Challenges in national and international economic policies

Challenges in national and international economic policies

Proceedings of the 2nd 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

Challenges in national and international economic policies

Edited by:
Beáta Udvari – Éva Voszka

Editors:
    Beáta Udvari
    Éva Voszka

Copy editor:
    Márton Levente Szigeti

Reviewers:
    Beáta Farkas
    Klára Kazár
    Gábor Dávid Kiss
    Andreász Kosztopulosz
    Beáta Udvari
    Éva Voszka

Contents

PART FOUR   FREE MOVEMENT OF GOODS, CAPITAL AND PERSONS

Contributors

Abalfaz Abdullayev PhD student, Szent István University.

Isaac Kwesi Ampah PhD student, University of Szeged.

Elimdar Bayramov PhD students, Corvinus University of Budapest.

Ngo Thai Hung PhD student, Corvinus University of Budapest.

Anita Kéri PhD student, University of Szeged.

Gábor Dávid Kiss assistant professor, University of Szeged.

Balázs Kotosz associate professor, University of Szeged.

Katsiaryna Marmilava PhD student, University of Miskolc.

John Kibara Manyeki PhD student, University of Szeged.

Nguyen Trinh Thanh Nguyen PhD student, Corvinus University of Budapest.

Ana Podvršič PhD student, University of Ljubljana and University Villetaneuse-Paris13.

Marianna Sávai PhD student, University of Szeged.

Katalin Székelyhidi PhD student, University of Szeged.

Preface

The Doctoral School in Economics at the University of Szeged aims at organizing a series of international PhD workshops. In 2017 this event joined the workshop of distinguished scholars, supported by the European Association for Comparative Economic Studies. On the parallel PhD workshop, entitled "Challenges in national and international economic policies", 23 papers were presented. It is our pleasure to publish 10 selected and peer-reviewed articles with authors coming from seven countries in this volume.

Considering the complexity of challenges in the post-crisis period and the international background of the PhD students, who concentrate mainly on the problems of their own homeland, the broad coverage of the topics is hardly surprising. Nevertheless, there are two common features of most studies: they analyse their subject in the context of the Great Recession, and they are built on a well-founded methodological background.

The papers are grouped into four parts. The first includes two case studies dealing with different aspects of the European Union: the "exceptional" case of Slovenia, its route from the neo-corporatist system to substantial structural reforms, followed by the investigation of EU aid for trade to Vietnam. The second part of the book is devoted to fiscal and monetary policy issues: an empirical analysis of Euro-Hungarian Forint exchange volatility; tax incentives encouraging research and development activities and some methodological aspects of fiscal sustainability. Part Three includes two papers on agriculture and the food industry. One of them elaborates a model of Hungarian food export; while the other one investigates factors influencing the technical inefficiency of livestock production in Kenya. The first paper of Part Four also explores the problems of Africa, namely the relation between the capital flight and the external debt in heavily indebted poor countries in Sub-Saharan regions. We are particularly pleased that these two interesting papers were written by the first students of our English doctoral program. The last contributions of Part Four under the heading "Free movement of goods, capital and persons" join to this aspect by analyzing the foreign students' motivations and expectations in a Hungarian University, as well as the effect of political conflicts and terrorism on tourism in Turkey.

We owe our thanks to the reviewers, including Beáta Farkas, Klára Kazár, Gábor Dávid Kiss, Andreász Kosztopulosz, for their contribution to the realization of the volume.

Szeged, 2017

The Editors

PART ONE

The European Union

The internationalisation of the Slovenian state under the Eurozone regime and the crisis of Slovenian exceptionalism

Ana Podvršič

This article studies the institutional changes of Slovenian capitalism that have taken place since the post-2007/2008 crisis by exploring the impact of internationalisation of the Slovenian state apparatuses under the Eurozone regime on the restructuring of Slovenian neo-corporatism. A theoretical framework combining the labour-centred approach to capitalist development, the neo-Poulantzasian debate on neoliberal internationalisation of states and Latin American dependency theory is used. A political economy of the Slovenian institutional dynamics before and after the crisis is proposed. Whereas the importance of external and internal constraints to the post-2008 policy shift has been acknowledged, the rescaling and remodelling of Slovenian state regulations in line with the Eurozone regime and the consequent uneven restructuring of the capacities of various local social forces to influence decision-making process have been underestimated. One should go beyond the dichotomist understanding of institutional change in terms of continuity and change to integrate the question of power relations between social forces and institutions representing them.

Keywords: Slovenia, post-2007/08 crisis, Eurozone, neocorporatism, institutional change

1. Introduction

This contribution examines the changing role of the state in national economies by discussing the institutional changes of Slovenian capitalism that have taken place since the post-2007/2008 crisis. As various accounts point out, the crisis revealed more than some internal weakness in the Slovenian pre-crisis growth regime (Bohle–Greskovitz 2012, Myant–Drahokoupil 2011). By 2010, it also became clear that the country barely resembled a regional social-democratic outlier, as (at least until recently) the widely accepted assertion would have it: a strong erosion of corporatist and democratic policy making (Bohle–Greskovitz 2012, Guardiancich 2012, Krašovec–Johannsen 2016, Stanojević et al. 2016), extreme government instability and the radicalisation of political leaders' agendas with regard to EU policy directives (Bembič 2013, Lindstrom 2015, Stanojević 2014) are some of the characteristics commonly associated with Slovenian policy-making during the crisis. Finally, between 2010 and 2014, substantial structural reforms were implemented, leading scholars to question the future of Slovenian "exceptionalism" (Guardiancich 2016, Lindstrom 2015, Stanojević et al. 2016,). These developments were alternately

attributed to the country's reluctance to engage in liberal reforms in the past, and its "oversized" communist heritage (Bugaric–Kuhelj 2015, Guardiancich 2016); the so-called "neoliberal" post-2004 turn of the Janša administration, which impaired neo-corporatist decision-making (Bohle–Greskovitz 2012) as well as to pressures from the EU and financial markets (Stanojević et al. 2016).

This analysis aims to contribute to the existing debate on the post 2007/08 dynamics of Slovenian capitalism by considering the country's membership in the Eurozone and exploring the impact of internationalisation of the Slovenian state apparatuses under the Eurozone regime on the restructuring of Slovenian neo-corporatism. Since the mid-2000s the latter entered a period of significant change, which only accelerated during the crisis. Since 2010, a various set of regulatory packages have been implemented at the European level that further narrowed member states' capacities to manage the crisis politically and economically. By deepening the crisis hardship and transferring the main burden of adjustment on labour social welfare, this regime accelerated the internal reshuffling of Slovenian neo-corporatism, led by internal devaluation constraints.

The argument unfolds in three steps. First, a theoretical framework is proposed. Then, the discussion focuses on the establishment and erosion of a labour-centred neo-corporatism before the crisis. In the last part, political and institutional developments during the crisis are explored.

2. Theoretical background: The labour-focused international political economy and the centre-periphery relations within the EU

Though distancing itself from theoretical underpinnings of the dominant approach on the diversity of post-socialist capitalism(s), the proposed theoretical framework draws from insights highlighted in the debate on the shortcomings of the VoC paradigm. There are three aspects of post-socialist institutional change that an alternative framework should contain: the role of labour within conflictual industrial relations (Crowley–Stanojević 2011, Hardy 2015), the importance of international actors, especially the EU (Bohle–Greskovits 2007, Bluhm 2010), and the dependent form of international integration (Myant–Drahokoupil 2011, Nölke–Vliegenthart 2009). For these reasons, the proposed alternative theoretical framework builds on three perspectives: the labour-centred approach to capitalist development, the neoliberal internationalisation of states and Latin American dependency theory.

2.1. Labour-centred approach to studying institutional change in a capitalist economy

Building on Poulantzas's state theory, Selwyn (2014) highlights that states are not closed "containers" but embody various networks of institutions and agencies, themselves in conflictual relations. State institutions should be understood as outcomes of prior and on-going struggles between labour, capital and state over the

organisation of production and redistribution of the produced value. Consequently, the concrete state form and related hierarchy of state apparatuses are inherently precarious (Hirsch–Kannankulam 2010, p. 17). "[T]he state itself is mutable to the extent that struggles by different classes and fractions of capital, and the outcome of these struggles, are constitutive processes in state institutional formation and reproduction" (Selwyn 2011, p. 11).

The role of labour in shaping state institutions should be particularly taken into account as "[i]ndustrial relations is the core battleground in the clash between capital and labour at the very heart of the value creating process that gives capitalism its profits, its dynamism and its inexorable requirement to expand" (Coates 2014, p. 26). Analysing the specificities of trade unions in the countries of the former Yugoslavia, which include Slovenia, it is useful to distinguish between the societal and political power of organized labour. "Societal power rests on such capacities as high trade union density (representativeness), the ability to organize public protests or the ability to sway public opinion. Political power rests on the ability to influence top-level decision-making through corporatist institutions, centralized bargaining, and the practice of social pacts" (Grdešić 2008, p. 145).

The formation, articulation and reshaping of state apparatuses has spatial dimension as well. This is particularly true in the contemporary period when the neoliberal restructuring of capitalist production gave additional impetus to the re-scaling of regulatory mechanisms below and above state level, and reconfigured institutionalised structures of regulation and agency that were set up in a context of post-war Fordism (Brenner 1999, pp. 60–67). The so-called "internationalisation of state" does not imply, however, a diminution of states. Instead, what is at stake is the transformation of "the role of states in making markets and shaping market relationship" (Panitch–Gindin 2012, p. 105) and the creation of "a system of states prepared to follow the neoliberal agenda of economic deregulation, privatization, and securing property." (Hirsch–Kannankulam 2010, p. 26).

The reconfiguration of state apparatuses is also impacted by the fragmentation of world markets and unequal structuration of the international state system. The global process of accumulation could be seen as a result of different and unequal means of national accumulation and regulations, and is based on the possibility of playing one off against the other (Hirsch 2013, p. 77). As Bruszt and Greskovits (2009) highlight, in Latin America's dependency school, Cardoso and Faletto's historical structural approach (1979) is seen as particularly valuable, as it seeks to understand the "variability of the forms of integration on the world markets" (Cardoso 2009 in Bruszt and Greskovits 2009, p. 412) by exploring changing constraints, mechanisms and structures of dependency relations (see also Becker et al. 2015). The development process in central economies structures and dominates the development at the periphery, contributing to different forms of national development. Production taking

place in core and periphery takes structurally asymmetrical, yet interdependent and unequal forms and macroeconomic characteristics that are historically determined.

Nevertheless, arguing against the mechanist view of dependency relations defended by Frank (1966), Cardoso and Faletto (1979) do not simply regard dependence as an external variable. Although the limits for manoeuvring are largely set by the world system, the particular internal configuration of a country determines a specific response to the same external events. The composition of the ruling bloc can be much more complex and depends on particular socio-economic structure. External interests can be internalised by peripheral state and civil society, with no explicit external pressure. Therefore, the relationship between the representatives of foreign and national capital can take different forms, from strategic coalitions to partial conflict (Cardoso–Faletto 1979, p. xvi). To contrast Frank's (1966) "development of under-development" thesis, and to emphasize that the forms of dependence are not permanent and that some of them are compatible with local industrialisation, Cardoso (1972, p. 90) introduces the concept of "dependent capitalist development".

2.2. The internationalisation of post-socialist states

The following discussion attempts to outline the main particularities of the internationalisation of post-socialist states in Central and Eastern Europe (CEE). It is widely acknowledged that Washington-based agencies (IMF and WB) and the EU have played prominent roles in the development of capitalism and national states' regulatory regimes in CEE. In the late 1980s and early 1990s, by tightening its financial assistance, the IMF could effectively exercise "hard" power to achieve structural reforms which were part of the Washington Consensus strategy, in particularly in those countries that had "inherited" a considerable debt burden from their socialist regimes.

As far as the EU is concerned, the formal links with post-socialist states developed after 1993 with the so-called Association Agreements. In contrast to the IMF, the efforts of the EU concerned a much broader agenda of political, economic, and institutional changes. Nevertheless, during the accession period, the EU particularly focused on the improvement of the quality of the regulatory framework related to economic policy and organisation, and, by doing so, it indirectly shaped local arrangements in the social area. Moreover, accession to the EU required the elimination of control on the cross-border movement of capital; the countries were required to enter the Economic and Monetary Union (EMU), and to introduce the European common currency (Myant–Drahokoupil 2011).

Given the fact that Slovenia adopted the euro in 2007, as the first among the EU post-socialist members to enter the Eurozone, EMU regulatory constraints should be considered as well. The EMU regime, codified in the Maastricht Treaty, The Stability and Growth Pact, and the Lisbon Treaty, consists of a set of rules that significantly

impact member states' capacities and economic policies. Five of them are particularly important. Firstly, while fiscal policy was essentially national policy, it was, however, restricted to the short term, with budget deficits not to exceed 3% of GDP. Secondly, monetary policy was centralized at the EU level with the European Central Bank (ECB) effectively targeting inflation close to or below 3%. Thirdly, the financial markets were liberalised, and until recently, no-bail out clause prevailed, i.e. neither national government nor the ECB could help a country in financial difficulties. Finally, within the EMU economic policy regime, internal devaluation became the prime mechanism of adjustment to external shocks. Since standard economic tools were paralysed "labour markets are supposed to be flexible. The European Commission and the ECB regard wage flexibility as the cure for economic imbalances. By this they mean downward wage flexibility […] The burden of adjustment has thus to be carried by the labour market and wage policy" (Stockhammer–Köhler 2015, p. 38).

However, preceding the crisis, member states maintained considerable residual sovereignty over the implementation of EMU rules concerning fiscal policies and the extent of labour market liberalisation; they varied considerably across the region, in line with local socio-economic structures, struggles and compromises achieved (Lapavitsas 2012). With the unfolding of the Eurozone crisis, however, the EU adopted a set of legislative packages, known as "new European economic governance", which enabled European policy, to "step by step, tighten[ed] its grip" (Schulten–Müller 2015, p. 332) on national policy areas that were previously confined to the national "negotiation arena".

With respect to the binding character of new policy directives, Schulten and Müller (2015) distinguish two main channels of EU intervention. The country-specific recommendations issued each year since 2010 within European Semester cycles have not been legally binding; nevertheless, following the 2011 Six-Pack provisions, member states can be issued a fine if the "corrective action" is not implemented properly. Secondly, more binding mechanisms concerning the "quid pro quo of reforms for financial support" (Schulten–Müller 2015, p. 337) were laid down between individual countries and the Troika (the EU Commission, the ECB and the IFM).

The tightening of the Euro regime had crucial implications for the policy manoeuvring of member states during the crisis. Fiscal and monetary restrictions limited, if not prevented, the ability to counter the crisis with expansionary fiscal policies, while the separation of fiscal and monetary policy exposed countries to pressures from financial markets (Stockhammer–Köhler 2015). A similar impact was also produced by the EU competition and state aid restrictions that ruled out help to individual industrial enterprises (Myant et al. 2013) and preconditioned the approval for state aid to financial institutions with the restructuring of troubled enterprises,

where privatisation was seen as the best possible option (Taškar Beloglavec–Taškar Beloglavec 2014).

Moreover, the "euro-led" restructuring of state apparatuses reshaped the decision-making process. The established mechanisms granted substantial powers to the EU executive and the ECM at the expense of democratically elected bodies, and increased their interference in the macroeconomic policy of member states (Keucheyan–Durand 2015). The new regulations also tended to reconfigure power relations between the EU and a member state, as well as between national apparatuses within individual states (Oberndorfer 2015). The deepening of the European integration in the name of financial stability and the euro unevenly reshaped the capacities of local social and political forces, and their institutional representatives, to impact the local policy-making process. While the executive institutions and those linked to finance were strengthened and accorded the right of policy-making, the institutions defending social rights, protection and equality were weakened and institutionally reduced to "policy-taking" (cf. Keucheyan–Durand 2015, p. 42). "Increasing encroachment on the procedures of formal democracy and the rule of law […] are intended to place the European ensemble of state apparatuses […] of which the national executives are part, in a position to chip away the social rights that are still anchored in the national legal systems" (Oberndorfer 2015, pp. 202–203).

3. Slovenian neo-corporatism before the crisis: Emergence and destabilisation

The particular institutional and macroeconomic trajectory of Slovenian capitalism before the crisis is widely acknowledged, as well as a considerable weakening of the established system after 2004. The following lines argue that these developments are best understood by taking into consideration the (changing) influence of organized labour and the extent of the internationalisation of the Slovenian state.

3.1. Labour pressures and Slovenian neo-corporatist gradualism

Slovenia is widely known for its gradualist approach to macroeconomic stabilisation during the transition and its neo-corporatist regime, which both proved to be rather exceptional in the CEE region (Bohle–Greskovitz 2012, Rojec et al. 2004). Notwithstanding the importance of historical legacies and favourable initial macroeconomic conditions, two factors were particularly important for the peculiar path of Slovenian capitalism: the power of the organized labour and the relatively small degree of internationalisation of the Slovenian state. As a consequence of favourable debt negotiation with the IMF and international lenders after secession, the country was not obliged to seek financial assistance from international creditors (Lindstrom–Piroska 2007).

The establishment of the institutional infrastructure of Slovenian capitalism took place in a period of intense social conflict. In a context of high inflation (approaching 200 percent per year, SORS), real wage increases became unsustainable and were a

source of major concern to employers (especially exporters) and the DEMOS government (Crowley–Stanojević 2011, Feldmann 2014). In 1992, when the government decided to freeze wages and suspend collective agreements as unemployment stood at 12% (SORS), the main union federation Zveza svobodnih sindikatov Slovenije organized a massive warning strike that practically paralyzed the country for a few hours, and this evolved into a quite exceptional wave of strikes, which was maintained through the year (Crowley–Stanojević 2011).

Indeed, the strength of organized labour impacted the trajectory of Slovenian capitalism in many ways. Politically, it helped remove the unstable DEMOS coalition from power, resulting in the twelve-year rule of the centre-left government coalition that considered Yugoslav heritage a valuable asset and was consequently reluctant to sell national enterprises to foreign investors (Bandelj 2004, Lindstrom–Piroska 2007, Mencinger 2004). Institutionally, it pushed the government to adopt a method of privatisation in the interests of insiders, while the state became the majority owner of larger, capital-intensive companies. After the strike wave, the government abandoned the wage freeze and accepted the unions' proposal to manage inflation via centralized collective bargaining in the shape of the 1994 Economic and Social council, the main institution of the Slovenian system of social dialogue (Crowley–Stanojević 2011). Finally, Bembič (2013) outlines how organized labour also impacted the policy of the Bank of Slovenia – a fixed exchange rate regime was politically unacceptable, as it would result in direct confrontation with a strong labour movement. According to Lindstrom and Piroska (2007), the Central Bank of Slovenia during the 1990s chose a floating exchange rate in order to protect domestic industries and maintain a low current account deficit, thus acting as a kind of a "social partner" (Greskovits 2009).

This does not imply that the Slovenian government did not try to de-regulate the established system. When, in the second half of the decade, negotiations with the EU started, the government used the accession process as an opportunity to privatise the pension system; at which the unions organized a mass rally with over 20,000 participants in March 1998, repeating the action a year later. The government was forced to reconsider its proposal and to adopt a significantly softer version of the pension system reform (Stanojević 2011). During the 1990s "Slovenia was the most strike-prone country in eastern Central Europe: the volume of strikes (or working days lost per 1,000 employees) in those years was ninety-two in Slovenia, compared to twenty-one elsewhere in Eastern Europe" (Crowley–Stanojević 2011, p. 278).

Thus, the pressures for organised labour and a relatively autonomous policy-making space were the main political factors ensuring "a relatively competitive and simultaneously internally integrated system during the entire period of Slovenia's preparation for membership of the EU and the Eurozone" (Stanojević 2014, p. 104). The country has been widely recognized as being a CEE leader in its drive for capitalist accumulation (Bohle–Greskovitz 2012), and this without undermining social equality and becoming dependent on international investors, either in the

banking or corporate sector, as was the case with many other post-socialist countries (see Figure 1 and 2). Finally, the Slovenian state channelled the highest share of its GDP to social protection in the region; while the poverty rate barely increased, from 13.6% in 1993 to 13.8% in 1998, and remained below the EU-18 average of 18% (IMAD 2002).

Figure 1 Net FDI stock, CEE countries, 1997-2007 average, % of GDP
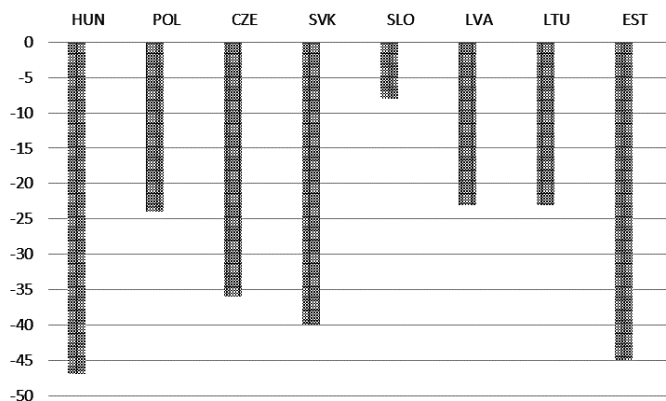
Source: UNCTAD

Figure 2 Market share of foreign-owned banks, Slovenia and Visegrád countries, 2001-2007 average, % of total assets
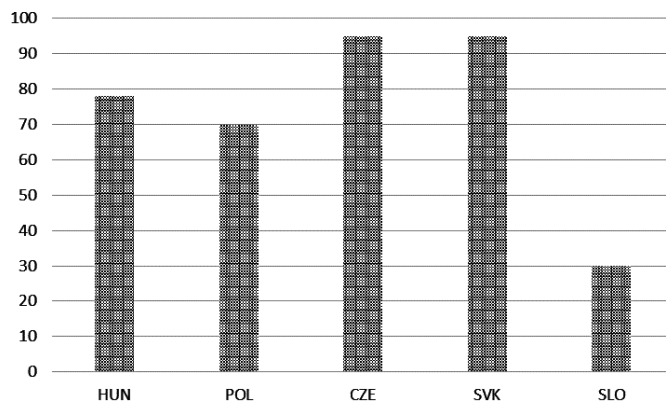
Source: Raiffeisen CEE Banking Sector Report 2004, 2008, 2014.

3.2. Euro-led rescaling of Slovenian state apparatuses and changing power balance

In 2004/2005 the rescaling of Slovenian state apparatuses in line with the requirements of EU accession and the ERMII regime provoked the first major turning

point in the development of Slovenian capitalism, both in terms of its growth model and institutional set-up. The state abolished protectionist measures and control of (financial) capital flows, and lost its exchange rate mechanism (external devaluation) and control over monetary policy (Kržan 2014). The implications of this change for the structural weakening of organized labour were all the more pronounced as the country's entry in the EU coincided with a change in government, bringing a centre-right wing coalition to power. At the beginning of its mandate, the government proposed a package of radical reforms, including a flat tax rate, justifying it with the country's accommodation into the Eurozone. The trade unions organised the largest public protest in the history of the country, joined by around 40,000 workers. The government promptly abandoned the proposed tax reforms but nevertheless succeeded in implementing other measures, though more gradually (Leskošek–Dragoš 2014, Stanojević 2014). The post-2004 restructuring of the state had three important implications for Slovenian industrial relations and the manner of its international integration.

Intensified pressures from international competition and the increasing indebtedness of corporate sector further destabilized the "competitive solidarity" pattern within enterprises. Meanwhile, the growing discontent of workers fuelled interest fragmentation and the radicalisation of trade unions, which now faced collapsing membership. After 2004, the unions lost almost one quarter of their membership, standing at 26% in 2008 (Stanojević et al. 2016). At the same time, after the fixing of the tolar to the euro and the consequent transfer of monetary policy to the European level, the coordination of wage setting and national macroeconomic policy became less important (Feldmann 2014). In fact, in 2006, the government decided to abolish mandatory membership of the main employer organisation; faced with falling membership, their representatives radicalised their stances and increasingly turned towards individual firm-based industrial relations (Bohle–Greskovitz 2012). Following the reforms of labour market, tax system and welfare state, state expenditures on social security decreased by over 3 percentage point to 21.4% of GDP in 2007, and the at-risk-of-poverty rate after social transfer increased by over 2 percentage point to 12.3% between 2004 and 2008 (SI-STAT 2017).

Moreover, the Bank of Slovenia transformed from being a "social" to a "financial" partner. Once the country gained access to the cheap credits that damaged European markets after the euro launch, the loan-to-GDP ratio of domestic banks more than doubled from around 40% of GDP in 2003 to close to 90% in 2008 (OECD 2013) as a result of the explosion of foreign indebtedness in the corporate sector. As Figure 3 shows, up to 2005, the Slovenian economy had assumed the position of a net creditor; but during the following three years, net external debt exploded to represent more than a third of the wealth produced in 2008 (34% of GDP). The credit growth was the most rapid in 2006 and 2007 period, when rising inflation further reduced the real interest rates in Slovenia in comparison to other euro area countries (Bank of Slovenia 2015).

Figure 3 Net external debt, Slovenia, 1995-2012, % of GDP
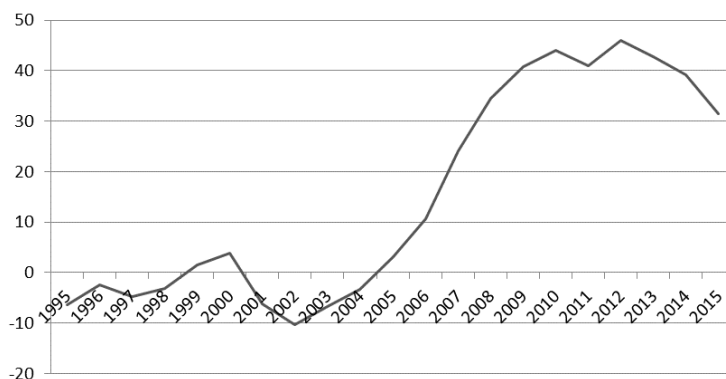
Though the growth in credit was the most intense in banks with majority foreign ownership (Bank of Slovenia 2015), domestic banks, which still had predominant market shares at home market, were much more exposed to corporate failure (Kržan 2013).

The changing balance of social power within the Slovenian state apparatuses also manifested itself on the macroeconomic level with a shift in the growth model from export-led industrialisation in favour of domestic capitalists towards a credit-fuelled overheating of the economy, driven by an intense investment activity (Becker–Jäger 2012, Kržan 2014, Ponikvar et al. 2014). Though the largest share of foreign credit was used for erroneous over-investment in core business activities in all sectors of the economy, indebtedness increased most rapidly in cyclical sectors, like construction, real estate and financial holdings. Moreover, cheap credit was also used to finance a new wave of ownership centralisation led by manager-leveraged buy outs (Kržan 2014).

Crucially, the inflows of foreign finance did not lead to any significant technological breakthrough or improved productivity, but instead increased the vulnerability of the Slovenian economy to external shocks (Ponikvar et al. 2014). Rapidly increasing inflation, fuelled by the pre-crisis economic boom, undermined the price competitiveness of the Slovenian economy. In fact, since the mid-2000s, analysts have started to warn about the structural weakness of Slovenian manufacturing, manifested among other things in slower growth of market shares in comparison to benchmark economies (Rojec et al. 2004), but also in the destabilisation of the "competitive solidarity pattern" in enterprises, which used work intensification as its main adjustment to external pressures (Stanojević 2012).

Thus, although the institutional framework of the economy was formally preserved, after 2004 the "Slovenian industrial relations model was already exposed to intensive, significant pressures and changes" (Stanojević et al. 2016, p. 4). As seen

now, the crisis only accelerated the underlying pressures: instead of reducing the economic meltdown, a tightened Eurozone regulation not only weakened the Slovenian state's capacities to stabilise economic activity, and exposed the country to pressures from financial markets, but also heightened social tensions over policy measures.

4. The neo-corporatist restructuring following authoritarian and competitive anti-Keynesianism

Slovenia was severely hit during the recent crisis: between 2008 and 2015, the country experienced one of the biggest economic declines of the CEE region, well beyond the EU-19 and the EU-28 average (Eurostat 2017, see also Table 1). Moreover, in contrast to many other states, the initial crisis of the "real economy" evolved into a serious crisis of the banking sector and of sovereign debt. The outbreak of the crisis brought to the forefront of public attention the precariousness of the country's pre-crisis growth, and the necessity of structural changes (Bohle–Greskovitz 2012). However, by promoting an export-led model in favour of foreign investors and exhibiting a strong anti-Keynesian demand management bias, the chosen "anti-crisis" policy program mostly accelerated the rehierarchisation of the Slovenian state apparatuses, following a pattern of "authoritarian competitive statism" (Oberndorfer 2015, p. 185).

4.1. Managing the crisis under an austeritarian regime

For the greater part of the period studied, the political management of the crisis in Slovenia was characterised by the "austeritarian regime" (Lehendorff 2015, p. 11), according to which the austerity measures and structural reforms seeking to reducing labour costs went hand-in-hand with increasingly authoritarian rule. The last quarter of 2008 marked the proper beginning of a crisis in the Slovenian economy, with GDP growth going down by 1.2% (OECD 2015). A decline in foreign demand and the emerging liquidity strain provoked a pronounced contraction in manufacturing and construction. The emergence of the crisis in Slovenia in late 2008 coincided with a change in government, bringing a centre-left coalition to power. Following the European Recovery program, the government initially implemented various fiscal packages that sought to alleviate the shock of a plummeting external demand and financial sources (Tajnikar–Bonča 2015). However, when the country entered the excessive deficit procedure in 2010 and was henceforth under observation within the European Semester cycles, the government performed a strategic U-turn; though the crisis was neither caused nor driven by problems related to fiscal (in)solvency or excessive labour costs (Bole 2012a, Tajnikar–Bonča 2015), the Slovenian government made fiscal consolidation and the improvement of (price) competitiveness the cornerstone of the Slovenian Exit Strategy 2010-2013 (Government of the Republic of Slovenia 2010).

Table 1 Economic performance, Slovenia, selected indicators, 2007-2014, in %

	2007	2008	2009	2010	2011	2012	2013	2014
GDP growth	6,9	3,3	-7,8	1,2	0,6	-2,7	-1,1	3
Government debt/GDP	22,8	21,8	34,6	38,4	46,6	53,9	71	81
Government deficit/GDP	0,1	1,4	5,9	5,6	6,7	4,1	15	5
Unemployment rate	4,9	4,4	5,9	7,3	8,2	8,9	10,1	9,7
Current account balance/GDP	-4,1	-5,3	-0,6	-0,1	0,2	2,6	4,8	6,2

Source: SI-STAT (2017) and Eurostat (2017)

This "ambitious program of structural reforms" (OECD 2013, p. 11) comprised the introduction of a fiscal rule; the liberalisation of the pension system and privatisation of state-owned enterprises; a decrease in taxes on labour and the reorganisation of the social security system in line with workfare principles, as well as a mini-jobs reform copying the German system (Government of the Republic of Slovenia 2010). The planned fiscal consolidation was not only strongly digressive, privileging higher-income groups while directly affecting the living standards of low and middle income social strata, but was also pro-cyclical: in the context of rapidly expanding unemployment together with domestic banks highly exposed to corporate failure, it would have been more appropriate to favour fiscal expansionary policy instead of expansionary austerity (Bole 2012a, Senjur 2012).

This policy shift took place in a period of intense labour protests. Throughout 2009, a wave of spontaneous strikes progressively intensified, culminating in November 2009 with the staging of a massive rally. After the protest, the government agreed to increase the minimum wage by almost 23%, partially to appease the workers and partially to gain union approval for its planned reforms of the pension system and labour market (Stanojević et al. 2016). However, the negotiations between institutional partners over the pension system and labour market reforms broke down irremediably (Guardiancich 2012), and the government decided to implement both reforms unilaterally (Stanojević 2014).

This move pushed the entire "Keynesian electorate" to the opposition: public sector unions organized the biggest strike in the history of the independent state, involving about 80,000 workers, and joined private sector unions in promoting a massive referendum campaign against legislative changes (Stanojevic–Klaric 2013). The government now called upon the Constitutional Court to assess whether the pension reform was unconstitutional (Feldmann 2014). The Court, however, refused the government's demand, and in spring 2011, both reforms were rejected by the populace and withdrawn from the legislation schedule. Slovenia found itself in a serious political crisis: the government suffered a vote of no-confidence and, for the first time in the history of the independent state, early elections took place, bringing the centre-right coalition back into power in early 2012 (Stanojević et al. 2016).

The change in government coincided with a significant degradation of the Slovenian economy, and this despite the fact that as early as in 2010, improved foreign

demand had been leading the Slovenian export manufacture towards recovery (Myant–Drahokoupil 2011): unemployment, standing at 8% in late 2011, had almost doubled since the outbreak of the crisis, the unresolved problems of corporate-banking debt led to a rapid growth in non-performing loans on bank portfolios, standing at over 19% of GDP in 2012 (Kržan 2014, OECD 2013), while the ECB status (see above) and turmoil in the Eurozone had sent Slovenia's costs of borrowing upwards, though public debt remained below Maastricht criteria and fiscal solvency was above the EU average (Bole 2012a, Kržan 2013). The new government now centralised policy decision-making in the finance ministry (Mekina 2012b); the new program combining a foreign-led restructuring of the corporate and banking sectors with drastic austerity measures intended to bring the public deficit from 6.7% to below 3% of GDP in a year (Government of the Republic of Slovenia 2012, p. 23). In addition, by the end of the year the government amended over 100 laws under the 'fast track' costumes procedure (Mekina 2012b).

Meanwhile, the proposed reform package and the authoritarian ruling had sparked anger in the local population. The public trade unions organised another general strike and urged the government to moderate its proposed budgetary cuts (Stanojevic–Klaric 2013). Several calls for a referendum against the proposed measures were made by trade unions and members of opposition groups. Whereas the unions' calls were dismissed by methods on the limits of legality (Dnevnik 2012), the demands of the opposition were reviewed by the Constitutional Court at the request of the government. This time, the Court considered a referendum would be unconstitutional (Pistotnik–Živčič 2015). The Court's decision came at the very peak of the so-called Slovenian "winter of discontent", the biggest civil society movement since the country's independence (Stanojević et al. 2016, p. 5).

During the winter of 2012/2013, a constructive no-vote took place, and a new centre-left coalition was formed. By now, mostly as a result of the "austeritarian" drive, the country found itself "in a typical crisis of fast indebtedness of the government sector and negative economic growth. This has created conditions that have been proper for almost all countries of the European south" (Tajnikar–Došenović Bonča 2015, p. 757, see also Bole 2012b, pp. 7–8). After the Cyprus crisis, when Slovenian government bonds spiked at close to 7% (Eurostat 2017), the international press again speculated whether the country would become "The next domino?" (The Economist 2013) While the third "crisis" government did succeed in sheltering the country from the poisoned chalice of Troika assistance, this was achieved at the expense of social rights and democratic procedures.

By the middle of the year, further cuts in public expenditure and labour market reform had been implemented. The Parliament approved the constitutionalisation of the "golden fiscal rule", restricted referendum legislation, and thus "removed a powerful tool from the trade unions to combat anti-labour proposals" (Stanojević et al. 2016, p. 6), and launched the procedures for the privatisation of state owned

enterprises. In June 2013, i.e. during the annual period of revision of national reform programs by EU institutions, the EU Commission and the ECB blocked the governments' action of bank recapitalisation and the transfer of non-performing loans to bad banks, and demanded new stress tests (Breznik–Furlan 2015, Council of the EU 2013).

The operation resulted not only in much higher estimation of the total capital needs of the banks at 10% of GDP, and increased public debt almost half to 71% of GDP; Slovenian authorities also, rapidly and without public debate, modified banking capital legislation and insolvency procedures (Mencinger et al. 2014). As a prerequisite to the approval of state aid, the government committed to fully privatise two, mainly state-owned banks (NKBM and Abanka) after their recapitalisation, and to reduce state ownership in the largest, mainly state-owned bank to 25% plus one share in the medium term (DC ECOFIN 2014, for information on exact state aid decision see Taškar Beloglavec–Taškar Beloglavec 2014).

Losing all legitimacy and credibility, the Bratušek administration resigned in early 2014, less than a year after it had assumed power. By 2014, more than 90% of the population was dissatisfied with the state of democracy, while prior to the crisis, this figure represented half of the population (Krašovec–Johannsen 2016). And while by 2014, the crisis seemed to be pacified, the recovery was mostly driven by exports and heightened dependency on foreign demand. Between 2007 and 2015, the share of exports in GDP increased from 67% to 79%, and investment (measured as fixed capital formation) went down from 30% to 15%, reaching its lowest point since the exit of the Slovenian economy from the "transformation depression" of the early 1990s (SI-STAT 2017). A rather depressed domestic demand was also a major factor behind the stabilisation of the balance-of-payments situation, allowing the country to accumulate unprecedented current account surpluses, standing at a stunning 6.2% of GDP in 2014 (Bole 2016, IMF 2016). At the same time, the country recorded an above EU-average rise in at-risk-of-poverty-rate during the crisis, going up from 12.3% in 2008 to 14.5% in 2015. Among the post-socialist countries from the CEE region, only Hungary recorded a similar expansion in poverty (Eurostat 2017). To a large extent, the deterioration of living standards was related to the adopted structural reforms discussed below.

4.2. Institutional reshuffling in favour of (price) competitiveness

Though both organised labour and the state as the main regulator of Slovenian capitalism had been attacked to an unprecedented extent, the crisis failed to enfeeble either of them, and most resulting reforms were implemented with the agreement of social partners. Instead, the implemented reforms accelerated the already present trend of reshuffling Slovenian institutional infrastructure at the expense of the central role of labour in political and economic management.

In 2010, the reform of the social security system introduced means tested social transfers and subsidies. Social allowances were now attributed on the basis of income as well as property. Social work centres were reorganised and a new electronic system was established in order to ensure a better overview of the property and incomes of applicants for social support. (OECD 2013) The reform changed the Slovenian social security system in line with new welfare principles, meaning that benefits moved from being universal to targeted and conditional (Trbanc et al. 2016). The 2012 pension system reform raised the retirement age for both woman and men to 65 years, or after 40 years of pensionable service, and introduced a restrictive pension indexation policy (IMAD 2016).

By practically lowering the working standards of permanent workers to that of the casual workers, the 2013 labour market reform provoked one of the biggest decreases in the employment security index among OECD countries during the crisis (OECD 2015). Slovenia currently has the biggest share of fixed-term youth contracts in the EU, representing over 80% of all contracts (IMAD 2016). In addition, the reform also introduced a new hierarchy in the system of collective bargaining by allowing more flexible arrangements at the company level. The recent practices have shown that this flexibility is mostly used to lower wage standards and working conditions. (Stanojević et al. 2016)

A cross-sectorial Public Finance Balance Act, adopted in 2012, provided legal grounds for a restrictive fiscal policy (Pistotnik–Živčič 2015). As mentioned, a restrictive fiscal policy gained constitutional grounds in the middle of 2013, when the Parliament agreed to the introduction of the fiscal rule in the Constitution following the recommendations of the European fiscal pact. In 2015, constitutional changes were complemented with a Law on fiscal rule that operationalised the rule and prepared the institutional framework for the establishment of the Fiscal council (IMAD 2016).

The reforms of labour welfare went hand-in-hand with the restructuring of the corporate governance system. In 2013 and 2014 the bad bank and sovereign state holding (SSH) were established and became institutional actors in the privatisation of state assets and selling of troubled enterprises. SSH, which centralises all state assets, resembles those that other post-socialist countries established at the beginning of the 1990s (Mekina 2012a). In May 2013, the Parliament approved a list of enterprises to be privatised that included enterprises from the manufacturing sector and strategic ones, like airports, airlines and the major telecom provider. At the end of the year, as seen above, the state also committed itself to selling two state-owned banks and to reducing state ownership of the biggest national bank. (OECD 2015) The initial privatisation plan was formalised in 2015 with the adoption of the State Asset Management strategy. By April 2015, four companies and one bank were sold to foreign investors. According to the Institute for Macroeconomic Analysis and

Development, the FDI inflows amounted to EUR 1,447 million in 2014 and attained EUR 1,184.8 million between January and October 2015 (IMAD 2016).

Finally, a word on changes in referendum legislation is in order. The constitutional amendments narrowed the scope of the issues that may constitute the object of a referendum, reduced the mechanisms enabling the call for a referendum and restricted the rules over the voting results. Referendums are no longer allowed to be called with respect to laws concerning fiscal issues (like laws on taxes, customs and other obligatory charges, or laws regulating the implementation of the central government budget); emergency measures regarding the security of the state, the ratification of international treaties, as well as laws that protect constitutionality in the area of human rights and fundamental freedoms (Pistotnik–Živčič 2015).

Despite a significant wave of reform, Slovenian neo-corporatist structures, do in fact remain in place and social dialogue has not vanished. However, as Stanojević et al. (2016, p. 12) stress, "within this formal structure, which has been exposed to small, incremental changes, there are clear signs of major changes in power relations as well as in the logic and quality of the industrial relations system". This logic and quality is best described in terms of competitive authoritarianism, where democratic pressures for social expenditures and more equal redistribution of produced wealth are prevented by legal barriers.

5. Conclusion

This contribution discusses the changing role of states in their national economies by focusing on the internationalisation of the Slovenian state and related transformations of Slovenian neo-corporatism. In a context of a comparatively shallow internationalisation of the Slovenian state and a relatively "autonomous" space for policy-making during the period of EU negotiations, the institutional infrastructure of Slovenian capitalism was shaped by strong organised labour that assured that the economic and political management of labour predominated the institutional hierarchy. With the rescaling of Slovenian state regulations in line with the European single market and Eurozone constraints, labour bargaining power and its institutional capacities to impact on policy-making over major macroeconomic decisions started to weaken even prior to the crisis. This trend accelerated in the post-2008 period and its "austeritarian" crisis management. Whereas the local population was pushed into a position of policy acceptance, the decision-making process increasingly took place between leading Slovene financial institutions and executive bodies, and the European Commission together with the ECB. In other words, while the structural weakness of the Slovenian economy and power struggles between various social forces had domestic roots, the Eurozone regime helped to consolidate the external dependency of the Slovenian economy and to weaken the wage-bargaining power of labour.

