SGEI than SSGI (Anchini 2016).

The package has been revised, and in 2011 the European Commission adopted a new package of EU state aid rules for the assessment of public compensation of

[26] Case C-280/00 – Altmark Trans

services of general economic interest (SGEI). The new package clarified key state aid principles and introduced a diversified and proportionate approach with simpler rules for SGEIs that are small, local in scope or pursue a social objective; at the same time competition considerations for large cases have been taken more fully into account. Of course, this was also a response to the latest phenomenon to occur in HC systems, namely bringing market principles/characteristics into healthcare policies. The SGEI allows for a proportionate exception to the rules of EU competition regulation as exceptions to the general competition rules (Sauter–van de Gronden 2010).

Since the adoption of the latest SGEI package, many things have changed. Because of the stronger presence of the healthcare systems in the internal market, the ECJ's crucial role has only increased. As liberalization spreads, the growing importance of the EU's competition policy and the practice of ECJ (together with the national courts) in health policies are more and more on the EU's agenda. The EU balances upholding national measures that restrict economic freedoms in the name of non-economic interests, with at the same time, allowing market principles to appear at the level of funding, provision, and access to the services of the national healthcare systems whenever it is possible (Lear et al. 2010, Anchini 2016).

It seems that Article 107 further details the regulations on *undertakings,* but when the ECJ and the Court of First Instance (CFI) apply these regulations in their practice, a distinction is made among the different actors. The ECJ and the CFI decide whether actors are undertakings or not. Since the ECJ clarified that although not all entities pursue profit, antitrust laws deem healthcare providers to be undertakings. From this milestone onwards, competition policy relevancy is straightforward, and the above-mentioned conflict seemed to be settled via manual control: responsible EU bodies must investigate case-by-case the nature of the activities in question whether there is Community relevancy or not. This is important because again there seems to be a "gate" for the MSs for the interpretation of the state aid rules (van de Gronden 2009, Sauter–van de Gronden 2010). As Lear et al. (2010) describes, since the "accepted" definition of undertaking is more about its function rather than its status, the term can be easily applied to both private and public HC services. For example, when benefits are granted by public authorities to bodies that operate in state-oriented HC systems where solidarity is predominant, the process will not fall within the ambit of Article 107 (1) of the Treaty. '*The Commission had clarified that where national health system, by implementing the principle of solidarity, is mainly grounded on public hospitals that are funded directly from social security contributions or other state resources, and provide their services free of charge to affiliate persons on the basis of universal coverage, then "the relevant organisations do not act as undertakings."'* [27] (Anchini 2016). Meanwhile doctors and other providers who are engaged in economic activities–since healthcare is usually provided for economic consideration–will fall within the ambit of the same Article (ESIF 2014)[28]. It seems that from the point of competition regulation, healthcare providers are positioned

[27] T-319/99 - Fenin v Commission

[28] ESI Funds for health investments Hungarian national workshop, 2014, http://www.esifforhealth.eu/pdf/National%20workshops_compilation.pdf

between the two extremes depending on the sources of their system (taxes based on solidarity or insurance based on the principle of competition) even if, in fact, most national systems are mixtures of these two (Anchini 2016).

4. Conclusion

The great impact of domestic conditions and of course interests and the possible leeway in regulation result in the different nature of markets in healthcare. In this article the main intention was to reveal how the framework established by the EU for developing competition on the healthcare market can also lead to integration and bring about the intended outcome.

If a research result comes from an integrated (free flowing) public services market topic, the active role of the EU is vital, but much more could be done to support member states. With all the different kinds of healthcare systems coexisting in Europe, we have a unique learning environment. The danger of this diversity might be that MSs cannot pick those parts that seem to be promising, since those will not be consistent with their inherited healthcare systems, its whole structure, and it might only lead to a patchwork of best practices, which also lacks traditional roots in their societies. There is fear now that, in the NMSs, the mix of different solutions in different parts of the healthcare system does not result in synergy, but operations that are worse than earlier models. From the internal market aspect another observable result of the introduction of relevant Directives is that it may not simplify the former system and practice of member states. The critique that it raised at another level on deciding about the relevant rules and reimbursement methods (Pennings 2011) is of course true, but it is as it is in the case of almost every service on the Internal Market.

It is the common points of Community level regulation of competition and healthcare that confine the MSs. Overall, MSs have many possibilities to avoid following strict competition rules in their healthcare market, even if the countries are willing to liberalise. The first possible exception arises with the Altmark criteria in connection with state aid rules while the second exception is provided by the SGEI regulations and the third possibility is the definition of undertakings and their links to healthcare finance. MSs has the possibility to choose whether they refer to their healthcare services as SGEI, and it depends on the extent to which they let private actors enter the market, but according to the definition of undertakings only with respect to status and functions as well. Greer and Rauscher (2011) stipulated there are still multiple barriers to entry and weak incentives for patients, providers or governments to respond to the EU health policy either by competition or entry into new markets. Therefore, there is no remarkable reflection on EU law, and where there is, it is driven by domestic political agendas.

National Competition Authorities (NCAs) may contribute to the enforcement of EU competition laws, since they are not directly responsible for local social policy objectives. This may create conflict on a national level. It has been mentioned that the ECJ is broadening the triangular relationship between patients, healthcare providers and the State(s) with an integrative perspective. At the same time, when the NCAs decide, they are likely to form their opinion according to EU competition laws and market values and ignore general social interests or what is best for European

integration and take these into consideration only maybe indirectly (Lear et al. 2010). They are however also likely to develop diverging sets of competition rules for healthcare (Sauter–van de Gronden 2010), which will bring about more diversity and divergence on a market where some progress would otherwise not be achieved. Today national HC regulations, the Directives of the internal market and the case law of the ECJ create a three-tier-system which reflects the European principle of free movement of citizens but also the more intensive national will to protect national systems (Pennings 2011).

Moreover, within these domestic agendas, practice usually decides whether an intervention or investment in the healthcare market is considered to be state aid or not. Usually cases are analyzed and evaluated in detail and the ECJ/NCAs examine case-by-case (Lear et al. 2010, Anchini, 2016). For a move towards a more automatic evaluation in competition distorting cases within the healthcare market, a more coherent European framework and more integration should be necessary in social/healthcare services and also in the field of competition regulations. However, with all the above-mentioned "built-in escape clauses", flexibility of EU-level competition regulation and the practice allowing MSs to express these differences and decide on the degree and extent of the market, reforms may not bring the foreseen health market integration. This may be even more valid for the NMSs.

Further possibilities of this research require the profound analysis of the extent of private actors and private financing and their relations to each other. This may involve the detailed mapping of type and number of competition cases, if they appear in a great number or they are just "avoided" due to SGEI decisions. Finally, the exact positioning of the Hungarian system by its characteristics among the other Member States is one further direction this research could well take.

Acknowledgments: The study has been „Supported by the UNKP-17-4 New National Excellence Program of the Ministry of Human Capacities" with "Health policy as a general economic interest and a pillar of our competitiveness" as the title of the research project.

References

Anchini, M. (2016): The Role of the European Union in the Health care Market. *Columbia Journal of European Law*, November. Retrieved from http://cjel.law.columbia.edu/preliminary-reference/2016/the-role-of-the-european-union-in-the-health care-market/

Arora, S. (2001): Health, human productivity, and long-term economic growth. *The Journal of Economic History*, 61, 3, 699–749.

Atun, R. – Menabde, N. (2008): Health systems and systems thinking. In Coker, R. – Atun, R. – McKee, M. (eds): *Health systems and the challenge of communicable diseases: Experiences from Europe and Latin America.* Buckingham: Open University Press (European Observatory on Health Systems and Policies Series).

Bloom, D. E. – Canning, D. – Sevilla, J. (2004): The Effect of Health on Economic Growth: A Production Function Approach. *World Development*, 32, 1, 1–13.

EC (2006): Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market, Brussels, European Commission.