This discussion contributes to the existing debate on the political economy of Slovene capitalism during the crisis in three ways. Firstly, differences in policy

responses have often been explained in terms of the cultural/ideological backgrounds of successive governments (Lindstrom 2015, Myant et al. 2013). According to this analysis, however, the policy agenda and the actual implementation of reform measures were also related to the strength of organised labour and its organisational capacities. Secondly, whereas the importance of external and internal constraints to the post-2008 policy shift has been acknowledged (Bohle–Greskovitz 2012, Stanojević et al. 2016), the "embeddedness" of Slovenian state regulations in the Eurozone regime and the consequent uneven restructuring of the capacities of various local social forces to influence decision-making process have been underestimated. Thirdly, when discussing the institutional transformation of the Slovenian economy in the post 2007/08 period, the analysis should go beyond the dichotomist understanding of institutional change in terms of continuity and change to integrate the question of power relations between social forces and institutions representing them.

Acknowledgments

References

Bandelj, N. (2004): Negotiating global, regional, and national forces: Foreign investment in Slovenia. *East European Politics and Societies*, 18, 3, 1–26.

Bank of Slovenia (2015): *Report of the Bank of Slovenia on the causes of the capital shortfalls of banks*. Ljubljana: Bank of Slovenia.

Becker, J. – Jäger, J. (2012): Integration in crisis: A regulationist perspective on the interaction of European varieties of capitalism. *Competition & Change*, 16, 3, 169–187.

Becker, J. – Jäger, J. – Weissenbacher, R. (2015): Uneven and dependent development in Europe: The crisis and its implications. In Jäger, J. and Springler, E. (eds.): *Asymmetric crisis in Europe and possible futures: Critical political economy and post-Keynesian perspectives*. London and New York: Routledge, 81–97.

Bembič, B. (2013): Kolikšna je bojna pripravljenost socialnega partnerja? In Hajdini, S. (ed.): *Prvotna akumulacija med zgodovino in konceptom*. Ljubljana: Inštitut za delavske študije, 83–95.

Bluhm, K. (2010): Theories of capitalism put to the test: Introduction to a debate on Central and Eastern Europe. *Historical Social Research*, 35, 2 (132), 197–217.

Bohle, D. – Greskovits, B. (2007): Neoliberalism, embedded neoliberalism and neocorporatism: Towards transnational capitalism in Central-Eastern Europe. *West European Politics*, 30, 3, 443–466.

Bohle, D. – Greskovitz, B. (2012): *Capitalist diversity on Europe's periphery*. Cornell: Cornell University Press.

Bole, V. (2012a): Ekonomsko-politični videz in stvarnost. *Gospodarska gibanja*, 449, 6–21.

Bole, V. (2012b): Repesaž ekonomske politike. *Gospodarska gibanja*, 444, 6–14.

Bole, V. (2016): "Potencial" potencialnega produkta. *Gospodarska gibanja*, 486, 6–23.

Brenner, N. (1999): Beyond state-centrism? Space, territoriality, and geographical scale in globalization studies. *Theory and Society*, 28, 1, 39–78.

Breznik, M. – Furlan, S. (2015): Kje je Slovenija v mednarodni dolžniški krizi? In Breznik, M. – Rastko, M. (eds): *Javni dolg: Kdo komu dolguje*. Ljubljana: Založba, 169–215.

Bruszt, L. – Greskovits, B. (2009): Transnationalization, social integration, and capitalist diversity in the East and the South. *Studies in Comparative International Development*, 44, 4, 411–434.

Bugaric, B. – Kuhelj, A. (2015): Slovenia in crisis: A tale of unfinished democratization in East-Central Europe. *Communist and Post-Communist Studies*, 48, 4, 273–279.

Cardoso, F. H. (1972): Dependency and development in Latin America. *New Left Review*, 74, 1, 83–95.

Cardoso, F. H. – Faletto, E. (1979): *Dependency and development in Latin America*. California: University of California Press.

Cardoso, F. H. (2009): New paths: reflections about some challenges of globalization. *Studies in Comparative International Development*, 44, 4, 296–317.

Coates, D. (2014): Studying comparative capitalisms by going left and by going deeper. *Capital & Class*, 38, 1, 18–30.

Council of the EU (2013): *Council recommendation on the national reform program of Slovenia 2013 (C 217/75)*. Brussels: Council of the EU.

Crowley, S. and Stanojević, M. (2011): Varieties of capitalism, power resources, and historical legacies: Explaining the Slovenian exception. *Politics & Society*, 39, 8, 368–285.

DC ECOFIN (2014): *Macroeconomic Imbalances Slovenia 2014*. Occasional Papers 187, DC ECOFIN.

Dnevnik (2012): Sindikat KNG: Kam je izginilo 394 podpisov na poti od DZ do MNZ? https://www.dnevnik.si/slovenija?ved=0CBsQ0gIoATAA&usg=AFQjCNE1 iyAoFq_5eHCNSMSgx54gfjRxbQ&ei=cOsNVK3YIsSlO4v7gMgG&sa=U &p=1093 Accessed: 05/11/2012.

EUROSTAT (2017): European Statistics. http://ec.europa.eu/eurostat/ Accessed: November 15, 2017

Feldmann, M. (2014): Coalitions and corporatism: The Slovenian political economy and the crisis. *Government and Opposition*, 49, 1, 70–91.

Frank, A. G. (1966): Development of underdevelopment. *Monthly Review*, 18, 4, 17–31.

Government of the Republic of Slovenia (2010): Slovenian Exit Strategy 2010–2013.

Government of the Republic of Slovenia (2012): National reform program 2012–2013.

Grdešić, M. (2008): Mapping the paths of the Yugoslav model: Labour strength and weakness in Slovenia, Croatia and Serbia. *European Journal of Industrial Relations*, 14, 2, 133–151.

Greskovits, B. (2009): Estonia, Hungary and Slovenia: Banking on identity. In Dyson, K. – Marcussen, M. (eds.): *Central banks in the age of the Euro: Europeanization, convergence, and power*. Oxford: Oxford University Press, 203–220.

Guardiancich, I. (2012): The uncertain future of Slovenian exceptionalism. *East European Politics & Societies*, 26, 2, 380–399.

Guardiancich, I. (2016): Slovenia: The end of a success story? When a partial reform equilibrium turns bad. *Europe-Asia Studies*, 68, 2, 205–231.

Hardy, J. (2015): Explaining 'varieties of solidarity': Labour mobility and trade unions in an enlarged Europe. *Transfer: European Review of Labour and Research*, 21, 2, 187–200.

Hirsch, J. (2013): *Gospostvo, hegemonija in politične alternative*. Translated by Mojca Dobnikar. Ljubljana: Sophia.

Hirsch, J. – Kannankulam, J. (2010): The spaces of capital: The political form of capitalism and the internationalization of the state. *Antipode*, 43, 1, 12–37.

IMAD (2002): *Development Report 2002*. Ljubljana: Institut for Macroeconomic Analysis and Development.

IMAD (2016): *Development Report 2016*. Ljubljana: Institut for Macroeconomic Analysis and Development.

IMF (2016): *Republic of Slovenia*. IMF Country Report No. 16/122. Washington, D.C.

Keucheyan, R. – Durand, C. (2015): Bureaucratic Caesarism. *Historical Materialism: Research in Critical Marxist Theory*, 23, 2, 23–51.

Krašovec, A. – Johannsen, L. (2016): Recent developments in democracy in Slovenia. *Problems of Post-Communism*, 63, 5–6, 313–322.

Kržan, M. (2013): Pregled gospodarske krize v Sloveniji s poudarkom na bančnem sektorju: vzroki, ukrepi, alternative. *Borec: revija za zgodovino, literaturo in antropologijo*, 65, 698/702, 132–160.

Kržan, M. (2014): Crisis in Slovenia: Roots, effects, prospects. *METU Studies in Development*, 41, 3, 323-348.

Lapavitsas, C. (2012): *Crisis in the Eurozone*. London: Verso Books.

Lehendorff, S. (2015): Europe's divisive integration: An overview. In Lehendorff, S. (ed.): *The divisive integration: The triumph of failed ideas in Europe – revisited*. Brussels: ETUI, 7–38.

Leskošek, V. – Dragoš, S. (2014): Social inequality and poverty in Slovenia: Policies and consequences. *Družboslovne razprave*, 30, 76, 39–53.

Lindstrom, N. (2015): Wither diversity of post-socialist welfare capitalist cultures? Crisis and change in Estonia and Slovenia. *European Journal of Sociology*, 56, 1, 119–139.

Lindstrom, N. – Piroska, D. (2007): The politics of privatization and Europeanization in Europe's periphery: Slovenian banks and breweries for sale? *Competition & Change*, 11, 2, 117–135.

Mekina, B. (2012a): Lisica bi pazila na kokoši. Mladina 24, 19/10/2012.

Mekina, B. (2012b): Nazaj v leto 1988. Mladina 47, 23/11/2012.

Mencinger, J. (2004): Transition to a national and a market economy: A gradualist approach. In Mrak, M. – Rojec, M. – Silva-Jáuregui, C. (eds.): *Slovenia: from Yugoslavia to the European Union*. Washington, D.C.: The World Bank, 67–82.

Mencinger, J. – Juuse, E. – Kattel, R. (2014): *Financial regulation in Slovenia*. FESSUD Working Paper Series 58.

Myant, M. – Drahokoupil, J. (2011): *Transition economies: Political economy in Russia, Eastern Europe, and Central Asia*. Hoboken: Wiley.

Myant, M. – Drahokoupil, J. – Lesay, I. (2013): The political economy of crisis management in East–Central European countries. *Europe Asia Studies*, 65, 3, 383–410.

Nölke, A. – Vliegenthart, A. (2009): Enlarging the varieties of capitalism: The emergence of dependent market economies in East Central Europe. *World Politics*, 61, 4, 670–702.

Oberndorfer, L. (2015): From new constitutionalism to authoritarian constitutionalism: New economic governance and the state of European democracy. In Jäger, J. and Springler, E. (eds.): *Asymmetric crisis in Europe and possible futures: Critical political economy and post-Keynesian perspectives*. London and New York: Routledge, 186–207.

OECD (2013): *Economic Survey: Slovenia*. OECD.

OECD (2015): *Economic Surveys: Slovenia 2015*. OECD.

Panitch, L. – Gindin, S. (2012): *The making of global capitalism*. London and New York: Verso Books.

Pistotnik, A. – Živčič, L. (2015): Impact of international finance and other institutions on key policies of Slovenia. http://www.sinteza.co/wp-content/uploads/2015/11/07-Pri-re%C5%A1evanju-krize-smo-poslu%C5%A1ali-le-tuje-akterje-%C5%A0TUDIJA-aa.pdf Accessed: November 15, 2017

Ponikvar, N. – Tajnikar, M. – Bonča, P. D. (2014): A small EU country attempting to exit the economic crisis: Rediscovering the post Keynesian perspective on incomes and prices policy. *Journal of Post Keynesian Economics*, 36, 1, 153–173.

Rojec, M. – Šušteršič, J. – Vasle, B. – Bednaš, M. – Jurančič, S. (2004): The rise and decline of gradualism in Slovenia. *Post-Communist Economies*, 16, 4, 459–482.

Schulten, T. – Müller, T. (2015): European economic governance and its intervention in national wage development and collective bargaining. In Lehndorff, S. (ed.): *Divisive integration: The triumph of failed ideas in Europe — revisited*. Brussels: European Trade Union Institute, 331–364.

Selwyn, B. (2011): Beyond firm-centrism: Re-integrating labour and capitalism into global commodity chain analysis. *Journal of Economic Geography*, 12, 1, 205–226.

Selwyn, B. (2014): *The global development crisis*. Cambridge: Polity.

Senjur, M. (2012): Varčevalni ukrepi v Sloveniji - ekspanzivni ali recesijski? *Bančni vestnik*, 61, 7/8, 24–27.

SI-STAT (2017): Statistical Office of the Republic of Slovenia. http://www.stat.si/statweb Accessed: November 15, 2017

Stanojević, M. (2011): Social pacts in Slovenia: Accomodation to the EMU regime and the post-euro development. *Warsaw Forum of Economic Sociology*, 2, 1(3), 107–135.

Stanojević, M. (2012): The rise and fall of Slovene corporatism: Local and European factors. *Europe-Asia Studies*, 64, 5, 857–877.

Stanojević, M. (2014): Conditions for neoliberal turn: The case of Hungary and Slovenia. *European Journal of Industrial Relations*, 20, 2, 97–112.

Stanojevic, M. – Klaric, M. (2013): The impact of socio-economic shocks on social dialogue in Slovenia. *Transfer: European Review of Labour and Research*, 19, 2, 217–226.

Stanojević, M. – Mrčela, A. K. – Breznik, M. (2016): Slovenia at the crossroads: Increasing dependence on supranational institutions and the weakening of social dialogue. *European Journal of Industrial Relations*, 22, 3, 281–294.

Stockhammer, E. – Köhler, K. (2015): Linking a Post-Keynesian approach to critical political economy: Debt-driven growth, export-driven growth and the crisis in Europe. In Jäger, J. and Springler, E. (eds.): *Asymmetric crisis in Europe and possible futures. Critical political economy and post-Keynesian perspectives*. London and New York: Routledge, 34–49.

Tajnikar, M. – Bonča, P. D. (2015): Razumevanje javnega sektorja in slovenska gospodarska politika po letu 2008. *Teorija in praksa*, 52, 4, 743–758.

Taškar, B. S. – Taškar, B. B. (2014): Sanacija bank – je izvedba prve in druge sanacije vsebinsko primerljiva? *Bančni vestnik: revija za denarništvo in bančništvo*, 63, 9, 39–45.

The Economist (2013): The next domino? 13/04/2013.

Trbanc, M. – Jež, S. S. – Dremelj, P. – Boljka, U. – Lebar, L. – Narat, T. (2016):
        Socialni položaj v Sloveniji 2014–2015 (Dopolnjeno končno poročilo).
        Ljubljana: Inštitut Republike Slovenije za socialno varstvo.

UNCTAD (2017): UNCTADStat.
        http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_Ch
        osenLang=en Accessed: November 15, 2017

Europeanization in Aid for trade - The case study of EU aid for trade to Vietnam

Nguyen Trinh Thanh Nguyen

My paper gives an explanation of the term Europeanization in aid for trade in which EU Aid for Trade norms and policies may influence among EU member states with significant variation in both the depth and speed level. It provides a specific analysis of Europeanization AfT by using the results of AfT from three EU member states to Vietnam in order to indicate the common values of aid projects and different aid allocation among these countries to Vietnam. In addition, this paper provides an overview of EU AfT polices and strategy from 2006 to 2020 as well as some main achievements in recent years. My finding is that EU AfT can interfere as "soft law" to EU member states. EU institutions give a common strategy in aid for trade to support its members to build their own aid for trade polices. EU also had some common funds in AfT to ask the contribution of EU member states. In the case of AfT to Vietnam, three EU member states follow their own interests and purposes in providing aid projects/programs. However, they involve the common values of aid policies of the EU in some manners.

1. Introduction

This study on Europeanization in Aid for Trade (AfT) introduces the structure of EU AfT policies and practices, which can influence the relative convergence and divergence of EU member states. Europeanization in AfT can be indicated by the impact of socialization and capacity of member states. There is significant variation in both the depth and speed of adapting EU AfT norms among EU member states, especially between old and new member states, with recipient countries.

The case study of EU aid for trade with Vietnam provides a specific analysis of Europeanization AfT, presenting the changing of EU AfT policy and a controversial debate on the impact of EU AfT on this recipient. Consequently, this paper raises two core research questions:

1. How can "Europeanization in Aid for Trade" influence its member states?
2. What Aid for Trade activities did the EU and EU member states support with regard to Vietnam?

The first part of this paper employs the literature to explain the major definitions of Europeanization in official development assistance, and to present the concept of

Europeanization in aid for trade. It also presents some notable achievements of EU aid for trade. Following this, the study examines *recent EU aid for trade activities in Vietnam*, pointing out that a large part of EU aid for trade focuses on the support of the EU-Vietnam Free Trade Agreement (EVFTA), which may *show the convergence of EU aid for trade* in the case of this recipient. This paper describes the connections of the EU aid for trade programs in Vietnam and the milestones of the EVFTA negotiation process, which include the matching of EU aid for trade policies/activities/results and the successful rounds of bargaining leading to the EVFTA. However, the divergence of EU member states in aid for trade to Vietnam can also be identified in three specific member states (Hungary, Germany and France) which are used as typical examples for the new/old member states, and for historical relations (colonial powers and countries without colonies) with Vietnam. France is one of the biggest donors to Vietnam, and provided most of its aid as concessional loans to improve Vietnamese infrastructure, while Germany channeled its aid to expand Vietnamese energy capacity. Hungarian aid concentrated on training sectors to support Vietnamese human resources.

The paper is based on desk-based research and a comparative methodology. Both primary and secondary sources were consulted, providing the context and the insight that there is no accurate, up-to-date database of EU aid for trade in general, or in the case of EU aid for trade to Vietnam. In the first instance, EU, Vietnamese and international publications in the field were used to determine the elements and content of Europeanization in aid for trade and EU aid for trade to Vietnam. The next step of this study was thus to create a summary of EU aid for trade policy/strategy, together with the relevant developments and achievements from 2007 to 2013, and the prospects for the ensuing period (from 2014 to 2020). The paper is descriptive of EU aid for trade in this respect. The data and the previous empirical results were collected and extracted from several databases of Eurostat, the IMF, WB, Ministry of Investment and Trade, MUTRAP[1] and other data in journals and online services.

2. Literature review of Europeanization in aid for trade

2.1. An overview of EU aid for trade

Aid for Trade (AfT) is the generic concept describing development assistance provided in support of partner countries' efforts to develop their capacity to expand trade, to foster economic growth and to more effectively use trade for poverty reduction. AfT is financial assistance composed of ODA grants, loans and equity, specifically targeted at helping developing countries to develop their capacity to trade.

---

[1] In 1998, the EU started to support trade assistance to Vietnam by means of the Multilateral Trade Assistance Project (MUTRAP), which is divided into four phases by four specific projects from MUTRAP I to EU-MUTRAP (lasting until 2018).

AfT entered the WTO agenda with the Doha Development Round in 2005, in which several donors, including the EU and its Member States, made commitments to increase their trade-related support to developing countries. AfT has a broad scope, encompassing both aid directly helping beneficiaries formulate and implement trade policies and practice ("Trade Related Assistance"), and aid supporting developing beneficiaries' wider economic capacity to trade, such as through investments in infrastructure and productive sectors ("wider AfT"). The OECD has specified five main groups of activities that it considered to constitute Aid for Trade: Trade policy and Regulation (category 1), Building Productive Capacity (category 2: a subset of category 4 having a Trade Development marker), Trade Related Infrastructure (category 3) and Trade Related Adjustment (category 5). A 6th category, Other Trade Related Needs, is specifically used to account for AfT that is embedded in broader multi-sector programs, and that would otherwise not be considered by the five other categories. The EU institutions and the EU member states together provide over 50% of the world's official development assistance (OECD 2012), resulting in the EU also being the largest provider of AfT. AfT is one of the key pillars of EU development policy and includes assistance in building new infrastructure, improving ports and customs facilities and assistance in helping factories meet European health and safety standards for imports, for example. Indeed, EU AfT is based on external documents (WTO-Doha Agenda; MDGs; Paris Declaration-Aid effectiveness principles) and the EU common policy on AfT (EU AfT Strategy) guides the design of AfT programs and the implementation of their measures. The EU and its member states have a Joint Strategy on Aid for Trade from 2007 which includes the following key goals:

- Implement the commitment by EU member states and European Commission to collectively spend €2 billion annually on Trade-Related Assistance (€1 billion from EU common fund and €1 billion from EU member states).
- Enhance the pro-poor focus and the quality of EU Aid for Trade.
- Build upon, foster and support regional integration processes through Aid for Trade, including Africa, Caribbean and Pacific (ACP) countries.
- Increase EU-wide and member state capacity, in line with the globally agreed aid effectiveness principles.
- Support effective Aid for Trade monitoring and reporting.

EU AfT is financed through different instruments for different recipients, as summarized in Figure 1. As shown in Figure 1, the available EU AfT funds are divided into:

- EDF: the European Development Fund (Funding to African, Caribbean and Pacific countries during the period of 2008 to 2013, totaling €22.682 million).

–   DCI: the Development Cooperation Instrument (Funding to Latin America and Asia including Central Asia for the 2007 to 2013 period, totaling €16.897 billion).

–   ENPI: the European Neighborhood Policy Instrument (Funding to neighboring countries and Russia from 2007 to 2013 totaling €11.181 billion).

–   IPA: Pre-accession instrument (funding to the Balkans and Turkey during 2007 to 2013 totaling €11.468 billion).

Figure 1 Process of EU AfT
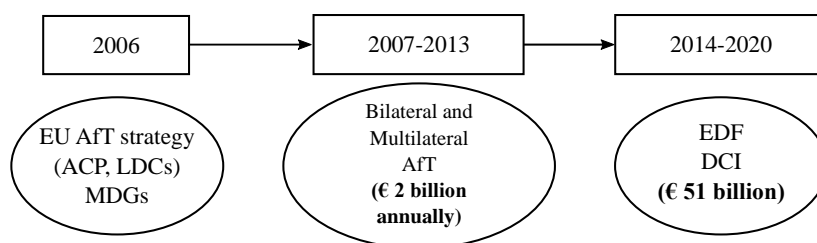
Source: own construction based on European Commission (2014a, 2016)

According to the EU Aid for Trade Report (European Commission 2016), the EU collectively increased AfT in 2014 by 8% to reach €12.7 billion. The strong increase in EU member state commitments (+33% in one year only) compensated for the large drop in the contribution of EU institutions (-50%), due to a delayed entry into force of the new European Development Fund (EDF) regulation. Among the six AfT categories, two represent more than 93% of the total EU AfT commitments: trade related infrastructure and building productive capacity. The largest category remained "trade related infrastructure", with € 6 billion of commitments in 2014 (47% of total EU collective AfT). However, the fact is that, since 2007, more than 70% of EU collective commitments have been provided by the EU institutions, Germany and France. With 34% of the total, Africa continued to receive the largest share of EU AfT in 2014, followed by Europe (23%), Asia (21%) and America (11%). In 2016, the EU and its member states started to revise their Joint Strategy on Aid for trade, dating back to 2007. In addition, in recent years, EU AfT also reflected the rolling out of recent EU Trade Agreements and updated Trade Preferences schemes with developing countries and regions.

2.2. *Europeanization in aid for trade*

The concept of Europeanization has been extensively used in the literature to explain why EU member states and candidate countries adopt or fail to adopt certain political provisions or policy level regulations, norms or "ways of doing things" advocated by the EU. The study of Europeanization was largely confined to the impact of European

integration and the governance on the member states of the EU, and the role of the EU in international relations (Schimmelfennig 2015). It means that Europeanization can influence regional and international fields on many levels. The scholars (Radealli, Wong, Sedemeier, Schimmelfennig, etc.) are certainly justified in assuming that EU organizations, policies and decisions have a relevant domestic impact on member states, states that participate in the internal market and on candidate states that must

Figure 2 Aid for Trade – EU and EU member states (in EUR million)
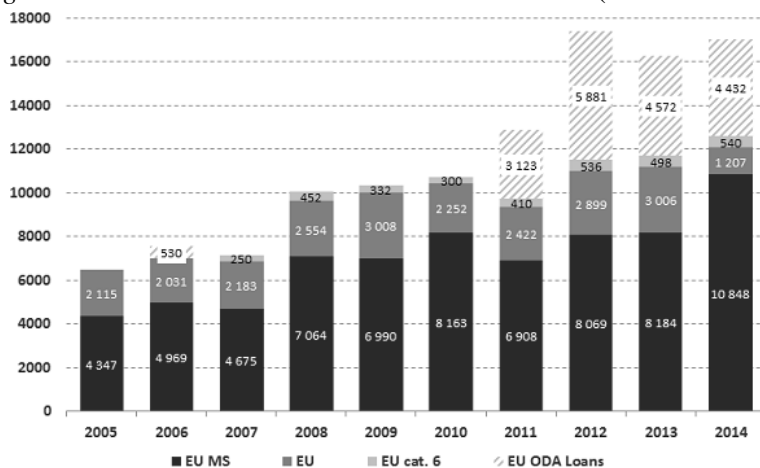
Source: European Commission (2016, p. 10)

Figure 3 Aid for Trade by type of Flow – EU and EU member states (in EUR million)
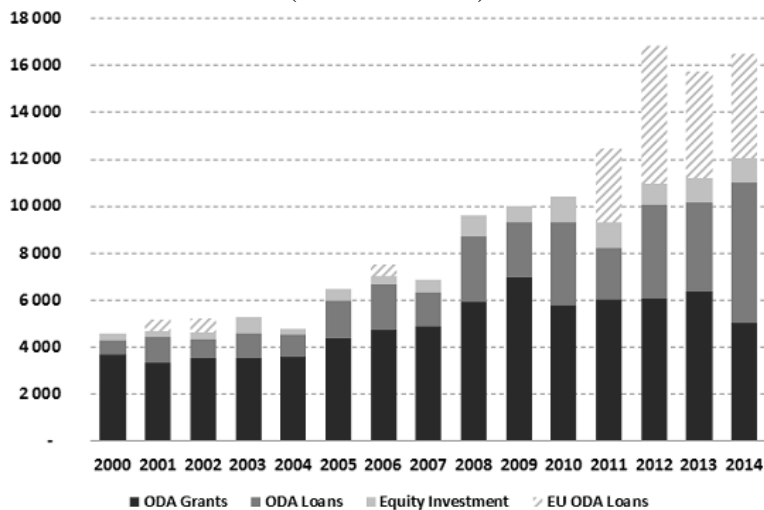
Source: European Commission (2016, p.18)

adopt the acquis communautaire to qualify for membership. The definition of Europeanization is: "a process of incorporation in the logic of domestic discourse, political structures and public policies of formal and informal rules, procedures, policy paradigms, styles, "ways of doing things", and shared beliefs and norms that are first defined in the EU policy processes' (Radaelli 2003 and Moumoutzis 2011). In addition, there is another approach of understanding and explaining the term of Europeanization which is related to bottom-up Europeanization, i.e. EU member states attempting to upload their policy agendas to the EU level (in the role of leading countries in the EU and in certain other specific cases).

Wong (2007) extended the model of Europeanization to three dimensions. Wong's concept included the top-down dimension which enables national institutions to react and adapt to the demands of the EU as the "downloading" direction. The second dimension was the bottom-up process ("uploading") used by EU member states to project their national preferences and ideas into policies created at the level of the EU. The third dimension is the process of subsequent identity reconstruction and its convergence around a shared notion of common EU identity and interest (known as "cross-loading").

The two main mechanisms for explaining this process of rule adoption are conditionality (based on rationalist institutionalism) and socialization (based on constructivist institutionalism) (Schimmelfennig–Sedelmeier 2005; Juncos 2011). Some other scholars (Radelli 2004; Borzel 2010) have developed 'the governance and policy modes' which are applied by European institutions as alternative mechanisms of Europeanization. They distinguish between governance by (1) hierarchy (2) coercion/compliance, (3) competition, and (4) cooperation-communication.

According to Orbie and Carbone (2016), numerous theoretical, methodological and empirical studies have been published on the issues of Europeanization, but the terms of Europeanization in development policy have largely been overlooked. The exceptions mostly concern articles focusing on countries in Central and Eastern Europe in the context of their accession and post-accession process. Particularly, Zemanová (2012) presented a comprehensive historical analysis of Europeanization in official development assistance (ODA) which showed the regulations and structures of the EU in ODA from the beginning to the updated documents. The author concluded that the Europeanization of development assistance occurs solely within the cooperation governance model, while the domestic change is achieved by adaptation mechanisms differing from those usually observed within other policy areas. However, there are many modalities hidden within the term, from communication and soft cooperation without any legal basis, to open coordination depending on the primary law and a multitude of secondary (legally non-biding) documents in the field of ODA. The evolution of the mode seems to be the interplay between EU member states and the community bodies, especially the EC. Lightfoot and Szent-Iványi (2015) investigated the Europeanization of international

development policies of four EU new member states (Hungary, Czech Republic, Poland and Slovakia) that have been "reluctant to adopt" the EU's development acquis. The paper concludes that the four new member states (NMS) seem less then fully engaged in integrating the EU's development acquis, and that these rules seem to have a low level of resonance with national beliefs on ODA policy. The lack of conditionality or material incentives can only partly explain the feeling that NMS are "reluctant donors". Due to lower capacities and lower interest in development policy, NMS are rather passive in making the development acquis. Consequently, the acquis in the field of EU ODA belongs to the "soft law" area, which may be expected to be light and limited to superficial absorption (Ladrech 2010).

Brazys and Lightfoot (2016) were the first to examine the emergence of the AfT norm using a Europeanization framework. The study demonstrated that the EU has uploaded AfT norms into multilateral processes rather than downloading and then disseminating them across the Union. The authors concentrated on three EU member states (Czech Republic, Germany and Ireland), showing the degree to which they have responded to the agenda promoted by the EU (through EU AfT monitoring reports, national AfT strategy…). They find considerable variation, ranging from absorption to transformation, which they see as a function of different levels of capacity and socialization: countries with lower levels of capacity and less prone to socialization effects experience shallower and less transformative Europeanization. Moreover, the capacity appears as a more influential explanatory factor in the depth of Europeanization while socialization may promote a speedier process of adaptation. Udvari (2014) evaluated the relations of aid and trade among EU old or new member states with recipient countries. The results of the gravity model indicate that the EU-15 (old members) is a more attractive market to ACP countries than the new member states: AfT provided to ACP countries has a positive influence on their exports to the EU-15, while it has no significant impact on trade with the new member states.

It can be seen that the main thrust of research on EU Aid for trade relates to the impact of EU aid for trade on recipient countries, or in the own interest of the EU as an approach to new markets, improving the quality of products, tied trade, alliances, etc. (Turner et al. 2012, Udvari 2014, Gerwan et al. 2016). These analyses and evaluations include approaches focusing on the global level as well as case studies which include theoretical and empirical contents. However, there are few studies using the concept of Europeanization to explain developments in the field of AfT.

3.   EU aid for trade to Vietnam

The EU, together with its member states, is currently the biggest donor of ODA in Vietnam. Historically, EU development aid to Vietnam has focused on poverty reduction and social issues. In 1990s, Vietnam was a weak developing economy with limited capacity for growth and internalization. Vietnamese people lived under income poverty, and hunger affected over 50% of the population in 1993. Hence, EU

ODA given to Vietnam focused on improving people's living standards. Besides these fields, the focus was also on political relations. However, after one decade of implementing a reform process, in the 2000s Vietnam experienced strong economic growth, with an annual increase in GDP of around 10%, and this has led the EU to reconsider its priorities regarding its relations with Vietnam. The focus is now more on aid for economic growth in Vietnam, leading to improved trade relations for both sides.

EU AfT is still an important capital resource for enhancing Vietnam's capacity for trade growth and integration into global trade. This is where the successful results in the case of AfT from EU to Vietnam have occurred, and both sides continue to aim for the tightening of their close trade relations. The EU has chosen AfT as one of the main types of ODA for economic development in Vietnam. Besides the good results of EU aid for trade in Vietnam, there are still several obstacles and challenges

Figure 4 EU aid disbursements evolution Vietnam
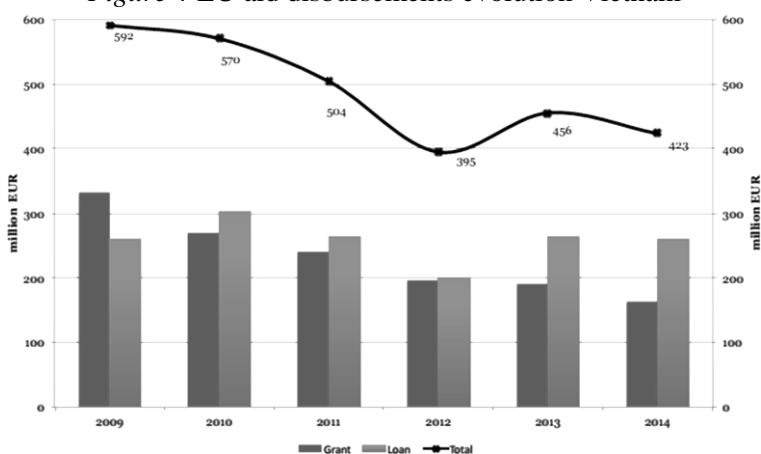
Source: European Commission (2015, p. 25)

Figure 5 Distribution of EU ODA in Vietnam by sector in 2014
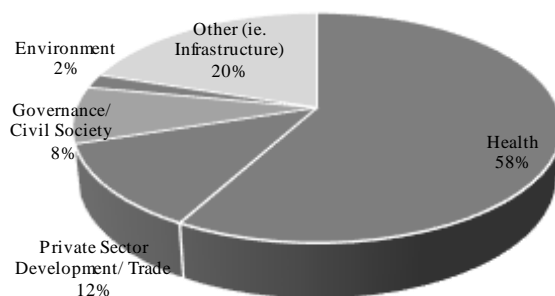
Source: European Commission (2015, p. 9)

remaining in this field, such as the long time of preparation of aid projects with the participation of several partners, which leads to increased total costs of projects and reduces the effective results. Furthermore, Vietnam and the EU have some differences in legal documents and statistical methods used in the process of conducting aid projects, from their design to evaluating the goals and achievements in each project. Consequently, both sides have had to deal with misunderstandings and confusion in implementing their aid projects. In the long run, there is no evidence of punishment or sanction from the EU if a project did not reach its stated aims. In fact, there is little research or official reporting which evaluate the influence of EU aid for trade on Vietnam which might provide recommendations on improving the effectiveness of aid allocation or in absorbing aid by actors.

Total EU aid to Vietnam in the period 2007-201 was over €4 billion with a slightly downward trend. In the early part of this period, ODA grants were significantly higher than ODA loans from the EU, but by the end of this period, loans started to dominate. This change can be explained by recent achievements of the Vietnamese economy,

Figure 6 EU aid for trade to Vietnam by category in 2014
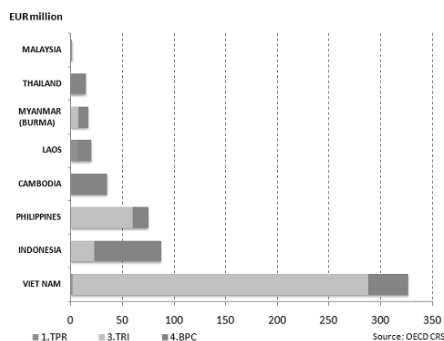
Source: European Commission (2016, p. 83)

Figure 7 EU grant commitment in Vietnam, 2015
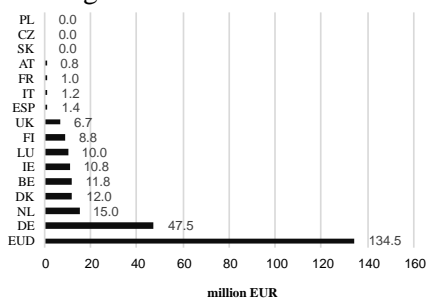
Source: European Commission (2016, p. 83)

Vietnam reaching the threshold for a low-middle income country; and the influence of the financial crisis on the EU.

In the new Vietnam development plan (2014-2020), the EU and EU member states confirmed that development aid will continue to the sectors where Vietnam is seeking progressive reforms, in order to maximize the impact of the relevant government policies. Hence, EU aid aims to contribute to Vietnam reaching its overall objective of inclusive and sustainable growth, and integration into the world economy. The goals of EU AfT in Vietnam are presented in Figure 8.

Figure 8 Goals of EU AfT in Vietnam
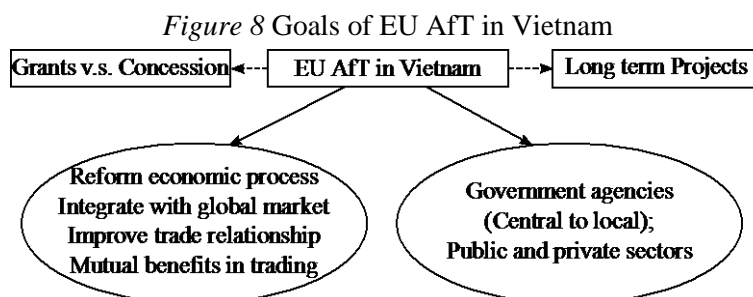
Source: EU-MUTRAP report (2016)

Recently, the EU and Vietnam negotiated and signed a bilateral agreement for free trade (EVFTA). The goals of this agreement are creating a stable and predictable entrepreneurial environment, which in turn promotes growth and employment. It has the potential to expand trade relations and investment by means of trade liberalization and better market access and by improving the business environment. The EVFTA negotiation achievements are to a large extent the results of the successful EU aid for trade projects to Vietnam. The central part of EU AfT to Vietnam is the Multilateral Trade Assistance Project (MUTRAP), which is the longest running and largest trade-related development project in the country. As the biggest contributor of trade-related assistance, since 1998, the EU has provided Vietnam with over €50 million over the four phases of MUTRAP.

The fourth phase of the MUTRAP project would help Vietnam further integrate into the global trade system and boost trade and investment ties between Vietnam and the EU, which has pledged €16.5 million of support for the period of 2012 to 2018. It is called the "European Trade policy and Investment support Project" or EU-MUTRAP. The EU will provide non-refundable aid worth 15 million euros in this period. Recently, much of the financial support for policy reform has focused on trade-related capacity building such as EVFTA negotiating capacity, EVFTA negotiation process and customs procedures. Especially improvements in regulatory quality appear to have played their intended role in the allocation of EU aid for trade, together with the improvement of the business environment.

EU-MUTRAP has committed an even larger portion of funding to aiding the preparation, negotiating and implementation of EVFTA. The EU and Vietnam launched EVFTA negotiations in June 2012. There were 14 rounds to the negotiating process before this bilateral trade agreement was signed in January 2016. The EU and Vietnam plan to implement EVFTA in early 2018 with high hopes of creating mutual benefits for both sides. Admittedly, through EU-MUTRAP, the EU supports Vietnam while extending market access for European exporters and investors, however average tariffs have fallen substantially, all thanks to the EVFTA negotiations process.

The key purpose of MUTRAP is to continue to assist Vietnam in the implementation of trade commitments which specifically focus on EVFTA. The project activities focus on the terms of building and enhancing Vietnamese capacities such as: human resources, materials, technical assistance and support agencies who will take on responsibilities in EVFTA negotiations. This project provides support for many trade-related actors from Vietnam government agencies to business associations; trade experts in universities and research institutions as well as private sectors. The main activities include teaching and transferring EVFTA-specific knowledge; and/or conducting surveys and research on facilitating Vietnamese trade and informing those in the field about the benefits of EVFTA. The activities of the project will be continuously updated as the project progresses.

In the mid-term evaluation of EU-MUTRAP, there were 20 reports, 20 publications were issued and over 130 conferences on related issues under the project were organized. According to this evaluation, the most outstanding result of the project is the improved policy framework for trade and investment in Vietnam, reflected through a series of reports supporting the construction of legal documents under the Vietnam Ministry of Industry and Trade (MOIT) and other related ministries, as well as strengthened trade co-operation between Vietnam and the EU and other partners to support the country in international integration, including integration within ASEAN. The EU-MUTRAP has also deployed six sub-projects directly financed by the European Commission. In 2014, EU-MUTRAP supported a research called "Sustainable impact assessment EU-Vietnam FTA". The research included general data on EU and Vietnamese trade to show the role of the EU market for Vietnam and vice versa. The ensuing results were the major impacts on EU and Vietnam trade sectors such as footwear, high-tech, automotive etc. following from the measures included in particular articles of EVFTA. They predict the impacts of EVFTA on trade for both sides and the potential benefits of implementing EVFTA, even recommending strategies for handling obstacles in the EVFTA process. Among the project's achievements were the listing of white asbestos on the list of banned substances under the Rotterdam Convention, Phu Quoc fish sauce being recognized as an appellation of origin product in Europe, and contributions to trade-related capacity building through research and seminars. Another example of EU-MUTRAP support is the "Vietnam Supporting Industries to EU" implemented by the Supporting

Industry Enterprises Development Centre (SIDEC) in conjunction with other development organizations. This project seeks to enhance capacity among local small and medium-sized enterprises (SMEs) in the "supporting industries", which include components and parts manufacturers, in complying with European market access requirements. Some of the activities include organizing training courses to enhance SME capacities, organizing activities to connect Vietnamese and EU businesses and supporting their participation at trade fairs and exhibitions in Vietnam and the EU. Since 2014, a quarterly EU-MUTRAP Newsletter has been published to present the studies and developments in EU and Vietnamese trade, many of which are related to EVFTA issues. The quarterly Newsletter summarizes recent specific EU-MUTRAP activities and introduces the activities for the following quarter. It is one of the most important and useful publications providing information on EVFTA.

EU-MUTRAP is therefore working on a number of issues to improve local SME potential, such as branding and marketing strategies, distribution and market access strategies, as well as information networks across the country to create enhanced export-focused trade sectors. A highlight of the project is the technical assistance extended to improve the local investment environment, focusing on environmental and social issues in trade and investment-related policies and legislation.

By the end of the project's lifetime, both Vietnam and the EU can expect significant results, including the strengthening of EU-Vietnamese trade and investment relations, the improvement of the investment policy framework, and greater access to information, regulations, and market opportunities in relation to Vietnam's international trade and investment commitments being enhanced.

Following the priorities of EU trade policies towards Vietnam, the EU uses aid for trade projects to support and to change the context of Vietnamese trade, as shown by the EU-MUTRAP and EFVTA.

During the EVFTA negotiation process, EU-MUTRAP supported many related activities to inform EVFTA discussions, promote EVFTA rounds and to reach conclusions. Obviously, these activities exerted influence on the achievements of the EVFTA process. Nevertheless, enhancing Vietnam trade capacity can be seen as an undirected method of influencing EVFTA by EU-MUTRAP. EU-MUTRAP implemented the effective methods of decentralized aid project management and coordination mechanisms, making use of local experts, cost cutting, evaluation reports, and research and publications that can attract diverse actors from both sides to jointly monitor EU-MUTRAP in the field as it supports the EFVTA process. Combining with EVFTA, "EU-MUTRAP" provides the foundation for the imminent EVFTA. The effective method of delivering EU aid in the EU-MUTRAP project is enhancing human resources in Vietnam, especially those involved in the realm of trade and trade policy.

However, weaknesses in the links between EU-MUTRAP and the EVFTA process include the lack of funding and supervision for sub-projects, and weak

exchanges of information between stakeholders. Both sides may focus on tightening criteria for the selection of project beneficiaries, strengthening activities in the business community and improving the diversification of implementation methods. The project could include the more directed substance of EVFTA in its activities, while supporting the business sector in preparing for the impact of the FTA between Vietnam and the EU.

4.   Comparative AfT progress of three EU members states to Vietnam

4.1. Hungarian ODA to Vietnam

Vietnam and Hungary established diplomatic ties in 1950. The two countries have been maintaining traditional friendship-based cooperation ever since. After Hungary's institutional transition, in the early 1990s, relations between the two countries saw little development. Since 1992, this relationship has been gradually improving. Vietnam is one of the main Hungarian development cooperation partners. It is a reference country for the European Union's (EU) development activities regarding policy harmonization and implementation, and is also a pilot country for the "One-EU" initiative. From 2010 to 2014, Hungary's ODA to Vietnam focused on cooperation in the field of health care and the field of education and training. Although there were no AfT projects between Hungary and Vietnam in the last project term turning to the new period (2014–2020), Hungary ODA aims to use most of its ODA to fund enhancing trade relations with this recipient.

Since 2003, Hungary has considered Vietnam one of the strategic partners in its ODA policy. In 2005, the two sides signed a framework agreement on cooperation and development to confirm common principles for supplying and receiving Hungary's ODA to Vietnam. Hungary had an ODA country strategy for Vietnam (CSP) which was drafted for 2008–2010. The International Development Cooperation Strategy and Strategic Concept for International Humanitarian Aid of Hungary for the period 2014–2020 affirm that: "Hungary attaches special importance to its ties with Vietnam and is willing to support the country in its development". Hungary considers Vietnam an important partner in the South East Asian region, not only in the past or the present, but also in the future. Currently, projects worth €35 million (US$49 million) are under preparation for water supplies and sewage treatment in three Vietnamese provinces. Another project will assume the form of Hungarian assistance in carrying out population registration. In the future, the two sides may assess the possibility of expanding the scope of this type of ODA assistance to the health sector by using Hungarian expertise in constructing and equipping a hospital. The Hungarian Government recently approved the provision of official development assistance (ODA) for the Can Tho tumor hospital project and the Red River clean water supply project, scheduled to commence in 2016, which the Hungarian government promises to fund with around €60 million.

Table 1 Hungary ODA disbursements 2007–2014 to Vietnam (in million €)

	2009	2010	2011	2012	2013	2014
Grants	0.1	0.1	0.1	0	0	na
Loans	0	0	0	10	10	na
Total	0.1	0.1	0.1	10	10	-
% Grants	100	100	100	0	0	-

Source: The Blue Book (2014, 2015, p. 47)

Hungarian ODA to Vietnam is usually included in the list of diplomatic activities which is offered as proof of the commitment of the Hungarian government when official visits are paid to Vietnam. Hence, there is a gap or delay in the implementation of the pledges. The Hungarian embassy in Vietnam takes the role of Hungary delegate in its ODA programs to this recipient. Recently, the change in bilateral development cooperation with Vietnam can be seen in the larger amount of ODA in each project and grant being replaced by tied aid, credit or concession loans. Both sides need to set up a general process or model in macro level (government agencies) that can give a framework for the management, evaluation and monitoring of their development cooperation projects, so that Hungary can ensure repayment by Vietnam of its relief loans. In the new project term, Hungarian aid to Vietnam concerns itself much more with economic benefits than the priorities of selecting ODA projects that constitute aid for trade, in helping both Hungary and Vietnam to expand their markets and obtain benefits from their mutual trade.

4.2. *German ODA to Vietnam*

Germany is Vietnam's third largest bilateral aid donor (behind Japan and France). The development cooperation focuses on the priority areas of vocational training, energy and the environment (see Figure 9), which is invariably fostered by Vietnam's Green Growth Strategy. German aid to Vietnam contributes to increasing the supply of sustainable energy as one of the core tools for improving economic infrastructure and industrialization. The two countries are also working together to ensure that Vietnam has a well-trained workforce. Specifically, they choose laborers in the industrial sector and vocational college, as these can benefit from German aid to Vietnam. Germany has differed in its allocation of aid compared to EU aid to Vietnam. Grants fluctuated during the period 2014-2020. Grants sharply declined in number until 2013 but it rebounded in 2014. In 2015, Germany pledged Vietnam funding worth approximately 220 million over a period of two years.

Germany is one of Vietnam's principal trading partners in the EU. In 2016, bilateral trade reached nearly €10 million. Therefore, the EVFTA will open new opportunities for both sides. Germany should expand its aid allocation to support the implementation of the EVFTA process.

Table 2 German ODA disbursements 2007-2014 to Vietnam (in million €)

	2009	2010	2011	2012	2013	2014
Grants	27.8	4.0	5.6	2.9	3.1	24.2
Loans	19.7	15.3	15.4	21.6	48.3	87.3
Total	47.5	19.3	21.0	24.5	51.4	111.5
% Grants	58.53	20.73	26.67	11.84	6.03	21.70

Source: The Blue Book (2015, p. 45)

Figure 9 German ODA by sectors to Vietnam
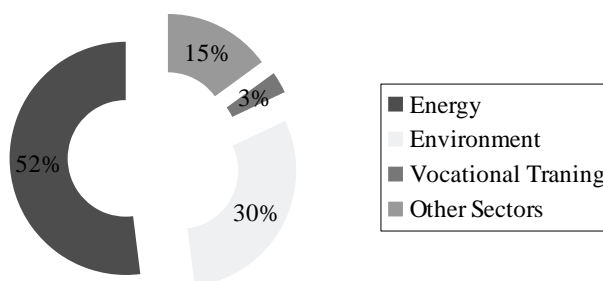
Source: The Blue Book (2015, p. 45)

4.3.4.3. French ODA to Vietnam

Vietnam was part of the French empire in the years between 1887 and 1940. France and Vietnam have long-standing ties. France was one of the first Western countries to support Vietnam's policy of renewal and has been supporting its commitment to international trade for over 20 years. Regarding development assistance, France is a leading European donor for Vietnam. France is the second largest historical bilateral donor for Vietnam, just behind Japan, with €1.5 billion in cumulative aid since 1993.

The French Development Agency (AFD) has the main role of financing and monitoring French aid to Vietnam. Present in Vietnam since 1994, AFD has funded 79 projects. Starting with its aid for rural development, ADF's support for Vietnam expanded to infrastructure development in the sectors of energy, transport, clean water and drainage (see Figure 10). In 2014, AFD pledged €89.3 million to Vietnam. Of these funds, €69 million went to the urban railway project in Ha Noi. In addition, €20 million was pledged for a support program to respond to climate change which aimed to include climate change adaptation to development policies for Vietnam. Complementing this support, ADF provides financing either to banks and financial institutions, including microfinance institutions, or via functional budget support (financial sector reform, small and medium enterprises development). The aim is to scale up financing for these actors, and to modernize their management and adapt to

Table 3 French ODA disbursements 2007-2014 to Vietnam (in million €)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Grants	39.5	2.39	9.1	6.8	7.7	5.8
Loans	168.5	179.32	159.0	114.1	139.4	131.6
Total	208.0	186.7	168.1	120.9	147.1	137.4
% Grants	19.0	4.0	5.4	5.6	5.2	4.2

Source: The Blue Book (2015, p. 43)

Figure 10 French ODA by sectors to Vietnam
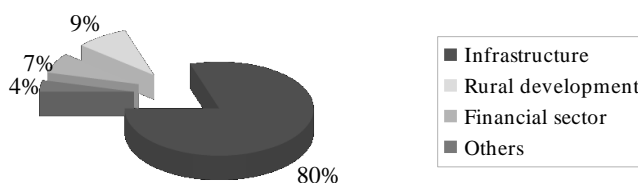
Source: European Commission (2015, p. 43)

international norms (compliance with prudential rules, social and environment protection, anti-money laundering and combating the financing of terrorism).

EU member states have their own policies and organizations for implementing aid projects in Vietnam. The differences in historical relations and capacity could be factors influencing the changes of their aid allocations/deliveries or priorities with regard to this recipient. Hungary, as a smaller economy, thus concentrated only on enhancing Vietnamese human resources with quite small aid amounts. Germany and France funded varieties of sectors in which France provided concessional loans to improve Vietnamese infrastructure, while Germany channeled its aid to expand Vietnamese energy capacity. These aid projects can be considered AfT, but it is hard to recognize their AfT volumes. Europeanization is evidenced in the three states in choosing Vietnam as a strategic partner of development cooperation and helping Vietnam to integrate into the global market (reform economic structure, support to private sector and SMEs). The common voice of the EU and these three member states can support the transfer of their normative values of democracy and human rights and sustainable development (environment protection, green energy etc.) in many aid projects to Vietnam. Combining EU aid and the aid from EU member states can lead to positive impacts for Vietnamese economic growth and increasingly close relations between the EU and Vietnam. The results of their assistance are also opening up new opportunities for the benefit of their mutual trade as the connection between EU-MUTRAP and the progress of EVFTA has displayed.

5. Conclusion

Europeanization aims to explain the interactions among the EU and its member states. The Europeanization of AfT is still lacking in research, however, there is some research that mentions the case of EU AfT to Vietnam and includes an evaluation of EU AfT to Vietnam in general and in the specific EU member states.

The EU creates AfT projects to support and to change Vietnam's trade circumstances such as the relations between EU-MUTRAP and EFVTA demonstrate. EU AfT supports many related activities to inform EVFTA discussion, promote EVFTA rounds, and to reach conclusions. It can be seen that these activities are directed towards influencing the EVFTA process. Moreover, enhancing Vietnamese trade capacity can be seen as the biggest contribution of EU-MUTRAP by successfully impacting on trade-related human resources (Vietnamese elites and other actors). EU AfT projects have implemented the effective methods of decentralized aid project management and coordination mechanisms, using local experts, cost cutting, evaluation reports, research and publications that can attract and diversify actors from both sides to jointly monitor EU AfT in Vietnam. As a result, it is not only helpful for projects to Vietnam but can also serve as a role-model for EU member states in running their own aid projects in Vietnam.

The EU has an AfT strategy and common AfT funds to use in development cooperation. EU AfT "soft law" aims to influence and evaluate the contribution of EU member states.

In the case of AfT to Vietnam, three EU member states follow their own interests and purposes in providing aid projects/programs. However, they involve the common values of aid policies of the EU in some manner. In summary, the EU's ongoing contributions support effective relations with Vietnam.

However, weaknesses in the connection of EU AfT in Vietnam include the lack of funding and supervision for sub-projects, and the weak exchange of information among stakeholders. Therefore, both sides should focus on tightening criteria for the selection of project beneficiaries, strengthening activities in the business community and improving the diversification of implementation methods. Recently, the EU has been faced with rising skepticism towards harmonization among EU member states after Brexit. Consequently, EU AfT can expect new challenges in implementing underlying EU policies. Finally, the concept of Europeanization in AfT requires more research, especially for this new period of uncertainty in the EU.

References

Akiko, S. E and Verdier, T. (2007): Aid and trade. *Oxford review for Economic Policy*, 23, 3, 481–507.

Basnett, Y., Engel, J., Kennan, J., Kingombe, C., Massa, I. and te Velde, D. W. (2012): *Increasing the effectiveness of Aid for Trade: The circumstances under which it works best*. Working Paper, 353, Overseas Development Institution.

Brazys, S. and Lightfoot, S. (2015): Europeanization in Aid for Trade: The impact of capacity and socialization. *European Politics and Society*, 17, 1, 120–135.

Cadot, O., Fernandes, A., Gourdon, J., Mattoo, A. and de Melo, J. (2014): Evaluating Aid for Trade: A survey of recent studies. *The World Economy*, 37, 4, 516–529.

Cali, M. and te Velde, D. W. (2009): *Does Aid for Trade really improve trade performance*. London: Overseas Development Institute.

European Commission (2016): *Aid for trade Report: Review of progress by the EU and its Member States*. Brussels, European Commission.

European Commission (2013): *EU Blue Book. European Union Development Activities in Vietnam*. Brussels, European Commission.

European Commission (2014a): *Aid for trade Report: Review of progress by the EU and its Member States*. Brussels, European Commission.

European Commission (2014b): *EU Blue Book. European Union Development Activities in Vietnam*. Brussels, European Commission.

European Commission (2015): *EU Blue Book. European Union Development Activities in Vietnam*. Brussels, European Commission.

Featherstone, K. – Radaelli, C. M. (2003): *The Politics of Europeanization*. Oxford: Oxford University Press.

Ladrech, R. (2010): *Europeanization and National Politics*. Basingstoke: Palgrave Macmillan.

Hoang, H. H. (2014): Aid darling and the European Union's aid allocation policy: The case of Vietnam. *Asia and Europe Journal*, 12, 301–324.
    http://mutrap.org.vn/index.php/en. Date of access: 25th January 2017

Lightfoot, S. and Szent-Iványi, B. (2014): Reluctant donors? The Europeanization of international development policies in the new members. *Journal of Common Market Studies*, 52, 6, 1–16.

Moumoutzis, K. (2011): Still fashionable yet useless? Addressing problems with research on the Europeanization of foreign policy. *Journal of Common Market Studies*, 49, 3, 607–629.

Nguyen, B. D. (2014): *Forecasting impacts of the European—Vietnam free trade agreement on Vietnam's economy*. Hanoi: Foreign Trade University.

Nguyen, Q. T. (2016): Foreign direct investment in Viet Nam under the impact of EVFTA. *Communist Review*, 877, …

Orbie, J. and Carbone, M. (2106): The Europeanisation of development policy. *European Politics and Society*, 17, 1, 1–11.

Radealli, C. M. (2004): Europeanization: Solution and problem? European Integration online Papers, 8, 16.

Schimmelfennig, F. and Sedelmeier, U. (2005): *The Europeanization of Central and Eastern Europe*. Cornell University Press.

Schimmelfennig, F. (2015): Europeanization beyond Europe. *Living Reviews in European Governance*, 10, 1, 1–28.

Seldemmeier, U. (2011): Europeanization in new member and candidate states. *Living Reviews in European Governance*, 6, 1, 4–23.

Sicurelli, D. (2015): The EU as a norm promoter through trade: The perceptions of Vietnam elites. *Asia and Europe Journal*, 13, 23–39.

Turner, L. and Rovamaa, L. (2012): *Aid for Trade: Reviewing EC and DFID Monitoring and Evaluation Practices*. London: Saana Consulting, Traidcraft and CAFOD.

Udvari, B. (2014): Impacts of Aid for Trade on trade with the EU: The role of old and new member states. *Journal of Global Policy and Governance*, volume/issue (3): 77–93.

Wong, R. Y. P. (2007): Foreign Policy. In Graziano, P. and Vink, M. P. (eds.): *Europeanization: New Research Agendas*. Basingstoke and New York: Palgrave Macmillan, 321–334.

Zemanová, Š. (2012): The Europeanization of official development assistance: EU governance by cooperation communication and domestic change. *Eastern Journal of European Studies*, 3, 1, 31–47.

http://mutrap.org.vn/index.php/en

www.oecd.org/dataoecd/11/41/34428351.pdf

http://trade.ec.europa.eu/doclib/docs/2015/september/tradoc_153808.pdf.

PART TWO

Monetary and fiscal policy

An empirical analysis of Euro Hungarian Forint exchange rate volatility using GARCH

Ngo Thai Hung

The paper aims to analyse and forecast Euro Hungarian Forint exchange rate volatility with the use of generalised autoregressive conditional heteroscedasticity GARCH-type models over the period from September 30, 2010 to January 02, 2017. This model is the extension of the ARCH process with various features to explain the obvious characteristics of financial time series such as asymmetric and leverage effect. In applying EUR/HUF with this model, we performed both estimation and forecast.

Keywords: Volatility, GARCH, EURHUF, Volatility forecast

1. Introduction

In recent years, the study of the volatility of a market variable measuring uncertainty about the future value of the variable has played a prominent part in monitoring and assessing potential losses. Quantitative methods measuring the volatility of the Euro Hungarian Forint exchange rate have received the most attention because of its role in determining the price of securities and risk management. Typically, a series of financial indices have different movements in a certain period. This means that the variance of the range of financial indicators changes over time. The Euro Hungarian Forint exchange rate is one of the most crucial markets by market capitalization and liquidity in central Europe.

According to Econotimes (2016): "the momentum of Hungarian economic growth is likely to slow in 2016, following a strong expansion of 3 percent last year. The Hungarian economy will be impacted by the warning of the regional auto industry boom, pausing of EU fund inflow in 2016 before picking up again in 2017 and the risk to the German economy from developments in China. The end of easing cycle is expected to result in a stable forint in the coming quarters. However, the currency is likely to face slight upward pressure from Brexit related uncertainties. The EUR/HUF is likely to trade at 322 by the end of 2016, stated Commerzbank. Persistent low inflation is expected to renew rate cut expectations in the coming year. Such a development, combined with an expected deceleration of the GDP growth in 2016, is expected to exert upward pressure on the EUR/HUF pair by the end of 2016". Therefore, the investigation of the volatility of the Euro Hungarian Forint exchange rate is timely indeed.

As Bantwa (2017) mentions, for most investors, the prevailing market turmoil and a lack of clarity on where it is headed are a cause for concern. The majority of investors in markets are mainly concerned about uncertainty in gaining expected returns as well as volatility in returns. Diebold et al. (2003) provide a framework for integrating high-frequency intraday data into the measurement, modeling, and forecasting of daily and lower frequency return volatilities and return distributions. Use of realized volatility computed from high-frequency intraday returns permits the use of traditional time series methods for modeling and calculating.

Banerjee and Kumar (2011) focus on comparing the performance of conditional volatility model GARCH and Volatility Index in predicting underlying volatility of the NIFTY 50 index. Using high-frequency data, the underlying volatility of the NIFTY50 index is captured. Several approaches to predicting realized volatility are considered.

Wiphatthananananthakul and Songsak (2010) estimated ARMA-GARCH, EGARCH, GJR and PGARCH models for the Thailand Volatility Index (TVIX), and drew comparisons in forecasting between the models. GARCH model has become a key tool in the analysis of time series data, particularly in financial applications. This model is especially useful when the goal of the study is to analyze and forecast volatility according to Degiannakis (2004). With the generation of GARCH models, it is able to reproduce another, very vital stylised fact, which is volatility clustering; that is, big shocks are followed by big shocks.

In this paper, we applied GARCH model to estimate, compute and forecast EUR/HUF volatility. Nevertheless, it should be pointed out that several empirical studies have already examined the impact of asymmetries on the performance of GARCH models. The recent survey by Poon and Granger (2003) provides, among other things, an interesting and extensive synopsis of these. Indeed, different conclusions have been drawn from these studies. The rest of the paper proceeds as follows: the concept of volatility and GARCH model are described in the next section, and the final section will discuss results and offer a conclusion.

2.   Theoretical Background, Concept and Definitions

2.1. Definition and Concept of Volatility

Hull (2015, p. 201) states that "the volatility σ of a variable is defined as the standard deviation of the return provided by the variable per unit of time when the return is expressed using continuous compounding. When volatility is used for option pricing, the unit of time is usually one year, so that volatility is the standard deviation of the continuously compounded return per year. However, when volatility is used for risk management, the unit of time is usually one day, so that volatility is the standard deviation of the continuously compounded return per day."

In general, $\sigma\sqrt{T}$ is equal to the standard deviation of $ln\left(\frac{S_T}{S_0}\right)$ where S_T is the value of the market variable at time T and S_0 is its value today. The expression $ln\left(\frac{S_T}{S_0}\right)$ equals the total return earned in time T expressed with continuous compounding. If σ is per day, T is measured in days, if σ is per year, T is measured in years".

The volatility of EUR/HUF variable is estimated using historical data. The returns of EUR/HUF at time t are calculated as follows:

$$R_i = ln\frac{p_i}{p_{i-1}}, i = \overline{1,n}$$

where p_i and p_{i-1} are the prices of EUR/HUF at time t and $t-1$, respectively. The usual estimates s of the standard deviation of R_i is given by

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(R_i - \bar{R})^2}$$

where $\bar{R}$ is the mean of R_i.

As explained above, the standard deviation of R_i is $\sigma\sqrt{T}$ where σ is the volatility of the EUR/HUF.

The variable s is, therefore, an estimate of $\sigma\sqrt{T}$. It follows that σ itself can be estimated as $\hat{\sigma}$, where $\hat{\sigma} = \frac{s}{\sqrt{T}}$

The standard error of this estimate can be shown to be approximately $\frac{\hat{\sigma}}{\sqrt{2n}}$. T is measured in days, the volatility that is calculated is daily volatility.

2.2. GARCH Model

The GARCH model by Bollerslev (1986) imposes important limitations, not to capture a positive or negative sign of u_t, as both positive and negative shocks have the same impact on the conditional variance, h_t, as follows

$$u_t = \eta_t\sqrt{\sigma_t}$$
$$\sigma_t^2 = \omega + \sum_{i=1}^{p}\alpha_i u_{t-1}^2 + \sum_{j=1}^{q}\beta_j\sigma_{t-j}^2$$
where $\omega > 0, \alpha_i \geq 0$, for $i = \overline{1,p}$

and $\beta_j \geq 0$ for $j = \overline{1,q}$ are sufficient to ensure that the conditional variance, σ_t is non-negative. For the GARCH process to be defined, it is required that $\omega > 0$. Additionally, a univariate GARCH(1,1) model is known as ARCH(∞) model (Engle 1982) as an infinite expansion in u_{t-1}^2. α represents the ARCH effect and β represents the GARCH effect. GARCH(1,1) model, σ_t^2 is calculated from a long-run average variance rate, V_L, as well as from σ_{t-1} and u_{t-1}. The equation for GARCH(1,1) is

$$\sigma_t^2 = \gamma V_L + \alpha u_{t-1}^2 + \beta \sigma_{t-1}^2$$

where γ is the weight assigned to V_L, α is the weight assigned to u_{t-1}^2 and β is the weight assigned to σ_{t-1}^2. Since the weights must sum to one, we have $\gamma + \alpha + \beta = 1$.

2.3. Volatility forecasting

There is a broad and relatively new theoretical approach that attempts to compare the accuracies of different models for conducting out-of-sample volatility forecasts. Akgiray (1989) observed the GARCH model to be superior to ARCH, exponentially weighted, moving average and historical mean models for forecasting monthly US stock index volatility.

West and Cho (1995) indicated that the apparent superiority of GARCH used one-step-ahead forecasts of dollar exchange rate volatility, although for longer horizons, the model behaves no better than its counterparts. Specifically, Day and Lewis (1992) examined GARCH and EGARCH models in depth and considered their out-of-sample forecasting performance for predicting the volatility of stock index.

Arowolo (2013) concluded that the Optimal values of p and q in a GARCH(p,q) model depends on location, the types of the data and model order selected techniques being used. The model that Day and Lewis (1992) employed was a so called a 'plain vanilla' GARCH(1,1):
$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 h_{t-1}$
when they applied the properties of linear GARCH model for daily closing stocks prices of Zenith bank PlC on the Nigerian stocks exchange.

2.4. Data Description

The data for our empirical investigation consists of the EUR/HUF index transaction prices obtained from Bloomberg, accounted by the Department of Finance, Corvinus University of Budapest, the sample period being from September 30, 2010 to January 02, 2017 which constitutes a total of $n = 1654$ trading days. For the estimation, we use the daily returns of EUR/HUF to estimate GARCH(1,1) by using Eview 7.0 software.

3. Results

3.1. Descriptive Statistics

The descriptive statistics of daily logarithmic returns of the EUR/HUF is given in Table 1. The average return of EUR/HUF is positive. A variable has a normal distribution if its skewness statistic equals zero and its kurtosis statistic is 3, but the return of EUR/HUF has a positive skewness and high kurtosis, suggesting the presence of fat tails and a non-symmetric series. Additionally, as we can see, the Jarque-Bera normality test rejects the null hypothesis of normality for the sample, this

means we can draw a conclusion that the return of EUR/HUF is not normally distributed. The relatively large kurtosis indicates non-normality, and that the distribution of returns is leptokurtic.

Table 1 Descriptive statistics of EUR/HUF Returns

Mean	Std. Dev	Skewness	Kurtosis	Max	Min
0.000068	0.005235	0.087168	4.479947	0.022156	-0.021550
Jarque-Bera			153.0389		
Probability			0.000000		

Source: own construction

Figure 1 depicts the histogram of daily logarithmic return for EUR/HUF. From this histogram, it appears that EUR/HUF returns have a higher peak than the normal distribution. In general, Q-Q plot is used to identify the distribution of the sample in the study, it compares the distribution with the normal distribution and indicates that EUR/HUF returns deviate from the normal distribution.

Figure 1 Histogram and Q-Q Plot of Daily Logarithmic EURHUF returns
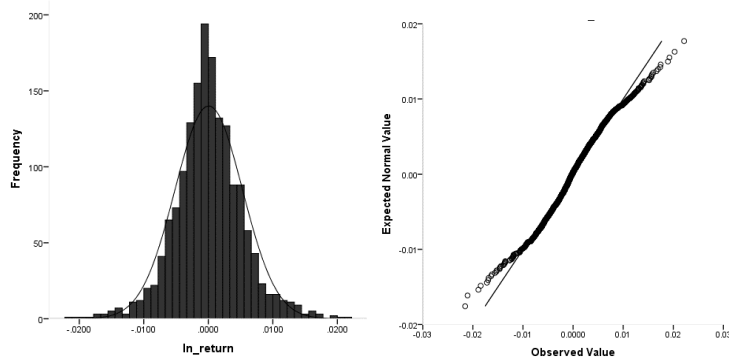
Source: own construction

Figure 2 Daily price and EURHUF returns
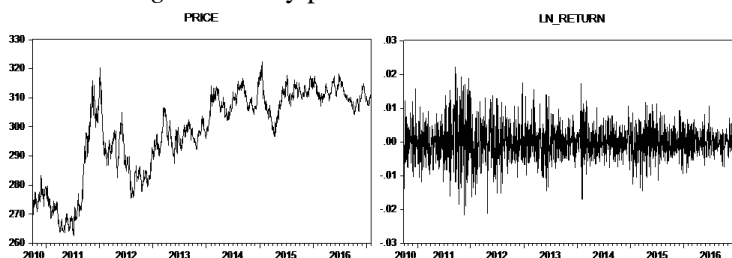
Source: own construction

Figure 2 presents the plot of price and EUR/HUF returns. This indicates some circumstances where EUR/HUF returns fluctuate.

The unit root tests for EUR/HUF returns are summarized in Table 2. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to test the null hypothesis of a unit root against the alternative hypothesis of stationarity. The tests have large negative values of statistics in all cases at levels such that the return variable rejects the null hypothesis at the 1 per cent significance level, and therefore, the returns are stationary.

Table 2 Unit root test for Returns of EUR/HUF

Test	None	Constant	Const & Trend
Phillips-Perron	-43.07319	-43.07511	-43.06830
ADF	-42.82135	-42.81734	-42.80833

Source: own construction

3.2. Estimation

Table 3 represents the ARCH and GARCH effects from statistically significance at 1 per cent level of α and β. It shows that the long-run coefficients are all statistically significant in the variance equation. The coefficient of α appears to show the presence of volatility clustering in the models. Conditional volatility for the models tends to rise (fall) when the absolute value of the standardized residuals is larger (smaller). The coefficients of β (a determinant of the degree of persistence) for all models are less than 1, showing persistent volatility.

Table 3 GARCH on Returns of EUR/HUF

GARCH					
Mean Equation			**Variance Equation**		
	Coefficient	z-statistics		Coefficient	z-statistics
Constant	0.000022	0.205460	ω	0.000000163	2.468227 (0.0136)
Mean			α	0.054850	6.529890 (0.0000)
			β	0.938494	101.6264 (0.0000)

Source: own construction

GARCH(1,1) model is estimated from daily data as follows

$$\sigma_t^2 = 0.000000163 + 0.054850u_{t-1}^2 + 0.938494\sigma_{t-1}^2$$

Since $\gamma = 1 - \alpha - \beta$, it follows that $\gamma = 0.000656$ and, since $\omega = \gamma V_L$, we have $V_L = 0.000024489$. In other words, the long-run average variance per day implied by the model is 0.000024489. This corresponds to a volatility of $\sqrt{0.000024489} = 0.004948$ or 0.49%, per day.

3.3. Forecasting Results Using GARCH (1,1) Model

The selected model $\sigma_t^2 = 0.000000163 + 0.054850u_{t-1}^2 + 0.938494\sigma_{t-1}^2$ has been tested for diagnostic checking and there is no doubt of its accuracy for forecasting based on residual tests. We can use our model to predict the future volatility value. Figures 3 and 4 show the forecast value. It can be seen that the forecast of the conditional variance indicates a gradual decrease in the volatility of the stock returns. The dynamic forecasts show a completely flat forecast structure for the mean, while at the end of the in-sample estimation period, the value of the conditional variance was at a historically lower level relative to its unconditional average. Therefore, the forecast converges upon their long term mean value from below as the forecast horizon decreases. Notice also that there are no $\pm$ 2-standard error band confidence intervals for the conditional variance forecasts. It is evidence for static forecasts that the variance forecasts gradually fall over the out–of sample period, indeed they show much more volatility than for the dynamic forecasts (see Figure 3 and Figure 4).

Figure 3 Static forecasts of the conditional variance
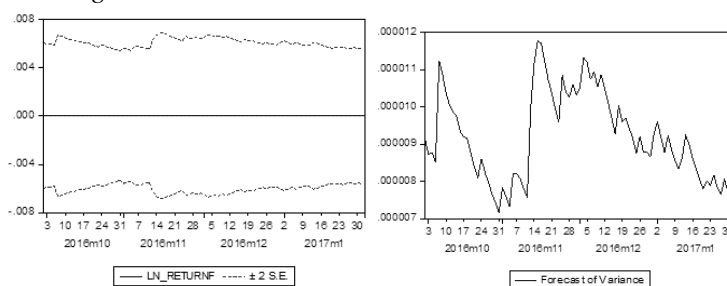
Source: own construction

Figure 4 Dynamic forecasts of the conditional variance
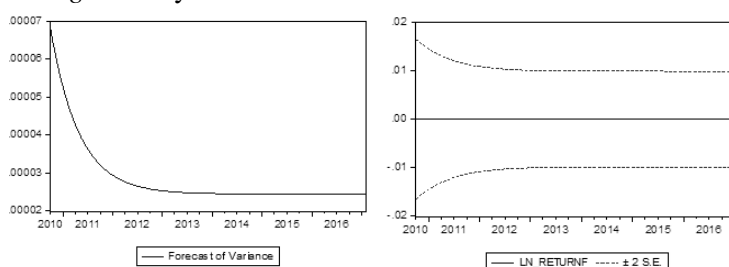
Source: own construction

4. Conclusion

This paper estimates the volatility of the Euro Hungarian Forint exchange rate returns using GARCH model from the seemingly complicated volatility formula established by Bollerslev (1986). The results of statistical properties obtained supported the claim that the financial data are leptokurtic. The GARCH model was identified to be the most appropriate for the time-varying volatility of the data. The results from an empirical analysis based on the Euro Hungarian Forint exchange rate showed the volatility is 0.49% per day. Additionally, the results of forecasting conditional variance indicate a gradual decrease in the volatility of the stock returns. This is in contrast to the findings of Wiphatthananananthakul and Songsak (2010).

References

Akgiray, V. (1989): Conditional heteroskedasticity in time series of stock returns: Evidence and forecasts. *Journal of Business*, 62, 1, 55–80.

Arowolo, W. B. (2013): Predicting stock prices returns using GARCH Model. *The International Journal of Engineering and Science*, 2, 5, 32–37.

Banerjee, A. – Kumar, R. (2011): Realized volatility and India VIX, IIM Calcutta. *Working Paper Series*, No. 688.

Bantwa, A. (2017): A study on India volatility index (VIX) and its performance as risk management tool in Indian Stock Market. *Indian Journal of Research*, 6, 1, 248–251.

Bollerslev, T. (1986): Generalized autoregressive heteroskedasticity. *Journal of Econometrics*, 31, 3, 307–327.

Day, T. E. – Lewis, C. M. (1992): Stock market volatility and the information content of stock index options. *Journal of Econometrics*, 52, 1-2, 267–87.

Degiannakis, S. (2004): Forecasting realized intraday volatility and value at Risk: Evidence from a fractional integrated asymmetric Power ARCH Skewed t model. *Applied Financial Economics*, 14, 18, 1333–1342.

Diebold F. X. – Andersen T. – Bollerslev T. – Labys, P. (2003): Modelling and forecasting realized volatility. *Econometrica*, 71, 2, 529–626.

Econotimes (2016): Hungarian economic growth to slow in 2016; EUR/HUF likely to face mild upward pressure. Retrieved from http://www.econotimes.com/Hungarian-economic-growth-to-slow-in-2016-EUR-HUF-likely-to-face-mild-upward-pressure-232142. Date of access: 6 July 2016.

Hull, J. C. (2015): *Risk management and financial institutions*. Hoboken, NJ: John Wiley & Sons, Inc.

Poon, S. H. – Granger, C. W. J. (2003): Forecasting volatility in financial markets: A review. *Journal of Economic Literature*, 41, 2, 478–539.

West, K. D. – Cho, D. (1995): The predictive ability of several models of exchange rate volatility. *Journal of Econometrics*, 69, 2, 367–391.

Wiphatthananananthakul, C. – Songsak, S. (2010): The comparison among ARMA-GARCH, -EGARCH, -GJR, and -PGARCH models on Thailand Volatility Index. *The Thailand Econometrics Society*, 2, 2, 140–148.

APPENDIX

The residual test

Date: 03/17/17   Time: 14:57
Sample: 10/01/2010 2/01/2017
Included observations: 1654

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.027	-0.027	1.2230	0.269
		2	-0.008	-0.008	1.3206	0.517
		3	-0.063	-0.064	7.9102	0.048
		4	-0.016	-0.019	8.3203	0.081
		5	-0.008	-0.010	8.4150	0.135
		6	0.017	0.013	8.9164	0.178
		7	-0.013	-0.015	9.2126	0.238
		8	0.034	0.032	11.090	0.197
		9	-0.011	-0.008	11.307	0.255
		10	-0.033	-0.035	13.170	0.214
		11	0.017	0.019	13.632	0.254
		12	-0.011	-0.012	13.846	0.311
		13	0.017	0.013	14.318	0.352
		14	0.017	0.018	14.816	0.391
		15	-0.043	-0.042	17.849	0.271
		16	-0.063	-0.065	24.568	0.078
		17	-0.036	-0.040	26.762	0.062
		18	0.013	0.008	27.066	0.078
		19	0.011	-0.000	27.286	0.098
		20	-0.012	-0.019	27.511	0.121
		21	0.019	0.020	28.145	0.136
		22	-0.009	-0.009	28.274	0.167
		23	-0.031	-0.030	29.922	0.152
		24	0.018	0.021	30.476	0.169
		25	-0.039	-0.041	32.992	0.131
		26	-0.024	-0.034	33.958	0.136
		27	0.014	0.010	34.281	0.158
		28	-0.024	-0.026	35.216	0.164
		29	0.010	0.005	35.399	0.192
		30	0.000	0.000	35.399	0.228
		31	0.009	0.006	35.523	0.264
		32	0.003	-0.008	35.537	0.305
		33	0.037	0.034	37.850	0.257
		34	0.000	0.008	37.850	0.298
		35	0.019	0.013	38.475	0.315
		36	-0.045	-0.037	41.892	0.230

Series: Standardized Residuals	
Sample 10/01/2010 2/01/2017	
Observations 1654	
Mean	0.015260
Median	-0.032466
Maximum	4.447776
Minimum	-3.232094
Std. Dev.	0.998667
Skewness	0.169411
Kurtosis	3.492414
Jarque-Bera	24.62201
Probability	0.000005
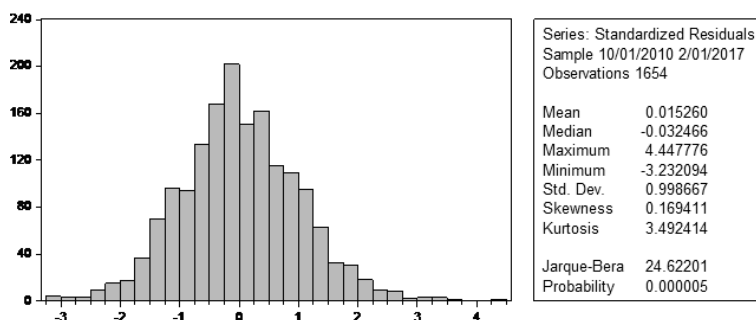
Heteroskedasticity Test: ARCH

F-statistic	0.815876	Prob. F(1,1651)		0.3665
Obs*R-squared	0.816461	Prob. Chi-Square(1)		0.3662
Test Equation:				
Dependent Variable: WGT_RESID^2				
Method: Least Squares				
Date: 03/17/17 Time: 14:59				
Sample (adjusted): 10/04/2010 2/01/2017				
Included observations: 1653 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.974711	0.045924	21.22463	0.0000
WGT_RESID^2(-1)	0.022225	0.024606	0.903258	0.3665
R-squared	0.000494	Mean dependent var		0.996877
Adjusted R-squared	-0.000111	S.D. dependent var		1.578091
S.E. of regression	1.578178	Akaike info criterion		3.751629
Sum squared resid	4112.059	Schwarz criterion		3.758175
Log likelihood	-3098.721	Hannan-Quinn criter.		3.754056
F-statistic	0.815876	Durbin-Watson stat		2.000105
Prob(F-statistic)	0.366521			

Tax incentives for encouraging R&D activities

Katsiaryna Marmilava

This article highlights important stages and choices in the tax incentive process that policy makers might find useful in their deliberations. It describes the main steps in the design and implementation of R&D tax incentives. The principal aims of tax incentives are reviewed, and the preferred forms and administrative mechanism based on international experience are considered. Furthermore, the accumulated experience in assessment of the effectiveness of R&D tax incentives is summarized, and the advantages and limitations of different assessment methods are clarified.

Keywords: tax incentives, research and development expenditures, forms of tax incentives, tax credit, tax allowances, accelerated depreciation, tax savings, effectiveness of R&D tax incentives

1. Introduction

Due to the contribution that research and development (R&D) makes to long-term economic growth and its significant potential for future positive impact on society, governments are motivated to find appropriate ways to encourage R&D expenditure. Tax incentives are becoming an increasingly important instrument in the policy mix to stimulate private R&D in many countries around the world. Over recent decades the number of OECD countries promoting R&D tax incentive schemes has rapidly increased from 12 in 1996, to 19 in 2006, to 27 in 2012 (OECD 2015a). These vary from country to country, depending on their respective economic and industrial structure, and the social objectives of the state.

When considering the implementation of tax incentives, the following questions should be precisely answered:

1. Which activities, industries, and types of firms are to be encouraged?
2. What forms of tax incentives should be considered?
3. What will the administrative process be?
4. What methods will be used to evaluate the effectiveness of the selected tax incentives?

These four questions will be the focus of this review.

2. Intention of R&D tax incentive policy

Occasionally, countries seek to develop or strengthen specific industries and in such cases tax incentives are devised to benefit the target industry. For example, in Canada special federal and provincial tax credits apply to selected industries including

interactive digital media, film and television, video game development, and industries involved in the development of new technologies addressing issues of climate change, clean air, and water and soil quality. Israel provides R&D tax incentives for pharmaceuticals, software and hardware development, energy, and utilities (Deloitte 2015).

Often countries do not limit eligibility to particular industries, but instead define qualifying features of products and services, or designate broad fields to be eligible. In Belgium, the company must certify that the aim of R&D is to develop products and services that are innovative in the domestic market and will not have a negative impact on the environment (or the company has taken steps to mitigate that impact). Ireland categorizes activities that qualify for the credit: natural sciences, engineering and technology, medical science, and agricultural sciences. In the Netherlands technical and scientific research should be conducted in fields such as physics, chemistry, biotechnology, production technology, and information and communications technology to qualify for R&D tax incentives.

Additional key aims of introducing tax incentives policies are to provide support to small and medium-sized enterprises (SMEs); stimulate cooperation between industry and public research institutions and universities; and encourage patenting activity.

Since small business have high innovation potential but greater financial and technical constraints, many countries have more generous tax incentives for small firms (e.g. Canada, France, Japan, Netherlands, United Kingdom, Norway, Korea) (see Table 1). Conversely, countries that provide bigger tax reliefs for large firms (e.g. Hungary) put multinational companies in an advantageous position with respect to domestic firms.

Collaboration between universities and industry is critical for innovation and technology transfer, skills development, and the generation of new enterprises. As such, many countries have adopted policies to stimulate the interaction between academia and industry. For example, in France companies can apply existing tax incentives for contract research expenses (up to 2 million euro and 3 times the amount of other R&D expenses incurred by the company). In Hungary a 200% super deduction is available for subcontracted R&D activities if the partner is a public/non-profit research site. Other countries (Belgium, Italy, Japan) provide more generous tax relief for industry R&D projects contracted to universities and public research institutes. In Italy tax subsidy increases from 25% to 50% for costs of R&D activities outsourced to universities and research centers or to other companies. Meanwhile, Japan provides a 30% tax credit (from 8% up to 12% for other eligible R&D expenditure) for joint R&D with a university or public research institution, or where the R&D is contracted to such entities (Deloitte 2015, OECD 2015c).

Countries can adopt special tax regimes for intellectual property (IP) to increase innovation activities and foster global leadership in patented technology. Furthermore,

Table 1 Targeted R&D tax incentives

Country	Firm size	Activity
Belgium		Collaboration
		Patenting activity
Canada	SME	
Italy		Collaboration
		Patenting activity
Japan	SME	Collaboration
Korea	SME	Patenting activity
Netherlands	SME	Patenting activity
Norway	SME	
Spain		Patenting activity
United Kingdom	SME	Patenting activity
Ireland		Collaboration
		Patenting activity
Hungary	Large	Collaboration
		Patenting activity
France	SME	Collaboration
		Patenting activity

Note: Blank spaces indicate no targeting in these areas.
Source: own construction based on OECD (2015b) and Deloitte (2015)

such regimes can create attractive tax environments for the allocation of IP into the country and promote multinational firms to shift their profits from patents that will bring additional income to the state in the form of taxes. Given the rapid spread of such tax incentives over the last decade their implementation could be a reactive measure to maintain tax competitiveness; however, this may result in overall lower welfare due to loss of tax revenues.