EC (2014a): On effective, accessible and resilient health systems. Communication from the Commission, COM(2014) 215 final, Brussels, European Commission,. https://ec.europa.eu/health//sites/health/files/systems_performance_assessment/docs/com2014_215_final_en.pdf

EC (2014b): Communication from the Commission on effective, accessible and resilient health systems. COM(2014) 215, final, Brussels, European Commission.

Ecorys (2016) Study on the financing models for public services in the EU and their impact on competition. Final report. European Commission, Brussels.

ECR (2017): The management of health systems in the EU Member States. The role of local and regional authorities. European Committee of the Regions.

Farkas, B. (2016): *Models of Capitalism in the European Union. Post-crisis Perspectives.* Palgrave Macmillan.

Goddard, M. (2015): Competition in Health care: Good, Bad or Ugly? *International Journal of Health Policy and Management* 4, 9, 567–569.

Greer, S. L. (2014): The three faces of European Union health policy: Policy, markets, and austerity. *Policy and Society*, 33, 1, 13–24.

Greer, S. L. – Hervey, T. K.– Mackenbach, J. P.– McKee, M. (2013): Health law and policy in the EU. *Lancet*, 381, 1135–44.

Greer, S. L. – Vanhercke, B. (2010): The hard politics of soft law: the case of health. In Mossialos, E. et al. (ed.): (2010): *Health Systems Governance in Europe.* Cambridge University Press, 186–230.

van de Gronden, J. W. (2009): Financing Health Care in EU Law: Do the European State Aid Rules Write Out an Effective Prescription for Integrating Competition Law with Health Care? *The Competition Law Review*, 6, 1, 5–29.

Guy, M. (2017): Competition and sectoral regulation in Dutch and English healthcare: factors shaping the competition focus of the new healthcare regulators and their relationship with the competition authorities. Lancaster University, *EPrints Ius Publicum Network Review*, 2017 (2).

HCP (2018): *Euro Health Consumer Index*, *Report 2017*. Health Consumer Powerhouse.

Hendricks, L. (2002): How important is human capital for development? Evidence from immigrant earnings. *American Economic Review*, 92, 1, 198–219.

Joumard, I.– André C. – Nicq C. (2010): Health Care Systems: Efficiency and Institutions. *OECD Economics Department Working Papers*, No. 769, OECD Publishing.

Kulesher, R. – Forrestal, E. (2014): International models of health systems financing. *Journal of Hospital Administration*, 3, 4, 127–139.

Lear, J. – Mossialos, E. – Karl, B. (2010): EU competition law and Health policy. In Mossialos, E. et al. (ed.): *Health Systems Governance in Europe.* Cambridge University Press, 337–378.

Lenaerts, K. (2012): Defining the concept of 'services of general interest' in light of the 'checks and balances' set out in the EU treaties. *Jurisprudence*. 19, 4, 1247–1267.

Maudos, J. – Pastor, J. M. – Serrano, L. (1999): Total factor productivity measurement and human capital in OECD countries. *Elsevier, Economic Letters*, 63, 1, 39–44.

Meheus, F. – McIntyre, D. (2017): Fiscal space for domestic funding of health and other social services. *Health Economics, Policy and Law*, 12, 159–177.

OECD (2013): *Measuring Well-being and Progress: Understanding the issue.*

Orosz, É. – Merész, G. – Nagy, B. (2013): Egészség: befektetés a humán tőkébe. [Health: Investments in human capital.] *Educatio*, 2, 159–176.

Papanicolas, I. – Smith, P. C. (eds.) (2013): *Health system performance comparison. An agenda for policy, information and research.* Open University Press, McGraw-Hill.

Pennings, F. (2011): The cross-border health care directive: more free movement for citizens and more coherent EU law? *European Journal of Social Security*, 13, 4, 424–452.

Sauter, W. (2013): The impact of EU Competition Law on National Healthcare Systems. *European Law Review*, 4, 457–478.

Sauter, W. – van de Gronden, J. (2010): Taking the temperature: A survey of the EU law on competition and state aid in the healthcare sector. *Tilburg Law and Economics Center*, Tilec, 11.

Schultz, T. W. (1961): Investment in Human Capital. *The American Economic Review Journal*, 51, 1, 1–17.

Thomson, S. – Foubister, T. – Mossialos, E. (2009): Financing health care in the European Union. Challenges and policy responses. *European Observatory on Health Systems and Policies, World Health Organization*.

Tzeremes, N. G. (2014): The effect of human capital on countries' economic efficiency. *Elsevier, Economic Letters*, 124, 1, 127–131.

WEF (2017): Realizing Human Potential in the Fourth Industrial Revolution. An Agenda for Leaders to Shape the Future of Education, Gender and Work. *White Paper*, January, World Economic Forum.

WHO (2000): The World Health Report 2000, Health Systems: Improving Performance. World Health Organization, Geneva.

Udvari B. – Voszka É. (eds) 2019: Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Economics, Szeged, pp. 278–296.

Resource curse: The case of Ecuador

Cristina Isabel Orozco Espinel

Among others, Jeffrey Sachs and Andrew Warner have demonstrated a positive correlation between the abundance of natural resources and poor economic growth, the so-called resource curse. Certainly, it depends on several factors, e.g. government corruption, internal conflict, revenue volatility and excessive indebtedness. Most of these issues perfectly suit with the Ecuadorian economy. Indeed, this country has historically been an exporter of primary goods, mainly petroleum, which accounts for 45% of its exports and is closely related to economic dependence and poverty.

The abundance of oil revenue has discouraged investment in economic diversification, preventing the country from having a more stable economy in the long term. In this context, this paper is focused on showing Ecuador as a case of the resource curse. Firstly, it reviews the most relevant literature about resource curse over time. Secondly, it links the general theory to the specific country characteristics of Ecuador and gives some insights into this country. Thirdly, it analyses five of the causes of resource curse emphasizing on the context of Ecuador. Finally, it draws some conclusions about how this country has historically become dependent on oil exports and why its economy is extremely vulnerable to oil prices, confirming the resource curse hypothesis.

Keywords: resource curse Ecuador, oil corruption

1. Introduction

The resource curse, also known as the paradox of abundance, refers to the paradox that countries with an abundance of natural resources, especially non-renewable resources, such as minerals and fuels, tend to have lower economic growth and worse development results than countries with fewer natural resources. In this context, since 1972, when oil exploitation began in Ecuador, it has become the central axis of its economy and continues to maintain its fundamental importance. The enormous income captured by the state over time has allowed Ecuador to invest in road, energy and health infrastructure, addressing multiple economic and social pressures. Paradoxically, in the last decade (2004–2014) it has recorded the highest income from oil resources in the last 50 years. Meanwhile, the government has suffered a lack of liquidity, a situation that has led the country into continuous indebtedness to China in exchange for concessions over its natural resources, mainly in the oil industry (Acosta 2009).

Indeed, oil has been Ecuador's main export item since the 1970s. The previous government chaired by Rafael Correa (2007–2017) tried to break this primary export pattern in order to diversify exports and promote value-added products. To this end, there were promulgated principles of sustainable development for the first time in the country's economic history, pretending to use the extractive industry as a driver of change in the development model focused on prioritizing environmental sustainability and social inclusion. In this model, the money from the oil industry was earmarked

for projects to gradually diversify the economy, adopting a long-term sustainable model (Villalba 2013).

Despite this supposed change in the management of economic policy, this new economic model could not be achieved in the medium term (Acosta 2010) due to the intensification of the extractive industry in the period (2010–2017), contrary to the government's discourse. Conversely, the oil industry slowed down the development of the country, leaving it in a state of greater vulnerability and indebtedness. Indeed, despite the change of government in 2017, the actions taken during 2018 point to economic management remaining the same. The current president Lenin Moreno has recognized that the present economic situation is "critical", due to the low prices for oil on the international market and high indebtedness (Spurrier 2018).

With this background, during 2018 the level of indebtedness has increased. In October 2017, the balance of the aggregate debt was USD 46,162.4 million; that is, 6,228 million more than in 2017, when the new government was established. This debt was mainly channeled through bond issues on the international market at high interest rates, between 8.75 and 9.625%. In the same way, the government used the gold reserves administered by the Central Bank of Ecuador (ECB) to obtain financing from Goldman Sachs (Spurrier 2018).

Above all, in the current situation of the country's indebtedness and the context of low oil prices, productive diversification is returning to the center of the debate on development strategies. Currently, productive diversification is a topic of particular relevance for middle-income countries which face the challenge of acquiring new productive capacities and translating them into a more diversified basket of exports made up of more sophisticated products (Felipe et al. 2012). Therefore, the research question of this study seeks to demonstrate whether Ecuador fits into the resource course hypothesis. Thus, this study is organized as follows; Firstly, it reviews the most relevant literature about resource curse over time. Secondly, it links the general theory to the specific characteristics of Ecuador and gives some insights into this country. Thirdly, it analyses five of the causes of resource curse emphasizing on the context of Ecuador. Finally, it gives some conclusions about how this country has historically become dependent on oil exports and why it is vulnerable to be part of the resource curse hypothesis.

2. Abundance of resources, why is it a curse?

The resource curse, also known as the paradox of abundance, refers to the paradox that countries with an abundance of natural resources, especially non-renewable resources such as minerals and fuels, tend to have a lower economic growth and worse development results than countries with fewer natural resources. The resource curse focuses on many different reasons, including a decrease in the competitiveness of other economic sectors caused by Dutch disease, the volatility of income from natural resources due to the tendency to the variation of the global commodities price market, the mismanagement of resources by the government and the presence of weak, inefficient, corrupt and unstable institutions due to the flow of real or anticipated income from extractive activities, which can be easily diverted.

There is intense debate about the reasons for and against resource curse. In this context, the relationship between primary exports, growth and productive diversification has been a matter of study for almost a century. In the neoclassical economic theory approach, predominant until the middle of the last century, the abundance of natural resources was considered as a source of comparative advantage and, consequently, primary-export specialization could boost growth and productive diversification. (Dominguez 2009). However, the first criticisms of this approach in the Latin American context appear in the so-called Prebisch-Singer thesis, which observes that international prices of raw materials, unlike industrialized products, follow a downward trend, which generates a progressive deterioration of the terms of trade between peripheral countries (producers of raw materials) and central countries (producers of manufactured goods). Consequently, there is an inequitable distribution of revenues in international trade (Prebisch 1950, Singer 1975).

In this context, authors like Neary and Wijnbergen (1983) state that the discovery of oil in a country can lead to recession because of the new income received. Indeed, the resource curse is associated with Dutch disease derived from mining or hydrocarbon income. According to IMF studies regarding the resource curse, which are based on a comparative analysis of countries to determine the relevance it has in developing economies, it is found that resource curse is a phenomenon intrinsic to most countries that have oil or minerals; that is, the possession of these resources is linked to the contraction of long-term growth (IMF 2010).

Moreover, income from the oil sector can encourage deindustrialization because the appreciation of the exchange rate can affect the manufacturing sector, a phenomenon related to Dutch disease (Corden–Neary 1982). Indeed, in more recent studies, Harding and Venables (2013) carry out an investigation that analyses 41 countries during the period 1970–2006, which shows that the export of non-renewable natural resources (oil and minerals) has the effect of reducing trade in the other sectors. Authors such as Bresser-Pereira (2008), also identify Dutch disease as the main obstacle to the growth of developing countries. Furthermore, Richard Auty (1990) analyzed the results of the industrialization strategy based on natural resources, specifically oil. This study shows that there are some risks associated with the exploitation of oil that prevents the success of this strategy. In 1993, the same author formulated the resource curse thesis. Indeed, Auty was the first author who used this expression to indicate the observable negative correlation between natural resource wealth and economic growth.

More recently, Sachs and Warner (1995, 2001) compare the growth of countries abundant in natural resources in relation to their GDP during the period 1970–1989. The authors find a negative correlation, which is not explained by other factors, such as, income level, price volatility or the type of commercial policy adopted (Sachs–Warner 1995). Therefore, the authors conclude that economies abundant in natural resources tend to grow at a considerable slower rate than economies without a large number of resources. The curse seems to be particularly acute in the case of oil-exporting countries (Frankel 2012).

On the whole, according to what is established in the literature (Sachs–Warner 1997, Neary–Wijnbergen 1983), the resource curse would come from macroeconomic imbalances produced by income, affecting investment decisions for the whole

economy. Moreover, the terms of trade in foreign trade have an effect on long-term development. Bearing in mind that the exchange ratio is the price of the good that a country exports divided by the price of the good that it imports, when the exchange ratio of the exported product falls, the country loses, which gives rise to the possibility posed by Bhagwati (2004), the author stating that a country can be in a worse condition after starting to export oil than if it had based its development on other sources of income, a phenomenon called "impoverishing growth".

Part of the explanation of the curse can be sought in the strength of the economy, which is not dependent on natural resources. In this context, Hausmann and Rigobon (2002) state that an economy which diversifies, in terms of having a significant non-oil tradable sector, will be much less affected by volatility than an economy that is already fully specialized in the oil sector. In Latin America, this maxim has great validity in development issues. Indeed, several studies have been developed in this region with the purpose of testing the resource curse hypothesis. In this context, the study by Rojas and Forero (2011) analyses possible correlations between oil exploitation and resource curse in a wide group of countries through three variables: growth of the Gross Domestic Product (GDP), decrease in indebtedness and industry growth. It is concluded that from a group of 15 countries, only two of them show favorable trends, while the other 13 show negative indicators in the three variables. This phenomenon is attributable to the resource curse. In light of these data, the low level of Latin American development over the years can reasonably be associated with the phenomenon of resource curse, as shown by the various regional studies conducted. It is also important to include the analysis of ecological problems, in which the implications of the resource curse have several dimensions, particularly, in the context of China's growing leadership in the Latin American region since 2000. It has increased demand for products from the extractivist industries. Specifically, in the case of Ecuador, this has promoted the discovery of new and promising hydrocarbon fields on land and sea, and the reutilization of the fields already exploited. Likewise, it has fostered an intensification of mining exploitation.

3. The case of Ecuador

For small, open economies such as Ecuador, the recent boom in raw materials has represented an opportunity to fully exploit its comparative advantages and complementarities, at the cost of deepening the economic dependence on China (Cunha et al. 2013, Casanova et al. 2015). Indeed, during the recent decade (2004–2014) Ecuador's per capita gross domestic product grew at an annual cumulative rate of 4.92% and its Human Development Index increased by 8.6%. In this period, Ecuador, like other countries in the region, supported its development with the export of natural resources, a dynamic that has been described as a kind of new conservative economic convergence, also known as the Consensus of the Commodities (Svampa 2013).

According to the World Bank, GDP growth during the period 2004–2010 was driven by high oil prices and substantial external financing. This stimulus enabled increased social spending and important investments, especially in the energy and transportation sectors. During this period, poverty declined from 37.6 percent to 22.5 percent. The Gini coefficient fell from 0.54 to 0.47, given that income growth of the

poorest population segment was higher than the average for the remainder of the population.

Nevertheless, this period of extraordinarily high prices ended in 2014. Therefore, these achievements are currently threatened by declining oil prices and the stronger U.S. dollar. Indeed, between 2014 and 2016, urban unemployment rose from 4.5 percent to 6.5 percent and urban underemployment increased from 11.7 percent to 18.8 percent. During this period, the poverty rate and the Gini coefficient remained largely unchanged. In this context, given Ecuador's lack of a local currency and limited fiscal savings, the government has been forced to reduce public investment and curb spending. Government officials have also mobilized different sources of external and domestic financing and have somewhat reduced spending. Furthermore, temporary measures have been applied to increase non-oil public income and restrict imports. These measures have briefly eased the effects of low oil prices. However, they have also increased public debt (World Bank 2017).