3. Design and implementation of R&D tax incentives

The next question that should be resolved is how to design and implement the best policy mix to encourage R&D investment at an appropriate amount to meet economic and political objectives.

R&D tax incentives can take different forms: tax credits, tax allowances, and accelerated depreciation associated with investments in R&D. Tax credit allows for the deduction of a certain percentage of R&D expenditures from tax liabilities (according to the tax credit rate). It may apply to either the absolute value of a company's R&D expenditures (volume-based approach), to the increase in R&D spending over a calculated base level (incremental-based approach), or to a combination of both.

The incremental approach is less common as it provides limited or no encouragement to businesses whose R&D spending fluctuates or remains at a steady level (for instance in times of macro-economic volatility). Moreover, it has higher

administrative and compliance costs and may distort R&D investment planning (it makes a gradual increase in R&D investment more attractive).

Thus, many countries over the last few years have replaced their more complex hybrid volume and incremental-based schemes with simpler and more generous volume-based schemes (for instance, France in 2008, Australia in 2010, Ireland in 2015).

Table 2 R&D tax incentives by type of tax scheme, 2015

	Level of R&D	**Increment of R&D**	**Hybrid**
R&D tax credits	Australia	United States	Spain
	Canada	Italy	Portugal
	United Kingdom	Japan	
	France	Korea	
	Belgium		
	Ireland		
	Austria		
	Iceland		
	Norway		
	Korea		
	Hungary		
R&D allowances	Belgium		Czech Republic
	Netherlands		Slovak Republic
	United Kingdom		
	Hungary		
	Slovak Republic		

Source: own construction based on OECD (2015b) and Deloitte (2015)

R&D tax credit in some countries (e.g. Spain and Portugal) is both incremental and volume-based, even though either of these tax schemes could be mutually exclusive (e.g. Korea).

Tax allowances enable firms investing in R&D to deduct more from their taxable income than they actually spend on R&D. For example, the Netherlands provides a super deduction of 160% of qualifying expenses directly attributable to qualified research activities. In the United Kingdom small and medium-sized companies qualify for a 230% super deduction of qualifying expenses.

Although there is not a big difference between tax credits and tax allowances in the reduction of the after-tax cost of R&D (as they can be made equivalent), tax credits have become a more popular measure. This tendency can be explained from an administrative point of view. As tax allowances vary with the corporate tax rate, they need to be adjusted with these rate changes, thereby causing additional administrative difficulty (Lester–Warda 2014).

As R&D expenditure may precede revenue generated by innovation by several years, it is good practice to provide a carry-over facility and the option to receive the benefit even in the case of a company not being profitable (cash refunds). This is especially relevant for young companies that typically are not profitable in the first

years of their operation. For example, in France, a volume-based tax credit may be carried forward for three years. If it is not utilized within this period, the taxpayer is entitled to a refund. Indeed, new companies, young innovative companies, SMEs and companies with financial issues can request an immediate refund of unutilized credits.

Table 3 Treatment of excess claims by country

	Carry-forward	Refund
R&D tax credits	United States	Norway
	Belgium	Belgium (after five years)
	Ireland	Ireland
	France	France (SMEs)
	Spain	Spain
	Australia	Australia (SMEs)
	Canada	Canada (SMEs)
	Korea	United Kingdom (large companies)
		Austria
R&D allowances	United Kingdom Belgium Netherlands Slovak republic	United Kingdom (SMEs)

Source: own construction based on OECD (2015b)

The United Kingdom provides cash credits for SMEs in a loss position up to 33.35% of qualifying expenditure. Cash credits are available as well as for large companies under the R&D expenditure credit scheme if the company does not have corporate tax liabilities. Unused benefits may be carried forward for utilization in future periods. In Belgium there is no an immediate refund of tax credit. If it is not utilized it can be refunded only after 5 years.

Where a government seeks to maintain control over the budget allocated to tax incentives, it can put a ceiling on the amount that a firm can claim. There are two types of ceilings: a cap on the absolute amount of R&D that can be claimed (Australia, Norway, Canada), or a cap on the maximum amount of the tax incentive that can be deducted (Hungary, Japan, United States, Spain). Limits can be defined as absolute amounts or as a percentage. While the presence of an absolute upper ceiling reduces the overall cost of support by limiting the absolute amount of R&D expenditure or tax relief that a firm can claim, it may also reduce the incentive effect at the margin among large firms, which typically have higher levels of R&D. In contrast, proportional limits reduce tax support for all eligible firms regardless of their size. For example, in Hungary, the R&D tax credit can be applied to reduce up to 80% of tax liabilities. Meanwhile, Norway limits the absolute amount of qualifying expenditures. The maximum base is 15 million NOK in the tax year for projects based on the taxpayer`s own R&D, and 33 million NOK for projects based on R&D purchased from institutions approved by the Research Council. In the case of a rapid increase in R&D activity, the limiting of the maximum amount of tax relief as a percentage of corporate

tax liability may reduce the risk of a significant decrease in tax payments and provide a certain level of corporate tax revenues.

Threshold-dependent rates imply a discrete reduction in the size of the R&D tax credit or allowance rate once qualified R&D spending surpasses a pre-defined threshold amount. For example, in Canada, qualified current R&D expenditure by SMEs is completely refundable up to 3 million CAD, whereas above 3 million CAD only 40% is refundable (or there may be no refund at all, depending on certain conditions).

Thus, a ceiling is applied by most of the countries that use R&D tax incentive schemes and serves to spread R&D budgets over time and over subcontractors, and can be an indirect way to target tax incentives based on firm size.

If countries wish to stimulate at least the base amount of a company's R&D investments they can put a floor on R&D expenditure. This type of limitation is less common and used in only a few countries (Australia, Italy). Setting a floor on R&D expenditure can have the practical advantage of avoiding administrative costs that are high compared to the fiscal incentive, but can put young innovative firms at a disadvantage, as they tend to have lower R&D budgets.

Another popular form of tax incentives is accelerated depreciation provisions for R&D capital that allows recovery of the investment more quickly than the underlying economic depreciation of the long-lived asset (an immediate, e.g. in Spain, United Kingdom, or accelerated write-off of expenditures, e.g. in Belgium, France). According to OECD statistics the share of machinery and equipment, and building expenditures is about 10% of total R&D expenditure across OECD countries, which limits the effect of such incentives (OECD 2017).

When designing expenditure-based R&D tax incentives eligible expenses must be defined. They may include current R&D expenditures or parts thereof (for example, wages), capital R&D expenditures or parts thereof (for example, machinery and equipment or buildings), and all expenditures for R&D (current and capital). Qualifying all R&D tax expenditures enlarges the incentive for companies, but increases the public cost of the policy. For example, in Canada only current expenses are eligible for tax credit (salaries and wages for employees in Canada, materials, overhead and some others). In France eligible expenses include general and administrative expenses, depreciation allowances for R&D assets, staff expenses, contract research costs, patent costs and costs of technological monitoring, while materials used in the research process don't qualify. Belgium proposes tax credit for wages paid to qualifying researchers working on R&D projects ("payroll withholding tax credit"). While Spain and France allow accelerated depreciation only for machinery and equipment, in United Kingdom and Belgium it is applied for all capital R&D expenditures.

Tax incentives based on the wage bill paid to researchers can be considered better practice from the point of view of spillover effects (European Commission 2014).

Besides they have a practical advantage in lowering administration and compliance costs.

Government can provide tax incentives in form of a reduced corporate tax rate (for example, "Patent box" or "Innovation box" regime). The types of IP that qualify for preferential tax treatment vary. For instance, in addition to patents, some countries (Hungary, Italy, Spain) include "know-how", trademarks, designs and models as qualified IP for tax benefit purposes.

By combining different schemes, government can achieve several policy goals. For instance, the Netherlands offers fiscal incentives on labor costs (WBSO), R&D tax allowances for capital costs and certain current costs (consumables), and Innovation box. Belgium, in addition, also offers accelerated depreciation for assets used in R&D. Thus, some countries simultaneously stimulate R&D investments, patenting activity and spillovers.

After designing tax incentives some important administrative questions should be resolved: the necessity of pre-approval of qualified R&D expenditures, and requirements for mandatory documentation to support the claim. Sometimes usage of pre-approval may be explained by particular features of the R&D tax credit. For instance, in Belgium for the application of an R&D investment deduction applied to R&D investments beneficial to the environment, the taxpayer must file a claim for environmental certification though regional authorities. In Australia, pre-approval is mandatory only for activities that will be physically performed outside the country, and aims to limit unwarranted shifting of R&D abroad. Most countries don't require initial approval, but oblige firms to maintain supporting evidence (e.g. information, records, documentation) in the event of an audit by tax authorities (for example, Canada, Check Republic, Japan). Other countries have record keeping substantiation requirements only for particular entities, depending on the level of R&D expenses (e.g., France) or size of cash refund (e.g., Spain). The absence of approvals mentioned above lowers administrative barriers to the utilization of tax incentives, but reduces government control of qualifying R&D expenditures.

4.   Evaluation of effectiveness of R&D tax incentives

When designing R&D tax incentives, policy makers should already clearly identify which data will be needed for their evaluation, and how to collect these data. Evaluation is essential in monitoring effectiveness of R&D tax incentives. The main question that should be answered is: do tax incentives achieve their objectives and to what extent? John Clark and Eric Arnold (2005) proposed measuring three types of effects (Figure 1).

Figure 1 Effects from fiscal R&D incentives

First order effects	→	Second order	→	Third order

Input / direct additionality Amount of R&D by the firm increases	Innovation additionality Increased share of sales of innovative products or services; Way of doing R&D changes	Output/macro additionality Increased spillovers, productivity, economic growth
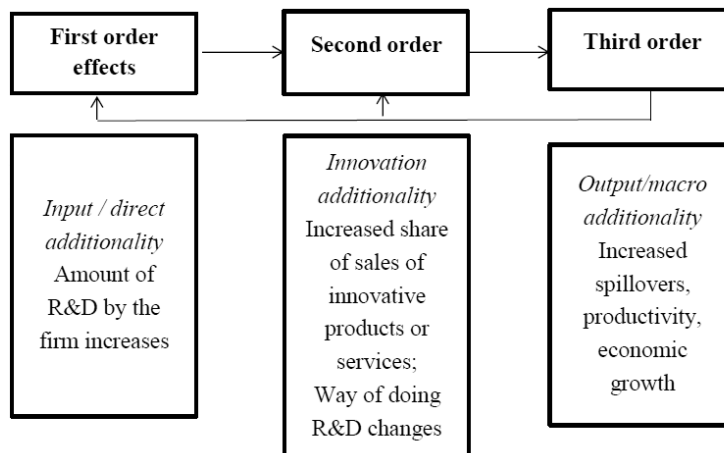
Source: own construction based on Clark–Arnold (2005)

The first- and second-order effects normally arise at the firm level, while third-order effects happen at the economy or international level. Moreover, all these effects can reinforce each other through a feedback loop.

Since the main objective of expenditure based R&D tax incentives is to stimulate private investment, input additionality is a central question. The empirical analysis amounts to comparing the tax expenditures with the additional amount of R&D spent by private firms. The policy is said to lead to additional R&D if firms spend in excess of the amount of tax incentives they receive from the government. The policy is clearly ineffective if investment displacement occurs - that is when firms simply substitute government tax support for private R&D financing.

Beyond the induced R&D, there remains the question of whether this additional R&D is efficient in generating innovation output (innovation additionality) and ultimately improves economic performance and net welfare (macro additionality). There are different approaches and methodologies that can be used in the evaluation of tax incentive effectiveness (Figure 2).

Testing for additionality generally involves the computation of the "bang for the buck" (BFTB). It is measured by dividing the amount of R&D generated by the R&D tax incentives by the net tax revenue loss (tax expenditures or taxes forgone). The BFTB is also known in the literature as the "incrementality ratio", "cost effectiveness ratio", "tax sensitivity ratio" or "inducement rate" (Parsons–Phillips 2007).

When calculating tax expenditures, one should consider the change in the firms' tax positions, since the tax credits can be taxable themselves (Hall–van Reenen 2000).

Figure 2 Reconciling evaluation notions

Additionality	Full Cost benefit analysis	General equilibrium analysis
Cost effectiveness ratio Incrementality ratio Tax sensitivity ratio	Spillovers Administration costs Compliance costs Opportunity costs	Wage effects Balanced budget Open trade
	Second-order effects Third-order effects	
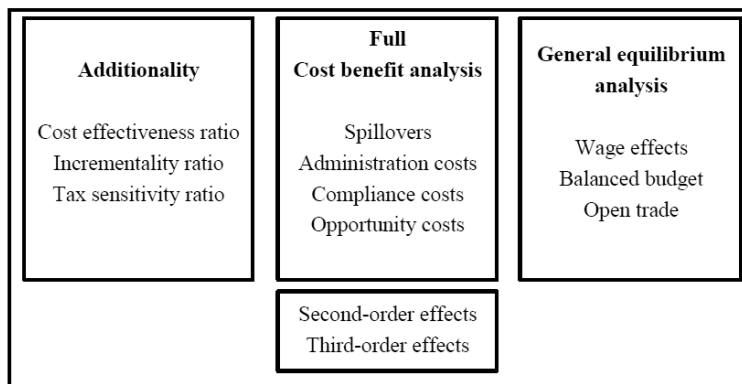
Source: Mohnen–Lokshin (2008)

To isolate the effect of R&D tax incentives on R&D two main approaches can be used:

1. structural modelling approach;
2. quasi-experimental econometric evaluation approach.

The structural approach has been adopted by institutions such as the U.S. Government Accounting Office (GAO 1989) and the OECD (1997), and it has been developed by several authors such as Hall (1993), Mairesse and Mulkay (2004, 2008) and Lokshin and Mohnen (2007, 2009).

This approach involves the two following steps for estimating the effect of the tax credit on R&D expenditures:

1. computation of the impact of the tax credit on the "effective price of R&D" faced by the firm, or more generally on the "user cost of R&D capital" (actual costs of R&D) for the firm;
2. specification and estimation of an econometric model that relates the changes in the firm's R&D to changes in the effective price of R&D or in the user cost of R&D capital (elasticity coefficient of R&D expenditure with respect to the user cost of capital is estimated).

Structural modelling allows evaluating future reforms and separating short-term (1 year) from long-term effects (5-15 years). The necessity of distinguishing these types of effects arises due to the fact that induced R&D may take time to show up because of adjustment costs in R&D (devising projects, finding scientists and engineers, etc.). In addition, the long-term effect may be larger because an increase in R&D investments adds to the firm's knowledge base, thereby increasing the marginal payoff of future R&D investments.

A difficulty of the structural approach is in reverse causality between the amount of R&D expenditure and the user-cost of R&D (Gaillard-Ladinska et al. 2015). A number of R&D tax credit schemes share the characteristic that the size of the tax credit is dependent on the amount of R&D performed. The user cost of R&D capital thus increases with the level of R&D expenditure, which leads to potential underestimation of the effectiveness of the tax credit. In the absence of a social experiment or suitable instrumental variable, some studies try to reduce this problem by controlling for lagged R&D expenditure and fixed firm effects using a dynamic panel data estimator (examples are Baghana and Mohnen (2009) and Harris et al. (2009)).

Quasi-experimental evaluation approach statistically constructs a control group and compares the growth rate of R&D expenditure from before to after the policy reform, for firms just below and just above the eligibility ceiling. It provides convincing ex-post additionality estimates, but unlike the structural approach, it doesn't allow for the simulation of the impact of changes in the features of the tax credit. Furthermore, it often makes no distinction between short term and long-term effects.

A comprehensive computation of the effectiveness of R&D tax incentives generally requires a *full cost-benefit analysis* that would compute the total (direct and indirect) costs and benefits related to the R&D tax incentive. On the benefit side, it would mean not just computing the amount of additional R&D but also the return on that R&D. This requires looking into the existence of second-order and third-order effects, i.e. the effects on innovation behavior and on an economic performance measure like productivity or profitability. Another kind of secondary effect that should be included is an increased producer surplus accompanying an expanded R&D capital stock. A proper analysis of benefits requires incorporating R&D spillovers which can be positive (knowledge externalities or rent) or negative (market stealing or obsolescence).

The main components of costs are:
1. foregone tax revenues, assessed by taking into account the opportunity cost of public funds;
2. compliance costs of R&D performing firms applying for R&D tax incentives (e. g. hiring consultants, accountants, financial experts);
3. tax administration costs of governmental bodies administering the R&D program (e.g. hiring auditors, tax officers).

The idea of the analysis is not to estimate all of these various elements, but to conduct a sensitivity analysis by simulating the benefit-cost ratio using ranges of reasonable estimates of R&D, to see what patterns of estimates of the various components that matter would produce positive net results. The limits of the approach are thus mainly due to very imprecise estimations of these various components.

While econometric techniques are well suited to capturing effects that may be quantified in a sensible way, they are not appropriate for identifying behavioral additionality, i.e. changes in the way firms understand R&D and how R&D decisions are made. Here, surveys are a more relevant method.

After the assessment of R&D tax effectiveness, a government should reach a decision on whether a tax incentive scheme should be continued, modified or abandoned. Thus, it is necessary to take into account a time gap between the introduction of tax incentive and different types of effects arising (particularly, second- and third-order effects). Frequent and substantial policy changes are likely to strongly reduce the effectiveness of policies – regardless of their design (Westmore 2013).

5. Conclusion

When introducing tax incentives governments should clearly identify the aims and possible results of such policy. The policy effectiveness will depend on the design of the incentives themselves, administrative mechanism, timely and reliable assessment of the effects that will lead to appropriate conclusions, and further improvements. The accumulated international experience should be considered.

By combining different R&D tax incentives schemes, countries may achieve several policy objectives such as growth of R&D expenditures, providing support to small and medium-sized enterprises; stimulating cooperation between industry and public research institutions and universities; and encouraging patenting activity. This will provide diversity of available tax incentives and ensure the tax competitiveness of the country. When introducing or modifying tax incentives the preference should be given to volume-based tax incentives and carry-over provisions. The former will be easier to administer for both firms and tax authorities, while the possibility of carrying over provisions will provide firms with more flexibility in their investment decisions, allowing them to invest in high risk R&D activity with high innovative potential. Countries should also take into account that the lower the corporate tax rate of a country, the higher the tax support provided in the form of tax allowances should be (due to less tax savings), in order to raise their significance.

The evaluation method of the effectiveness of tax incentives will depend on the country-specific context with its particular economic structure, social values, as well as accumulated evaluation expertise, and on the data that can be collected. The survey is the most common and convenient means, while econometric techniques represent a more complicated but objective way to estimate the extent of additionality.

References

Baghana, R. – Mohnen, P. (2009): Effectiveness of R&D tax incentives in small and large enterprises in Quebec. *Small Business Economics*, 33, 1, 91–107.

Clark, J. – Arnold, E. (2005): Evaluation of fiscal R&D incentives. Report to CREST OMC Panel, Technopolis, September 2005, p. 5

Deloitte (2015): 2015 Global Survey of R&D Tax Incentives. Deloitte Publishing.

European Commission (2014): A study on R&D tax incentives. Final report. *Working papers*, no. 52–2014. Luxembourg: Office for Official Publications of the European Communities.

Gaillard-Ladinska, E. – Non, M. – Straathof, B. (2015): More R&D with tax incentives? A meta-analysis. *CPB Discussion Paper*, 309, Bureau for Economic Policy Analysis, Netherlands.

GAO (1989): The research tax credit has stimulated some additional research spending, U.S.A., Tax Policy and Administration report. General Accounting Office.

Hall, B. (1993): R&D tax policy during the eighties: Success or failure? *Tax Policy and the Economy*, 7, 1–36.

Hall, B. – J. van Reenen (2000): How effective are fiscal incentives for R&D? A review of the evidence. *Research Policy*, 29, 4-5, 449–469.

Harris, R. – Li, Q. C. – Trainor, M. (2009): Is a higher rate of R&D tax credit a panacea for low levels of R&D in disadvantaged regions? *Research Policy*, 38, 1, 192–205.

Lester, J. – Warda, J. (2014): An international comparison of tax Assistance for research and development: Estimates and policy implications. *Working Paper*, Canada: University of Calgary, The School of Public Policy.

Lokshin, B. – Mohnen, P. (2007): Measuring the effectiveness of R&D tax credits in the Netherlands. Maastricht: University of Maastricht, UNU-MERIT WP.

Lokshin, B. – Mohnen, P. (2009): *What does it take for an R&D tax incentive policy to be effective*. Barcelona: Universitat de Barcelona.

Mairesse, J. – Mulkay, B. (2004): Une évaluation du crédit d'impôt recherche en France (1980–1997). *Revue d'économie politique*, 6, 747–778.

Mairesse, J. – Mulkay, B. (2008): The effect R&D tax credit in France (1980– 2003). Transparencies presented at the 'Knowledge for Growth Conference', Toulouse, July 2008.

Mohnen, P. – Lokshin, B. (2008): What does it take for an R&D tax incentive policy to be effective? Presentation to the Expert Group Seminar on Evaluating RD Tax Incentives, European Commission, Brussels, October 6, 2008.

OECD (1997): *Fiscal measures to promote R&D and innovation*. Paris: OECD Publishing.

OECD (2015a): *OECD Science, Technology and Industry Scoreboard 2015: R&D Tax Incentives*. Paris: OECD Publishing.

OECD (2015b): *R&D Tax Incentives Database*. Available: www.oecd.org/sti/rd-tax-stats.htm. Date of access: December 2015.

OECD (2015c): *Compendium of R&D tax incentives schemes: OECD countries and selected economies*. Paris: OECD Publishing.

OECD (2017): Research and Development Statistics (RDS). Available: www.oecd.org/sti/rds. Date of access: May 2017.

Parsons, M. – Phillips, N. (2007): An evaluation of the federal tax credit for scientific research and experimental development. *Working paper*, 2007-08, Department of Finance.

Westmore, B. (2013): R&D, Patenting and growth: The role of public policy. *Working Paper*, 1047, OECD Economics Department.

A draft on theories of fiscal sustainability

Marianna Sávai

Fiscal sustainability has been an oft-mentioned concept since the world's last economic and financial crisis. This global crisis has drawn attention to the problems of public deficits and debt growth. It is, however, expected of modern analysis that any such lessons learnt should be based on empirical examination. To this end, we have tried to summarize the basic methodology for measurement of fiscal sustainability. We have examined and compared many ways or methods for achieving fiscal sustainability. Our experience is that the measurement of fiscal sustainability depends on the definition of fiscal sustainability itself, the definition of the balance of the public deficit and debt, the length and quality of the time series used, the particular characteristics of the countries participating in the study, and the researchers' own approaches and expectations. Here we discuss what have been the most important milestones in the literature, and what kind of methods would serve in own research.

Keywords: fiscal sustainability, fiscal policy, public deficit, public debt

1. Introduction

The economics of sustainability is based on the economics of ecology, environment and resources, but it is not a single discipline. It has three major research fields, the first of which tries to define and operate itself, the second one tries to analyse the uncertainty of connections between humanity and the environment, while the third examines the institutions, and political and government structures that are most important for sustainability. Indeed, fiscal sustainability is the main part of the economics of sustainability. Our slow economic growth rate, the ageing population and the changing model of emerging countries, have all put pressure on the European Union, in response to which Eurostat has created sustainable development indicators and fiscal sustainability indicators. Moreover, several researchers and international organisations (for example IMF and World Bank) have followed Eurostat's lead.

Our study analysed the definition of fiscal sustainability, the main elements of the measurement of fiscal sustainability, public deficit and public debt, which are components of budget constraint, and showed some econometrical methods of fiscal sustainability. Due to the limited scope of this study, we have foregone a detailed introduction to econometrical methods, and assume that our readers will all have a degree of econometrical experience.

2. Public sector deficit and budget constraints

Publications on the empirical examination of fiscal sustainability have defined a measurement of debt and deficit, while other papers have shown a budget constraint in the macro economic environment, and hence it will be necessary to provide a basic

introduction to budget constraint. After that, we will be in a position to interpret fiscal sustainability, its measurement and its econometrical examination.

The examination of several debt situations means having to face the problem of data heterogeneity, because there is no uniform measure of public debt. Some countries provide data on central government debt; while other countries record consolidated public-sector debt with their respective central banks. Other countries again list gross public debt, including public guarantees and pension liabilities, and others publish only the net basis of debt. Researchers in the field are forced to match and compare reports about public debts and fiscal deficits. They use public debt decomposition, but assume that all factors contributing to changes in the level of debt are simultaneously determined. In fact, these factors influence each other as well. Therefore, studies of this kind should attempt to link changes in debt-to-GDP ratios to episodes of marked policy change or structural factors. Most similar papers have been based on the studies by Barro (1974, 1979) and Buiter (1982), and have assumed their budget constraints.

Barro (1974) examined the economy with overlapping-generation model. The question was whether an increase in government debt causes perceived household wealth increase. He discussed the "Ricardian" equivalence theorem on public debt, i.e. that debt and tax finance shift has no first-order effect on the real interest rate, volume of private investment, etc. The paper showed that government debt and tax liabilities generate risk, and that an increase in government bonds could cause overall risk in household balance sheets to rise. The nature of the tax system, transaction costs and private insurance arrangements, however, all affected the relationship of risk and household balance sheet. The main conclusion by Barro (1974) was that there is no convincing theoretical case for treating government debt, at the margin, as a net component of perceived household wealth.

Barro (1979) showed a simple theory of "optimal" public finance that included some factors which have an effect on the choice between the tax and debt issue. The model used Ricardian invariance theorem but set up a second-order "excess burden" of taxation to determine (optimal) value of debt creation. He tested the theorem on time-series data from the United States up to World War I. The main results were evidence of the positive effect on debt issue of a temporary increase in government spending (especially in war and post-war periods), and the negative effect of a temporary increase on income (larger than in theory) and the one-to-one effect on expected inflation rate and on the growth rate of nominal debt. The historical data did not evidence an impact of such temporary changes on federal taxes. He concluded that business-cycle effects from temporary tax changes and fiscal policy in isolation were difficult to establish. He used the following government budget equation:

$$G_t + rb_{t-1} = \tau_t + (b_t - b_{t-1})$$

where G_t is the volume of real government expenditure excluding interest payments on public debt, and assumed to be exogenous, while τ_t is the real tax revenue during the period t, and b_t real public stock outstanding at the end of period t. He assumed that the initial price level could be expected to be constant over time, and the real (and nominal) rate of return on public and private debts, r, is also a constant. Meanwhile, the government's budget equation is as follows:

$$\sum_{t}^{\infty}\left[{G_t}/{(1+r)^t}\right] + b_0 = \sum_{t}^{\infty}\left[{\tau_t}/{(1+r)^t}\right]$$

Buiter (1982) discussed budgetary, financial and monetary policy evaluation with a comprehensive wealth or permanent income accounting framework. He claimed that the public sector financial deficit and the public sector borrowing requirement (at current or constant prices or as proportion of GNP) provided uninformative statistics; and therefore, he had corrected these factors with the change in the real value of outstanding stocks of interest-bearing public debt.

In addition, while several countries have significant mineral rights (e.g. Norway, UK, US and Russia and other oil-producing nations) or economic activity that depends on nationalised sector accounts (e.g. UK, and many developing countries), we have to take into account equity and public sector property rights in land and natural resources from the public sector balance sheet. These items are open-ended commitments to subsidise loss-making public enterprises, that depress net worth. He distinguished between the problem of cyclical (transitory or reversible) deficit and permanent deficit. He assumed about transitory (e.g. cyclical) deficits and surpluses, that the government has to use fiscal management, disregarding the actual level of inflation. Money creation is another solution to the problem of cyclical deficit increase, which the government has to negate during an upturn. He modified public sector budget constraint in theory in the early 1970s, plotting imputed income and consumption deflated by general price level yields and the public sector financial surplus (at constant prices) (Buiter 1982).

A special theory on the topic of budget constraint was contributed by Kornai (1992), who defined a soft budget constraint. It describes the situation when an entity can manipulate its access to necessary funds. Because of the constraints of our study, we are unable to explain this theory further, beyond referring to Trehan and Walsh (1991), and their summary of the role of intertemporal budget constraint in a variety of contexts. Bohn (1998, p. 2) said, "Under fairly weak conditions, a positive (at least linear) response of primary surpluses to the debt-income ratio also implies that government policy is sustainable in the sense of satisfying an intertemporal budget constraint". Following on from Trehan and Walsh (1991), Greiner and Fincke (2015, p. 5) said, "the intertemporal budget constraint of the government requires that the present value of public debt asymptotically converges to zero".

The World Bank, International Monetary Fund and European Union make an annual fiscal stability report about member states. They have developed particular measurement practices for debt, deficit and fiscal sustainability, and have improved them year by year. The World Bank (2005, p. 8) analysed public debt trends with the following equation:

$$\Delta d_t = pd_t - \frac{g}{(1+g)}d_{t-1} + \frac{d_{t-1}}{(1+g)}\left[\frac{\hat{\imath}}{1+\pi} - \frac{\pi}{1+\pi} - \frac{\alpha(\pi^* - \pi)}{(1+\pi)(1+\pi^*)}\right]$$
$$- \alpha\frac{RXR}{(1+\pi^*)(1+RXR)} \cdot \frac{d_{t-1}}{(1+g)} + \text{otherfactors}$$

where d_t is the public debt-to-GDP ratio, pd_t is the primary deficit to GDP ratio, g is the real GDP growth rate, $\hat{\imath}$ is the weighted averages of domestic and foreign interest rates, and π is domestic inflation rate (the percentage change in GDP deflator). Further, π^* is the US inflation rate (the percentage change in US GDP deflator), α the share of foreign currency denominated debt in total public debt, and RXR the change in (bilateral, US dollar per local currency unit) real exchange rate ($RXR > 0$ means a real exchange rate appreciation).

The examination is based on 31 market access countries (MACs), however their averages for 21 MACs were computed in the period 1991-2002. We are able to see more details from 15 MACs in different periods in their study. They concluded that initial conditions and country specifics were important in similar examinations. Another main conclusion was that fiscal consolidation and quality of fiscal policy influenced debt sustainability, and that debt reduction affected growth. The quality of fiscal management is able to determine the amount of public debt. Most MACs used fiscal rules as a result of weak institutions and pro-cyclical fiscal policy. Meanwhile, automatic debt dynamics and debt structure affected interest rates and exchange rate appreciation (World Bank 2005).

The IMF kept in mind the fact that the measurement of fiscal sustainability was affected by country-specific circumstances, a country's policy track record and policy options. They distinguished between market-access countries and low-income countries (LICs). The Debt Sustainability Analysis (DSA) framework for MACs became operational in 2002 (IMF 2002). Worth noting are also early warning indicators, which try to sign financial or currency crisis (Wyplosz 2007). Because LICs often have large external debt, both the IMF and World Bank have developed the Debt Sustainability Framework (DSF) for LICs. The aim was to help guide countries and creditors finance development in such a way as to prevent the former entering excessive debt situations (IMF 2003).

3. Empirical examination of fiscal sustainability

The first definition of fiscal sustainability was originated by Hamilton and Flavin (1986, p. 811), as "the government budget must be balanced in present-value terms". Another common definition of fiscal sustainability came from Blanchard et al. (1990, p. 11): "sustainable fiscal policy can be defined as a policy such that the ratio of debt to GNP eventually converges back to its initial level … unsustainable a policy which implies a temporary bulge in the ratio". The sustainability definition by the IMF (2002, p. 5) is "An entity's liability position is sustainable if it satisfies the present value budget constraint without a major correction in the balance of income and expenditure given the costs of financing it faces in the market". Croce and Juan-Ramón (2003, p. 3) said, "the question is whether the government can continue to pursue its set of budgetary policies without endangering its solvency".

Several papers have been published about public debt since the study by Hamilton and Flavin (1986). The main question was whether the given debt policies were able to be considered as sustainable. If we examine these papers, we can find some key factors in the measurement of sustainability. The current interest rate, interest payment growth and public deficit are the main variables examined in these studies. There are econometrical examinations, which are very sensitive to the quality and quantity of data and lead to heterogeneous results. The following part of study seeks to show some more interesting measures of fiscal sustainability. Table 1 is a summary of these measures.

Table 1 Selected papers on fiscal sustainability measurement

Article	Sample	Time horizon	Model or indicator
Blanchard et al. (1990)	Selected OECD countries	1983-2028	Fiscal gap (short-, medium and long-term)
Bohn (1995)	U.S.	1916-1990	Stochastic model
Croce and Juan-Ramón (2003)	12 developed and developing countries	1990-2000	Indicator of Fiscal Sustainability
Tanner and Samake (2006)	Brazil, Mexico and Turkey	1998-2005	Vector autoregression model
Greiner and Fincke (2015)	Austria, France, Germany, Italy, The Nederland, Portuguese and the USA	1970-2012	Panel model
European Commission (2016)	European Union countries	2015-2030	Fiscal sustainability indicators (S0, S1, S2)

Source: Own construction

All papers on fiscal sustainability mentioned the fiscal gap by Blanchard et al. (1990). They used a set of indicators in different time horizons (1, 5 and 40 years), these indicators being denoted short-term, medium-term and long-term gaps. The short-term gap was given by:

$$d + (r - \theta)b_0$$

from

$$t_0^* - t = g + h - t + (r - \theta)b = d + (r - \theta)b$$

The medium-term gap:

$$[(\text{average over the next 5 years of } g + h) + (r - \theta)b_0] - t$$

from:

$$t_n^* = (r - \theta)[b_0(1 - exp - (r - \theta)n)]^{-1}\left[\int_0^n (g + h)exp - (r - \theta)s \, ds\right]$$

where r and θ are the expected average real interest and growth rates over the next 5 years, and t the constant tax rate. If we compare the short-term with the medium term, we can say that the short-term gap is a desirable characteristic of a medium-term gap; the medium-term gap anticipating movements in the short-term gap. They illustrated these indicators in OECD countries in the 1980s period, and assessed specific government programmes. In the medium term, these programmes reached far into the future, in particular, depending on population ageing. They suggested that the assessment of the fiscal sustainability should be forward-looking, and not just static.

Bohn (1995) provides one of the first tests of sustainable debt policies. He said that the public debt policy is sustainable if the primary surplus relative to GDP is a positive function of the debt to GDP ratio. The intuition behind this proposition is that if governments run into debt today, they have to take corrective actions in the future by increasing the primary surplus. Since the middle of the 2000s, researchers in the area have focused on the measurement and testing of sustainability of public debt, for example Afonso (2005), Ballabriga and Martinez-Mongay (2005), Greiner et al. (2007), Neck and Sturm (2008), Bohn (2008), Fincke and Greiner (2008), and Greiner and Fincke (2015).

The Indicator of Fiscal Sustainability by Croce and Juan-Ramón (2003) is another oft-cited indicator besides the fiscal gap. They tested 12 countries' data in the 1990s period, with the following algorithm:

$$IFS_t = (\beta_t - \lambda_t) = \frac{1 + r_t}{1 + g_t} - \frac{ps_t - ps^*}{d_{t-1} - d^*}$$

where β_t is the spread between the observed real interest rate and the observed rate of growth at time t. Meanwhile λ_t denotes a ratio between the deviation of the observed primary surplus ratio with respect to the primary ratio which would maintain the debt ratio at its target value and the deviation of the observed public-debt ratio with respect to its target value. Further, ps is the primary surplus ratio, and d^* means the lowest value reached by the debt ratio during the period. If the algorithm is greater by more

than 75 percent than the threshold during the 1990s, then the county's fiscal policy is unsustainable. In a subsequent empirical examination, Argentina, Brazil and Turkey are classified as unsustainable. In contrast, the countries (Belgium, Indonesia, Ireland, and Mexico) where the IFS was lower than 75 percent of the threshold during the 1990s were classified as sustainable.

Tanner and Samake (2006) examined the sustainability of fiscal policy in Brazil, Mexico and Turkey, distinguishing between retrospective and prospective sustainability. In determining retrospective sustainability, the following question was posed (Tanner–Samake 2006, p. 4): "If historical policies were to be continued into the future, would fiscal policy be sustainable - or will a modification of policies be required?". Meanwhile, prospective sustainability seeks to answer the following question (Tanner–Samake 2006, p. 4): "What policies should be undertaken today in order to prevent the need for further adjustments in the future?" They categorized these two types of approach to sustainability in previous papers. Hamilton and Flavin (1986) with stationarity of deficit, Bohn (1991) about cointegration of revenues and expenditures, and Bohn (1998, 2005) about the link between primary surplus and debt, all based on retrospective sustainability. Blanchard et al. (1990) with fiscal gap was included in both categories. The papers which employed Value-at-Risk, like Kopits and Barnhill (2003), Adrogué (2005), or simulated debt projections, namely Celasun et al. (2006) and Hoffmaister et al. (2001), were grouped in the prospective approach.

Tanner and Samake (2006) used vector auto-regression model, i.e. historical decomposition with fiscal and macroeconomic variables in retrospective examination. Historical decomposition is able to identify which shocks were most important in debt accumulation, when such shocks happened and whether they caused increasing or decreasing debt.

A country's policy was "unsustainable" if the debt stock rose under certainty (the baseline projection); otherwise, policy was "sustainable". Absent shocks, fiscal policy is sustainable over the period $M + 1$ through $M + j$ if (Tanner–Samake 2006, p. 13):

$$\frac{b(base)_{M+j}}{GDP_{M+j}} \leq \frac{b_M}{GDP_M}$$

While in a historical decomposition, each element of X is expressed as the sum of a baseline projection of that variable, conditional on all information available in the base period M; plus the (orthogonal) impacts of shocks from all variables thereon, accumulated from $M + 1$ onward. Thus, in any period $M + j$ ($j = 1,2,3,4\ldots J$) the change in debt (that is, the deficit) Δb_{M+j} is the following:

$$\Delta b_{M+j} = \Delta b(base)_{M+j} + z_{b1j}^* + z_{b2j}^* + \cdots z_{bIj}^*$$

where $\Delta b(base)_{tB+k}$ incorporates all information about the evolution of deficit that is available before time $M + 1$, while z_{bij}^* represent the impacts of the i-th variable ($i = 1,2,3,\ldots I$) on the deficit, accumulated from $M + 1$ through $M + j$. The variables

corresponding to z^*_{bij} are both policy and non-policy, as discussed below. Thus, a country's debt level at the end of period $M + j$ is the following:

$$b_{M+j} = b_{M+j-1} + \Delta b(base)_{M+j} + z^*_{b1j} + z^*_{b2j} + \cdots z^*_{bIj}$$

Tanner and Samake (2006) presented simulations of the VAR system with randomly generated shocks. The equation is:

$$b(sim)_t = b(sim)_{t-1} + (1 + r(sim)_t) + pd(sim)_t$$

where $b(sim)$, $r(sim)$, $pd(sim)$ are simulated values of the debt, interest rate and primary deficit for any period $t > J$, and:

$$r(sim) = \zeta_{r0} + \zeta^*_{r1t} + \zeta^*_{r2t} + \cdots + \zeta^*_{rIt}$$
$$pd(sim) = \zeta_{p0} + \zeta^*_{p1t} + \zeta^*_{p2t} + \cdots + \zeta^*_{pIt}$$

with ζ_{r0} and ζ_{p0} representing the assumed mean levels of the real interest rate and primary surplus, while the terms ζ^*_{rit} and ζ^*_{pit} are simulated impacts of shocks to variable i on the real interest rate and primary deficit, respectively.

They showed with Monte Carlo simulation that the primary surplus rising causes increasing debt-GDP ratio, the worst situations the 50, 25, and 10 percent of circumstances. Although the field of simulation is a very interesting part of empirical examination in itself, we shall now focus on testing methods. That of Tanner and Samake (2006) has its advantages, the first being the richer and more sophisticated econometric framework compared to previous frameworks, and moreover, their framework communicates a clearer menu of options for policymakers than other frameworks. The central message is that the optimal primary surplus and debt reduction path depend on the specific technology and preferences of a country, and hence any analysis must incorporate general equilibrium model as well.

One of the newest empirical examination for sustainable debt level comes from Greiner and Fincke (2015). The study seeks to answer the important questions of whether a sustainable debt policy is compatible with a rising debt to GDP ratio, and of identifying the critical initial debt ratio of unsustainable debt policy. They used correlation between the primary surplus and public debt, all measured as ratios of GDP. They analysed seven countries (Austria, France, Germany, Italy, The Nederlands, Portugal and the U.S) from 1970 to 2012 in panel model. They created three-type interval (year 1, year 3 and year 5). The initial equation is:

$$s(t) = \psi(t)b(t) + \phi^T Z(t) + \epsilon(t)$$

where $s(t)$ is the primary surplus to GDP ratio, $b(t)$ the public debt to GDP ratio at time t, $Z(t)$ is a vector of additional variables which influence the primary surplus ratio, and $\epsilon(t)$ is an error term (i.i.d. $N(0, \sigma^2)$). After that, they broaden the equation with $YVar(5)$ as a business cycle variable, which means accounting for fluctuation in revenues. They were able to measure this variable with Hodrick Prescott-Filter (HP-

Filter) to the real GDP series. The primary surplus was affected by deviations of real public expenditures from its long-run trend, therefore they use $GVar(t)$, i.e. the fluctuations of public expenditure around its trend, and computed by HP-filter. Finally, they changed $b(t)$ to $b(t-1)$, which solved problems of endogeneity. The new equation was the following:

$$s(t) = \phi_0 + \varphi(t)b(t-1) + \phi_1 GVar(t) + \phi_2 YVar(t) + \epsilon(t)$$

They made a pooled OLS estimation with fixed and random effect, using control variables, too, as the following equation shows:

$$y_{i,t} - y_{i,t-q} = \phi_0 + \psi b_{i,t-q} + \phi_1 y_{i,t-q} + \phi_2 Trade_{i,t-q} + \phi_3 GCons_{i,t-q} + \phi_4 Infl_{i,t-q} \epsilon_{i,t}$$

where $y_{i,t}$ is the natural logarithm of real GDP per capita for country i at time t. Further, b is the public debt to GDP ratio, $y_{i,t-q}$ the initial real GDP per capita expressed in log units, $Trade_{i,t-q}$ is foreign trade proxied by the difference between exports and imports (i.e. the external trade balance or net exports) relative to GDP. The $GCons_{i,t-q}$ is government consumption calculated as government consumption expenditures relative to GDP and $Infl_{i,t-q}$ is the initial annual inflation rate.

Their results revealed the negative relationship between the public debt to GDP ratio and the growth rate. The panel data estimation without control variables showed significant negative relation between the public debt to GDP ratio and economic growth in the subsequent periods. When they estimated with control variables, they experienced smaller negative correlation between debt and growth. The linear relationship as empirical evidence for non-linearities is very weak, indeed they could not find any indication of non-linearities for the 3-year time interval and for annual growth rates (Greiner–Fincke 2015).

Fiscal sustainability meant "solvency" of the public sector for the European Union. They use three sustainability indicators, $S0$, $S1$ and $S2$. $S0$ is a composite indicator, a set of fiscal and financial-competitiveness variables (28 variable); therefore, their methodology is very different from others. $S0$ is described as an "early detection indicator designed to highlight shorter term risks of fiscal stress (within a 1-year horizon) stemming from the fiscal, as well as the macro financial and competitiveness sides of the economy" (European Commission 2015, p. 29). In contrast, $S1$ is a medium-term and $S2$ a long-term sustainability indicator, and these reflect the aforementioned solvency definition of fiscal sustainability. These are based on the government intertemporal budget constraint[1] and help provide fiscal projection

---

[1] The intertemporal budget constraint defined by "public debt and the discounted value of future government expenditure, including the projected increase in age-related public spending, need to be covered by the discounted value of future government revenues" (European Commission 2016, p. 22).

under the assumption of unchanged fiscal policy. The time horizon of interest of S1 extends to 2030 and it has a specific debt target (60% for gross public debt to GDP), but S2 has an infinite horizon and foregoes a specific debt ratio target

$S1 = Gap\ to\ debt\ stabilising\ primary\ balance\ +$
$additional\ adjustment\ required\ to\ reach\ 60\%\ debt\ ration\ in\ 2030 +$
$additional\ adjustment\ required\ to\ finance\ the\ increase\ in\ public$
$spending\ due\ to\ ageing\ up\ to\ 2030$
$S2 = Gap\ to\ debt\ stabilising\ primary\ balance +$
$additional\ adjustment\ required\ to\ finance\ the\ increase\ in\ public$
$spending\ due\ to\ ageing\ over\ infinite\ horizon$

Tóth (2014) assessed some indicators of fiscal sustainability by predicting power. These are the primary gap by Blanchard (1990), the stationary tests for public debt by Miyazaki (2014), the stationary test for the first differential of public debt by Prohl and Schneider (2006), the public revenues and expenditures cointegration by Afonso and Jalles (2012) and the fiscal reaction function by Bohn (1998). The effectiveness of the various forecasting methods was analysed by three indicators: the true positive rate (TPR)[2], false positive rate (FPR)[3] and classification accuracy[4]. The primary gap had the best forecasting capacity, in spite of the fact that the primary gap was the most static among the methods examined. Tóth (2014) drew attention to unit selection, the frequency of data series, the length of the periods, indicators, estimation methods, and hypotheses testing, together with structural breaks affecting measurement. He suggested that the studies should incorporate more country-specific factors (threshold values) in order to increase the efficiency of fiscal indicators.

4. Conclusion

We analysed the basic measurement and empirical methods of fiscal sustainability. To do this, we needed to discuss the definition of fiscal sustainability, and show the connection between debt, deficit and fiscal sustainability. The simplest definition is "the government budget must be balanced in present-value terms" (Hamilton–Flavin 1986, p. 811).

We examined several measurement models of fiscal sustainability and were able to identify the more important findings, introducing each briefly. Over the years, the empirical examination of fiscal sustainability has transformed into more sophisticated econometric framework than previous attempts. These methods help policymakers make better decision about optimal fiscal policy. But in attempting to create a model

---

[2] $TPR = TP/(TP + FN)$ where TP is correct classification, with unsustainable fact and unsustainable forecast and FN is type II error.

[3] $FPR = FP/(FP + TN)$ where FP is type I error.

[4] $Classification\ accuracy = (TP + TN)/(TP + TN + FP + FN)$ where TN is correct classification with sustainable fact and sustainable forecast.

to measure fiscal sustainability, we have to keep in mind that the optimal primary surplus and debt reduction path depend on a country's specific circumstances, and the quality and quantity of data available for that country.

As Wyplosz (2007) found, we could not apply sophisticated forecasting methods, because sustainability depends on the future, meaning we could not draft a statement on primary surpluses with any degree of certainty. It is future balances that matter, not just the past and not just the current debt level, and the difficult and sophisticated models in question have huge data demands.

Based on these are facts we would like to test the models presented here with Monte Carlo simulation in the next paper. In so doing, we hope to be able to identify best practice.

References

Adrogué, R. (2005): Central America: Global integration and regional cooperation. *IMF Occasional Paper*, 243, 59–68.

Afonso, A. (2005): Fiscal sustainability: The unpleasant European case. *Finanzarchiv*, 61, 1, 19–44.

Afonso, A. – Jalles, J. T. (2012): Revisiting fiscal sustainability: panel cointegration and structural breaks in OECD countries. *Working Paper*, 1465, European Central Bank.

Ballabriga, F. C. – Martinez-Mongay, C. (2005): Sustainability of EU public finances. *Economic Papers*, 225, European Commission.

Barro, R. J. (1974): Are government bonds net wealth? *The Journal of Political Economy*, 82, 6, 1095–1117.

Barro, R. J. (1979): On the determination of the public debt. *The Journal of Political Economy*, 87, 5, 940–971.

Blanchard, O. (1990): Suggestions for a new set of fiscal indicators. *OECD Economics Department Working Papers*, 79, Paris: OECD Publishing.

Blanchard, O. – Chouraqui, J. C. – Hagemann, R. P. – Sartor, N. (1990): The sustainability of fiscal policy: New answers to an old question. *OECD Economic Studies*, 15, 7–37.

Bohn, H. (1991): Budget balance through revenue or spending adjustments: Some historical evidence for the United States. *Journal of Monetary Economics*, 27, 3, 333–59.

Bohn, H. (1995): The sustainability of budget deficits in a stochastic economy. *Journal of Money*, Credit and Banking, 27, 1, 257–271.

Bohn, H. (1998): The behaviour of U.S. public debt and deficits. *Quarterly Journal of Economics*, 113, 3, 949–963.

Bohn, H. (2005): The sustainability of fiscal policy in the United States. *CESifo Working Paper*, 1446.

Bohn, H. (2008): The sustainability of fiscal policy in the United States. In Neck, R. – Sturm, J.-E. (Eds.): *Sustainability of public debt*. Cambridge: MIT, 15–50.

Buiter, W. H. (1982): The prober measurement of government budget deficits: comprehensive wealth accounting or permanent income accounting for the public sector: its implications for policy evaluation and design. *Working Paper*, 1013, National Bureau of Economic Research.

Celasun, O. – Debrun, X. – Ostry, J. D. (2006): Primary surplus behaviour and risks to fiscal sustainability in emerging market countries: A "Fan-Chart" approach. *IMF Working Paper*, 67.

Croce, E. – Juan-Ramón, H. V. (2003): Assessing fiscal sustainability: A cross-country comparison. *IMF Working Paper*, 145.

European Commission (2016): Fiscal Sustainability Report 2015, *European Economy Instituional paper*, 018.

Fincke, B. – Greiner, A. (2008): How to assess debt sustainability? Some theory and empirical evidence for selected euro area countries. *Applied Economics*, 44, 28, 3717–3724.

Greiner, A. – Fincke, B. (2015): Public debt, sustainability and economic growth: *Theory and empirics*. London: Springer International Publishing.

Greiner, A. – Köller, U. – Semmler, W. (2007): Debt sustainability in the European monetary union: Theory and empirical evidence for selected countries. Oxford Economic Papers, 59, 2, 194–218.

Hamilton, J. D. – Flavin, M. (1986): On the limitations of government borrowing: A framework for empirical testing. *The American Economic Review*, 76, 4, 808–819.

Hoffmaister, A. W. – Rojas, M. – Saenz, M. – Segura, M. – Tenorio, E. (2001): Solvency of the overall public sector: A preliminary empirical study for Costa Rica. *Central Bank of Costa Rica, Economics Division, Research Note*, 04–01.

IMF (2002): *Assessing Sustainability*, SM/02/06, Washington.

IMF (2003): Report on Joint Bank-Fund Workshop on debt sustainability in low-income countries, Washington D.C., September 11–12 Available: http://www.imf.org/external/np/pdr/sustain/2003/100903.htm. Date of access: 01.19.2016

Kopits, G. – Barnhill, T. F. (2003): Assessing fiscal sustainability under uncertainty. *IMF Working Paper*, 79.

Kornai J. (1992): *The socialist system: The political economy of communism*. Princeton: Princeton University Press.

Miyazaki, T. (2014): Fiscal reform and fiscal sustainability: Evidence from Australia and Sweden. *Discussion Papers*, 1407, Graduate School of Economics, Kobe University.

Neck, R. – Sturm, J.-E. (2008): Sustainability of public debt: Introduction and overview. In Neck, R. – Sturm, J.-E. (eds.). *Sustainability of public debt*. Cambridge: MIT Press, 1-14.

Prohl, S. and Schneider, F. G. (2006): Sustainability of public debt and budget deficit: panel cointegration analysis for the European Union member countries. *Working Paper*, 610, Department of Economics, Johannes Kepler University of Linz.

Tanner, E. – Samake, I. (2006): Probabilistic sustainability of public debt: A vector autoregression approach for Brazil, Mexico, and Turkey. *IMF Working Paper*, 295.

Tóth, G. Cs. (2014): The forecasting capacity of indicators measuring budget sustainability. *Public Finance Quarterly*, 59, 4, 544–561.

Trehan, B. – Walsh C. E. (1991): Testing intertemporal budget constraints: Theory and ppplications to U. S. federal budget and current account deficits. *Journal of Money*, Credit and Banking, 23, 2, 206–223.

World Bank (2005): *Public debt and its determinants in Market Access Countries: Results from 15 country case studies*. Washington DC: World Bank.

Wyplosz, C. (2007): Debt sustainability assessment the IMF approach and alternatives. *IHEID Working Paper*, 03-2007, The Graduate Institute of International Studies.

PART THREE

Agriculture and environment

Technical efficiency estimation in the livestock industry:
Case study of the southern rangelands of Kenya

Manyeki John Kibara – Balázs Kotosz

Measurement of the efficiency of agricultural production is an important issue in developing countries such as Kenya. A measure of producer's performance is often useful for policy purposes, and the concept of technical efficiency provides a theoretical basis for such a measure. This study investigated factors influencing the technical inefficiency of livestock production in the southern rangelands of Kenya. Using cross-sectional household data and Maximum Likelihood Estimate technique we found that the factors contributing to the inefficiency of livestock production were years of schooling of the household, household size, access to market information and input markets. The mean technical inefficiency was higher for sheep and goats (64.98%) than cattle (1.48%) production, implying that about 65% and 2% of output of the small ruminants and cattle respectively is lost due to the misallocation of variable factors within the household.

1. Introduction

One of the great challenges that the Kenyan Government has been facing over the last 20 years has been to sustain the increase in the amount and efficiency of red-meat production to fulfil export requirements and to satisfy the rapidly increasing domestic demand (Behnke– Muthami 2011). Recent studies on animal products demand and supply projection indicate that, unless appropriate interventional measures are introduced, the country may soon register a deficit in most of livestock products (Farmer–Mbwika 2012). One such intervention proposed by modern economic theorists would be enhancement of efficiency of the farm, which can be achieved through technical efficiencies in factors of production (Farrell 1957). Measurement of the efficiency of agricultural production is an important issue in developing countries such as Kenya because a measure of producer performance is often useful for policy purposes, and the concept of technical efficiency provides a theoretical basis for such a measure.

Livestock farming has been estimated to be present on more than 75% of the smallholdings in Kenya, particularly to supply milk and cash for the farm family (Salami et al. 2010). In addition to meeting subsistence needs, they are expected to produce food and raw materials for local and overseas markets, create jobs and contribute towards poverty reduction. Therefore, for enhanced real livestock

productivity, the efficiency in the use of resources among smallholders' farmers is paramount, although question on the resource productivity has lately been raised due to the dwindling of livestock's contribution to the national GDP in Kenya (decline from 16.6% in 1980s to 10% by 2016), casting a cloud of doubt on efficiency in the use of available resources (Behnke et al. 2011). This disquiet necessitated the need to investigate the causes underlying technical inefficiency in the production of cattle, sheep and goats among smallholder farmers in the southern rangelands of Kenya.

Technical efficiency can be defined as a measure of the ability of a firm to produce maximum output from a given level of inputs, or achieve a certain output threshold using a minimum quantity of inputs, under a given technology (Farrell 1957, Varian 1992). As indicated by Fare and Lovell (1978), measurement of technical efficiency is an important tool for the following reasons: Firstly, it is a success indicator in performance appraisal, by which production units are evaluated. Secondly, as measurement of causes of inefficiency, it makes it possible to explore the sources of efficiency differentials and eliminate causes of inefficiency. Finally, the identification of sources of inefficiency is essential to the institution of public and private policies designed to improve performance. Therefore, investigating factors that influence technical efficiency offers important insights into key variables that might be worthy of consideration in policy-making, in order to ensure optimal resource utilization. Technical inefficiency can be modelled as either input-oriented/input-saving or output-oriented/output-augmenting. We adopted an output-oriented measure that indicated the magnitude of the output of the i-th livestock farmer relative to the output that could be produced by the fully efficient farmer using the same input vector (Kumbhakar–Efthymios 2008).

There are two methods that have been widely used in the past to estimate production technical efficiency. These are non-parametric data envelopment analysis (DEA) (Charnes et al. 1978) and the econometric stochastic frontier approach (SFA) (Aigner et al. 1977, Meeusen–Van den Broeck 1977). Upon empirically testing, Coelli et al. (2005) observed that DEA has some limitations in that its deterministic frontiers do not account for measurement errors and other sources of stochastic variation, and hence do not permit hypothesis tests on technical efficiency estimates. Similarly, the estimation of random term of stochastic, DEA is usually hampered by computational complexities. The SFA was found fit for this analysis as it is capable of overcoming the above limitation. Indeed, SFA is useful in providing information on the relationship between the amount of output and the inputs of production, given the level of technology involved.

There is extensive literature on technical efficiency as it applies to crops, livestock and mixed crop-livestock farming, in other part of the world (e.g. Battese–Corra 1977, Featherstone et al. 1997, Hadley 2006, Shaq et al. 2007, Barnes 2008, Ceyhan–Hazneci 2010, Ogunniyi 2010, Kalangi et al. 2014, Mevlüt et al. 2016). In Kenya, past studies on efficiency have mainly focused on crops (e.g. Nyagaka et al. 2010) and

dairy (e.g. Kavoi et al. 2010), and so far only one piece of research in the beef industry involving free-range production has been undertaken (Otieno et al. 2014). The present study contributes to this momentum aiming at investigating technical inefficiency effects for cross sectional data from smallholder pastoral livestock farmers in terms of some farmer-specific and inputs variables in the southern rangelands of Kenya.

The paper is organized as follows. In Section 1 we discuss the data and methods used in this study. The main subjects of this section are the location of the survey and its data collection procedure, the theoretical framework of the stochastic production frontier function and the Maximum Likelihood method of estimation and procedure for estimating inefficiencies. The section is concluded by the determination of the variables used in the stochastic frontier and technical inefficiency effects models. Section 2 presents the empirical results, and Section 3 concludes with some recommendations for policy.

2. Data and Methods

2.1. Location of Survey and Data Collection Procedure

This study was confined to the southern rangelands of Kenya. The choice of this region was based on the region's dominance in livestock production relative to other livestock production regions in Kenya. The study used cross-sectional farm household data that was collected during September-October 2013 and was structured and managed in a way that ensured high data quality. The data used was part of the intensive and costly survey conducted under the Agricultural Sector Development Support Program at the Ministry of Agricultural, Livestock and Fishery, and was coordinated by staff from the Kenya Agriculture and Livestock Organization (KALRO) and the University of Nairobi. Agricultural households were selected using a proportionate to population size sampling method and the survey was confined to the prominent production systems (agro-ecological zones) within each county; therefore, each county's sample size was randomly distributed to different areas based on the population density of each production system. Unfortunately, it was not possible to stratify the samples on the basis of livestock numbers on individual properties, and therefore the register list of Kenya National Bureau of Statistic of 2009 was used as it constituted the most complete population listing that was available at the time (GoK 2010a). To ensure fair distribution of sample size, households identified for sampling were entered in Global Positioning System (GPS) by GIS mappers who had earlier been recruited and trained and the identified households were supplied with coupons which were to be submitted to the data clerk after a face-to-face interview. The mapping of households was done prior to the actual data collection. Enumerators and data entry clerks were recruited and trained on the survey instrument, and a pre-test was conducted before actual data collection.

In order to investigate technical (in)efficiency on smallholder pastoral livestock farmers in terms of some farmer-specific and inputs variables in the southern

rangelands of Kenya, the project adapted the usual definition of the household. According to the adapted definition, for the purpose of this study, a household consisted of a group of people who cook together and eat together and drawing food from a common source – share resources together and therefore for this purpose, household members are not necessarily the same as family members (Shaw 1988, Unalan 2005, EAL 2008). Data were obtained through face-to-face interviews using a structured questionnaire on 1254 livestock keeping households that were distributed across the six counties that includes Narok, Kajiado, Tana-River, Kitui, Makueni and Kwale counties. The six counties were purposively selected by considering total population of livestock based on the recent livestock population census of 2009 and the total number of farming households in each county (GoK 2010b). Livestock farming in the six counties surveyed is representative of the production systems available to the majority of Kenyan southern rangelands livestock regions, 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.

2.2. Theory on stochastic Frontier Production function

The stochastic frontier production function (SFPF) is an extension of the familiar regression model based on the theoretical premise that a production function, or its twin, the cost function, or the convex conjugate of the two, the profit function, represents an ideal, the maximum output attainable given a set of inputs, the minimum cost of producing that output given the prices of the inputs, or the maximum profit attainable given the inputs, outputs, and prices of the inputs. Since the seminal paper of Farrell (1957), technical efficiency has typically been analysed using two principal theoretical frameworks; the non-parametric data envelopment analysis (hereafter DEA) (Charnes et al. 1978) and the econometric stochastic frontier approach (hereafter SFA) (Aigner et al. 1977, Meeusen–Van den Broeck 1977). A potential advantage of SFA over DEA is that random variations in production function can be accommodated, so that the measure is more consistent with the potential production under "normal" working conditions. SFA developed from isolated influences but the literature that directly influenced the development of SFA was the theoretical framework for production efficiency which originated in the 1950s (e.g. Debreu 1951) and which to date remains the framework of choice for many scholars (e.g. Nyagaka et al. 2010, Otieno et al. 2014, Mamardashvili–Bokusheva 2014). SFA utilizes econometric techniques whose models of production recognize technical inefficiency and the fact that random shocks beyond producers' control may affect production. Differently from traditional production approaches that assume deterministic frontiers, SFA allows for deviations from the frontier, whose error can be decomposed for adequate distinction between technical efficiency and random shocks. Using SFA

idea, the Stochastic SFPF can be expressed using J inputs $(X_1, X_2 \dots X_J)$ to produce output Y as:

$$Y_i = f(X_{ij}; \beta)\exp(v_i - u_i); i = 1,2, \dots, N \qquad (1)$$

where v_i is a random error associated with random factors not under the control of the producing unit i. It is the "noise" component and assumed to be a two-sided normally distributed variable and constant variance $(v_i \sim N(0, \sigma_v^2))$. Meanwhile, u_i is the non-negative technical inefficiency component and is half normal distributed $(u \sim F)$ with variance σ_u^2. Moreover, u_i and v_i are assumed to be independent of each other and independently and identically distributed across observations. Together they constitute a compound error term, with a specific distribution to be determined, hence the name of "composed error model" as it is often referred to. $f(X_{ij}; \beta_i)$ is the production frontier, β is a vector of technology parameters to be estimated, and u_i defines the ratio of observed output to maximum feasible output. If $u_i = 1$, then, the i-th farmer obtains the maximum feasible output, while $u_i < 1$ provides a measure of the shortfall of the observed output from maximum feasible output. This model is such that the possible production Y_i is bounded above by the stochastic quantity, $f(X_{ij})\exp(v_i)$, hence the term stochastic frontier.

We now turn to the selection of the functional form of the stochastic production frontier function. The issue of functional form for the production or cost function is generally tangential to the analysis and not given much attention. In a production model, the choice of functional form brings a series of implications with respect to the shape of the implied isoquants. In particular, the Cobb-Douglas production function has universally smooth and convex isoquants. The alternative translog model is not monotonic or globally convex, as is the Cobb-Douglas model, and imposing the appropriate curvature on it is generally a challenging problem. Therefore, we adopted the latter and assumed that $f(X_i; \beta)$ takes the log-linear Cobb-Douglas form expressed as:

$$LnY_i = \beta_0 + \sum_{i=1}^{n} \beta_{nj} LnX_{nj} + v_i - u_i, \qquad (2)$$

Now, u_i which defines the inefficiency term, can be represented by non-negative unobservable random variables associated with the technical inefficiency of production, such that for a given technology and level of inputs, the observed output falls short of its potential output. This specification allows us to examine the null hypothesis that there are no technical efficiency effects in the model $H_0: \sigma_u^2 = 0$ versus the alternative hypothesis $H_1: \sigma_u^2 > 0$. Value $\sigma_u^2 = 0$ denotes that the deviation from the frontier is due entirely to noise while $\sigma_u^2 = 1$ represents that all deviation is due to technical efficiency.

Technical inefficiency effect model proposed by Battese and Coelly (1995) is described by:

$$u_i = f(Z_i) = \delta_0 + \delta_i Z_i, \tag{3}$$

where Z are vectors of the socio-demographic and other independent variables assumed to contribute to technical inefficiency, i.e. a $(1 \times M)$ vector of explanatory variables associated with the technical inefficiency effects of the producer i. δ is an $(M \times 1)$ vector of unknown parameters to be estimated. The nature of technical inefficiencies can be examined by conducting a null hypothesis of $(H_0: \lambda = 0)$ versus $(H_1: \lambda > 0)$ the alternative. When $\lambda = \delta_i = 0$, there is no technical inefficiency deterministic or stochastic, and when all $\delta_i = 0$ parameters (except λ_0) are zero and the variables do not affect technical efficiency levels, then the model reduces to the one proposed by Stevenson (1980). The technical efficiency of an individual producing unit is defined in terms of the ratio of the observed output of the corresponding frontier output, given the available technology.

$$TE = \frac{Y_i}{Y_i^*} = \frac{f(X_i; \beta) \exp(v_i - u_i)}{f(X_i; \beta) \exp(v_i)} = \exp(u_i) \tag{4}$$

Here, Y_i is the observed output and Y_i^* is the frontier output. The parameters β_j in SFPF and δ_j in inefficiency effect model were estimated by the method of maximum likelihood, using the computer program STATA version 11. The production scale elasticity of j-th inputs was computed by $E_j = \sum \beta_i$ and if the frontier is concave in inputs then $E_j < 0$ and SFPF is in the range 0 to 1.

The next step involved the procedure for estimation of the stochastic frontier production function and technical inefficiency effect model. The parameters β_j and δ_j of the stochastic frontier production functions and technical inefficiency effects model respectively were estimated by the method of maximum likelihood and truncated regression approach using the computer program STATA version 12. In case of cross-sectional data, the technical inefficiency model can only be estimated if the inefficiency effects u_i are stochastic and have particular distributional properties. Aigner et al. (1977) assumed a Half-Normal distribution, $u_i \sim N^+(0, \sigma_u^2)$, while Meeusen and Van den Broeck (1977) opted for an exponential one, $u_i \sim \varepsilon(\sigma_u)$. Other commonly adopted distributions are the Truncated Normal (Stevenson 1980) and the Gamma distributions (Greene 2003). The authors of this study opted for a half-normal distribution and Stochastic Frontier analysis was based on two sequential steps: 1) estimates of the model parameters $\hat{\Theta}$ which were obtained by maximizing the log-

likelihood function $e(\Theta)$, where $\Theta = (\alpha, \beta', \sigma_u^2, \sigma_v^2)$[1], and 2) point estimates of inefficiency which were obtained through the mean (or the mode) of the conditional distribution $f(u_i|\hat{\varepsilon}_i)$, where $\hat{\varepsilon}_i = Y_i - \hat{a} - X_i; \beta$

2.3. Determination of the variables for empirical analysis

Several independent variables were selected to estimate the predicted values of the dependent variables. The choice of the variables used is largely based on work by Ceyhan and Hazneci (2010), Ogunniyi (2010), Kalangi et al. (2014), Otieno et al. (2014) and Mevlüt et al. (2016) where factors contributing to farmer production (in)efficiency in the livestock industry were extensively reviewed. The set of independent variables potentially expected to contribute to the (in)efficiency in production of cattle, sheep and goats in the SR of Kenya are grouped into two, with the stochastic frontier model variables and the inefficiency effects model variables

Table 1 Variables for stochastic frontier and technical inefficiency effects model

Variable name	Variable descriptions	Anticipated sign
Stochastic frontier model		
Natural pasture (X_1)	Discrete (land in hectares)	+
Labour (hired and family) (X_2)	Discrete (man-days)	+
Use mineral supplements (X_3)	Have been using mineral supplements = 1, 0 otherwise	+
Use dewormers (X_4)	Have been using dewormer = 1, 0 otherwise	+
Purchase fodder (X_5)	Have been purchasing fodder = 1, 0 otherwise	+
Inefficiency effects model		
Household head age (Z_1)	Discrete (age in years)	-
Years of schooling of the household head (Z_2)	Discrete	-
Household size (Z_3)	Discrete (Head count of active member)	-
Number of technology adopted (Z_4)	Discrete	-
Membership agricultural group / association (Z_5)	Belong to farmers' group or association = 1, 0 otherwise	-
Agricultural extension services (Z_6)	Access to extension services = 1, 0 otherwise	-
Agricultural research services (Z_7)	Access to agricultural research services = 1, 0 otherwise	-
Market information (Z_8)	Access to market information systems = 1, 0 otherwise	-

Source: Own construction based on the literature

---

[1] Note, that different model parametrizations are used in the Stochastic Function literature as, e.g. $\Theta = (\alpha, \beta', \sigma^2, \lambda)'$ where $\sigma^2 = \sigma_u^2/(\sigma_u^2 + \sigma_u^2)$ and $\lambda = \sigma_u/\sigma_v$ where λ measures the association between variables and ranges from 1 (perfect association) to 0 (no association).

and their descriptions and the expected signs being summarized in Table 1. Generally, on a priori bases, the marginal productions of the stochastic frontier production function (equation 2) were expected to be positive, as the rate of change of the mean of production with respect to the j-th explanatory variable. In a one-step stochastic frontier production estimation, the parameter for inefficiency level (u_i) usually enters the model as the dependent variable in the inefficiency effects component of the model (equation 3), and therefore a negative sign for variables in the Z-vector is expected, which implies that the corresponding variable would reduce level of inefficiency.

3. Results and Discussion

3.1. Descriptive statistic of the variables

Before discussing the results of the SFA analysis, it would perhaps be of interest to present some of the descriptive data of the analysis. The summary statistics of selected technical, social and economic variables that influence livestock production is presented in this section. In this study, livestock were grouped into two classes; cattle representing large ruminants and sheep and goat (hereafter shoats) representing small ruminants. The combining of sheep and goat together was important because the two types of livestock are grazed together and share the same inputs and so proved difficult to distinguish from one another. As indicated in Table 2, the mean and standard deviation of herd size per household was more for shoats (38.78±86.55) and lower for the cattle (20.95±55.41) which concurred with the findings by Otieno et al. (2014).

Table 2 Summary statistics of the survey data

Variable descriptions	Cattle	Shoats
Input/output variable		
Number of livestock	20.95±55.41	38.78±86.55
Natural pasture land in hectares	41.34±82.06	38.76±177.43
Labour (hired and family) (man-days)	85.50±164.11	94.31±165.35
Use mineral supplements in percent	52.03	42.58
Use dewormers in percent	77.73	70.93
Purchase Fodder in percent	8.57	7.98
Socioeconomic indicators in livestock rearing		
Age of the Household Head (in years)	48.20±15.21	48.49±15.16
Years of schooling of the household head	6.54±5.24	6.60±5.26
Household size (active member)	6.59±3.02	6.61±3.06
Number of technology adopted	0.23±0.62	0.21±0.60
Membership of an agricultural group/association in percent	12.50	11.90
Access to the agricultural extension services in percent	11.80	10.50
Access to agricultural research services in percent	4.00	3.60
Access to market information in percent	29.30	28.30
Access to input market in percent	35.00	33.90

Source: Own construction using household survey data

The higher mean in shoats explains why shoats are often regarded as an important alternative to cattle in pastoral areas (Huho et al. 2011). In general, both stochastic frontier inputs and inefficiency factors did not exhibit a significant difference between shoat and cattle production. The results show a high standard deviation from the mean for land and labour input in the two enterprises. This is because a majority of smallholder households have less than five hectares of the land, and therefore keep relatively few animals, which also require low labour input. Labour was captured on a weekly basis, recognizing the fact that cattle and shoat production are labour intensive. The percentage use of mineral supplements was higher in cattle (52.03%) than in shoat production (42.58%). Meanwhile, the rate of use of dewormer was over 70% for both cattle and shoat production. This is a clear indication that farmers are mostly concerned with the control of worm infections which have remained one of the major disease constraints to livestock production in Kenya. This confirms the findings by Perry et al. (2002) who found that worm infestation in livestock continue to be a major challenge, especially in small ruminants in the tropics and subtropics. Purchase of fodder for supplementing livestock was very low among cattle and shoat producers, although relatively high for cattle production alone. In general, shoat feed intake is low compared to large livestock like cattle and camels, and perhaps it subsequently makes no economic sense for farmers to buy feed for shoat production.

In the case of socioeconomic variables, the margins in the difference of the averages and percentages for the two enterprises were relatively low. For instance, the mean age and standard deviation of household head calculated was 48.20±15.21 and 48.49±15.16 for cattle and shoats respectively, translating to a difference in margin of less than one. However, the result indicates that a majority of livestock farmers in the southern rangelands of Kenya are within the productive age bracket (between 30-50 years) suggested by Skirbekk (2003). The mean years of schooling was 6 years with standard deviation of 5 years which implies that literacy levels were very low; indeed the household heads' average level of education was the equivalent of completing primary school. Similar findings were reported by Ogunniyi (2010) for livestock farmers under similar environmental condition in Nigeria. The average number of people per household engaged in shoat and cattle production was relatively high based on the average herd size, translating to a livestock-to-people ratio of 3-6 animals, implying a low average marginal productivity. Although the number of technologies adopted by each farm was insignificant, and membership of agricultural groups and associations was relatively high among cattle farmers (12.5%). Coming together as a group has the potential impact on cattle production. It is probably less likely in shoat production because of the relatively lower returns, meaning there would be no perceived personal benefit to farmers from belonging to a shoat production group and participating in collective action. The result also indicates that cattle enterprise benefit from relatively better access to livestock extension, agricultural research, market information services and input markets compared to shoat production.

3.2. Estimating stochastic frontier model

The results of the estimated parameters of the SFPF (equation 2) are presented in Table 3. The results show that the natural pasture land size, labour and use of dewormer had the expected positive sign and were statistically significant (either at 1%, 5% and 10%) for both shoat and cattle production. The coefficient for natural pasture land was 0.28 and 0.29 for cattle and shoats respectively. This implies that 10% increases in the pasture land in terms of quantity and quality would result in a 28% and 29% increase in the herd of cattle and shoats respectively. The impact of labour was positive and statistically significant at 1% and 10% for cattle and shoat production respectively. The coefficients for labour inputs were 0.14 and 0.09 for cattle and shoat production respectively. These results imply that cattle production is relatively labour sensitive. The positive coefficient of labour implies that as more labour is employed, gross margin increases. The coefficients for the use of dewormer were 0.62 and 0.53 for cattle and shoat production respectively. This variable was captured as a dummy variable and the result indicates that a one unit increase in the number of farmers using dewormer would result in an upward shift of the production frontier function by a margin of 0.62 and 0.53 for cattle and shoats respectively. Use of mineral supplement had the expected positive sign. The relationship between use of mineral supplement and shoat production was significant at 5%. Purchases of fodder for livestock had a negative influence on livestock production. The negative sign confirms that livestock production in this region is semi-commercialized. The constant term for shoat was statistically significant at 1% implying that there are other variables contributing to shoat production that were not included in the analysis.

The value of lambda (λ) indicates the proportion of variation in the model that is due to capacity utilization. The lambda value of 0.73 for shoat production was very high indicating that the unexplained variations in output are the major sources of random errors. The estimates for σ_s^2 of 1.21 and 1.91 for cattle and shoats respectively was significantly different from zero at 1% level of significance. This indicates a good fit and correctness of the specified distributional assumption of Normal-Half Normal of the composite error term. This suggests that conventional production function is not an adequate representation of the data. The log likelihood ratio and Wald chi2 (5), indicate that all the five predictors' regression coefficients are significantly different from zero at 1%. The elements in the row labelled 'scale elasticity' are the sum of the individual effects of inputs on livestock output, which reflects the output oriented measure in response to a change in all inputs variables combined usually referred to as return to scale. In the two enterprises, the scale elasticity is less than one and therefore the returns to scale are decreasing. Since the scale elasticity of stochastic frontier production function is in the range 0 to 1, the frontier is concave to the inputs.

The Likelihood-ratio test technical inefficiency error terms are also presented in Table 3. These tests involve the null hypothesis $H_0: \sigma_u^2 = 0$ against the alternative

hypothesis $H_1: \sigma_u^2 > 0$. If the null hypothesis is true, the stochastic frontier model reduces to an OLS model with normal errors. For this case, the result shows a likelihood-ratio (LR) of 0.00 with a p-value of 1.00 for the half-normal model for cattle production which implies that σ_u^2 is zero and therefore the stochastic model reduces to OLS with a normal error term. The LR for shoats was 0.17 with a p-value of 0.34, implying that σ_u^2 is also different from zero. This implies that at the probability of 34%, the level on inefficiency in shoats (sheep and goat production) is 17%. Ogunniyi (2010) and Otieno et al. (2014) obtained similar results in their different studies.

Table 3 Maximum likelihood estimation for stochastic frontier production function

Variables	Cattle			Shoats		
	Coefficient	Std. Dev	z-value	Coefficient	Std. Dev	z-value
Pasture Land	0.2854215***	0.038245	7.4	0.28909***	0.0432775	6.68
Labour	0.1380475***	0.0494517	2.79	0.085688*	0.0533552	1.61
Mineral	0.1628442	0.1496802	1.09	0.387198**	0.1680707	2.3
Use Dewormer	0.6188858***	0.1586346	3.90	0.525808***	0.1587034	3.31
Buy Fodder	-0.4597568***	0.2038254	-2.26	-0.2993532	0.2277415	-1.31
Constant	0.5524782	0.7760403	0.71	1.9984***	0.6271836	3.19
$\sigma_s^2 = \sigma_v^2 + \sigma_u^2$	1.213671***	0.1021317	-	1.91476***	0.7716011	-
$\lambda = \sigma_u^2 / \sigma_v^2$	0.0168126	0.9014291	-	0.7276227	0.912332	-
Log likelihood	-447.12328***	-	-	-552.0394***	-	-
Scale elasticity[a]	0.7454422	-	-	0.988431	-	-
Likelihood-ratio test for technical inefficiency error term σ_u^2	0.000	-	1.000	0.17	-	0.341
*Significant at 10% level (p < 0.10);						
**Significant at 5% level (p < 0.05);						
***Significant at 1% level (p < 0.001).						
Wald chi2(5) for cattle = 115.55 and Shoats = 112.00						
[a]Total production elasticity of *j*-th inputs						

Source: own construction

3.3. Estimating the inefficiency effects model

Presented in Table 4 are the estimated parameters for the inefficiency effect model (equation 3). The estimates of the parameters for the schooling of the household head, household size, number of technologies adopted, membership of a group or association, access to research and input markets had a positive impact on the inefficiency experienced in shoat production, while household size, number of technologies adopted, access to livestock market information and input markets were significant in determining the level of inefficiency. The positive effect of years of schooling of the household head and membership to a group were statistically

significant at 10% while access to input market was significant at 1%. The positive relationship between age of the household and the level of inefficiency would perhaps be attributed to the relatively old mean age reported in Table 2. This implies that as age increases, productivity reduces, widening the gap away from the optimal frontier.

Table 4 Technical inefficiency of shoat rearing in southern rangelands of Kenya

Variables	Coefficient	Std	z-value
Age of household head	0.0008036	0.0007665	1.0
Years of schooling of household head	0.0039033*	0.0020837	1.87
Household size	-0.0085943**	0.0037286	-2.30
Number of technologies adopted	-0.0264413*	0.0164617	-1.61
Membership of an agricultural association	0.0497639*	0.0285603	1.74
Access to the agricultural extension services	0.0099435	0.0298006	0.33
Access to agricultural research services	0.0221102	0.0543631	0.41
Access to livestock market information	-0.07919***	0.0266762	-2.97
Access to input market	0.08558***	0.0234373	3.65
σ_2	0.19254***	0.0073947	26.04
Log likelihood	77.4564***	-	-
*Significant at 10% level (p < 0.10); **Significant at 5% level (p < 0.05); ***Significant at 1% level (p < 0.001); Wald chi2(9) = 33.31			

Source: own construction

Education is said to be one of the factors that could improve technical efficiency, since it could improve the managerial capacity of farmers and contribute to farmers' capacity to understand information on livestock production, and a positive sign of the length of education to technical inefficiency could be explained by the high level of illiteracy reported in Table 2. Similarly, in Kenya it has also been shown that as the average number of years of schooling increases, inefficiency increases (Karanja 2002, Kibaara 2005). This could probably be explained by the observations that high education attenuates the desire for farming, and that farmers consequently tend to concentrate more on salaried employment. As the number of school years increases, inefficiency increases and the number of farmers decreases. Closely related to years of schooling of the household head is the number of technologies adopted by household, which had the hypothesized negative sign and was significant at 10%. The more the number of technologies adopted, the higher the reduction of the levels of inefficiency. Household size had the expected negative sign and was also significant at 10%. This variable implies that households with more active members are likely to be more efficient. Based on this variable; an increase in household size by 1 unit would result in a reduction in the inefficiency of the production of shoats by about 0.0086. Research by Sarma and Ahmed (2011) and Mussa et al. (2012) also showed that family size is significant in improving the economic efficiency of agriculture, including the cattle business.

The institutional factors considered in this study were membership of group or association, access to extension, research and market information systems. The coefficient for memberships to groups indicated a positive contribution to the level of inefficiency. Access to market information had the expected negative sign and was significant at 1%. This implies that improvement of the marketing information systems would reduce information asymmetry and hence enhance production of shoats. Access to input made a positive contribution to the level of inefficiency in shoat production and the impact was significant at 1%. This positive result could be attributed to the framing effect, distance and availability of transport to markets, which would need to be further investigated. The estimate of σ^2 (0.19) was significantly different from zero at 1% level of significance. This indicates a good fit and correctness of the specified distributional assumption of half normal of the non-negative error term u. The log likelihood ratio and Wald chi2 (9) shows that all the nine predictors' regression coefficients were significantly different from zero at 1%.

In summary, the most important variables that would significantly reduce the level of inefficiency are household size, number of technologies adopted and access to livestock market information.

3.4. Efficiency size of livestock production

The estimates of technical inefficiency are summarized in Table 5 below. The estimated mean technical inefficiency was 0.015±0.00011 and 0.65±0.202 for cattle and shoats production respectively. The presence of technical inefficiency implies that the allocation of resources in the two productive enterprises is not Pareto efficient therefore there is scope for increasing livestock production in southern rangelands of Kenya by 1.47% and 64.98% for cattle and shoats respectively with the present technology, if the parameters contributing to the inefficiency are improved. The computed efficiency levels for cattle were high (98.5%) while that for shoats was low (14.8%) with the highest being about 55%. Similar high efficiency level for cattle (69%) was reported by Otieno et al. (2014) in Kenya. The differences in the measure of efficiency levels for cattle and shoat production likely have a twofold explanation. The first is associated with the differences in marginal productivity of labour and capital, where the latter was represented by deworming, and second the constant term for shoats is statistically significant at 1% with three times the marginal effect of cattle (Table 3). Cattle production is more efficient in the utilization of the two productive factors. This implies that there are other important factors in shoat production which were not included in the model. Equally, this result confirms the importance of cattle compared to shoats on the small farm, as the estimated ratios of production of shoats in relation to cattle was 1:12 for value and 1:8 for biomass (Stotz 1983).

Table 5 Distribution of Technical (in)efficiency Levels

	Technical inefficiency (TI) levels		Computed efficiency levels (1-TI)	
Classes	Mean	Std deviation	Min	Max
Cattle	0.015	0.00011	0.98511	0.98534
Shoats	0.650	0.202	0.148	0.552

Source: Own construction

4. Conclusion

The study aimed at investigating the level of technical (in)efficiency of smallholder farmer-specific characteristics and input variables on livestock production in the southern rangelands of Kenya using a cross-sectional data analysis. A Stochastic Frontier Analysis theoretical framework was employed in providing information about input-output relations and technical (in)efficiencies in shoat (sheep and goat) and cattle enterprises in southern rangelands of Kenya. A production frontier was fitted, and it was found that shoats are further from the frontier than the cattle. The empirical findings suggest that livestock farmers were technically inefficient in the use of productive resources, particularly land, in both enterprise. Production potential can be increased by increasing the use of mineral supplement, and substantially, by frequently deworming the livestock. There is a very high level of technical inefficiency in shoat production which translates to the low level of small ruminant production. The results of this study showed that one of the key avenues for increasing efficiency is to address the institutional and socioeconomic infrastructure which causes drudgery, especially in shoat production. This inefficiency is explained by such variables as the years of schooling by household head, household size, number of technologies and access to input markets and market information. Hence, for efficient production of livestock in the study area, these factors must be addressed and their effects reduced to bare minimum. This can be done through good policy formulation, implementation, proper supervision of livestock production programmes, the effective extension services and proper market information systems.