In addition, the natural resources industry has involved a high risk of illegal activities. The extractive industries, which make up more than half of Ecuador's exports, have been characterized by a lack of transparency regarding monetary issues and environmental impact (Zuckerman 2016). Indeed, in the last two years, countless cases of corruption associated with the negotiation and sale of oil to Chinese companies have been identified. Since 2008 Ecuador has borrowed over 11 billion USD from China, this money was mainly used to pay fiscal debt and build infrastructure for oil, mining and energy projects. This debt was mainly contracted with China Export-Import Bank and the Chinese Development Bank. Many of the loans have been in the 1–2 billion USD range, with interest rates of between 6% and 8%, and demand payment in barrels of crude oil (Finer 2017). Currently, the Ecuadorian external debt is of 37.75 billion dollars, which represents 38.8% of its GDP (World Bank 2017).

In 2013, Chinese money helped cover as much as 61% of the government's financing needs. In exchange, China has claimed nearly 90% of the country's oil shipments over the next few years, most of which it then trades around the world and especially in the United States. Currently, a new credit line is under negotiation, which would be in addition to $9 billion in financing that Ecuador is seeking from China for the construction of a refinery that will process 200,000 barrels of crude oil a day (Kuo 2014). The consequent risk is that Ecuador will lose its sovereignty and will be forced to drill for oil in its natural and ethnic reserves to repay its debts to China, indigenous peoples' rights will be violated and some of the most biodiverse areas in the world harmed. Many critics of the current administration states that Ecuador will resemble a wholly owned subsidiary of China, like many solvency-challenged yet resource-rich countries in sub-Saharan Africa (Salmon 2011).

4. Causes of the resource curse

With the background stated above, it is evident that in Latin America abundant *"marketable natural resources have been often an indicator of low levels of economic growth"* (Cori–Monni 2014, p.11). In this context, the development of Ecuador is also closely linked to the causes that explain the so-called resource curse. Therefore, after

the review of the literature about resource curse, below are, identified and analyzed, five principal explanations for it: (1) Dutch disease; (2) Misallocation of revenue deriving from the exploitation of resources; (3) Rent-seeking behavior; (4) Corruption; and (5) Level of institutional quality.

4.1. Dutch disease

There is wide selection of literature on Dutch disease, generally associated with an external impact from the increase in price of the main exports, which accounts for large inflows of foreign currency into a country. It generates a wealth effect and an appreciation of the real exchange rate, which has negative effects on the industrialization of other products (Magud–Sosa 2013). Therefore, the Dutch disease explanation suggests that a resource boom will divert a country's resources away from activities that are more conducive to long-term growth (Van Wijnbergen 1984).

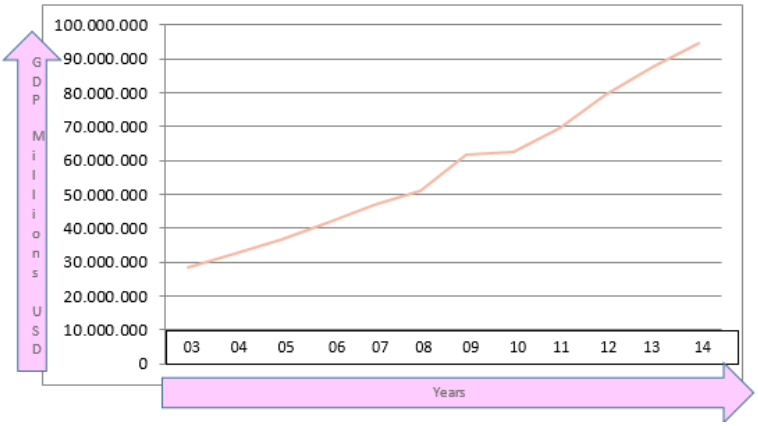
Generally, a resource boom causes the appreciation of the exchange rate, producing a contraction in manufacturing exports or displacement of capital and labor factors away from manufacturing towards the extractive industries and raising manufacturing costs as a result. Moreover, the appreciation of the exchange rate reduces the prices for tradable products, mainly manufactured goods and agricultural products relative to the prices of non-tradable products, mainly construction and services. Therefore, labor and capital are withdrawn from the tradable sector and flow into the non-tradable sector (Cori–Monni 2014).

In addition, foreign investment can be attracted by investment opportunities in the export boom sector. This causes further appreciation of the real exchange rate. Obviously foreign direct investment inflows would have negative impacts only if it is highly concentrated in the resource-intensive sector. The movement of resources between sectors may reduce capital accumulation. Furthermore, technological progress is faster in the tradable sector than in the non-tradable sector (Torvik 2001).

In this context, understanding if an economic system has really been affected by Dutch disease is an extremely complicated task that requires a much longer period of analysis than 2004–2014. It is important to emphasize that the Ecuadorian planning concept was based on the assumption that an initial primary export phase must precede redeployment of the production system (SENPLADES 2013). By increasing public spending, generated from the income of the extractive industry, there will be an increase in domestic demand and subsequently the industrial sector will be developed (higher added value) this fact will enable exports to be gradually replaced.

This step has been jeopardized by the effects of Dutch disease deriving from an increase in the exploitation of natural resources. This hypothesis is supported by data on GDP growth (Figure 1), trade balance (Figure 2) and the proportion of industrialized products in the country's total exports (Figure 3). Figure 1 shows a sustained growth in GDP during the period 2003 to 2014, mainly due to the high price of oil on the international market.

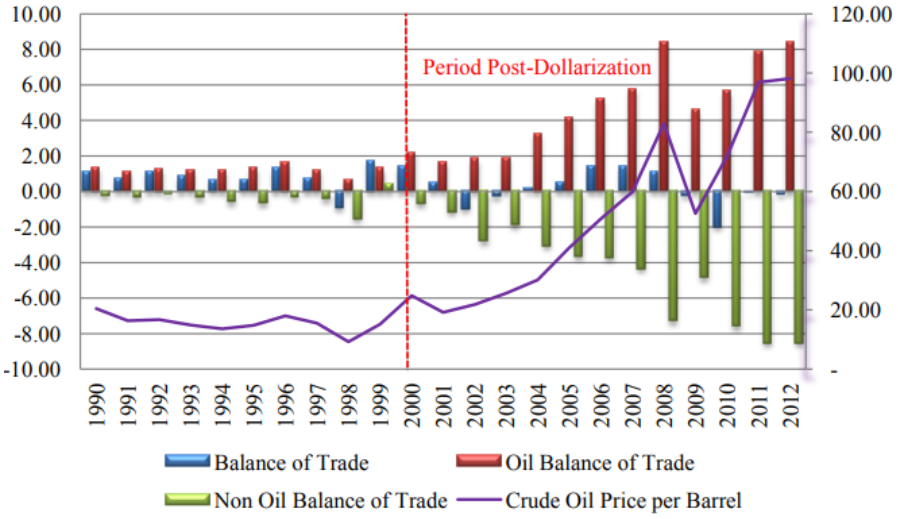
Figure 1 Growth of GDP in the period 2003-2014



Source: Central Bank of Ecuador (2016)

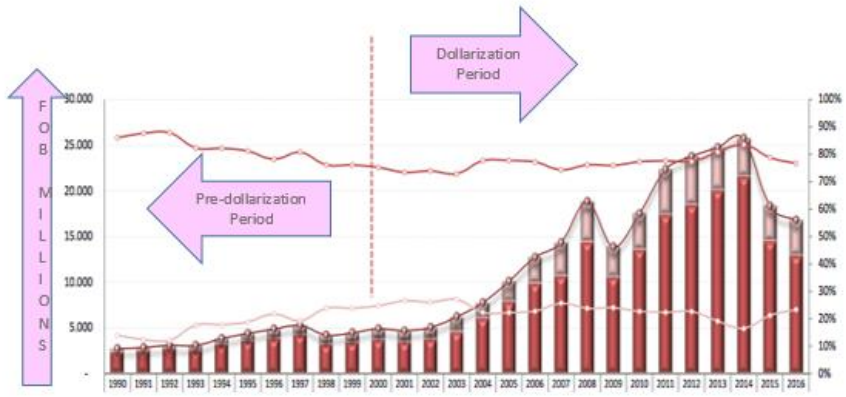
As can be seen in Figure 2, despite this sustained growth of GDP, the trade balance of Ecuador has a constant deficit and this deficit remains or increases despite the country's income increase from oil exports. This occurs even though since 2007, the Ecuadorian government has imposed quotas and taxes on the importation of all goods in order to balance the historical deficit in the trade balance and boost national production. However, despite the measures taken, the trade balance remains negative.

Figure 2 Total oil, non-oil trade balance (millions of USD) and average price of oil per barrel (USD), 1990–2012



Source: Central Bank of Ecuador (2016)

Figure 3 Exports of primary and industrialized products in Ecuador, 1990–2014 (in millions of USD)



Source: Central Bank of Ecuador (2016)

Finally, this pattern of primary exporting economy mainly supported by the export of oil is confirmed in Figure 3, where it can be seen that the export of primary goods is largely higher than the export of industrialized goods and this historical trend increases over time. After analyzing these graphs, it can be concluded that there is a marked contradiction between the objectives established by the government on sustainable development, diversification of exports and change of the productive matrix and the observed results. This shows an effect of Dutch disease in the Ecuadorian economy, which in turn is strongly linked to the theory of the resource curse, in the long term would prevent the country from establishing a sustainable development model. In the next few years it is expected that Ecuador will maintain this trend and continue intensifying the exploitation of oil and other extractive industries, as well as increasing its levels of indebtedness

4.2. Misallocation of revenue deriving from the exploitation of resources

In countries with large amount of resources, the management of the national savings account is crucial. Indeed, there is empirical evidence that those countries with higher savings rates are in better condition to avoid the resource curse (Atkinson–Hamilton 2003, Boyce–Emery 2005, Neumayer 2004). For instance, those developing countries that have managed to escape from resource curse, such as Malaysia and Thailand, have higher levels of wealth-adjusted savings rate than those that have not been able to escape, like Venezuela, Congo and Peru (World Bank 2011).

In this context, the negative rates of net adjusted savings, together with an increase in consumption of natural resources, is the first indicator of misallocation of revenues from natural resources exploitation. This is evidently the case of Ecuador. Particularly, negative values of genuine savings characterize countries with effects of resource curse whereas positive values of genuine savings are associated with countries that have overcome it (Constantini–Monni 2008). Furthermore, the

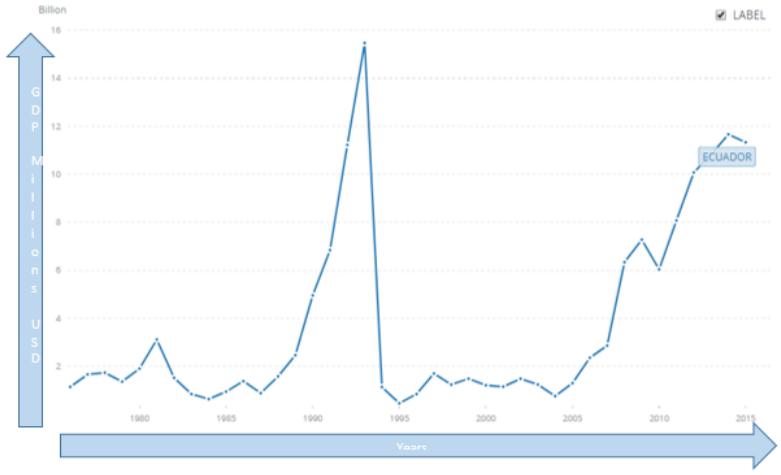
investment decision of the resources coming from oil exploitation is biased by distorted price signals, a situation in which the resource apparently looks more profitable than it really is, mainly due to production costs. Thus, it is exploited at an unsustainable rate. Overexploitation of resources negatively affects the economic growth of a country in the long term (Atkinson–Hamilton 2003).

Several authors have studied the factors that have negative effects on the growth of countries rich in natural resources. For instance, Atkinson and Hamilton (2003) carried out a study based on empirical evidence that showed how unsustainable management of income derived from the exploitation of natural resources is directly related to low rates of economic growth. More specifically, sustainable management of income derived from the exploitation of natural resources is identified by a policy of investment deriving from the use of natural resources in alternative activities that can generate additional sources of wealth so that the losses caused by the depletion of non-renewable resources are compensated for by this new income (Solow 1986).

In this context, several studies have shown that countries with high income deriving from the extractive industry encounter problems when applying a sustainable policy. Investment of this income in activities that aim to increase the human capital required for a more advanced state of service-based, long-term development is usually insufficient. In this sense, the theory of misallocation of revenue is closely linked to the effects of Dutch disease which account for the tendency to concentrate on investment in the primary sector.

In the case of Ecuador, there was a failure to reinvest. The resources from oil were used for public expenditure and consumption instead of investment. Therefore, it has not fostered long-term development. To analyze in depth, the misallocation of revenue derived from the exploitation of resources, this study would take into account the information on Ecuadorian Genuine Savings during the years 2004–2014. In Figure 4, it can be seen that although the Genuine Savings increased during the period 2004 to 2014, they started to decrease after 2014, when the oil price boom ended. Likewise, in 2009 a reduction in genuine savings can be observed, despite the fact that during this period, the highest revenue was recorded, as a result of high oil prices on the international market. After analyzing these data, it can be concluded that while adjusted net savings, increased during the period of the oil price boom, these revenues could not be reinvested in other industries in order to change the primary exporting pattern of the economy with the aim of achieving a more sustainable economic model. Therefore, since 2014 this indicator has decreased again, showing a strict dependence of the economy on the oil export.

Figure 4 Adjusted net savings, excluding particulate emission damage, 1975–2015 (current US dollars)



Source: World Bank (2018)

4.3. Rent-seeking behavior

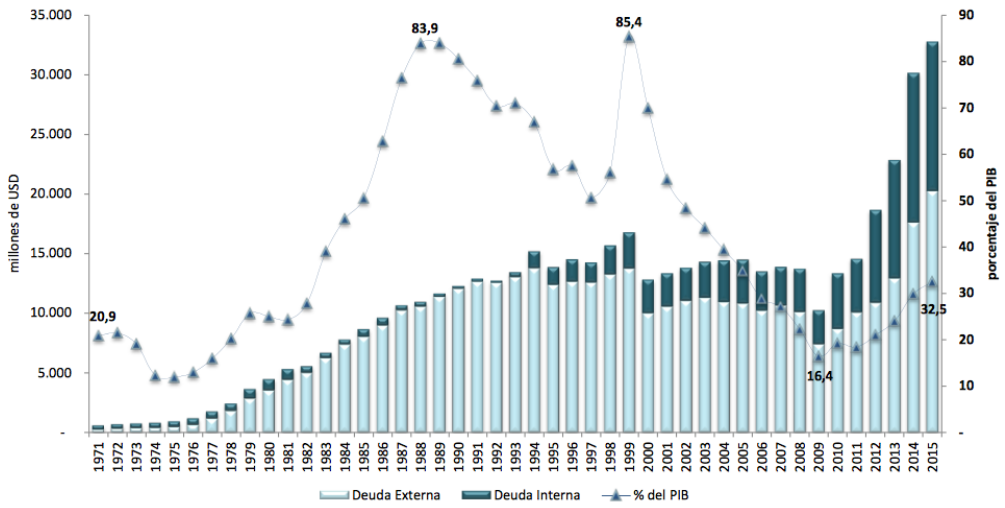
This explanation of the resource curse is based on the fact that the abundance of income fosters rent-seeking behavior because these resources are of easy appropriation. Thus, these resources encourage political and business interest, in search of public favors, especially in countries with high levels of corruption, such as Ecuador. The management of these high incomes are concentrated in the business and political elite. Hence, it impedes that these resources be redistributed adequately for the country development, fomenting political struggle for the appropriation of these resources (Bhagwati 1982).

In this context, Torvik (2002) explains that when there is a resource boom, rent-seeking activities tend to increase. In the case of Ecuador, the search for rents became an increasingly attractive activity in the oil sector, while in the other sectors the same level of income was maintained. Therefore, entrepreneurs from other sectors also sought new opportunities.

Certainly, according to Vicente (2010), rent-seeking activities leads to an increase in the level of corruption and the search for greater concentration of political power. In summary, the studies based on empirical evidence indicate that from every point of view rent-seeking activities are detrimental for a country's development, especially in those countries that have a great wealth of natural resources and a weak institutional framework.