Government should make policies that will motivate livestock farmer to optimally allocate productive resources to achieve optimum level of production, which should also form the basis for future research in exploring critical issues such as the marginal productivity level. A pro-pastoral Livestock Input Subsidy Programme similar to the Input Subsidy Programme under the Kenya National Accelerated Agricultural Inputs Access Programme of 2007/08, which was found by Mason et al. (2017) to improve productivity in the crops industry, is required. The study recommends capacity building of livestock farmers through regular training on the efficient use of resources and agribusiness techniques. The results also show that poor market information flow impacts negatively on livestock productivity. It also increases costs of market information and sourcing for inputs and produce, thereby increasing information asymmetry and reducing the margins of farmers. New investments and improvements

in the existing market information network would require the enhancement of public expenditure on rural infrastructure. This implies that the government must remain the main player in rural information network development in order to promote smallholder agriculture.

Acknowledgements

References

Aigner, D. J. – Lovell, K. – Schmidt, P. (1977): Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6, 1, 21–37.

Barnes, A. (2008): Technical efficiency estimates of Scottish agriculture: A note. *Journal of Agricultural Economics*, 59, 2, 370–376.

Battese, G. E. – Corra, G. S. (1977): Estimation of a production frontier model: With application to the pastoral zone of eastern Australia. *Australian Journal of Agricultural Economics*, 21, 3, 169–179.

Battese, G. E. – Coelli, T. J. (1995): A model for technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics*, 20, 2, 325–332.

Behnke, R. – Muthami, D. (2011): The contribution of livestock to the Kenyan economy. *FAO IGAD LPI Working Paper*, 03-11, IGAD Livestock Policy Initiative: The Addis Ababa, Ethiopia.

Ceyhan, V. – Hazneci, K. (2010): Economic efficiency of cattle-fattening farms in Amasya province, Turkey. *Journal of Animal and Veterinary Advances*, 9, 1, 60–69.

Charnes, A. – Cooper, W. W. – Rhodes, E. (1978): Measuring efficiency of decision making units. *European Journal of Operational Research*, 2, 6, 429–444.

Coelli, T. – Rao, D. S. P. – Battese, G. E. (2005): *An introduction to efficiency and productivity analysis*. 2nd edition, Boston: Kluwer Academic Publishers.

Debreu, G. (1951): The coefficient of resource utilization. *Econometrica*, 19, 3, 273–292.

EAL (Encyclopedia of American Law) (2008): Household. *West's encyclopedia of American law, edition 2*. Available:
http://legal-dictionary.thefreedictionary.com/household
Retrieved March 17 2017

Fare, R. – Lovell, K.C. A. (1978): Measuring the technical efficiency of production. *Journal of Economic Theory*, 19, 1, 150–162.

Farmer, E. – Mbwika, J. (2012): End market analysis of Kenyan livestock and meat: A desk study. United States Agency for International Development or the United States Government, Accelerated Microenterprise Advancement Project (AMAP) Knowledge and Practice II task order, microREPORT #184, Nairobi, Kenya. Available at: https://www.microlinks.org/sites/microlinks/files/resource/files/Kenya_Livestock_End_Market_Study.pdf.

Farrell, M. J. (1957): The measurement of productive efficiency. *Journal of the Royal Statistical Society A*, 120, 3, 253–281.

Featherstone, A. – Langemeier, M. – Ismet, M. (1997): A nonparametric analysis of efficiency for a sample of Kansas beef cow farms. *Journal of Agricultural and Applied Economics*, 29, 1, 175–184.

GoK (Government of Kenya) (2010a): Livestock population by type and district – 2009. Nairobi, Kenya, Census Vol II Q, 11.

GoK (Government of Kenya) (2010b): 2009 Population and housing census results. Nairobi: Kenya National Bureau of Statistic, Ministry of Planning, National Development and Vision 2030.

Greene, W. H. (2003). Simulated likelihood estimation of the normal-gamma stochastic frontier function. *Journal of Productivity Analysis*, 19, 2, 179–190.

Hadley, D. (2006): Patterns in technical efficiency and technical change at the farm-level in England and Wales, 1982–2002. *Journal of Agricultural Economics*, 57, 1, 81–100.

Huho, J. M. – Ngaira, J. K. – Ogindo, H. O. (2011): Living with drought: The case of the Maasai pastoralists of northern Kenya. *Educational Research*, 2, 1, 779–789.

Kalangi, L. S. – Syaukatc, Y. – Kuntjoro, S. U. – Priyanti, A. (2014): Technical efficiency of beef cattle breeding business in East Java Province. *Medpet Journal*, 37, 2, 136–142.

Karanja, A. M. (2002): *Liberalization and smallholder agricultural development: A case study of coffee farms in Central Kenya*. Wageningen University, PhD dissertation.

Kavoi, M. – Hoag, D. – Pritchett, J. (2010): Measurement of economic efficiency for smallholder dairy cattle in the marginal zones of Kenya. *Journal of Development and Agricultural Economics*, 2, 4, 122–137.

Kibaara, B. W. (2005): *Technical efficiency in Kenya's maize production: An Application of the stochastic frontier approach*. Fort Collins: Colorado State University, MSc. Thesis.

Kumbhakar, S. C. – Efthymios, G. T. (2008): Estimation of input-oriented technical efficiency using a nonhomogeneous stochastic production frontier model. *Agricultural Economics*, 38, 1, 99–108.

Mamardashvili, P. – Bokusheva, R. (2014): Heterogeneous farm output and technical efficiency estimates. *German Journal of Agricultural Economics*, 63, 1, 16–30.

Mason, N. M. – Wineman, A. – Kirimi, L. – Mather, D. (2017): The effects of Kenya's 'smarter' input subsidy programme on smallholder behaviour and incomes: Do different quasi-experimental approaches lead to the same conclusions? *Journal of Agricultural Economics*, 68, 1, 45–69.

Meeusen, W. – Van den Broeck, J. (1977): Efficiency estimation from Cobb-Douglas production functions with composed error. *International Economic Review*, 18, 2, 435–444.

Mevlüt, G. – Demircan, V. – Yilmaz, H. (2016): Technical efficiency of goat farming in Turkey: a case study of Isparta province. *Revistabrasileira de zootecnia*, 45, 6, 328–335

Mussa, E. C. – Obare, G. A. – Bogale, A. – Simtowe, F. P. (2012): Analysis of resource use efficiency in smallholder mixed crop-livestock agricultural systems: Empirical evidence from the central uplands of Ethiopia. *Developing Country Studies*, 2, 9, 30–40.

Nyagaka, D. O. – Obare, G. A. – Omiti, J. M. – Nguyo, W. (2010): Technical efficiency in resource use: Evidence from smallholder Irish potato farmers in Nyandarua North District, Kenya. *African Journal of Agricultural Research*, 5, 1, 1179–1186.

Ogunniyi, L. T. (2010). Factors influencing the economic efficiency of goat production in Ogbomosho agricultural zone, Oyo state. Nigeria. *Animal Research Institutional*, 7, 1, 1129–1133.

Otieno, D. J. – Hubbard, L. – Ruto, E. (2014): Assessment of technical efficiency and its determinants in beef cattle production in Kenya. *Journal of Development and Agricultural Economic*, 6, 6, 267–278.

Perry, B. D. – Randolph, T. F. – McDermott, J. J. – Sones, K. R. – Thornton, P. K. (2002): *Investing in animal health research to alleviate poverty*. International Livestock Research Institute, Nairobi, Kenya, pp 148.

Salami, A. – Kamara, A. B. – Brixiova, Z. (2010): Smallholder agriculture in East Africa: Trends, constraints and opportunities, *Working Papers Series* No. 105 African Development Bank, Tunis, Tunisia.

Sarma, P. K. – Ahmed, J. U. (2011): An economic study of small scale cattle fattening enterprise of Rajbari district. *Bangladesh Agricultural University Research System (BAURES)*, 9, 141–146.

Shaq, M. – Farooq, A. – Farooq, U. (2007): Economies of scale in small ruminants farming in Southern North-West Frontier Province-Pakistan. *Livestock Research for Rural Development*, 19, 2, …

Shaw, S. M. (1988): Gender differences in the definition and perception of household labor. *Family Relations*, 37, 3, 333–337.

Skirbekk, V. (2003): Age and individual productivity: A literature survey. *MPIDR Working Paper* Wp028, Max Planck Institute for Demographic Research: Rostock, Germany. Available at: http://www.demogr.mpg.de.

Stevenson, R. (1980): Likelihood functions for generalized stochastic frontier functions. *Journal of Econometrics*, 13, 1, 57–66.

Stotz, D. (1983): *Production techniques and economics of smallholder livestock production systems in Kenya*. Ministry of Livestock Development, Nairobi, 4, 95–106.

Unalan, T. (2005): Definition of household membership in international migration surveys. *Journal of Social Sciences*,1, 4, 225–2005.

Varian, R.H. (1992): *Microeconomic analysis*.3rd edition W.W Norton and Company: New York, USA.

Application of the gravity model on the exports of the Hungarian food economy

Katalin Székelyhidi

The last few decades have been characterized by deepening trade connections and the elimination of trade barriers. There are more and more trade agreements among countries, and their integration is becoming deeper and deeper. This process is continuous as ongoing negotiations between countries and regional blocs proceed, for example between the EU and third countries. These processes make it important to identify and examine those factors that influence foreign trade flows (like distance, income and trade barriers) and to analyse the effects of integration, as nowadays, deeper forms of integration eliminate not only tariffs, but non-tariff barriers as well.
In this study I model trade flows of the Hungarian food economy with a gravity model. Gravity models are widely used for ex-post analysis in order to examine the effects of agreements, and to model trade flow. The results of this study suggest that distance, tariffs and non-tariff barriers are serious obstacles to trade. They seem to confirm many countries' efforts to establish deeper cooperation, not just to reduce tariffs but also non-tariff barriers, which often remain present after eliminating tariffs as well.

Keywords: gravity model, foreign trade, food economy

1. Introduction

Nowadays there are only a few countries which are not integrated in the global economy. Experience from past decades shows that economies around the world have recognised the benefits of foreign trade, so more and more trade agreements and regional integration have been created. This phenomenon makes it important to identify those factors that influence foreign trade and quantify the extent of their influence, especially as far as agricultural and food products is concerned, which are very sensitive products in trade negotiations. Gravity models are generally used for this purpose. On the one hand, they are used to determine factors influencing trade flows (both export and import), and on the other hand, they are suitable for analysing the effects of agreements and integration that have already been established for some time, so their effects can be evaluated. Gravity model was derived from Newton's law of gravity. It has been widely used in the social sciences over the past decades, and although its theoretical foundations are well established, there is no general modelling framework which could be used in all types of commercial relations.

In this study I model the factors that influenced Hungary's export of agrarian and food products for 2013 with the gravity model. In doing so, I have applied a new explanatory variable in the model which has never been used before in similar models.

This indicator is called the 'Trade Freedom index', as it measures the effects of tariffs and non-tariff barriers. Before presenting the results of the model, I shall summarize the relevant literature on integration from early regionalism, both in connection with tariffs and with the effects of their elimination to new regionalism, which is a more adequate theory for integration as it typically occurs today. Integration is much more thorough going nowadays, and going beyond the simple elimination of tariffs, it has special characteristics which are better described by new regionalism. In the next part of this study, I present the gravity model and its statistical background. Then I sum up those empirical models in the literature that have been made for analysing agrarian and food trade flows in order to identify models and explanatory variables successfully used in explaining foreign trade. In the last section of this study, I present my model of the Hungarian food economy's trade flows.

2. Integration theories

Over the past few decades, countries all over the world have recognised that the benefits of foreign trade can be enhanced by simplifying the process of trading with each other. Acting on this insight, they have signed agreements, creating and joining trading groups in order to decrease or eliminate tariffs, and even further-reaching forms of integration have been established to eliminate other barriers to trade as well. Such integration is often referred to as regionalism, which can be any form of regional agreements. Integration can be defined as the institutional linking-up of separate national economies into larger economic blocks or communities (Robson 2002). Integration can take different levels, which can create even closer relationship between countries. Moreover, integration increases foreign trade even in cases where a free trade agreement has previously been signed and been in force before subsequent integration entered into force, meaning that there is more to increasing trade flows than merely the elimination of tariffs. Hungary already had a free trade agreement with the EU before 2004, and there were zero or close to zero tariffs on many products, but after EU accession foreign trade still managed to increase. The elimination of administrative barriers to trade further deepened trade relations in the case of those products where tariffs had been eliminated well before 2004 (Kürti et al. 2007). The history of integration is divided into two parts. The 1950's and 1960's was the first significant period of integration, which mainly involved European integration. This period is called regionalism, the first wave of regionalism being characterized mainly by the establishment of the principle of customs union. The second wave was the era of new regionalism from the middle of the 1980's. From this time on, regionalism was considered to be global, and integration interpreted much more widely than simply the elimination of tariffs, as it had become clear that integration had much deeper economic effects.

2.1. Theory of customs union

Early theories of integration concentrated on the elimination of tariffs between countries. Jacob Viner introduced his idea of eliminating tariffs in 1950, and his theories completely changed established thinking on the subject. His thoughts were at the core of integration theory for decades. According to his theory, customs union has two effects: trade creation and trade diversion. The first one appears when, after the elimination of tariffs, countries import in order to substitute high cost domestic production with cheaper foreign products. The theory states that this is a positive process as foreign producers with cheaper products get the chance to supply the market and a new trade connection comes into being. Trade creation is obviously advantageous for the exporting country. For the importing country it can be both advantageous and disadvantageous as well. Consumers benefit from trade creation because they can buy cheaper products instead of the domestic products, but cheaper foreign products may squeeze domestic producers out of the market. Trade diversion, on the other hand, means that, after customs union, a new partner becomes the exporter of a product, even though the former partner could produce the product more efficiently. As the former partner is not a member of the union, it has to pay customs, meaning the price of its products is higher than that of the new partner created by integration. It is advantageous for the partner country resulting from integration, because it seizes a market, but it is also beneficial for the importing country as it is supplied with cheaper products. But it is only partly beneficial for the latter, because the less effective country will supply the importing country, and it also loses an old, well-functioning business relationship and the associated customs revenues. In Viner's theory the scale of trade creation and trade diversion compared to each other represents integration's true effects on the welfare of a national economy (Clausing 2001). The benefits of the elimination of tariffs derives from the balance of trade creation and trade diversion. This balance depends on many factors such as:

- The scale of tariffs eliminated: The higher the value of the tariffs, the higher the degree of trade creation within the integration, as the main purpose of customs was to protect a less effective industry;
- The economic size and geographical area of the integration: The larger the size of the union, the larger the benefits of integration. In contrast, the smaller the size of the union, the larger the scale of trade diversion.
- Transport costs deeply influence trade between two countries and it is also connected to the size of integration. It is extremely important in the context of larger unions because transport cost can be very high where integration involves a large geographical area. In this case closer partners are more likely to trade with each other. Many researchers draw attention to the fact that transport costs are larger obstacles to trade in many cases than tariffs (Limao–Venables 2001, Clark et al. 2004, Hummels 2007).

The effect of distance, which is a decisive part of transport costs, is generally used as a proxy for transport costs in gravity models. Research proved that there is a negative correlation between trade flow and distance between two countries. Moreover, 23 percent of world trade by value is conducted between countries who share a common border.

- Economic structure of countries: Similarity in product structure between two countries, on the one hand, and difference in their production costs make the customs union more profitable (Palánkai 2004).

The effects of customs unions mentioned above are the static effects but there are dynamic effects as well, like economies of scale, increased competition (companies may fold), investment stimulation and the better utilisation of resources. The effects of these are predicted to be larger than static effects (Michalopoulos–Tarr 2004, Scitovsky 1958).

2.2. New regionalism

Viner's theory of customs unions has been used to explain foreign trade for many decades, but the past decades of dynamically increasing trade and deepening integration cannot be explained by trade creation and trade diversion alone. Former theories had been created at the same time as the creation of the European Union mainly to explain and justify the EU. On the other hand, new types of integration have emerged from the 1980s onward, and these former theories could not explain these new forms. There are many reasons for this, foremost of which, the fact that trade in processed products between industrialised countries had become much more deeply intertwined. During the old regionalism, less developed countries were closed to trade and to the flow of capital, but in the past few decades they have been taking steps to play a part in the global multilateral system of trade. The third characteristic of the new international economic world is the intense flow of FDI between developing and developed countries. Regionalism has become worldwide and has different characteristics in different parts of the world and different types of integration come into being (Söderbaum 2003, Hettne 2005).

Indeed, the deepest form of integration in which countries establish full economic, political and regulatory integration cannot be explained by Viner's theory. That is in fact why new regionalism was created, and its main area of research is the examination of deep forms of integration, especially with regard to the following aspects (Burfisher et al. 2004):

- standardisation and protection of investments in order to promote the mobility of financial and real capital;
- ensuring the free flow of labour;
- harmonisation of domestic tax and subsidy policies especially in case of production and trade;

- harmonisation of fiscal and monetary policies including exchange rate policies;
- establishment of institutions in order to enhance the operation of the integration;
- development of transport and communication infrastructure for ensuring the free movement of labour and capital;
- harmonisation of product and factor markets' regulations;
- creation of an integrated monetary and exchange rate policy for the introduction of the common currency.

The characteristics mentioned above can be interpreted as steps towards the deepest integration. These kinds of integration have the following characteristics:

- One or more small countries become integration partners or sign a regional agreement with a large country. For example, in the case of NAFTA, Mexico and Canada are small countries compared to the USA, or one might cite the EU and its enlargement eastwards. In case of MERCOSUR, Brazil plays the decisive role in the integration;
- Small countries introduce reforms in many areas, for example the system change of Central and Eastern European countries, and all the efforts they have made since then to harmonise with the EU;
- There are no drastic steps to reaching free trade, usually it is a matter of a series of smaller steps towards liberalising trade. For example, with regard to agricultural products there are smaller reductions in tariffs, sometimes in several steps over a number of years, or for sensitive products, protection is even maintained. This also shows mistakes in Vinerian theory, tariffs not needing to be eliminated immediately and completely in many cases (Burfisher et al. 2004, Ethier 1998);
- In many cases, agreements are one-sided as small countries take steps towards liberalisation. These typically involve granting preferences not only in terms of tariffs but also with regard to institutional systems. The same applied to the EU's eastern enlargement, when the accessing countries adapted to the EU's system. Mexico and Canada also granted more preferences to the USA than the USA to them. It must be noted that the larger country often has lower tariffs well before the integration;
- In the era of new regionalism, deeper forms of integration are also established in which the elimination of tariffs is not the only target but the harmonisation of economic policies;
- Regional agreements and integration are regional in the geographical sense as well meaning that the participants are typically neighbouring countries (Ethier 1998).

3. The gravity model

There are two main methods to model foreign trade flows. Computable General Equilibrium (CGE) models are used for ex-ante analysis, which means that the possible effects of integration and agreements can be estimated. The other modelling tool is the gravity model, which is used for ex-post analysis, with the help of which one can evaluate the effects of instances of integration that had already come into force. Coincidently, Tinbergen and Pöyhönen developed the model virtually simultaneously, and completely independently from each other. It was introduced in 1962 and it has become a very popular tool for analysing many types of flows, for example migration, foreign investments, but more typically foreign trade flows. The model is basically a regression model which is used to identify factors that can explain trade flows between regions. With the gravity model one can capture the causal relationship between the explanatory factors and the trade flow. On the other hand, it can be used to estimate the effects of integration and agreements on foreign trade with the help of panel data (Garcia et al. 2013).

The basic gravity model explains trade flow between two nations with the size of the countries and the cost of transportation. The size of the country is captured by income, and the transport cost is measured by the distance between country pairs. The higher the income of the countries, the higher the trade flow between them will be, and the larger the distance between two countries, the smaller the trade flow between them. Linnemann added population to the explanatory variables in 1966 (Cheng–Wall 2005). The model seemed to fit observations very well, and it was widely used over the next few decades, even though it lacked a theoretical foundation. Work on this was begun in the 60s and nowadays it has a solid theoretical background as well.

The gravity model of trade explains the export between countries with income, population, distance and other dummy variables. The basic equation of the gravity model is the following:

$$X_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} P_i^{\beta_3} P_j^{\beta_4} D_{ij}^{\beta_5} A_i A_j A_{ij} \epsilon_{ij}, \tag{1}$$

where X_{ij} is the export from country i to country j, Y_i (Y_j) is the income of the countries, which is captured by GDP, P_i (P_j) is the population of the countries, D_{ij} is the distance between the countries, and β are the coefficients of the explanatory variables. Meanwhile, A_i, A_j, A_{ij} are dummy variables characterising country i, j and their relationship. These are used to capture qualitative, specific features of countries. With dummy variables one can examine the effects on trade of common language, common border, colonial past, participation in an agreement or in an organization, whether one or both of the country pair is a landlocked country or enjoys access to a coastline. The dummy variable has the value of 1 if the country or the country pair

has the given characteristic, and zero if otherwise. For example, if the countries have the same language, then the value of the dummy variable will be 1.

The basic equation of the gravity model is a multiplicative equation for trade flows and if we take the logarithm of it, we get the linear form of the equation. The result is a simple loglinear regression equation which can be analysed with the tools of the basic regression model. The basic loglinear form of the gravity model is:

$$lnx_{ij} = \ln\beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln P_i + \beta_4 \ln P_j + \beta_5 \ln D_{ij} + A_i + A_j + A_{ij} + \mu_{ij}$$
(2)

According to the model, if the income of the exporting country increases its production will increase as well, and its potential for export will be greater. Hence the coefficient of β_1 is expected to be positive. The logic is the same in case of β_2, because if the income of the importer country increases, it can purchase more products from abroad. The coefficient of population is not as obvious as for the former variables, because β_3 and β_4 can be both positive and negative according to absorption effect or economies of scale. In case of absorption effects a country's exports are low compared to its high population, and the sign of the coefficient will be negative. On the other hand, if a country has a large population and it exports a lot, then the economies of scale prevails (Martinez-Zarzoso and Nowak-Lehman 2003).

Gravity model had been used for cross-section data only for a long time, so the gravity equation was estimated only for one year. A few years before the millennium, panel data began to be used, because the estimation is more accurate when analysing many years.

4.   Application of the gravity model in the foreign trade of a food economy

The application of gravity models has become widespread in explaining foreign trade flows and estimating the effects of integration measures that have already come into force. It has been also widely used in agriculture and the food industry since the beginning of century. The reason for that lies in the many agreements and instances of integration that were established about 20 years before the millennium, meaning that by 2000 there was enough data from many years on which the effects of this integration could be examined.

   The effects of agreements on the continent of America has been widely analysed, among other things pertaining to the food economy (Table 1). The results of this research prove that the market opening of Mexico in the 1980s increased US exports to Mexico much more than to other countries. The effects of NAFTA seemed to be much less, it was only significant in the case of a few products. With the establishment of MERCOSUR, trade flows between the USA and Brazil fell sharply, especially those of milk, sour cream, legumes and wheat (Zahniser et al. 2002).

   Another research dealt with the trade creation and trade diversion effect of NAFTA as it affected six agricultural products (meat, cereals, vegetables, fruits, sugar and oil seeds). The results showed that for 5 products out of the 6 categories examined, NAFTA decreased the openness of the countries, and that after NAFTA had entered into force, trade among member states had increased (Jayasinghe–Sarker 2007).

   The research also dealt with agricultural trade in general, and tried to explain the tendencies of its foreign trade (Table 2). In 2008 a study stated that the agricultural trade increased between 1990 and 2002, but trade among less developed countries increased much more slowly than that of OECD and EU countries. Moreover, developed and developing countries had become closed to each other. The results of the study proved that if a rich country was a member of NAFTA or the EU, then it exported much more than other countries, a phenomenon which could admittedly be the result of the huge subsidies paid to producers. Latin America and Africa were seriously affected by the protectionist behaviour of rich countries, they had become relatively closed and imported less than their size and other explanatory variables would have predicted (Paiva 2008).

   According to another piece of research, foreign trade of manufactured products (light industry, heavy industry, and food industry altogether) increased in the second half of the 20th century, but if we examine only the food economy, then data shows that the share of products of the food economy actually declined. In 1951 their share was 43% in world trade but it had fallen back to 6.7% by 2000. It also decreased in terms of quantity, by 20 percentage points. The results of the gravity model showed

Table 1 Some characteristics of gravity models used to analyse foreign trade flows of America

Period	Author(s)	Target	Target variable	Explanatory variable(s)
1980-1999	Zachniser et al. (2002)	Examination of the effects of interactions created in the continent of America	Export	GDP, distance, participation in the agreement
1985-2000	Jayasinghe and Sarker (2007)	Examination of the trade creation and trade diversion effects of NAFTA in case of 6 agricultural products	Export	GDP, distance, participation in the agreement, openness

Source: Own construction

Table 2 Some characteristics of gravity models used to analyse the foreign trade
flows of the food economy in general

Period	Author(s)	Target	Target variable	Explanatory variable(s)
1990-1993, 1999-2002	Paiva (2008)	Examination of the unequal liberalisation of trade comparing developed and developing countries	Export	GDP, distance, participation in an agreement, remoteness, the size of the countries, population density, the share of agriculture in GDP, landlocked country, common border, common language, common currency, colonial past, regional classification, income categories
1963 - 2000	Serrano and Pinilla (2012)	Examination of the decreasing share of the exports of the food economy in world trade in long time-series and comparing it with manufactured products	Export	GDP, distance, distance weighted by income, GDP per capita, participation in an agreement, common border, common language, exchange rate

Source: Own construction

that income played an important role in the tendencies of trade, but whereas for manufactured products income was in positive correlation with trade, for agricultural and food products, the correlation showed a negative sign in the 40 years examined. The research refers to the income elasticity of food products, i.e. because they are inferior products, their consumption decreases as the income increases. The model also proved that the products of the food economy are more sensitive to trade agreements, especially true of the EU (Serrano–Pinilla 2012).

Gravity model has also been used for the examination of the food economy of a single country (Table 3). Among these the trade connection of the EU with Mediterranean countries is the subject of much of the research. The reason for this could be that they play an important role in EU foreign policy, not only because of their proximity, but the colonial past of some EU countries also affecting trade (Crescimanno et al. 2013). For example, Germany's import of olive oil was significantly influenced by partnership agreements between Mediterranean countries and the EU (Kavallari et al. 2008). In the case of Italy, these agreements were less significant, whereas agreements signed with potential candidate countries significantly influenced exports because of the fewer barriers to trade (Crescimanno et al. 2013).

Gravity models have been used to analyse foreign trade with the Middle East, mainly with Egypt, which has experienced a fall in exports of agricultural products over the past few decades. Research has shown that common language is very important in Egypt's trade connections, as it clearly exports more to the Arab countries. On the other hand, agreements with Arab countries do not play a significant

Table 3 Some characteristics of gravity models used to analyse the foreign trade flows of specific countries

Period	Author(s)	Target	Target variable	Explanatory variable(s)
1995 – 2006	Kavallari et al. (2008)	Examination of German olive oil imports, particularly the effects of partnership agreement with Mediterranean countries	Import	GDP, distance, employees coming from the partner country to Germany, EU membership, Euro-Mediterranean partnership membership, presence of German tourists in the partner country, direct supply, labelling
1996 – 2010	Crescimanno et al. (2013)	Examination of the exports of Italy to Mediterranean countries	Export	GDP, distance, participation in an agreement, colonial past, share of land used in for agricultural production, regional classification (Balkan, Machrek, Maghreb country)
2001 - 2009	Angulo et al. (2011)	Examination of Tunisian olive oil exports with the tools of spatial econometrics	Export	GDP, distance, common language, HDI index
2002 - 2012	Melece and Hazners (2014)	Examination of Latvia's food trade flows	Export	GDP, distance, EU membership, colonial past, common border, landlocked country
1994 - 2008	Hatab et al. (2010)	Examination of the decreasing share of Egypt's agricultural exports in total exports, especially in the case of its largest importers	Export	GDP, distance, openness, participation in an agreement, exchange rate, common language, common border
1995- 2010	Said and Shelaby (2014)	Examination of the decreasing share of Egypt's agricultural exports in total exports, only exports to other Arab countries	Export Import	GDP, distance, number of foreign capital investments, common border
2012	European Parliament (2014)	Examination of tariffs and non-tariff barriers in trade of agricultural products between the EU and the USA	Export	GDP, distance, common border, common language, presence of non-tariff barriers, tariffs

Source: Own construction

role in the exports of Egypt, which is due to the similar comparative advantages, the lack of harmonisation of regulations and the low level of private sector activity. The infrastructure is not modern either, and rather represents a serious barrier to trade which limits the transportation of large shipments (Hatab et al. 2010, Said–Shelaby 2014).

Many gravity models have tried to estimate the effects of tariffs and non-tariff barriers, which are very difficult to quantify because of the many types of tariffs and non-tariff barriers. The results of a gravity model proved that tariffs and non-tariff barriers in trade of agricultural and food products also affect trade relations. Looking at the trade connection between the EU and the USA, trade flows were negatively affected by these trade barriers but the effects of non-tariff barriers were much larger and more serious than the effects of tariffs.

Much research has been conducted with gravity model for modelling food economy trade flows, but no standard modelling framework or general specification has been created. Income and distance have been part of every gravity models, but the other variables depend on the country examined or the integration being modelled. The reason for this is likely the many factors influencing the trade of a country or a group of countries like language, common borders, history or being party to an agreement.

5. Gravity model of the Hungarian food economy

5.1. Data

The gravity model of the Hungarian food economy was a cross-section analysis for 2013 seeking to identify and quantify the main factors influencing the exports of the food economy. The target variable of the model was the export value (HS 01-24) in dollars, as taken from the database of the Central Statistical Office. Explanatory variables were the GDP of the importing country, population from the World Bank, and the distance between country pairs as quoted in the CEPII database. The data was collected in the Research Institute of Agricultural Economics as part of a research started in 2015 examining foreign trade relations. The reason for using cross-section analysis instead of panel data was to test potential variables that might be applied in later models using panel data. The database also contained the share of agriculture in GDP as listed by the World Bank. The model used variables that have not been applied by other researchers so far:

- *Trade Freedom index*, which was collected from the Heritage Foundation (2017a). This variable quantifies the tariffs and non-tariff barriers and its value is between 1 and 100. If the value of the indicator is higher for one country compared to another country, its trade is more liberalized. This indicator is very useful as tariffs and non-tariff barriers are of crucial importance in trade, but they are very difficult to quantify and it can be a simpler way to model tariffs and non-tariff barriers;
- *Corruption Freedom index* from the same source (Heritage Foundation 2017b). It is also an indicator with values between 1 and 100 and the higher the value of the Corruption Freedom index, the lower the corruption is in a given country;

- *Trading Across Borders index* from Doing Business (World Bank 2017). This indicator measures logistical and bureaucratic barriers (documents needed for export, import, days necessary for export and import, transport costs) excluding tariffs. It ranks countries starting from a country with the lowest barriers to the highest.

The database also contained dummy variables such as common border with Hungary, whether the partner country applied tariffs, and whether the country was a member of the EU. After the construction of the database, I took the logarithms of all variables except for the dummy variables. Hungary exported its agricultural and food products to 153 countries in 2013. The model consisted of 133 observations, as certain countries had to be excluded for lack of data for the Trade Freedom index. 20 observations were excluded from 153 observations, which constituted less than 1 per cent of the total exports of Hungary's food economy. The model was constructed with SPSS software.

5.2. Factors influencing the exports of the Hungarian food economy

The first step in modelling is the examination of linear correlations between the pairs of variables in order to determine which variables are connected to the target variable, and to what extent. On the other hand, in regression models, multicollinearity may be present causing bias to the estimation. Multicollinearity means that there is a significant correlation between the explanatory variables, which is a problem because in a regression model the main target is the estimation of partial effects of explanatory variables on the target variable. If multicollinearity is present, the results are biased by the correlation of independent variables, and they explain each other. The correlation matrix and the VIF indicator are used to identify this phenomenon. The VIF indicator is the variance inflation factor which measures the extent of multicollinearity among variable groups. If the value of the indicator is higher than 5, multicollinearity is considered disruptive and the estimation will be biased (Kovács 2008).

When we construct the correlation matrix, the relationship between the logarithms of the original variables can be examined. The matrix showed that that there was no significant connection between export and the population, but all other variables proved to be significantly related to export. The link was the weakest for the presence of a common border ($r = 0.349$). There was medium-level correlation with the Corruption Freedom index ($r = 0.466$), the share of agriculture in GDP ($r = -0.560$), GDP ($r = 0.569$), the application of tariffs ($r = -0.590$), EU membership ($r = 0.603$) and distance (r=-0.655). Export proved to be strongly related to the Trade Freedom index ($r = 0.702$) which quantifies the tariffs and non-tariff barriers applied by the partner country. The negative sign of the correlation means that the two variables move in the opposite direction. For example, as the distance between two countries increases, the trade flow between them will decrease. It is the same with the

share of agriculture in GDP and the presence of tariffs in the partner country variables as well. There is a positive sign in the case of Trade Freedom index, because as previously mentioned, if the value of the indicator is higher for a country compared to another country, its trade is more liberalized and export will increase as well.

Besides the examination of the relationship between export and all other variables, it is important to identify the connection between the explanatory variables in order to prove the presence or the lack of multicollinearity. GDP and population are strongly related to each other ($r = 0.627$) and there is a significant relationship between the distance and the presence of tariffs ($r = 0.501$), the distance and EU membership ($r = -0.582$), the presence of tariffs and EU membership ($r = -0.916$). These relationships seem to be logical, as for example in the latter, EU member countries are those partner countries of Hungary where there are no tariffs applied at borders. The Trade Freedom index, the Trading Across Borders index and the Corruption Freedom index also correlated with each other. The correlation matrix showed that multicollinearity could cause serious bias in the regression model, which will be tested with the VIF indicator.

For the first step, I ran a model which contained most of the variables in order to observe multicollinearity and partial effects. The first model proved what could have been seen from the matrix as well, namely that the presence of tariffs, the EU partnership, GDP and population, and the trade barrier indexes are strongly connected to each other and thus violate the requirement of the lack of collinearity among the explanatory variables in a regression model. In the next steps, I excluded those variables that violated this requirement, namely the presence of tariffs, the EU partnership, population, the Trading Across Borders index and Corruption Freedom index. Their exclusion depended on their importance to the model explaining export. According to this, Trade Freedom index remained in the model instead of the presence of tariffs because although both variables influenced export, the former had a much more significant role in accounting for it. The inclusion of Trade Freedom index thus resulted in a model with a much higher explanatory power. Similarly, the exclusion of population increased the explanatory power of the model as well, which is no surprise as it did not seem to be in connection with export at all according to the correlation matrix. Moreover, Trade Freedom index seemed to be the most important factor in the model among the three variables quantifying barriers to trade.

The results of the model correlated to the results of the models constructed in the literature. The food economy exports of Hungary are influenced by the GDP of the partner country, the distance between the two countries and the tariffs and non-tariff barriers to trade.

$$\ln Export_{ij} = -16.891 + 0.879 \ln GDP_i - 2.012 \ln Distance_{ij} + 7.026 \ln TFI_i \quad (3)$$

The model explained 79 (R^2) per cent of the differences in the exports, and there was a strong relationship between exports and sum of the explanatory variables ($R = 0.889$). According to the goodness of fit, the model can be used with confidence for the examination of Hungary's food economy exports. The VIF indicator proved that the constructed model is free of multicollinearity, so the explanatory variables are uncorrelated. When explaining the coefficients of the variables we have to consider that we have taken the logarithms of the variables. In practice that means that the linear relationship is between the logarithms of the variables, so when we speak about the original variables the regression coefficients must be interpreted as elasticities. According to this, the model suggests if the GDP of the importing country increases by 1 per cent from any level, the exports of Hungary increases by 0.88 per cent. The relationship of the export and distance is of negative direction. If Hungary exports to a country which is 1 per cent more distant, export decreases by 2.01 per cent. Tariffs and non-tariff barriers have the largest influence on export. The connection with the index suggests that if the level of these barriers falls by 1 per cent from any level, the export of food products of Hungary increases by 7.03 per cent (Table 4).

Table 4 The results of the gravity model of Hungary's food economy exports (n=133)

Parameters	Coefficients of the parameters (β)	level of significance	VIF indicator
Constant	-16,891	0.004	
GDP of the importer country	0.879	0.000	1.212
Distance	-2.012	0.000	1.356
Trade Freedom index	7.026	0.000	1.131
Correlation (R)		0.889	
Explanatory Power (R^2)		0.789	
Adjusted Explanatory Power (adjusted R^2)		0.785	

Source: Own construction

In the gravity model of Hungary's food economy, I applied an indicator which has not been used before in gravity models. This is the Trade Freedom index, which seemed to be applicable in explaining foreign trade flows. Tariffs and non-tariff barriers are very difficult to quantify as there are many types of tariffs in different countries for most of the products in question, if we model aggregate trade flows, it is very hard to define the average level of tariffs. On the other hand, non-tariff barriers are even harder to measure. This index thus provides a simpler way to quantify the effects of tariffs and non-tariff barriers to trade. The results of the model suggest that distance and especially tariffs and non-tariff barriers are serious obstacles to trade. This proves the importance of the integration efforts being conducted around the world. Countries close to each other must make efforts to create forms of integration concentrating not only on the elimination of tariffs, but also on the creation of deeper

alliances that eliminate all those regulatory, administrative barriers that seem to be even larger obstacles to trade than tariffs.

6. Conclusion

The gravity model of Hungary's food economy verified the results of gravity models presented in the literature. Export is negatively influenced by the distance of countries and positively affected by the GDP of the importer country. The contribution of this model is the application of variables that have not been used in gravity models before, but can be useful in quantifying trade barriers when exporting to a country. These indicators are the Corruption Freedom index, Trade Freedom index and Trading Across Borders. Trade Freedom index proved to be the most important factor in explaining food trade flows. The index measures the ease of trading with a country by quantifying the freedom of a country from tariffs and non-tariff barriers. Tariffs and non-tariff barriers are difficult to quantify directly, so this index could be useful in measuring the aggregate effects of these barriers to trade. The significant effect of tariffs and non-tariff barriers to trade suggest that forms of integration that aim to eliminate both types of barriers between partner states foster foreign trade as far as agricultural and food products are concerned. Hungary exports a significant part of its food economy products to the European Union, the effect of which is indisputable according to the results of the model in connection with proximity and barriers to trade. The model presented here can be developed by using panel data in order to determine country pair specific effects, and to make the estimation more accurate.

References

Angulo, A. M. – Mtimet, N. – Dhehibi, B. – Atwi, M. – Youssef, O. B. – Gil, J. M. – Sai, M. B. (2011): A revisited gravity equation in trade flow analysis: An application to the case of Tunisian olive oil exports. *Investigaciones Regionales*, 2011, 21, 225–239.

Burfisher, M. E. – Robinson, S. – Thierfelder, K. (2004): Regionalism: Old and new, theory and practice. *Agricultural policy reform and the WTO: where are we heading?* International Conference, June 23–25, Capri, Italy.

Cheng, I. H. – Wall, H. J. (2005): Controlling for heterogeneity in gravity models of trade and integration. *Federal Reserve Bank of St. Louis Review*, 87, 1–2, 49–64.

Clark, X. – Dollar, D. – Micco, A. (2004): Port efficiency, maritime transport costs, and bilateral trade. *Journal of Development Economics*, 75, 2, 417–450.

Clausing, K. A (2001): Trade creation and trade diversion in the Canada – United States Free Trade Agreement. *Canadian Journal of Economics*, 34, 3, 677–696.

Crescimanno, M. – Galati, A. – Yahiaoui, D. (2013): Determinants of Italian agri-food export in non-EU Mediterranean Partner Countries: An empirical investigation through a gravity model approach. *New Medit*, 12, 4, 46–54.

Ethier, W. J. (1998): The New Regionalism. *The Economic Journal*, 108, 449, 1149–1161.

European Parliament (2014): Risks and opportunities for the EU agri-food sector in a possible EU-US Trade Agreement. http://www.europarl.europa.eu/RegData/etudes/STUD/2014/514007/AGRI_IPOL_STU(2014)514007_EN.pdf Date of access: October 14, 2016.

García, E. C. – Pabsdorf, N. M. – Herrera, E. G. (2013): The gravity model analysis: an application on MERCOSUR trade flows. *Journal of Economic Policy Reform*, 16, 4, 336–348.

Hatab, A. A. – Romstad, E. – Huo, X. (2010): Determinants of Egyptian agricultural exports: A gravity model approach. *Modern Economy*, 1, 3, 134–143.

Heritage Foundation (2017a): Trade Freedom. http://www.heritage.org/index/trade-freedom Date of access: November 15, 2017.

Heritage Foundation (2017b): Government Integrity. http://www.heritage.org/index/freedom-from-corruption Date of access: November 15, 2017.

Hettne, B. (2005): Beyond the 'new' regionalism. *New Political Economy*, 10, 4, 543–570.

Hummels, D. (2007): Transportation costs and international trade in the second era of globalization. *Journal of Economic Perspectives*, 21, 3, 131–154.

Jayasinghe, S. – Sarker, R. (2007): Effects of regional trade agreements on trade in agrifood products: Evidence from gravity modeling using disaggregated data. *Review of Agricultural Economics*, 30, 1, 61–81.

Kavallari, A. – Maas, S. – Schmitz, P. M. (2008): Explaining German imports of olive oil: Evidence from a gravity model. Paper prepared for presentation at the 12th EAAE Congress 'People, Food and Environments: Global Trends and European Strategies', Belgium, Gent.

Kovács P. (2008): A multikollinearitás vizsgálata lineáris regressziós modellekben. *Statisztikai Szemle*, 86, 1, 38-67.

Kürti A. – Stauder M. – Wagner H. – Kürthy Gy. (2007): *A magyar élelmiszergazdasági import dinamikus növekedésének okai*. Budapest: Agrárgazdasági Kutató Intézet.