In the specific case of Ecuador, it can be concluded that the increase in income due to high oil prices, has led to an increase in public spending and long-term indebtedness, rather than encourage the development of the country, and as can be observed in Figure 5, the external debt of Ecuador has increased over time in spite the high revenues from oil industry.

Figure 5 External debt of Ecuador, 1971–2015 (Billions of US dollars)



Source: Central Bank of Ecuador (2018)

In this context, according to La Ferrara (2008), countries with high revenues from the export of petroleum, have similar institutional characteristics linked to the extractivist industry. In fact, these countries do not have the necessary technology to exploit their resources intensively. Therefore, foreign companies take advantage of this weakness, as an opportunity to benefit from resource exploitation, and seek to obtain permits from local governments encouraging rent-seeking behavior among local elites.

In this sense, within the context of the leadership of Chinese investment in the Latin American region, Ecuador has requested credits from the Chinese banks several times, in exchange for the granting of contracts for the exploitation of oil and minerals, as well as, for the anticipated sale of these resources in exchange for immediate liquidity for the Ecuadorian government (Salmon 2011). Indeed, China is close to enjoying monopoly control of crude oil exports in Ecuador. In November 2013, PetroEcuador, the State-owned oil company, signed an agreement with the Chinese state-owned company, PetroChina, in which Ecuador undertook to sell it over 90% of its oil production until 2022 (Schneyer–Medina 2013).

As can be seen in Figure 5, since 2011, Ecuador's external debt level has steadily increased to almost triple the debt contracted in 2000, i.e. from a debt of 12,000 million USD in 2000, Ecuador has an indebtedness of approximately 32,000 million USD in 2018, despite the evident increase in quantity and price of oil exports. Therefore, it is demonstrated that Ecuador became completely dependent on the export of oil and its commitment of pre-sale with Chinese companies.

4.4. Corruption

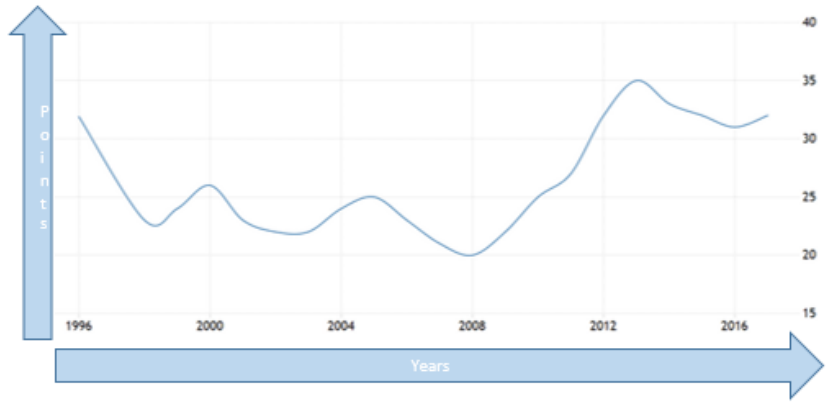
Above all, corruption related to the export of oil resources in Ecuador is a deep and historical problem. Indeed, the extractive industries, which make up more than half of

Ecuador's exports, have been characterized by a lack of transparency in regard to money and environmental impact data (Business Anticorruption Portal 2016). Certainly, in 2014, the U.S. Department of State cited Ecuador's corruption as a key human-rights problem. According to Freedom House (2015), "*Ecuador has long been racked by corruption*" and its weak judicial oversight and investigative resources perpetuate a culture of impunity.

In fact, Transparency International's 2017 Corruption Perception Index ranks Ecuador in the 117th place out of 176 countries. It scores 32/100. Therefore, it is ranked lower than countries like Ethiopia or Tanzania, located in Sub Saharan Africa. In this context, according to the paper, corruption plagues Ecuador's oil deals with China and Petroecuador (Ecuador's government-owned oil firm), was the center of "*a thriving culture of corruption*" involving "*oil executives, middlemen, and government officials*", who were enriching themselves through illegal "*commissions*" on oil being shipped to PetroChina in exchange for loans and credit. Therefore, business relations between China and Ecuador "*have created a climate of corruption on all sides*" (Zuckerman 2016). In this context, China has also tried to secure its loans by pushing for a massive expansion of Ecuador's oil frontier, especially in the central-south Amazon and Yasuní National Park that are considered protected natural areas by UNESCO, because of their biodiversity and large native population.

Figure 6 charts the evolution of the corruption index in Ecuador. It is very interesting to note that during the period 2014–2016, the index decreases. It means an increase in corruption associated with higher revenues from oil.

Figure 6 Ecuador corruption index, historical evolution, 1996–2017



Source: Transparency International (2018)

It is also important to state that corruption is a very difficult variable to measure because there is no real data on it available. Indeed, most governments try to hide this information from public scrutiny. In this context, the corruption index is mainly a statistic about perception. Specifically, over the last 4 years there have been countless cases of corruption associated with the oil industry in Ecuador, so the incidence of corruption could be much higher than the data analyzed in this paper.

4.5. Level of institutional quality

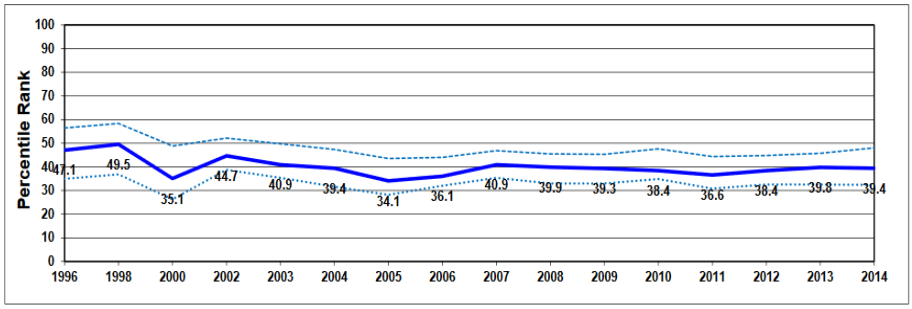
The role of institutions is fundamental to the management of oil resources. Indeed, when a country has a lower level of institutional quality, oil revenues will have more negative effects on the whole economy (Bahar–Santos 2018). In this context, weak institutions are likely to be responsible for several economic problems in developing countries, like lower investment, slower productivity growth, lower per capita income and overall slower output growth. Conversely, good institutions ensure efficient factor allocation, enable investment in higher-return activities, reduce uncertainty and frictions, favor convergence between private and social returns and ease economic agents' coordination (Jude–Levieuge 2017).

Therefore, the role of the institutions is extremely important as an explanation of resource curse. Indeed, the level of institutional quality is a factor that can transform natural resources into a disadvantage or an advantage for a country (Boschini et al. 2003, Mehlum et al. 2006, Van der Ploeg 2011). In this context, the measurement of the institutional quality of a country is a highly difficult job, however, and in order to analyze the level of institutional quality in Ecuador, information on institutional quality index and governance indicators provided by the World Bank will be considered.

Analyzing the data on the level of institutional quality in Ecuador, it can be observed that the country has historically had very poor institutional quality. Therefore, it obtains the worst scores for the categories of: Regulatory Quality, Rule of Law and Control of Corruption. These factors are closely related to the reasons discussed above regarding misallocation of resources, rent-seeking behavior and corruption. Indeed, Ecuador is among the 20% of countries with the worst performance in terms of institutional quality around the world, which obviously has had a lot to do with the government's failure to promote a new economic model to encourage product diversification and sustainability in the long term.

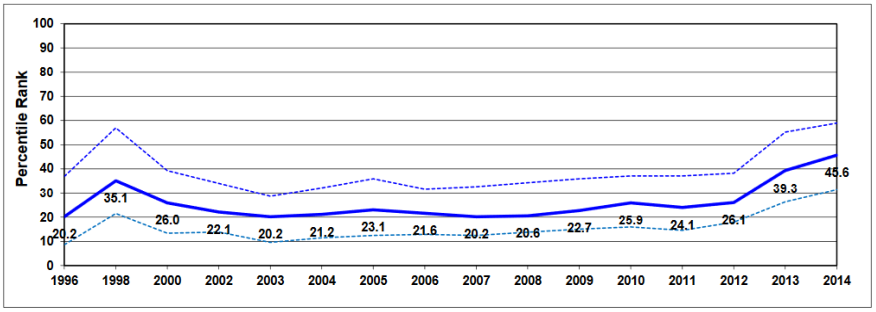
Finally, after the analysis on institutional quality, it can be concluded that Ecuador's oil revenue received during 2004–2014, was exposed to all the influences that justify the hypothesis of resource curse. In this context, poor institutional quality has been the most important factor since it has allowed other factors to flourish, such as; corruption, lack of investment in other industries and progressively increasing indebtedness.

Figure 7 Ecuador Voice and Accountability, 1996–2014



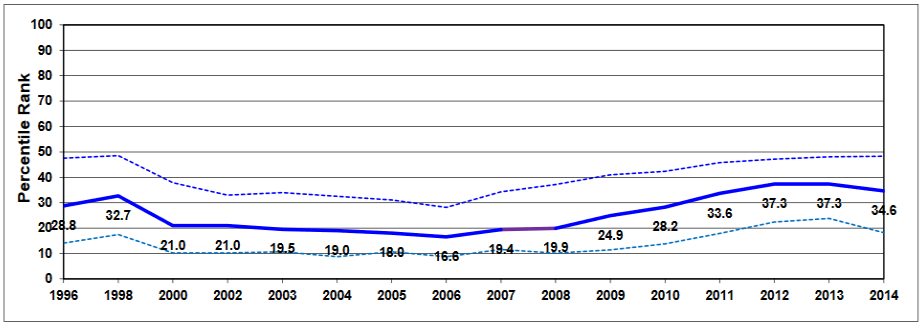
Source: World Bank (2016)

Figure 8 Ecuador Political Stability and Absence of Violence/Terrorism, 1996–2014



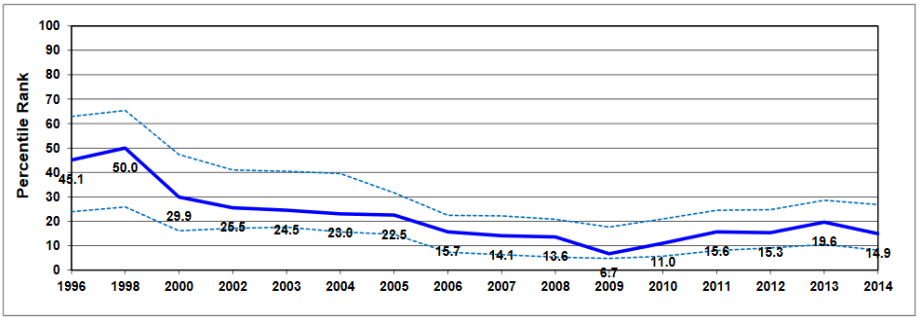
Source: World Bank (2016)

Figure 9 Ecuador Government Effectiveness, 1996–2014



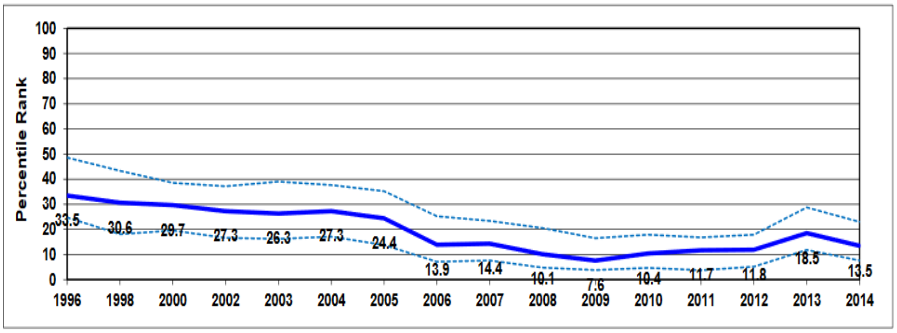
Source: World Bank (2016)

Figure 10 Ecuador Regulatory Quality, 1996–2014



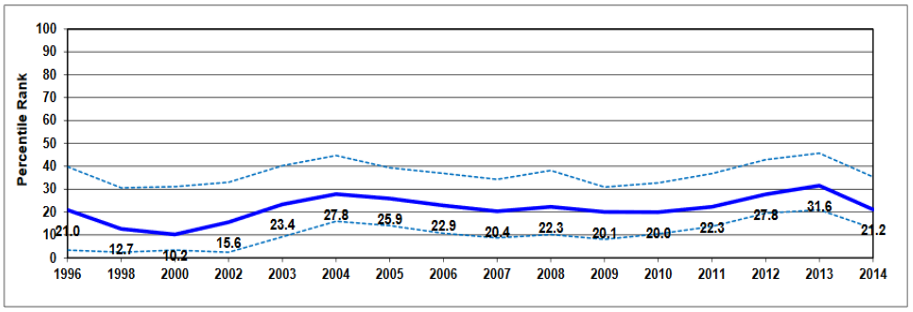
Source: World Bank (2016)

Figure 11 Rule of Law, 1996–2014



Source: World Bank (2016)

Figure 12 Control of Corruption, 1996–2014



Source: World Bank (2016)

5. Conclusions

In this paper, five reasons have been analyzed to demonstrate the existence of resource curse hypothesis in Ecuador, among them, Dutch disease, misallocation of revenue deriving from the exploitation of resources, rent-seeking behavior, corruption, and inefficient and unstable institutions. After this analysis, it is evidenced that Ecuador has the necessary conditions to be considered as case of resource curse, mainly from 2011, when the debt with China increased progressively in exchange for oil pre-sale, as well as, other extractive industries, such as; copper and aluminum. Above all, Ecuador has become more dependent on the oil industry over time. The abundance of oil revenue has discouraged investment in economic diversification, preventing the country from having a more stable economy in the long term. In a historical context, primary goods neither have been a sustainable source of income nor have served for development purposes. Therefore, Ecuador does not possess the conditions that the hypothesis considers necessary to protect itself from the possible negative effects caused by an increase in the exploitation of natural resources.

Acknowledgements: I wish to express my gratitude to the University of Szeged and my professors for promoting independent and high-quality research, and especially to the doctors, Anita Pelle PhD and Beáta Udvari PhD, for their great support and motivation.

References

Acosta, A. (2009): El Buen Vivir, una oportunidad por construir. *Ecuador Debate*, 75, 33–48.

Acosta, A. (2010): *Sólo imaginando otros mundos, se cambiará éste. Reflexiones sobre el Buen Vivir*, Revista Sustentabilidad, Universidad Nacional Abierta y a Distancia, Bogotá. http://www.plataformabuenvivir.com/wp-content/uploads/2012/07/AcostaReflexionesBuenVivir.pdf Accessed: 10 April 2018)

Atkinson, G. – Hamilton, K. (2003): Saving, Growth and the Resource Curse Hypothesis. *World Development*, 31, 11, 1797–1807.

Auty, R. (1990): *Resources-Based Industrialization: Sowing the Oil in Eight Developing Countries*. Clarendon Press, Oxford.

Bahar, D. – Santos, A. (2018): One more resource curse: Dutch disease and export concentration. *Journal of Development Economics*, 132, 102–114.

Bhagwati, J. (1982): Directly unproductive, profit-seeking (DUP) activities. *Journal of Political Economy*, 90, 5, 988–1002.

Bhagwati, J. (2004): *In Defense of Globalization*. Oxford University Press, New York.

Boyce, J. - Emery, H. (2005): A Hotelling Explanation of "The Curse of Natural Resources", Department of Economics, Discussion Paper 2005-06, University of Calgary, Alberta, Canada.

Boschini, A. - Petterson, J. – Roine, J. (2007): Resource Curse or Not: a Question of Appropriability. *The Scandinavian Journal of Economics*, 3, 593.