Limao, N. – Venables, A. J. (2001): Infrastructure, geographical disadvantage, transport costs, and trade. *The World Bank Economic Review*, 15, 3, 451–479.

Martinez-Zarzoso, I. – Nowak-Lehman, F. (2003): Augmented gravity model: An empirical application to MERCOSUR-European Union trade flows. *Journal of Applied Economics*, 6, 2, 291–316.

Melece, L. – Hazners, J. (2014): Evaluation of Latvia's agri-food trade using the gravity model. *Actual Problems of Economics*, 159, 9, 518–526.

Michalopoulos, C. – Tarr, D. (2004): *Are customs unions economically sensible in the commonwealth of independent states*. Washington: World Bank.

Paiva, C. (2008): Assessing protectionism and subsidies in agriculture – A Gravity Approach. *Journal of International Development*, 20, 5, 628–640.

Palánkai, T. (2004): *Az európai integráció gazdaságtana*. Budapest: Aula Kiadó.

Robson, P. (2002): The economics of international integration. New York: Routledge.

Said, M. A. – Shelaby, A. A. (2014): Potentials of Egypt agricultural bilateral trade with the Arab countries: Gravity model evidence. *International Journal of Food and Agricultural Economics*, 2, 1, 133–144.

Scitovsky, T. (1958): *Economic theory and Western European integration*. New York: Routledge.

Serrano, R. – Pinilla, V. (2012): The long-run decline in the share of agricultural and food products in international trade: a gravity equation approach to its causes. *Applied Economics*, 44, 32, 4199–4210.

Söderbaum, F. (2003): Theories of new regionalism. In Söderbaum, F. and Shaw, T. M. (eds): *Theories of new regionalism*. Basingstoke: Palgrave Reader, 1–21.

World Bank (2017): Doing Business - Trading Across Borders. http://www.doingbusiness.org/data/exploretopics/trading-across-borders Date of access: November 15, 2017.

Zahniser, S.S. – Pick, D. – Pompelli, G. – Gehlhar, M. J. (2002): Regionalism in the western hemisphere and its impact on U.S. agricultural exports: A gravity-model analysis. *American Journal of Agricultural Economics*, 84, 3, 791–979.

PART FOUR

Free movement of goods, capital and persons

Capital flight and external debt in Heavily Indebted Poor Countries in Sub-Saharan Africa: An empirical investigation

Isaac Kwesi Ampah – Gábor Dávid Kiss – Balázs Kotosz

Over the past few decades, Sub-Saharan African countries, in their bid to achieve economic growth and development have resorted to external borrowings, propelling them to the status of Heavily Indebted Poor Countries (HIPC), when their debt reached unsustainable levels in the early 2000s. Unfortunately, the economies of these countries reported only steady growth with successive periods of high inflation and undesirable balance of payments deficits, leading scholars to ask whether external debt really can contribute to growth. At the same time, there is now considerable evidence that the build-up in debt was accompanied by increasing capital flight from the region. Employing Pooled Mean Group (PMG) estimation and datasets from 1990 to 2012, this paper investigated the apparent positive relationship between capital flight and external debt in Sub-Saharan Africa, taking Heavily Indebted Poor Countries in the region as a case study. The results revealed that external debt exerted a positive and statistically significant effect on capital flight both in short and long-run, suggesting that if foreign borrowing remains unchecked, it will continue to lead to massive capital outflow in Heavily Indebted Poor Countries in Sub-Saharan Africa.

Keywords: Sub-Saharan Africa; external debt; capital flight; cointegration; Pooled Mean Group, Heavily Indebted Poor Countries (HIPC)

1. Background of the study

External borrowing is a common phenomenon in many developing countries especially in their early stages of economic development as they are confronted with limited domestic resources for investment (Todaro–Smith 2006). So a developing nation with meager savings needs to borrow more to finance the optimal level of economic growth and development it desires for its people. Thus, external debt is often obtained incurred to supplement domestic resources to fund the current account deficits arising from external disturbances, and also to strengthen the external liquidity position of the country, which otherwise would not be possible with the domestic resources available. Safdari and Mehrizi (2011), posit that foreign borrowing is desirable and necessary to accelerate economic growth since the interest rates normally charged by the international financial institutions like the International Monetary Funds (IMF) and the World Bank are about half those charged by the domestic financial institutions.

The subject of external debt, especially that of Sub-Saharan Africa, has been at the forefront of international discussion for the past three decades. Adepoju

et al. (2007) noted that insufficient internal capital formation is often a characteristic of developing countries in Sub-Saharan Africa, mainly due to the vicious circle of low productivity, low income, and low savings, and as a result, they have usually adopted a development policy framework that is highly dependent on foreign borrowing from both official and unofficial sources. According to Ajayi and Khan (2000), this means that for many countries in the continent, the amount of external debt accumulated over recent decades amounts to what is seen as an unsustainable position. From a level of US$176.36 billion in 1990, total external debt stocks of SSA rose to US$235.94 billion in 1995. During the same period, external debt as a percentage of GDP increased from 58.21% to 71.95% respectively. For the years under study (1990–2012), the highest external debt to GDP ratio of 78.23 percent was attained in 1994. With the total external debt stock standing at US$213.44 billion in 2000, their value rose by US$55.63 billion by the end of 2010, reaching US$269.08 billion. External debt witnessed a rapid build-up for the three-year period (2010–2013), increasing by US$ 98.43 billion (from US$269.08 billion to US$367.51 billion), representing 77 percent greater increase on than the increment realized during the previous decade (2000–2010).

The massive growth in external debt in Sub-Saharan Africa, according to policymakers, is thwarting the continent's prospects and efforts in achieving increased saving and investment, which consequently stymies economic growth and poverty reduction, principally known as the "debt overhang" effect. The debt overhang of the region has affected public investment in both physical and social infrastructure due to the massive outflow of resources in debt-service payments. Similarly, it has also inhibited private investment, since private investors are typically wary of policy distortions in environments marred by severe external imbalances and fluctuating exchange rates. By investing less in public health, social infrastructure, and human resource development, the implication is drawn that the external debt burden has compromised some of the essential conditions for sustainable economic growth and poverty reduction.

Furthermore, as the severity of external debt becomes more pronounced, there is considerable evidence that capital flight from the region is also increasing at a higher pace. Recent estimates suggest that capital flight has increased even more rapidly, and could amount to over twice the size of the external debt. Considering this emerging trend, a growing number of researchers have characterized the Sub-Saharan Africa region as "net creditor" to the world (Boyce–Ndikumana 2012). For instance, the latest estimates of capital flight show that Sub-Saharan African lost a total of $814.2 billion between the 1970-2010 periods. This stock of capital flight including compound interest earnings reached $1.06 trillion, which slightly exceeds the combined economic size of the countries as measured by their GDP ($1.05 trillion in 2010). The stock of capital flight also exceeds the $188.6 billion of external debt owed by these countries, making them as a group a 'net creditor' to the rest of the world. In

other words, these countries could go debt free if they could recuperate just 18 percent of the capital they have lost in unrecorded outflows. Again, this amount exceeds both the $659.5 billion in official development aid and $306.4 billion in Foreign Direct Investment for the same period (Boyce–Ndikumana 2011). Collier et al. (2001) also found evidence that compared to other developing regions, Sub-Saharan Africa has a greater share of private wealth being held abroad

It is against this background that this study has been conducted to empirically examine the long- and the short-run relationship between capital flight and external debt in HIPC countries in Sub-Saharan African, using time series datasets from 1990 to 2012. By estimating this relationship, the study hopes to shed some light on how to move forward by offering possible solutions for dealing with these issues. This study is organized into five parts. The first part, which is the introductory chapter, presents a background to the study providing a statement of the problem, the objectives of the study, as well as the scope and organization of the study. The second part presents a review of relevant literature, comprising both theoretical and empirical reviews. This section also looks at the trend of external debt and capital flight in HIPC countries in Sub-Saharan African. The third section presents the methodological framework and techniques employed in conducting the study. Section four examines and discusses the results, and major findings concerning the literature and the final part present the findings and policy implications of the study.

2. Literature Review

2.1. *Theoretical and empirical literature review*

The relationship between external borrowing and capital flight has been well documented in the literature, which recognizes that annual flows of foreign borrowing constitute the most consistent determinant of capital flight. A review of the literature suggests that the simultaneous occurrence of capital flight and foreign debt in a country is theoretically plausible. In the case of Argentina, Dornbusch and de Pablo (1987) noted that commercial banks in New York had lent the government the resources to finance capital flight which returned to the same bank as deposits. In a sample of 30 Sub-Saharan countries over the period 1970-96, Ndikumana and Boyce (2003) found that for every dollar of external debt acquired by a country in SSA in a given year, on average, roughly 80 cents left the country as capital flight. Their results also support the hypothesis by Collier et al. (2001) that a one-dollar increase in debt adds an estimated 3.2 cents to annual capital flight in subsequent years. This result leads to the question of why countries borrow so heavily while at the same time capital is fleeing abroad. From the literature, there are two main points of view:

- the indirect theory by Morgan Guaranty Trust Company (1986);
- Direct Linkages Theories by Boyce (1992).

2.1.1. Indirect theory

According to Morgan Guaranty Trust Company (1986) view, the simultaneous occurrence of external debt accumulation and the outflow of capital from developing countries is not a natural coincidence, but rather the track record of bad policies that have caused capital flight to arise are the very same policies responsible for increases in external debt accumulation. This view of external debt and capital flight linkage maintains that the relationship between the two may be attributed to poor economic management, policy mistakes, corruption, rent-seeking behavior, weak domestic institutions, and the like. For instance, the Morgan Guaranty Trust Company (1986) contends that indirect factors such as low economic growth regimes, overestimated exchange rates, and poor fiscal management by governments of developing countries are not only the cause of capital flight but also generate demand for foreign credit.

Another contention of the indirect theory by Morgan Guaranty Trust Company (1986) is that capital inflows (especially during surges of capital flows) lead to risky or unsound investment decisions and over-borrowing. For instance, when governance structures and mechanisms for administrative controls and prudential regulation are weak, fragile or absent, money borrowed from abroad can end up being pocketed by the domestic elite (and usually transferred into private accounts abroad). These fund are spent on conspicuous consumption or allocated to showcase unproductive development projects that do not generate foreign exchange or to finance external debt servicing. So capital flight and external borrowing are manifestations and responses to unfavorable domestic economic conditions.

2.1.2. Direct Theory

According to Ayayi (1997), the direct linkages theory contends that external borrowing directly causes capital flight by providing the resources necessary to affect flight. Cuddington (1987) and Henry (1986) showed that in Mexico and Uruguay, capital flight occurred contemporaneously with increased debt inflows, thus attesting to a strong liquidity effect in these countries. According to this theory, external resources acquired as loans can create conditions for capture as "loot" that individuals (often the elite) appropriate as their own. In fact, according to Beja (2006), the (captured) funds may not even enter the country at all. Instead, mere accounting entries are entered in the respective accounts of the financial institutions. Boyce (1992) further distinguishes four possible, equivalent links between external debt and capital flight.

The first is the debt-driven capital flight. According to Boyce (1992), in a debt-driven capital flight, residents of a country are motivated to transport their assets to foreign countries due to excessive external borrowing by the domestic government. The outflow of capital is, therefore, in response to fear of the economic consequences

of heavy external indebtedness. So the desire to avoid such taxes in the future causes individuals within the country to transport their capital abroad.

The second is debt-fueled capital flight. According to Boyce (1992), in a debt-fueled capital flight, the external debt acquired provides both the reason and the resources needed for capital flight. Suma (2007) identifies two processes that debt-fueled capital flight occurs. First, the domestic government acquires the foreign capital, then sells the resources to the domestic residents who later transfer them abroad either by legal or illegal means. Secondly, the government can lend the borrowed funds to private borrowers through a national bank, and the borrowers, in turn, transfer a part or all of the capital abroad. In this case, external borrowing provides the necessary fuel for capital flight (Ajayi 1997).

Meanwhile, Flight-driven External Borrowing is a situation where after the capital flight, which dries up domestic resources, the gap between savings and investment rises, so the government borrows more resources from external sources to fill the resource gap created in the domestic economy. This situation occurs due to resource scarcity in the domestic economy, with both the public and private sectors seeking replacement of the lost resources by acquiring more loans from external creditors. The external creditors' willingness to meet this demand can be attributed to different risks and returns facing residents and non-resident capital. "The systemic differences in the risk-adjusted financial returns to domestic and external capital could also arise from disparities in taxation, interest rate ceilings and risk-pooling capabilities" (Lessard–Williamson 1987, p. 215).

Finally, Flight-fueled External Borrowing occurs when the domestic currency siphoned out of the country through capital flight re-enters in the form of foreign currency that finances external loans to the same residents who transferred the capital. In other words, the domestic capital is converted to foreign exchange and deposited in foreign banks, and the depositor then takes a loan from the same bank in which the deposit may serve as collateral. This phenomenon is also known as round-tripping or back-to-back loans (Boyce 1992).

At the empirical level, Saxena and Shanker (2016) examined the dynamics of external debt and capital flight in the Indian economy; the authors using Two Staged Least Square (2SLS) method, investigate the relationship of the two during the period 1990-2012. The result of the study indicates a positive correlation between external debt and capital flight in India. Usai and Zuze (2016) provided a similar analysis for Zimbabwe using Vector Autoregression. The main objective of their study was to establish the direction of causality between capital flight and external debt for the period 1980-2010 in the essence of the revolving door hypothesis. Their study employed the Granger causality test to investigate this relationship. The pairwise Granger causality test revealed the existence of a unidirectional relationship running from external debt to capital flight. Their result indicates that for Zimbabwe, external debt has influenced capital flight and not the other way round.

Abdullahi et al. (2016), also examine the impact of external debt on the growth and development of capital formation in Nigeria. Time series data were used for a period from 1980 to 2013, employing Autoregressive Distributed Lag (ARDL) modeling. The result of stationarity tests showed that the variables are both I(0) and I(1) necessitating the use of ARDL. ARDL estimation also revealed the presence of a long run relationship amongst the variables. However, the study showed that the variables were related independently in the long-run. The result also indicated a negative and statistically significant association between external debt and capital formation with savings leading to a bidirectional causality relationship amongst the variables. The interest rate was also statistically significant even though it was weak. The other variables were found to be of unidirectional causal effects.

Boyce and Ndikumana (2012) also examine the impacts of capital flight with linkages to external borrowing in Sub-Saharan Africa. The results of the study established that Sub-Saharan Africa is a net creditor to the rest of the world because the private external assets exported exceed its external public liabilities. This finding suggests the existence of debt-fueled capital flight. The results also show a debt overhang effect, as increases in the debt stock spur additional capital flight in later years and underscore the exploitation of natural resource-rich countries. The studies also emphasize the significant role of government institutions and structures in alleviating the dangers of capital flight, while political uncertainty is found to be a key determinant of capital flight. McCaslin (2013) also explored estimates of capital flight from Portugal, Italy, Greece and Spain (PIGS) during the Eurozone debt crisis and examined the determinants of capital flight from the distressed PIGS zone. Demachi (2013) in his study, examine the impact of international resource price increases on capital flows from twenty-one (21) resource-rich developing countries (RRDCs) from 1990-2011. The results of his analysis suggested the need to focus more on capital outflow from RRDCs through transnational companies.

In a nutshell, the relationship between capital flight and external debt have been the focus of many types of research and policymakers. Under conventional expectations, the bidirectional relationship between capital flight and external debt, which is also known as the revolving door hypothesis, seems to be the more common research finding.

3. Methodology

3.1. Data sources and scope

The study uses secondary data mainly drawn from the World Bank (World Development Indicators, International Financial Statistics) and the African Bank Development Indicators 2016 online databases. HIPC countries in Sub-Saharan Africa comprise 30 countries, however, due to data unavailability on some relevant variables for some countries, annual data for 26 HIPC countries in Sub-Saharan Africa

countries were used in the study for empirical analysis. Data on capital flight or external debt for the remaining four (4) countries in the Sub-Region is unavailable. It is likely that their participation in external debt or capital flight activities in the region is insignificant, and hence the empirical results based on the 26 countries in the region is expected to reveal the real situation among HIPC countries in SSA. The study covers a period of 23 years (1990-2012) which captures the long-term impacts of the 1982 global debt crisis, the effect of the 2008 financial crisis and the current economic downturn, on external borrowing and capital flight. However, data unavailability for some of the years mentioned represented a constraint in choosing the period of 23 years for the empirical analysis.

3.2. Model Framework

The traditional panel models, such as fixed effects, random effects, and pooled OLS models have certainly had some challenges. For example, pooled OLS is considered to be a highly restrictive model since it imposes a common intercept and slope coefficients for all cross-sections, and thus disregards individual heterogeneity. The fixed effects model, on the other hand, assumes that the estimator has common slopes and variance but country-specific intercepts. Even though the cross-sectional and time effects can be observed through the introduction of dummy variables in the fixed effect model, especially in a two-way fixed effects model, nevertheless, this estimator also suffers severe problems due to the loss of degrees of freedom according to Baltagi (2008). Additionally, the parameter estimates produced by the fixed effects model are biased when some regressors are endogenous and associated with the error terms as demonstrated by Campos and Kinoshita (2008). The random effects model is comparatively less problematic as regards the degrees of freedom, basically because it has an inherent assumption of common intercepts. However, the random effects model considers the model to be time-invariant which means that the error at any period is not associated with the past, present, and future, known as strict homogeneity by Arellano (2003). The main issue is that, in real life, this assumption is very often invalid. Furthermore, as Loayza and Ranciere (2006) argue, static panel estimators do not take into account the panel dimension of the data by distinguishing between short- and long-run relationships. Furthermore, conventional panel data models assume homogeneity of the coefficients of the lagged dependent variable (Holly–Raissi 2009), and this can lead to a serious bias, when in fact the dynamics are heterogeneous across the cross-section components. Therefore, the standard panel methods have been criticized for neglecting the dynamic nature of the data, which happens to be the central theme in the empirical literature. Moreover, they only focus on the structural heterogeneity of the model with regard to random or fixed effects, but enforce strict homogeneity in the model's slope coefficients across countries, even when there may be significant distinctions among them.

In recent times, a lot more of the empirical studies have focused on the dynamic panel estimation method. However, according to Samargandi et al. (2015) and Roodman (2006), in the dynamic panel estimation, when there are a large number of countries compared to the time period, then the GMM-system estimator proposed by Arellano and Bover (1995) and the GMM-difference estimator by Arellano and Bond (1991) both work well. These two estimators are typically used to analyze micro panel datasets (Eberhardt 2012). However, a wide range of recent literature has applied GMM techniques to macro panel data, including from the area of capital flight and external debt (e.g. Fiagbe (2015) and Domfeh (2015)). However, GMM captures only the short-run dynamics, and the long-run relationships between the variables tend to be overlooked because these models are frequently restricted to short time series.

Pesaran and Smith (1995), Pesaran (1997) and Pesaran et al. (1999) present the autoregressive distributed lag (ARDL) model in error correction framework as a comparatively new cointegration test. However, the emphasis is on the need to have consistent and efficient estimates of the parameters both in the long- and short-run relationship. According to Johansen (1995) and Philipps and Bruce (1990), the long-run relationships exist only in the framework of cointegration between variables with the same order of integration. Pesaran et al. (1999) however, show that panel ARDL can be used even with variables with different orders of integration, and irrespective of whether the variables under study are I(0) or I(1) or a mixture of the two. This is a significant advantage of the ARDL model, as it makes testing for unit roots unnecessary. Also, the short-run and long-run effects can be estimated concurrently from a data set with large cross-section and time dimensions. Finally, the ARDL model provides positive coefficients despite the presence of endogeneity as it includes the lags of both the dependent and independent variables included in the model (Pesaran et al. 1999). This study, therefore, estimates the dynamic relationship between external debt and capital flight using the ARDL method. Specifically, the study will use the recent Pooled Mean Group (PMG) estimator. According to Samargandi et al. (2015), the main characteristic of the Pooled Mean Group estimator is that it permits the short-run estimates, the speed of adjustment to the equilibrium values of long-run, the intercepts and the error variances to be heterogeneous across countries, while the long-run slope coefficients are restricted to be homogeneous across countries.

The dynamic panel model of the study is specified as:

$$CF_{it} = \delta CF_{it-1} + \beta X_{it} + u_i + \varepsilon_{it} \tag{1}$$

Where CF represents external debt, X is the matrix of all the explanatory variables, u denotes unobserved country-specific time-invariant effect, ε_{it} accounts for the stochastic error term, δ, β are the parameters to be estimated, i stand for a particular country, and t is time. Along the lines of the theoretical and empirical relationship

between capital flight and external debt postulated in the literature review, equation 1 has been consolidated with variables and rewritten as

$$CF_{it} = \alpha_1 + \beta_1 CF_{it-1} + \beta_2 EXT_{it} + \beta_3 GDP_{it} + \beta_4 INF_{it} + \beta_5 POLITY_{it} + \beta_6 FD_{it} + u_i + \varepsilon_{it} \tag{2}$$

Here EXT is total external debt, CF is capital flight, GDP is the real gross domestic product growth rate, INF is inflation, $POLITY$ represents political stability, BD represents budget deficit, and FD is financial development. Further, the coefficients, $\beta_1, \beta_2 \dots \beta_6$, are the output elasticities of the factor inputs, while ε_{it} is the stochastic error term and α_1 is the constant term. The variable description and measurement, as well as their source, are presented in Table 1.

Table 1 Variables in the model: Definitions and Sources

Variable	Definition	Source
External Debt (EXT)	Total external debt measured as total stock of external debt as a ratio of GDP	WDI database
Capital Flight (CF)	Capital flight expressed as a percentage of GDP	Database of Political Economy Research Institute (PERI).
Gross Domestic Product (GDP)	Growth rate of Gross Domestic Product	WDI database
Political Stability (POLITY)	Political Stability is measured by the country's elections competitiveness and openness, the nature of political involvement in general, and the degree of checks on administrative authority. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e., ranging from -10 to +10.	Polity 2 data series from Polity IV database under
Inflation (INF)	Inflation rate is also measured as the growth rate of the CPI index	WDI database
Financial Development (FD)	M2 as a percentage of GDP	WDI database
Budget Deficit (BD)	Measured as current account balance as a percentage of GDP	WDI database

Source: Constructed by the authors

3.3. Estimation technique

As a general method, cointegration techniques following Johansen (1991), Engle and Granger (1987), Phillips (1991), Phillips and Loretan (1991) and Phillips and Hansen (1990) are used to estimate long-run relationships between variables integrated of order one, so-called I(1) variables. The basic premise of cointegration literature is that long-run relationships exist only between the cointegrated variables. If the variables

are not integrated of order one, traditional regression estimations are no longer applicable. Pesaran et al. (1999) re-examined the use of the traditional ARDL approach for the analysis of long-run relations and showed that slight modifications to standard methods render consistent and efficient estimators of the parameters in a long-run relationship between both integrated and stationary variables.

One very prominent feature of the autoregressive distributed lag (ARDL) approach to long-run modeling, as presented by Pesaran et al. is that it is not necessary to pre-test the stationarity or confirm the degree of integration of the variables of interest. The reason is that the estimate of the ARDL is still valid whether or not the variables of interest are interested of I(0) or I(1) or mutually cointegrated. Another advantage of ARDL method is that estimation is possible when explanatory variables are endogenous. Furthermore, a dynamic error correction model (ECM) can be derived from ARDL that integrates the short-run dynamic with the long-run equilibrium without losing long-run information. The study estimates the ARDL using the Pooled Mean Group (PMG) estimator of Pesaran et al. (1999), and a panel consisting of the 26 Heavily Indebted Poor Countries in Sub-Saharan Africa and spanning the years 1990 to 2012. The use of the PMG offers some advantages. It allows the short-run coefficients, with the intercepts, the speed of adjustment to the long-run equilibrium values and error variances to be heterogeneous among countries, while the long-run slope coefficients are limited to be homogeneous across countries. This is particularly important when there are reasons to suppose that the long-run equilibrium relationship between the variables is parallel across countries or, at least, a subset of them. Meanwhile, the short run adjustment is allowed to be country-specific, due to the widely different impact of capital flight on external debt. This framework is implemented by modeling equation (2) as:

$$\Delta CF_{it} = \beta_0 + \beta_1 CF_{it-1} + \beta_2 EXT_{it-1} + \beta_3 GDP_{it-1} + \beta_4 INF_{it-1} +$$
$$\beta_5 POLITY_{it-1} + \beta_6 FD_{it-1} + \beta_7 BD_{it-1} + \sum_{j=1}^{p} \alpha_{1j} \Delta CF_{it-j} + \sum_{j=1}^{p} \alpha_{2j} \Delta EXT_{it-j} +$$
$$\sum_{j=1}^{p} \alpha_{3j} \Delta GDP_{it-j} + \sum_{j=1}^{p} \alpha_{4j} \Delta INF_{it-j} + \sum_{j=1}^{p} \alpha_{5j} POLITY_{it-j} +$$
$$\sum_{j=1}^{p} \alpha_{6j} FD_{it-j} + \sum_{j=1}^{p} \alpha_{7j} BD_{it-j} + u_i + v_{it} \qquad (3)$$

Here Δ denotes the first difference operator, P is the lag order selected by Akaike's Information Criterion (AIC), β_0 is the drift parameters while v_t is the white noise error term which is $\sim N(0, \delta^2)$. The parameters α_i are the short-run parameters and β_i are the long-run multipliers. All the variables are defined as previously described.

Given that cointegration has been established from the model, the next step is to estimate the long run and error correction estimates of the ARDL and their asymptotic standard errors. The long run is estimated by:

$$CF_{it} = \mu_0 + \sum_{j=0}^{p} \beta_{1j} CF_{it-j} + \sum_{j=0}^{p} \beta_{2j} EXT_{it-j} + \sum_{j=0}^{p} \beta_{3j} GDP_{it-j} +$$
$$\sum_{j=0}^{p} \beta_{4j} INF_{it-j} + \sum_{j=0}^{p} \beta_5 POLITY_{it-j} + \sum_{j=0}^{p} \beta_{6j} FD_{it-j} + \sum_{j=0}^{p} \beta_7 BD_{it-j} + u_i +$$
$$v_{it} \tag{4}$$

This is followed by the estimation of the short-run parameters of the variables with the error correction representation of the model. By applying the error correction version of ARDL, the speed of adjustment to equilibrium is determined. When there is a long-run relationship between the variables, then the unrestricted ARDL error correction representation is estimated as:

$$\Delta CF_t = \phi_0 + \sum_{j=0}^{p} \delta_{1j} \Delta CF_{it-j} + \sum_{j=0}^{p} \delta_{2j} \Delta EXT_{it-j} \sum_{j=0}^{p} \delta_{3j} \Delta GDP_{it-j} +$$
$$\sum_{j=0}^{p} \delta_4 \Delta INF_{it-j} + \sum_{j=0}^{p} \delta_{5j} POLITY_{it-j} + \sum_{j=0}^{p} \delta_{6j} FD_{it-j} + \sum_{j=0}^{p} \delta_{7j} BD_{it-j} +$$
$$\gamma ECT_{it-j} + \Omega_{it} \tag{5}$$

Here γ is the speed of adjustment of the parameter to long-run equilibrium following a shock to the system and EXT_{t-1} is the residuals obtained from equations (4). The coefficient of the lagged error correction term γ is expected to be negative and statistically significant to further confirm the existence of a cointegrating relationship among the variables in the model. The value of the coefficient, λ, which signifies the speed of convergence to the equilibrium process, usually ranges from -1 to 0. -1 signifies perfect and instantaneous convergence while 0 means no convergence after a shock in the process.

4. Empirical Result

4.1. Pattern of Capital Flight and external debt from HIPC Countries in Sub-Saharan Africa

The pattern analyses focus only on the 26 HIPC countries covered by the study for the period 1990-2012. Both capital flight and external debt are measured in millions of constant US dollars. Estimates presented in Figure 1 show that over the 23-year study period from 1990-2012, capital flight from HIPC countries in Sub-Saharan Africa has shown both upward and downward trends. However, the trend is positive across all the years except 1999. This suggests that HIPC countries in Sub-Saharan Africa are experiencing net capital outflow on a yearly basis. This positive outflow of capital in the region is attributed to the abundant oil and other natural resources the region possesses, poor governance, weak institutions, and the poor macroeconomic environment that has plagued the region.

Figure 1 Pattern of capital flight in HIPC countries in Sub-Saharan Africa
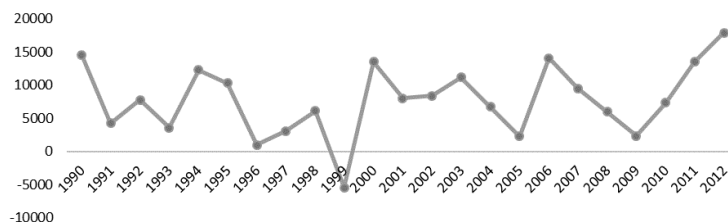
Source: own construction

Though the massive and continuous outflow of capital through illicit channels over the period 1990-2012 is a major issue for discussion, there are significant disparities in the regional pattern of illicit flows. Figure 2 shows that capital flight from West and Central Africa is the dominant driver of illicit flows from the HIPC Countries in Sub-Saharan region. The main reason for the difference probably may be a large number of HIPC countries in these sub-regions.

Figure 2 Regional pattern of capital flight
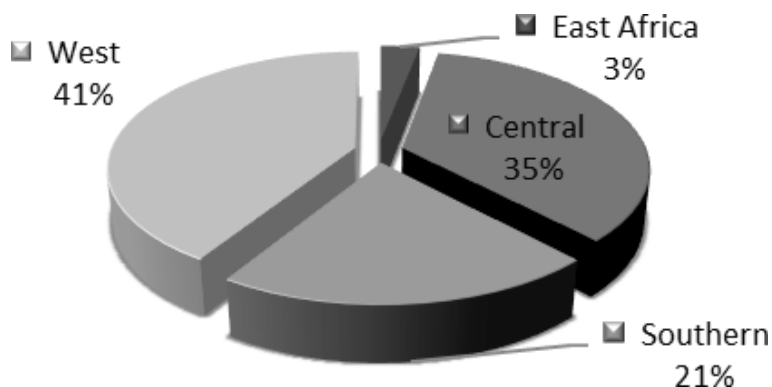
Source: own construction

Figure 3 also depicts average illicit capital outflow among the HIPC countries in SSA during the study period. This analysis and findings provide an insight into where the concentration of capital flight in the sub-region is positioned, and as such the need for the entire region to help draw up policies and procedures to help curtail the phenomenon where it is endemic. The analysis of Figure 3 shows that Congo, Mozambique, and Ghana contribute substantially to capital flight in the region with the average capital flight ranging from 1200 million USD.

Figure 3 Average capital flight for Sub-Saharan African countries

| | -1000.00 | -500.00 | 0.00 | 500.00 | 1000.00 | 1500.00 | 2000.00 |

Côte d'Ivoire 1550.21
Mozambique 1415.31
Ghana 1270.90
Ethiopia 1078.83
Congo, Rep. 1057.17
Gabon 882.40
Tanzania 755.30
Uganda 550.23
Congo, DR 488.05
Zambia 429.96
Sierra Leone 398.88
Cameroon 396.16
Madagascar 318.26
Burundi 271.79
Togo 142.20
Guinea 131.41
Mali 90.11
Rwanda 76.83
Guinea-Bissau 70.53
Chad 68.85
Central African Republic 51.39
Malawi 43.22
Burkina Faso 31.84
Benin 21.95
-459.87 Niger
-556.31 Senegal

Source: own construction

Figure 4 shows that over the 23-year study period from 1990-2012, external debt from HIPC countries in Sub-Saharan Africa also showed both upward and downward trends, as was the case for capital flight. However, the trend increases outweighed the falls. For instance, Figure 1 shows that external borrowing from HIPC countries in the region increased from 1990 and reached a peak in the year 1998 before beginning to fall. However, it regained its rising disposition from 2001 reaching its highest in 2004 and then declined sharply again in 2006 only to turn upward again in 2007. The decline in 1998 through 2000 and 2004 through 2006 is attributed to the fiscal discipline that most of the countries engaged in to qualify for the HIPC relief in 2000 and multilateral debt relief in 2006. Total real capital flight in the combined HIPC in Sub-Saharan African countries has been growing since 2007.

Figure 5 also shows the average capital flight estimates for HIPC countries in Sub-Saharan Africa for 1990-2012. Côte d'Ivoire has the largest amount of external borrowing among the HIPC countries in SSA. Burundi and the Central African Republic also have the lowest external debt among the HIPC countries in SSA.

Figure 4 External debt for HIPC in SSA
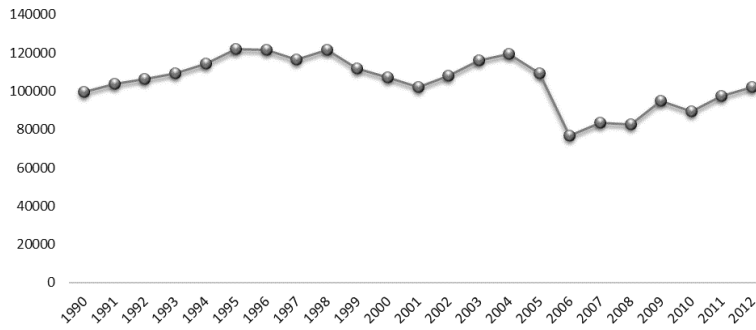
Figure 5 Average external debt for HIPC countries
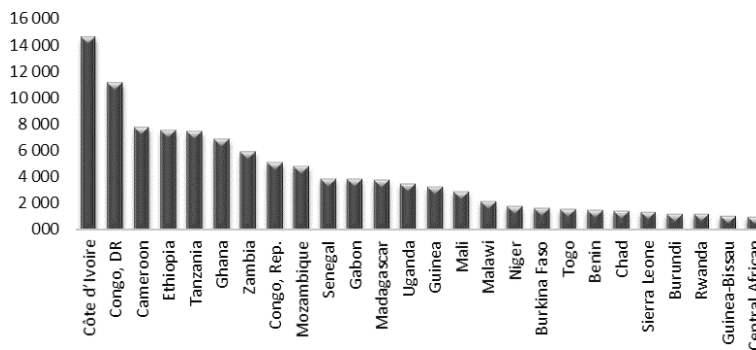
Table 2 provides a summary of statistics relating to the twenty-six (26) HIPC countries in SSA for the period 1990–2012. The table indicates the summary descriptive statistics of central tendency and measure of variability. The mean values indicate the average value of the variables used in the overall model. The standard deviation also captures the distribution of data around the mean value. It also shows the closeness of data to the average value over the period under consideration. Also, the range indicates the spread of the data, and this is also measured by the maximum and minimum values in each different model. The range is an indicator of the level of variations in the variables. The larger the range values, the higher the degree of variations in a variable and vice versa. N, n, and T in the table represent the total observations, a total number of countries sampled and the total number of years for the study respectively. The mean of external debt of the sample is 82.6574 and ranges in value between 10.70016 and 304.851.

Table 2 Descriptive statistics of the Data

Variable		Mean	Std. Dev.	Min	Max	Observations
EXT	Overall	82.6574	55.81469	10.70016	304.851	N = 460
	Between		28.52664	39.04989	150.0186	n = 26
	Within		48.37887	-44.70617	241.8563	T = 23
CF	Overall	0.0980781	0.2646581	-0.546687	1.953331	N = 594
	Between		0.1708889	-0.119774	0.777068	n = 26
	Within		0.2043844	-0.607496	1.446824	T = 23
GDP	Overall	6.214113	14.34703	-50.24807	105.2675	N = 598
	Between		13.10628	-0.023571	69.88397	n = 26
	Within		6.848762	-49.46443	41.59763	T = 23
INF	Overall	61.24963	33.43816	4.13E-10	163.56	N = 598
	Between		17.51328	19.82287	82.31043	n = 26
	Within		28.70715	-0.579933	172.5453	T = 23
Polity	Overall	0.4397993	4.845923	-9	9	N = 598
	Between		3.411009	-4.73913	6.043478	n = 26
	Within		3.503819	-12.73411	9.135452	T = 23
FD	Overall	11.06982	6.751876	0.1982856	36.49501	N = 596
	Between		5.392417	2.453031	21.7209	n = 26
	Within		4.184846	0.2103994	28.89799	T= 23

Source: Authors' own construction

Over the period 1990–2012, the average external borrowing for the twenty-six HIPC countries in SSA under study averaged 87.02381 million constant US dollars, ranging from a maximum score of 10.70016 and 304.851 showing a high level of variation. The range of the capital flight (the main value of interest) indicates that between countries, observations (cross-sectional dimension) in the region attain scores as low as -0.1197744 and as high as 0.7770688 within the period under consideration, whereas, within countries, observation shows a wider variation ($low = -0.607496$ and $high = 1.446824$). The GDP index averaged 1.794359. Empirical studies on external debt in SSA is determined by the value of the political and functionality of the institution perception index. From Table 2 above, the maximum value of this variable observed is 9 with a minimum of -9. The total number of observation as indicated in the table is 460 with 23 years and 26 countries.

4.2. *Panel unit root test*

Though the Pooled Mean Group Estimation renders (panel) unit-root tests of the variables under study needless as long as they are I(0) and I(1), the study performed these tests nevertheless to ensure that no variable exceeded the I(1) order of integration, which would result in inconsistent estimations (Asteriou and Monastiriotis 2004). To do this, we applied three commonly used panel unit root tests. The first is by Levin et al. (LLC) (1992), the second Im et al. (IPS) (1997), and finally

the Fisher-Type Chi-square. These tests are founded on the assumption that all series are non-stationary under the null hypothesis but accounts for heterogeneity in the autoregressive coefficient, which is assumed to change freely among the states under study. The LLC test is appropriate because it can cover the most general specification for all the pooled variables with the inclusion of a constant, a trend and lags (Mathiyazhagan 2005). The advantage of the Fisher-Type unit root test is that it can be applied in almost every set of data (Durnel 2012). According to the test of Im et al. (1997) that performed the Monte-Carlo simulations to equate the test that they suggested (IPS), and the Levin-Lin test, with the hypothesis of no cross-sectional correlation in panels, they showed that the IPS test is more powerful than the LL test. Table 3 presents the result of the unit root test.

The test results indicate that all the variables in the study are stationary at level except external debt and capital flight which is also significant at first difference. Due to the existence of mixed levels of integration among series, we proceeded to apply the Pooled Mean Group estimator rather than traditional static or panel cointegration test (Asteriou and Monastiriotis 2004). The Pooled Mean Estimator is characterized by multiplicities of advantages, of which it emphasizes and allows for the possibilities of estimating different variables with a different order of stationarity, as is the case in the study indicated in Table 3. We also noticed that our data suffers from either I(0) and I(1). On top of that these estimators allow us to estimate both short-run and long-run relationship along with the error correction coefficient.

4.3. Panel Cointegration Test

To determine whether a meaningful long-run relationship exists between the variables in our model, the study adopts the commonly applied Pedroni (2004) test, which accounts for heterogeneity by using specific parameters. This test offers eleven (11) panel statistics for which cointegration analysis can be made. The results of the test are given in Table 4. The results indicate a similar trend for both models with intercept only and the model with intercept and trend specifications. For the first model with intercept only, the null hypothesis of no cointegration is rejected at 1% level of significance for six out of the eleven test statistics. This means that six of the tests reject the null hypothesis of no cointegration indicating that cointegration exists. Again, the second model also showed the same result for the cointegration analysis. Given that six of the eleven test statistics concluded that there was cointegration between the variables under study, the study concluded that cointegration was present in the data and proceeded to the estimation using the mean group and pooled mean group estimator.

Table 3 Panel unit root test

Variables	Statistics	Values	Significance	Conclusion
EXT	LLC	-8.21057	0.0000	I(1)
	IPS	-8.50160	0.0000	I(1)
	ADF	177.988	0.0000	I(1)
CF	LLC	-4.83805	0.0000	I(0)
	IPS	-7.16709	0.0000	I(0)
	ADF	149.905	0.0000	I(0)
GDP	LLC	-5.95051	0.0000	I(0)
	IPS	-6.43913	0.0000	I(0)
	ADF	137.218	0.0000	I(0)
INF	LLC	-10.8606	0.0000	I(0)
	IPS	-8.48194	0.0000	I(0)
	ADF	172.024	0.0000	I(0)
POLITY	LLC	-2.19386	0.0141	I(0)
	IPS	-3.21556	0.0007	I(0)
	ADF	85.2743	0.0014	I(0)
FD	LLC	-2.34973	0.0094	I(0)
	IPS	-0.54454	0.0000	I(1)
	ADF	75.5886	0.0000	I(0)
BD	LLC	-1.38747	0.0826	I(0)
	IPS	-3.84589	0.0001	I(0)
	ADF	82.2886	0.0027	I(0)

Note: LLC, IPS, and ADF are Levin et al. (2002); Pesaran Shin and Smith (1997) and Fisher Type ADF, respectively.
Source: own construction

Table 4 Panel Models

Panel Model A: Intercept Only				
Within Dimension				
	Statistic	Probability	Weighted Statistics	Probability
Panel v-Statistic	-1.329927	0.9080	3.415912	0.928
Panel rho-Statistic	3.352467	0.9942	2.141952	0.9816
Panel PP-Statistic	-4.570207	0.0000	-8.691525	0.0000
Panel ADF-Statistic	-7.353888	0.0000	-8.133307	0.0000
Between Dimension				
Group rho-Statistic	4.643302	0.932		
Group PP-Statistic	-9.901646	0.0000		
Group ADF-Statistic	8.222222	0.0000		
Panel Model B: Intercept and Trend				
Within Dimension				
	Statistic	Probability	Weighted Statistics	Probability
Panel v-Statistic	-3.587684	0.9997	-5.46802	1.0000
Panel rho-Statistic	4.724599	0.9996	3.374462	0.99960
Panel PP-Statistic	-5.286987	0.0000	-10.92029	0.0000
Panel ADF-Statistic	5.474111	0.0000	-7.56946	0.0000
Between Dimension				
Group rho-Statistic	5.721004	1.0000		
Group PP-Statistic	-17.45533	0.0000		
Group ADF-Statistic	-8.299459	0.0000		

Source: Computed by the authors using Eviews 9

4.4. Long-run and short-run results using the Pooled Mean Group Estimator (PMG)

Given that cointegration had been established from the model, the study proceeded to estimate the long-run relationship and the short-run dynamics between the variables. The result of the long-run and short-run relationship between capital flight and the independent variables are presented in Table 5 below. As revealed in Table 5, the results indicate theoretically correct and prior expected signs for almost all the explanatory variables. External debt expressed as a ratio of GDP, Real GDP growth, political stability, inflation and budget deficit all have the expected sign and exert a statistically significant effect on capital flight in the long-run. Financial development, however, is statistically insignificant; it has the expected sign. The constant is also negative and statistically significant too. The positive and statistically significant coefficient of the capital flight means that increases in capital flight have the potential to stimulate external debt in Sub-Saharan African countries at the aggregate level over the study period. This result concurs with the findings of Saxena and Shanker (2016) for the Indian economy. Ndikumana and Boyce (2011) also found a similar result for Sub-Saharan Africa.