Bresser–Pererira, C. (2008): The Dutch disease and its neutralization: a Ricardian approach. *Brazilian Journal of Political Economy*, 28, 1, 47–71.

Business Anticorruption Portal (2016): Ecuador Corruption Report. https://www.business-anti-corruption.com/country-profiles/ecuador/ Accessed: 28 March 2018

Casanova, C. – Xia, L. – Ferreira, R. (2015): Measuring Latin America's export dependency on China. *Journal of Chinese Economic & Foreign Trade Studies*, 9, 3, 213–233.

Central Bank of Ecuador (2017): Macroeconomic statistics, structural presentation. https://contenido.bce.fin.ec/documentos/Estadisticas/SectorReal/Previsiones/IndCoyuntura/EstMacroEstruc2017.pdf Accessed: 15 April 2018

Costantini, V. – Monni, S: (2008): Environment, human development and economic growth. *Ecological Economics*, 64, 4, 867–880.

Corden, W. – Neary J. (1982): Booming sector and de-industrialization in a small open economy. *The Economic Journal*, 92, 825–848.

Cori, A. – Monni, S. (2014): The Resource Curse Hyphotesis: Evidence from Ecuador, *SEEDS, Sustainability Environmental Economics and Dynamic Studies*, Department of Economics, Roma Tre University, Ecological

Economics, Working Paper Series 28/2014, 867–880
Cunha, A. – Bichara, J. – Lelis, M. (2013): América Latina y el Ascenso de China: una perspectiva desde Brasil. *América Latina Hoy*, 65, 185–207.
Dominguez, R. (2009): 'Staple theory y crecimiento liderado por las exportaciones. México en el contexto norte y latinoamericano' Empresa y agricultura comercial en el Noroeste de México. *Historia económica y tendencias actuales*. UNAM, México, 421–457.
Felipe, J. – Abdon, A. – Kumar, U. (2012): Tracking the Middle-income Trap: What Is It, Who Is in It, and Why? Working Paper, 715, Levy Economics Institute.
Finer, M. (2017): *Ecuador's most spectacular waterfall threatened by Chinese-funded hydroelectric project*, International Rivers. https://www.internationalrivers.org/resources/ecuador-s-most- spectacular-waterfall-threatened-by-chinese-funded-hydroelectric-project Accessed: April 18, 2018
Freedom House (2015): Freedom in the world. Ecuador's Report. https://freedomhouse.org/report/freedom-world/2015/ecuador Accessed: March 28, 2018
Frankel, J. (2012): The Natural Resource Curse: A Survey of Diagnoses and Some Prescriptions, HKS Faculty, Research Working Paper Series RWP12-014, John F. Kennedy School of Government, Harvard University.
Harding, T. – Venables, A. (2013): The Implications of Natural Resources Exports for Non-Resource Trade. Research Paper, 103, *Oxford Center for Analysis of Resource Rich Economies*, Oxford.
Hausmann, R. – Rigobon, R. (2002): An Alternative Interpretation of the 'Resource Curse': Theory and Policy Implications. Working Paper, 9424, *The National Bureau of Economic Research*.
IMF (2010): When and Why Worry about the Real Exchange Rate Appreciation? The Missing Link Between Dutch Disease and Growth. IMF Working Papers, 271, International Monetary Fund.
Jude, C. – Levieuge, G. (2017): Growth Effect of Foreign Direct Investment in Developing Economies: The Role of Institutional Quality. *World Economy*, 40, 4, 715–742.
Kuo, L. (2014): *Ecuador's unhealthy dependence on China is about to get $1.5 billion worse*, Quartz Media. https://qz.com/256925/ecuadors-unhealthy-dependence-on-china-is-about-to-get-1-5-billion-worse/ Accessed: April 12 2018
La Ferrara, E. (2008): *Che maledizione queste risorse naturali*, Bocony University, Italy, http://www.viasarfatti25.unibocconi.it/notizia.php?idArt=3368 Accessed: 28 March 2018
Magud, N. – Sosa, S. (2011): The Missing Link between Dutch Disease, Appreciation, and Growt, IMF Research Bulletin. Núm. 12-2, http://international.vlex.com/vid/missing-dutch-disease-appreciation-466971534 Accessed: April 12, 2018
Mehlum, H. – Moene, K. – Torvik, R. (2006): Cursed by resources or institutions? *The World Economy*, 29, 8, 1117–1131.
Neary, J. – Wijnbergen, S. (1983): Can an oil discovery lead to a recession. UCD Center for Economic Research Working Paper, 15, University College Dublin

School of Economics.
Neumayer, E. (2004): Does the 'Resource Curse' hold for Growth in Genuine Income as well? *World Development*, 32, 10–14
Prebisch, R. (1950): *El desarrollo económico de América Latina y algunos de sus principales problemas*. Cepal, Santiago de Chile.
Rojas, N. – Forero, D. (2011): *Bonanza petrolera: ¿cómo aprovecharla?,* Centro de Investigacion Economica y Social, Fedesarrollo, Colombia, http://www.repository.fedesarrollo.org.co/handle/11445/372 Accessed: April 12, 2018
Sachs, J. – Warner, A. (1995): Natural resources abundance and economic growth. Working Paper, 5398, *The National Bureau of Economic Research.*
Sachs, J. – Warner, A. (2001): Natural Resources and Economic Development. The curse of natural resources. *European Economic Review*, 45, 827–838.
Salmon, F. (2011): *How Ecuador sold itself to China*? http://blogs.reuters.com/felix-salmon/2011/07/05/how-ecuador-sold-itself-to-china/ Accessed: March 28, 2018
Schneyer, J. – Medina, N. (2013): Cómo China se apropió del petróleo de Ecuador, El juego de poder de China en las narices de EEUU, Planv research, New York http://www.planv.com.ec/sites/default/files/reuters_sls_ecuador-china_sp.pdf Accessed: April 5, 2018
SENPLADES (2013): Buen Vivir. Plan Nacional 2013-2017.Quito: República del Ecuador, Secretaria Nacional de Planificación y Desarrollo.
Singer, H. (1975): The Strategy of International Development. In Cairncross, A. – Purl, M. (eds.): Essays in Economics of Backwardness. The Macmillan Press Ltd., Londres y Basingstoke.
Solow, R.M., (1986): On the intergenerational allocation of natural resources, *Scandinavian Journal of Economics*, 88, 1, 141–149.
Spurrier, W. (2018): El Comercio. http://www.elcomercio.com/pages/especial-enero-economia.html. Accessed: 28 April, 2018
Svampa, M. (2013): "Consenso de los *Commodities*" y lenguajes de valoración en América Latina. *Nueva Sociedad*, 244, 30–46.
Torvik, R., (2001): Learning by doing and the Dutch disease. *European Economic Review*, 45, 2, 285–386.
Torvik, R., (2002): Natural resources, rent seeking and welfare. *Journal of Development Economics*, 67, 455–470.
Transparency international, Ecuador's Profile, 2017, https://www.transparency.org/country/ECU Accessed: March 28, 2018
Van der Ploeg, F. (2011): Natural Resources: Curse or Blessing? *Journal of Economic Literature*, 49, 2, 366–420.
Van Wijnbergen, S. (1984): The Dutch Disease: A Disease After All? *The Economic Journal*, 94, 373, 41-55.
Vicente, P. (2010): Does oil corrupt? Evidence from a natural experiment in West Africa. *Journal of Development Economics*, 92, 1, 28–38.
Villalba, U. (2013): Buen Vivir vs Development: a paradigm shift in the Andes? *Third World Quarterly*, 34, 8, 1427–1442.
World Bank (2011): *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*, The World Bank, Washington DC.

World Bank (2016): Data of Ecuador. https://data.worldbank.org/country/ecuador Accessed: April 12, 2018

World Bank (2017): *The World Bank in Ecuador 2017*, http://www.worldbank.org/en/country/ecuador/overview Accessed: April 12, 2018

Zuckerman, A. (2016): *Corruption plagues Ecuador's oil deals with China.* www.planetexperts.com/corruption-plagues-ecuadors-oil-deals-china/ Accessed: April 18, 2018