Furthermore, the coefficient of the lagged error correction term ECM lagged one period (ECM_{-1}) is negative and highly significant at 1 percent significance level. This confirms the existence of the cointegration relationship among the variables in the model yet again. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The coefficient of the error correction term is -0.690460. This means that the deviation from the long-term growth rate in GDP is corrected by approximately 70 percent each year due to variations from the

Table 5: Estimated long run and short-run coefficients using the PMG Approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
EXT	0.039165	0.013680	2.862942	0.0047	***
GDP	-0.004202	0.001255	-3.349546	0.0010	***
POLITY	-0.004059	0.001105	6.724258	0.0003	***
INF	0.001880	0.000280	-0.732845	0.0000	***
FD	-0.000632	0.000863	-3.674303	0.4646	
BD	-0.000716	0.000217	-3.300769	0.0012	***
ECM	-0.690460	0.113483	-8.727833	0.0000	***
D(CF)	0.209593	0.090832	2.307483	0.0221	**
D(EXT)	0.144738	0.068257	2.120479	0.0353	**
D(GDP)	3.977373	3.969691	1.001935	0.3177	
D(INF)	2.676875	3.976444	-0.999131	0.3184	
D(POLITY)	-0.034080	0.005959	-5.719254	0.0106	**
D(FD)	-0.013245	0.007951	-1.665818	0.0975	*
D(BD)	0.001359	0.000803	1.692137	0.0923	*
C	-0.058680	0.002606	-22.52038	0.0002	***

Note: ***, **, and * denote significance at 1%, 5% and 10% respectively.
Source: own construction

short-run towards the long-run. In other words, the significant error correction term suggests that more than 70 percent of disequilibrium in the previous year is corrected in the current year.

From the result in Table 5, it is again evident that the results of the short-run dynamic coefficients of external debt, Polity, financial development, and budget deficit have the expected positive and negative signs respectively as in the long-run, and exert statistically significant coefficients on capital flight. Additionally, the value of the capital flight lagged one period on current values of capital flight in the short-run is positive and statistically significant at 5 percent significance. The implication is that current values of external debt are positively affected by their previous year's values.

4.4.1. Country Specific Short run estimates

The PMG estimator also produces country-specific short-run coefficients. It allows for the dynamics in the short run estimates depending on country-specific characteristics. Table 6 shows specific country short-run dynamics of the relationship between external debt and capital flight. The results indicate a short run positive and statistically significant relationship between external debt and capital flight (revolving door hypothesis) in Burundi, Cameroon, Central Africa Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia, Ghana, Malawi, Mozambique, Madagascar, Rwanda, Sierra Leone, Zambia, Guinea-Bissau, Benin, Niger, Mali and Senegal. Capital flight in Guinea, Tanzania, Togo, and Uganda, though are positive and have a large coefficient, meaning they are not significant. Additionally, Real GDP growth, political stability, inflation and budget deficit all exerted a statistically significant effect on capital flight across the countries, even though there are few differences in their expected signs. Also, the coefficients of the ECM are significant across all countries and have the expected negative sign, ranging between 0 and minus 2 as specified by the PMG estimator.

Table 6 Country Specific Short run estimates

Country	EXT	GDP	FD	INF	POLITY	BD	ECM
Burkina Faso	0.102403	0.000738	-0.008430	-0.008430	-0.017984	0.005701	-0.582283
	(0.1533)	(0.0006)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0058)
Burundi	0.262013	-0.007210	-0.008430	0.002423	-0.018582	0.002399	-0.253400
	(0.0040)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0046)
Cameroon	0.963259	0.013229	-0.03502	0.13293	-0.125968	0.012833	-1.270925
	(0.01020)	(0.0054)	(0.0041)	(0.0001)	(0.1150)	0.012833	(0.0001)
CAR	0.373586	0.008939	-0.045232	0.009172	-0.005034	0.007473	-1.469924
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
CHAD	0.212801	0.001071	-0.008035	0.001717	-0.020684	-0.004226	-0.412250
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Congo	0.312223	0.668455	-0.076063	0.66894	0.155716	0.003053	-1.016362
	(0.0194)	(0.7527)	(0.0000)	(0.7527)	(0.0005)	(0.0000)	(0.0002)
Congo DR	0.273293	-0.005580	-0.003831	0.023720	-0.058954	0.002544	-1.415318
	(0.0009)	(0.0000)	(0.0003)	(0.0000)	(0.0071)	(0.0000)	(0.0000)
Côte d'Ivoire	0.244698	0.016818	-0.030052	0.01950	0.025357	0.002844	-0.383619
	(0.0279)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0027)
Ethiopia	0.149112	0.003113	-0.003570	-0.004873	-0.023720	-0.000757	-0.450232
	(0.0005)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ghana	0.202100	0.020212	-0.029769	-0.007362	0.023720	-0.002128	-0.029723
	(0.0000)	(0.0002)	(0.0000)	(0.0000)	(0.4018)	(0.0000)	(0.6889)
Guinea	-0.322192	-0.001702	0.046863	0.008462	-0.007413	-0.00669	-0.894899
	(0.2579)	(0.0173)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0027)
Madagascar	-0.322192	-0.001702	0.046863	-0.008468	-0.016034	-0.000669	-0.894899
	(0.2220)	(0.0173)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0027)
Malawi	0.135143	0.014285	0.008952	-0.029555	-0.001077	-0.001114	-0.639702
	(0.0023)	(0.0000)	(0.0000)	(0.0000)	(0.0055)	(0.0000)	(0.0000)
Mozambique	0.625958	-0.002874	-0.070872	-0.013963	0.149784	-0.006511	-0.528012
	(0.0011)	(0.0000)	(0.0000)	(0.0000)	(0.0003)	(0.0000)	(0.0000)
Rwanda	0.078931	-0.006020	-0.018319	-0.003692	-0.048589	-0.002469	-1.699000
	(0.0066)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0023)
Sierra Leone	0.687616	-0.012902	-0.177893	0.076214	0.005722	-0.002469	-1.699000
	(0.0000)	(0.0000)	(0.0038)	(0.0000)	(0.0001)	(0.0000)	(0.0023)
Tanzania	0.046071	0.019845	-0.018745	0.013030	-0.011953	0.000624	-0.910069
	(0.1701)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	0.0246
Togo	0.205827	-0.019026	0.021323	0.054844	-0.017639	-0.001917	-0.461349
	(0.2201)	(0.0000)	(0.0009)	(0.0000)	(0.4110)	(0.0000)	(0.0072)
Zambia	0.404723	-0.018516	-0.001647	0.019089	-0.023451	0.000787	-0.474482
	(0.0009)	(0.0000)	(0.0023)	(0.0002)	(0.0000)	(0.0000)	(0.0007)
Guinea-Bissau	0.451317	0.033187	0.043329	0.002966	-0.048458	0.003617	-2.076112
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Benin	0.419427	-0.003559	-0.015949	-0.000312	0.040246	0.000665	-0.731836
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Mali	0.152117	0.016996	-0.004791	0.013206	0.015886	0.004760	-1.835586
	(0.0445)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Senegal	-0.350462	0.012689	-0.004106	0.001751	-0.004318	-0.000486	-1.720520
	(0.0021)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0021)
Niger	0.216078	0.035281	-0.077096	-0.024471	-0.002487	0.000774	-1.094705
	(0.0025)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0003)
Uganda	0.826455	0.050698	-0.124208	0.006900	-0.034080	-0.004582	-0.772302
	(0.2084)	(0.0000)	(0.0000)	(0.0000)	(0.0106)	(0.0000)	(0.0000)

Source: own construction

4.4.2. Regional Estimates

Although the PMG allows short-run estimates to differ across countries, the study split the sample into their distinct sub-region in the continent to assess whether the Pooled Mean Group estimates in both long- and the short run differ from the region. The results are reported in Table 7. External debt remains significant in all regions in the long run as well as in the short run except Central Africa, which has an insignificant relationship between external debt and capital flight in the short run even though it was significant in the long run. These results suggest a revolving door hypothesis in all sub-regions in Sub-Saharan Africa. In additions, political stability, financial development, budget deficit and inflation are all significant and have the aprori expected signs across the sub-region, in the long run, indicating that capital flight is very sensitive to financial development, political stability, inflation and budget deficit across all regions. This means that any instance of financial instability, political crisis, high levels of inflation and fiscal deficit in the HIPC countries will continue to produce high levels of capital flight.

Table 7 Regional results

Variable	East Africa		Southern Africa		West Africa		Central Africa	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
EXT	0.289625	0.0000	0.719102	0.0000	0.058568	0.0000	0.064276	0.0437
GDP	-0.017979	0.0009	-0.016749	0.3380	-0.008286	0.0000	-0.001665	0.2540
POLITY	-0.004199	0.3486	-0.025292	0.0550	-0.002544	0.0112	-0.077410	0.0000
INF	0.007504	0.0000	0.020281	0.0000	0.001031	0.0000	0.002910	0.0000
FD	-0.013527	0.0003	-0.02170	0.0882	-0.00227	0.0001	-0.013981	0.0003
BD	-0.000699	0.0545	-0.000406	0.8195	0.000124	0.4897	-0.003968	0.0000
ECM	0.199045	0.0047	-0.536250	0.0488	-0.506815	0.0003	-0.646343	0.0120
D(EXT)	0.295983	0.0781	0.285026	0.0096	0.646593	0.0138	-0.173767	0.3079
D(GDP)	0.013910	0.3071	-0.005970	0.3635	-0.008362	0.0129	-7.417992	0.3215
D(INF)	-0.017978	0.0945	-0.035464	0.0158	-0.000428	0.9388	7.437150	0.3208
D(POLITY)	-0.024486	0.3115	0.031753	0.4352	-0.028878	0.2755	0.030035	0.3123
D(FD)	-0.009367	0.4775	0.035022	0.0018	-0.002989	0.6067	-0.010427	0.5374
D(BD)	0.004083	0.0550	-0.002004	0.4428	-0.004573	0.0636	-0.022196	0.2847
C	-0.205022	0.0544	-0.434193	0.0182	-0.140816	0.0772	-0.227706	0.0244

Source: Computed by the authors using Eviews 9

5. Conclusion and policy implications of the study

This paper examined the relationship between capital flight and external debt in HIPC countries in Sub-Saharan Africa employing the Pooled Mean Group (PMG) estimator of Autoregressive Distributed Lag (ARDL) model for the period 1970 to 2012. The empirical evidence presented in this paper suggests that there is both short-run and long-run relationship between external debt and capital flight in Sub-Saharan Africa signifying that increases in external debt accumulation lead to increase in capital flight

and that if external debt remains unchecked, it will continue to cause a substantial amount of capital flight. At the regional level, external debt remains positive and has statistically significant effects on capital flight for all of the sub-regions in both short run and long run, except for Central Africa which has a positive and statistically significant relationship in the long run but not in the short run. This result implies that creditors knowingly or unknowingly finance the export of private capital rather than investment in HIPC countries in SSA. Such lending is often motivated by political and strategic considerations. Again, it could also imply a lack of diligence on the part of creditors before the loans are approved. A policy implication for external debt management is to insist that foreign creditors be made to bear the consequences of irresponsible or politically motivated lending while government should accept the liability of those portions of the debt incurred by a previous government that was used to finance development projects and programs.

In addition to greater accountability on the creditor side, it is equally important that HIPC Countries should establish mechanisms of transparency and accountability with respect to decision-making processes regarding external debt management. It is important that the government guarantee that any external loans acquired are invested into productive projects that give high returns on investment. If these loans are invested into such productive projects, it enhances the country's debt servicing capacity thereby reducing the incidence of falling into a debt crisis. Furthermore, the government also needs to timely pay its outstanding obligations to avoid a debt trap that can also spill over into a debt crisis. These measures can thus reduce capital flight since debt-driven capital flight is exacerbated when conditions for debt crises appear. This result also suggests an additional rationale for the annulment of debts since the continuous accumulation of external debt may signal increased risks, to which private capital owners may respond by pulling out their capital. The respective governments need to discuss the possibility of debt annulment or debt rescheduling with international financial institutions, the World Bank, and other bilateral loan providers.

References

Abdullahi, M. M. – Hassan, S. B. – Bakar, N. A. B. A. (2016): Analyzing the impact of external debt on capital formation in Nigeria: An autoregressive distributed lag approach. *Mediterranean Journal of Social Sciences*, 7, 1, 173–183.

Adepoju, A. A. – Salau, A. S. – Obayelu, A. E. (2007): The effects of external debt management on sustainable economic growth and development: Lessons from Nigeria. *MPRA Paper* No. 2147.

Ajayi, S. I. (1997): An analysis of external debt and capital flight in the severely indebted low-income countries in the Sub-Sahara Africa. *IMF Working Paper* WP/97/68.

Ajayi, S. I. – Khan, M. S. (2000): *External debt and capital flight in Sub-Saharan Africa*. Washington, D.C.: International Monetary Fund.

Arellano, M. (2003): *Panel data econometrics*. Oxford: Oxford University Press.

Arellano, M. – Bond, S. R. (1991): Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies* (New York), 58, 194, 277–297.

Arellano, M. – Bover, O. (1995): Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68, 1, 29–52.

Asteriou, D. – Monastiriotis, V. (2004): What do unions do at the large scale? Macro-economic evidence from a panel of OECD countries. *Journal of Applied Economics*, 7, 1, 27–46.

Baltagi, B. (2008): *Econometric analysis of panel data*. Chichester: John Wiley and Sons.

Beja, E. L. (2006): Revisiting the revolving door: Capital flight from Southeast Asia. *DESA Working Paper*, 16, UN Department of Economic and Social Affairs.

Boyce, J. K. (1992): The revolving door? External debt-capital flight: A Philippine case study. *Journal of World Development*, 20, 3, 335–349.

Boyce, J. K. – Ndikumana, L. (2012): Capital flight from Sub-Saharan African Countries: Updated Estimates, 1970-2010. *Political Economy Research Institute Research Report* (October 2012). University of Massachusetts Amherst.

Campos, N. F. – Kinoshita, Y. (2008): *Foreign direct investment and structural reforms: Evidence from Eastern Europe and Latin America*. Washington, D.C.: International Monetary Fund, IMF Institute.

Collier, P. – Hoeffler, A. – Pattillo, C. (2001): Flight capital as a portfolio choice. *World Bank Economic Review*, 15, 1, 55–80.

Cuddington, J. T. (1987). Capital flight. *European Economic Review*, 31, 1–2, 382–388.

Demachi, K. (2013). Capital flight and transfer from resource-rich developing countries. *MPRA Paper*, 50273

Domfeh, K. O. (2015). *Capital Flight and Institutional Governance in Sub-Saharan Africa: The Role of Corruption*. Doctoral dissertation, University of Ghana.

Dornbusch, R. and de Pablo, J. C. (1987): Comment. In Lessard, D. R. and Williamson, J. (eds) (1987): *Capital flight and third world debt*. Washington, D.C.: Washington Institute for International Economics.

Dürnel, J. C. (2012). *The Effects of Foreign Direct Investment on Turkish Economy*. Master's dissertation, Lund University Publications Student Papers (LUP-SP).

Eberhardt, M. (2012): Estimating panel time-series models with heterogeneous slopes. *Stata Journal*, 12, 1, 61–71.

Engle, R. F. – Granger, C. W. (1987): Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251–276.

Fiagbe, A. K. (2015). *The Effect of External Debt on Economic Growth in Sub-Saharan Africa*. Doctoral dissertation, University of Ghana.

Henry, J. S. (1986): Third-World debt hoax: where the money went. *New Republic*, 194, 15, 20–23.

Holly, S. – Raissi, M. (2009): The macroeconomic effects of European financial development: A heterogenous panel analysis. *FINESS Working Paper*, No. 1. 4

Im, K. S. – Pesaran, M. H. – Shin, Y. (1997). Testing for unit roots in heterogeneous panels. *Cambridge Working Papers in Economics*, 9526.

Johansen, S. (1991): Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica: Journal of the Econometric Society*, 59, 6, 1551–1580.

Johansen, S. (1995). A stastistical analysis of cointegration for I (2) variables. *Econometric Theory*, 11, 1, 25–59.

Lessard, D. R. – Williamson J. (1987): *Capital flight and third world debt*. Washington, D.C.: Washington Institute for International Economics.

Levin, A. – Lin, C. F. – Chu, C. S. J. (2002): Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics*, 108, 1, 1–24.

Loayza, N. V. – Rancière, R. (2006): Financial development, financial fragility, and growth. *Journal of Money*, Credit and Banking, 38, 4, 1051–1076.

Mathiyazhagan, M. K. (2005). Impact of foreign direct investment on Indian economy: a sectoral level analysis. *Working Paper*, 6, Institute of South Asian Studies.

McCaslin, W. A. (2013). *Capital Flight: An Empirical Study of PIGS*. Master Thesis, Copenhagen Business School.

Morgan Guaranty Trust Company (1986): LDC capital flight. *World Financial Market*, 2, 13–16.

Ndikumana, L. – Boyce, J. K. (2003): Public debts and private assets: Explaining capital flight from Sub-Saharan African Countries. *World Development*, 31, 1, 107–130.

Ndikumana, L. – Boyce, J. K. (2011): Capital flight from Sub-Saharan African countries: Linkages with external borrowing and policy options. *International Review of Applied Economics*, 25, 2, 149–70.

Pedroni, P. (2004): Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20, 3, 597–625.

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

Pesaran, M. H. (1997): The role of economic theory in modelling the long run. *The Economic Journal*, 107, 440, 178–191.

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

Phillips, P. C. (1991): Optimal inference in cointegrated systems. Econometrica: *Journal of the Econometric Society*, 59, 2, 283–306.

Phillips, P. C. – Bruce. H. E (1990): Estimation and inference in models of cointegration: A simulation study. *Advances in Econometrics*, 8, 225–248.

Phillips, P. C. – Loretan, M. (1991): Estimating long-run economic equilibria. The Review of Economic Studies, 58, 3, 407–436.

Phillips, P. C. – Hansen, B. E. (1990): Statistical inference in instrumental variables regression with I (1) processes. *The Review of Economic Studies*, 57, 1, 99–125.

Polity, I. V. (2016): Political regime characteristics and transitions. Online Database. Retrieved from: http://www.systemicpeace.org/inscrdata.html.

Roodman, D. (2006): How to do xtabond2: an introduction to 'difference'and 'system. In GMM in STATA'. *Center for Global Development Working Paper*, 103.

Safdari, M. – Mehrizi, M. A. (2011): External debt and economic growth in Iran. *Journal of Economics and International Finance*, 3, 5, 322–327.

Samargandi, N. – Fidrmuc, J. – Ghosh, S. (2015): Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle-income countries. *World Development*, 68, 4, 66–81.

Saxena, S. P. – Shanker, I. (2016): Dynamics of external debt and capital flight in India. *Scholedge International Journal of Management & Development*, 3, 2, 49–62.

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*. Doctoral dissertation, WU Vienna University of Economics and Business.

Todaro, M. – Smith, S. C. (2006): *Economic development*. Ninth edition. Pearson Addison-Wesley Printing Press.

Usai, L. M. – Zuze, M. (2016): Capital Flight and External Debt in Zimbabwe: Explaining the Revolving Door Hypothesis. *The International Journal of Business & Management*, 4, 7, 130–134.

World Bank (2016): World Development Indicators On-line Database. Washington, DC. Retrieved from: https://data.worldbank.org/.

Effects of political conflict and terrorism on tourism: How crisis has challenged Turkey's tourism develoment

Elimdar Bayramov – Abalfaz Abdullayev

This paper studies the influence of political conflict and terrorism on Turkey's tourism indicators and competitiveness. Turkey has been challenged by political conflict, and several associated terrorist attacks in recent years. Consequently, the risks involved in visiting one the world's top tourism destinations, Turkey, have increased. Crisis has challenged the country's competitiveness and share in world tourism as a top tourist destination. Studies on the effects of this on tourism have shown that conflict has a significant, negative impact on a region's tourism industry. The aim of this article is to analyze the effects of the crisis in Turkey on its tourism development. The study provides a descriptive analysis of the economic and tourism indicators of Turkey over the period from 2002 to 2015. The terrorism index was used to test its relationship with the changes in other economic and tourism indicators. The results show that there is the strong relationship between the changes in the terrorism index and overall tourism growth rates. Political conflict and terrorism have an adverse effect on Turkish tourism development.

Keywords: Conflict-Ridden Areas, Terrorism Index, Tourism Growth Trends, Crisis, Tourism in Turkey

1. Introduction

Tourism is one the largest industries in the world, comprising 1,186 billion international tourists in the world, and accounting for almost 10% of World GDP with its estimated US$ 1260 billion in total earnings worldwide in 2015 (UNWTO 2016). Tourism plays a more significant role in the economies of some countries than others, wherever the industry contributes to a great proportion to their respective economy and labor market. Turkey has long held a leading position among the world's top tourism destinations, for instance, being the 6th most visited country by international tourists, with 39.5 million tourist arrivals in 2015 (UNWTO 2016). However, tourism should also be considered one of the most vulnerable sectors of an economy, as it is fragile precisely because even adventure tourism offerings do not include being kidnapped, caught in crossfire, or the prospect of being blown up (Richter 1999). The statistical analysis of the number of tourist arrivals and other economic indicators show that the tourism market in Turkey has been affected by political instability and subsequent terror attacks. The impact of terrorism on tourism can be both direct and indirect. The direct costs of terrorism on the tourism sector include decreased tourist numbers, leading to decreased revenue and lower GDP, while indirect costs include

decreased employment in the tourism sector and reduced flow-on effects to other industries, such as food service, cleaning and maintenance businesses (IEP 2016). The differences in the development of countries with no terrorist attack and countries with terrorist attacks can be tracked by means of various economic indicators. For example, between 2008 and 2014, tourism and travel's average contribution to GDP growth in countries that had no terrorist attacks targeting tourists was 3.6 percent, while in countries where attacks deliberately targeted tourists it amounted to 1.9 per cent (IEP 2016). The aim of this paper is to analyze how political instability and terrorism is interrelated with tourist arrivals, and to identify their impact on the tourism industry. The study aims to provide a descriptive analysis of the economic and tourism indicators of Turkey, over the period from 2002 to 2015 and explore the interrelationship with the terrorism index to test the effect of terrorism and political instability on the tourism industry. The results reveal that there is the strong relationship between the changes in the terrorism index and overall tourism growth rates. Consequently, political conflict and terrorism can undoubtedly be said to have an adverse effect on Turkey's tourism development.

It is important to understand all the factors that influence and build destination image in the eye of potential tourists, especially for destinations in conflict-ridden areas which have much greater challenges. Since destinations are intangible products, customers rely heavily on their perceptions of alternative destinations when making their destination-choice decisions (Um–Crompton 1990). Destination image among potential tourists of conflict-ridden areas is significantly affected by international conflicts between countries affecting perceptions of the destination (Alvarez–Campo 2014). Perceptions related to Turkey have, among other things, been shaped by the coverage in the media of Turkish political and safety issues, including terrorism, instability in the political arena, Islamic fundamentalism, human rights concerns, the conflict with Greece over Cyprus, and the Turkish government's reaction to the allegations of Armenian genocide (Alvarez–Korzay 2008). In the case of Turkey, the conflict riven country seems to have been in continuous political crisis for many years, during which time conflict has escalated and been magnified through the media internationally. While the effect of some incidents and terrorist attacks may fade over time, continued conflict in the region may result in a permanent influence on both destination and destination image (Sönmez et al. 1999).

The research found that Turkey was one of six countries to display very significant deteriorations in their Global Terrorism Index (GTI) scores in 2015, leading to large changes in their ranking over the previous year (IEP 2016). These countries include; France, Turkey, Saudi Arabia, Kuwait, Tunisia and Burundi (IEP 2016). Indeed, OECD countries experienced substantial increases in terrorism, with Turkey and France being particularly affected, while Denmark, France, Germany, Sweden and Turkey recorded the most deaths from terrorism in a single year since 2000 (IEP 2016). However, the largest increase occurred in Turkey, where both ISIL and the

PKK became more active, resulting in the number of terrorism-related deaths rising from 20 in 2014 to 337 in 2015 (IEP 2016). Turkey is in fact the country that suffered the highest number of deaths from terrorism in the OECD since 2000, except for the September 11, 2001, attacks in the US (IEP 2016). There are studies showing that economic growth and terrorism have a negative relationship. Results from research by IEP (2016) on Turkey showed that terrorism had severe adverse effects on the economy when the economy was in an expansionary phase (IEP 2016).

The present study employs graph analysis to compare changes in growth rates of main tourism and economic indicators with changes in terrorism threat. In the first section, the growth of overall tourist arrivals and international tourism receipts over the period of 2002 and 2015 is presented by graph analysis. The effect of changes in terrorism index is illustrated by a comparison of the changes in international tourist arrivals, international tourism receipts, direct contribution to employment, direct contribution to GDP and overall GDP growth with the GTI growth rate. It is important for the country's destination managers to understand the real consequences of conflict and terrorism on the tourism industry, as tourism plays a significant role in the economy of Turkey, contributing substantially to the economy of the country. Consequently, the findings from the graph analysis in this study prove the significance of studying the effects of political conflict and terrorism on tourism in Turkey, while terrorism and conflict in the country challenge the competitiveness of Turkey's tourism development.

Considering the global context, conflict in one region or country, as well as terrorism, affects the tourism industry globally. There are several reasons why tourism growth in one geographic region is affected by negative events in other regions. Negative events related to conflict in one region threaten the growth of tourism well beyond that region's boundaries, resulting in significant decreases in the number of tourists from perceptions of risk. Hence, crisis and negative events within one region or a country may influence tourism growth globally. Neumayer's (2004) study revealed as a spill-over effect from political conflict, that tourists tend to visit neighbouring regions that offer a substitute to an affected destination with similar options and attractions, thus representing one positive influence on tourism growth. Consequently, negative events may also influence other tourism destinations positively. Generally, tourism studies support the general idea that while conflicts affect tourism in a destination negatively, a crisis in the region may have negative or positive effects on tourism growth to nearby destinations (Drakos–Kutan 2003, Neumayer 2004).

2. Literature review

Tourism as a constantly growing and one of the world's main industries is disrupted by political instability and terrorism. The threat of danger accompanied by these evils tends to impact demand from potential tourists and significantly impacts the flow of tourism (Sönmez 1998). World tourism is affected by the events and crises of an external environment, for instance, small conflicts have a considerable effect on a destination's image (Ritchie 2004). International conflicts between countries play a significant role in forming destination image since they affect the knowledge held by potential tourists of a destination (Alvarez–Campo 2014). Furthermore, various studies have shown that negative incidents in a region have a significant, detrimental impact on the tourism industry of that region (Clements–Georgiou 1998, Gartner–Shen 1992, Hall 2010, Rittichainowat–Chakraborty 2009, Thapa 2004).

The distinctions between and definitions of crisis and disaster have been important areas of discussion for many researchers. Faulkner (2001) made a distinction between crisis and disaster noting that crisis is a situation originating from within the organization, while disaster is a result of unpredictable catastrophic changes originating outside of the organization. The aim of this study, however, is to focus on crisis, as political conflict is caused by political issues. Nevertheless, the scale of a crisis should be considered in any such study. Parsons (1996) suggests three types of crises: (i) Immediate crises: where little or no warning exists, therefore, organizations are unable to research the problem or prepare contingency plans before the crisis hits, (ii) Emerging crises: these are slower in developing and may be able to be stopped or limited by organizational action, (iii) Sustained crises: that may last for weeks, months or even years. The crises in the study can be considered sustained crises, as they have been ongoing for many years. The type of control and strategies to deal with a different crisis will vary, depending on the consequences and time ratio (Ritchie 2004).

In the case of Turkey, continuous political crisis and terror attacks have been endemic for several decades, over which time conflict has escalated and been magnified through media reporting internationally. While the effect of some incidents and terrorist attacks may fade out given time, continuous conflicts in the region may result in permanent damage both to the destination and destination image (Sönmez et al. 1999). Recent studies have mainly focused on determining the effect of different specific events on destination image. However, this study tries to identify the effects of crisis on tourism, and to reveal their relationship.

Ritchie (2004) notes that studying crisis and disaster management for the tourism industry is difficult as the chaotic situations are usually unpredictable and difficult to control. However, it is still an important part of public and private sector management, which should be considered by tourism management (Ritchie 2004). Political instability or the outbreak of war in one part of the world can dramatically reduce tourist travel patterns to other parts of the world, as seen during the Gulf War of 1991

and the Iraq conflict in 2003, and consequently, tourism is highly susceptible to external factors and pressures in the wider operating environment (Ritchie 2004).

An understanding of the effect of terrorism and political instability on tourism numbers, and studying the relationship between these various dimensions before, after and during conflict, will contribute considerable theoretical knowledge of how tourism is changing in these countries, and how destination managers might apply this knowledge in practice to nurture tourist demand and maintain the growth of the industry in their respective economies.

Ritchie (2004) studied crisis management for the tourism industry from a strategic and holistic approach. According to Ritchie's (2004) notes, a strategic, holistic and proactive approach to crisis management should be implemented through (i) developing proactive scanning and planning, (ii) implementing strategies when crises or disasters occur, and (iii) evaluating the effectiveness of these strategies to ensure continual refinement of crisis management strategies. Our study follows the scanning component of the strategy to provide additional insights into the effects of political turmoil and terrorism, and to understand the change in economic indicators.

The study on the impact of political violence on tourism revealed that human rights violations, conflict, and other politically motivated violent events negatively affect tourist arrivals. In fact, even if autocratic regimes do not resort to violence, they have lower numbers of tourist arrivals than more democratic regimes, and are subject to intraregional, negative spillover, and cross-regional substitution effects (Neumayer 2004). It is suggested that sometimes it is difficult to realize the effects of a particular crisis on tourism, as it takes 3 to 9 months to see a drastic decrease in tourist arrivals, because tourist may not have a chance to change their existing travel bookings (Neumayer 2004). Tourists are sensitive to the negative image of a tourist destination, violent events often affecting a tourist destination long after the event has passed and stability has, in effect, been restored (Neumayer 2004). Depending on how sustained the period of crisis and the negative media coverage have been, it might take years for tourism to regain its previous level (Neumayer 2004).

To be successful in the tourism industry, considerable knowledge is required regarding the destination image as it is nurtured by potential tourists. Hence it is important to understand all the factors that influence and build destination image in the eye of potential tourists, especially in destinations in conflict-ridden areas, which face much greater challenges in this regard. Since destinations are intangible products, customers heavily rely on their images of alternative destinations when making their destination-choice decisions (Um–Crompton 1990). Understanding the image formation process in conflict-ridden areas, and the resulting tourist behavior, will lead to destination marketers building viable concepts, fully aware of destination image constructs and factors affecting the components of tourism destination image in conflict-ridden areas.

Another factor affecting the tourism decision-making process, and tourism demand as a consequence, is perceived risk. A study investigating perceived risk associated with international tourism using a random sample of US-born young adults revealed the seven risk factors: health, political instability, terrorism, strange food, cultural barriers, a nation's political and religious dogma, and crime (Lepp–Gibson 2003). Recently, tourism risk has become an important phenomenon, as evidenced by travelers' increasing attention to travel safety and travel risk. The concept of risk was first proposed by Bauer (1960) as part of consumer behavior, stating that, "consumer behavior involves risk in the sense that any action of a consumer will produce consequences which he cannot anticipate with anything approximating certainty, and some of which at least are likely to be unpleasant." Tourism risk perception is defined as a quantitative assessment of tourism security, and destination risk perception has a strong influence on tourist purchase intention (Cui et al. 2016). Tourism risk perception can be described as a judgment of tourists about the uncertainty of tourism activities and processes (Cui et al. 2016). In other words, tourism risk perception theory involves psychology, sociology, culture, economics and many other disciplines (Cui et al. 2016).

This literature review analyses certain, relevant political conflict and instability, and provides an understanding of the determinants and influencing factors in tourist demand for a destination. Hence, destination image formation process, tourists' risk perception and tourism numbers are all affected by crisis events in a particular country. There may be several factors affecting tourism growth and economic development in a country affected by violent events within its borders. Our aim is to analyse such negative events concentrating on political and social events (such as threats of disease, terrorism, political conflict, disasters) in Turkey, and to illustrate the changes that result by descriptive analysis. Such negative events in a region threaten the growth of tourism and lead to a significant decrease in the number of tourists as a result of perceptions of high-risk. Consequently, crises and negative events within one region may influence tourism growth in other regions.

3.   Data and methods

Descriptive analysis of the economic and tourism indicators of Turkey, over the period from 2002 to 2015 is used to analyze the effects of crisis in Turkey on its tourism development. Researching the effect of conflict on tourism and an economy is a complex area and requires comprehensive analysis. Indeed, a follow-up study is planned to include qualitative methods and in-depth quantitative analysis by bringing more influencing factors into the analysis. The reason for selecting descriptive analysis for this study was to provide preliminary research on the effects of conflict on the tourism industry in Turkey, and to illustrate their interplay with the help of graphical analysis. In this study, we present a graph analysis of the annual percentage growth rates of the main indicators in tourism. Annual percentage growth rates are

dimensionless measures of the amount of increase (or decrease) of a specific variable from one year to another in percentage terms (Claveria–Poluzzi 2016).

The study analyses the changes in growth rates of Turkey's economic indicators in comparison to Global Terrorism Index (GTI) as calculated by The Institute for Economics and Peace (IEP).

GTI provides a comprehensive summary of the key global trends and patterns in terrorism over the last 16 years, covering the period from the beginning of 2000 to the end of 2015 (IEP 2016). The GTI defines terrorism as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (IEP 2016, p. 6).

The data covers the period from 2002 to 2015, and accordingly the available GTI score for Turkey covers the same period. Meanwhile, data on tourism and economic indicators from the World Tourism Organization (UNWTO), World Travel and Tourism Council, World Bank and Tourism statistics published by the Ministry of Culture and Tourism of the Republic of Turkey are used. Tourism indicators include the number of international tourist arrivals (millions), tourism receipts (US$ thousands), direct contribution to employment (% growth), direct contribution to employment (thousands), direct contribution to GDP (US$ billions), GDP (% growth).

In this study, we conducted a graphical analysis of the evolution of the main variables between 2002 and 2015. Due to the lack of data for the years before 2002, we had to limit our graphs from 2002 to 2015. We calculated the growth rate in percentages of GTI in order to be able to compare with growth rates (%) of international tourist arrivals, tourism receipts, direct contribution to employment, direct contribution to GDP and GDP growth rate. In the graph analysis section, observations on changes in the main tourism statistics are graphically depicted to provide a precise and improved understanding of the topic for further development of the research.

The observed trends of growth rates of international tourism arrivals, tourism receipts, direct contribution to employment, direct contribution to GDP, and their possible relationship to the growth of GTI, provide a more thorough understanding of the topic. The results will allow us to develop further research questions to analyse the effects of political conflict and terrorism on tourism in Turkey and to assess how it challenges Turkey's tourism development with in-depth analysis. Consequently, the analysis used in this paper will assist researchers interested in conflict and its effect on tourism, and especially in Turkey, to gain further insight into the relationship of tourism and conflict, including terrorism and political conflict. Moreover, GTI and its relationship to tourism have not previously been considered in the research literature on tourism.

4. Results

The following section presents the results of statistical analyses of main tourism indicators for Turkey over the period of 14 years, from 2002 to 2015. The graphical data analysis reflects the major trends in growth rates and their relationship with the GTI score of Turkey. It presents the following analytical findings: 1) the relationship of GTI score and the number of international tourist arrivals, 2) the relationship of GTI score and tourism receipts, 3) the relationship of GTI score and direct contribution to employment (% growth), 4) the relationship of GTI score and direct contribution to employment (thousands), 5) the relationship of GTI score and direct contribution to GDP (US$ billions), and 6) the relationship of GTI score to GDP (% growth). These thematic sections of analysis are interrelated with each other and illustrate the effect of terrorism and political conflict on tourism competitiveness in Turkey. Moreover, the results suggest implications for future research development in this topic. The graphs and tables presented aim to provide information about the changes in tourism growth trends in Turkey, and to show where these changes were significant during the selected period.

Figure 1 shows the change in international tourist arrivals Turkey from 2002 to 2015. Overall, Turkey showed an increasing trend in the number of international tourist arrivals with slight fluctuations, however with changing annual growth rates. The lowest number of arrivals was in 2002 at around 11 million tourists, while the highest number of was arrivals in 2014 at 39 million tourists. The peak of international tourist arrivals was followed by a slight decrease in 2015. Nevertheless, Turkey maintains its position in the list of the world's top tourism destinations as measured by international tourist arrivals.

The overall illustration of tourism receipts for Turkey is depicted in Figure 2. Similar to tourism arrivals, tourism receipts also remained on an increasing trend over

Figure 1 The number of international tourist arrivals in Turkey
(number of overnight visitors)
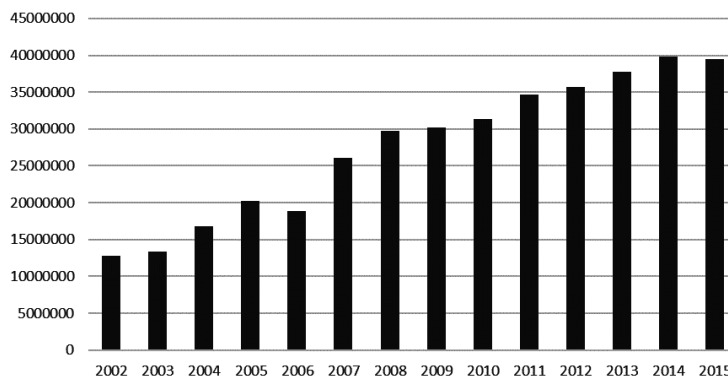
Source: UNWTO (2017)

the period overall, starting at around 11 billion US$ and reaching approximately 34 billion US$ in 2014. In the last four years investigated, from 2011 to 2015, international tourism receipts for Turkey remained stable at around 30 billion US$.

Figure 2 International tourism receipts of Turkey (US$ in thousands)
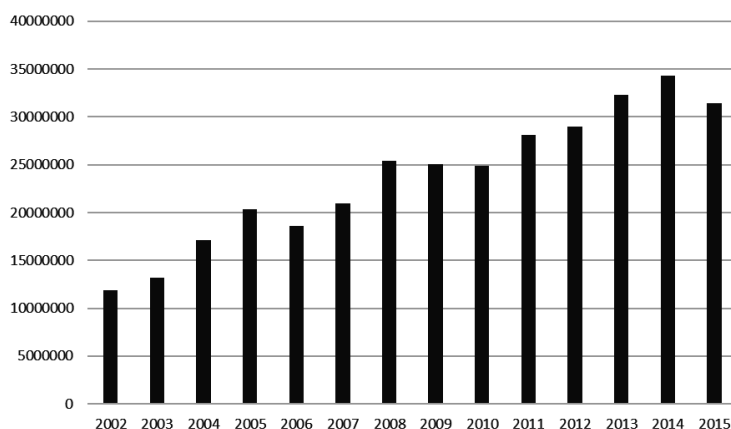
Source: UNWTO (2017)

The GTI scores of Turkey provided by the Institute for Economics and Peace (Table 1) show that terrorism was a real threat in the country over the entire period. The GTI score for Turkey had long hovered around 5. In 2002, it reached its lowest score for terrorism at 4.62. However, the score for terrorism kept rising, reaching its highest value in 2015 due to several incidents in the country, at 6.74 GTI score. The overall trend of GTI scores indicates that Turkey is a relevant case in point to study the effects of terrorism and political conflict on the tourism industry.

Table 1 Global Terrorism Index of Turkey, 2002-2015

| Years	2002	2003	2004	2005	2006	2007	2008
GTI	4.62	5.7	5.46	5.49	5.63	5.38	5.55
Years	2009	2010	2011	2012	2013	2014	2015
GTI	5.23	4.98	5.22	6.05	5.88	5.74	6.74

Source: IEP

We calculated annual percentage growth rates for GTI, and accordingly, the amount of increase (or decrease) from one year to another in percentage terms as illustrated in Figure 3. Significant growth rates in terrorism index are observed in 2003, 2012, 2015, with 23.4%, 15.9% and 17.4% growth respectively.

Figure 4 compares GTI growth rate with GDP growth rate of Turkey from 2002 to 2015. It can be observed that when there is a sharp increase in the GTI score, GDP growth rates show decline. However, in some cases, the indicated trend is not observed, for instance in 2009. We can observe that GTI score and GDP score both dropped simultaneously in 2009. However, the decline in GDP in 2009 can be related to the consequences of the global financial crisis in 2008. If we exclude the exception of the consequences of the global financial crisis, it can be claimed that GDP growth is positively affected by a decline in terrorism index, while it is negatively affected by an increase in terrorism index. Tourism has a positive impact on economic growth and development, as it generates employment and income, leads to a positive tourism balance of payments, stimulates tourism's supply sectors and leads to a generally increased level of economic activity in the country (Ivanov–Webster 2007). It is also accepted that tourism can have an impact on economic activity (Dwyer et al. 2004). Indeed, tourism has an impact on the most frequently used quantitative measure of economic development, gross domestic product (GDP) (Ivanov–Webster 2007). However, the relationship between tourism and GDP growth deserves broader analysis. In fact, changes in tourism's share in GDP can also be interpreted as the result of changes in other industries (Ivanov–Webster 2007). However, in general, our study confirms that tourism provides stimulation to economic growth.
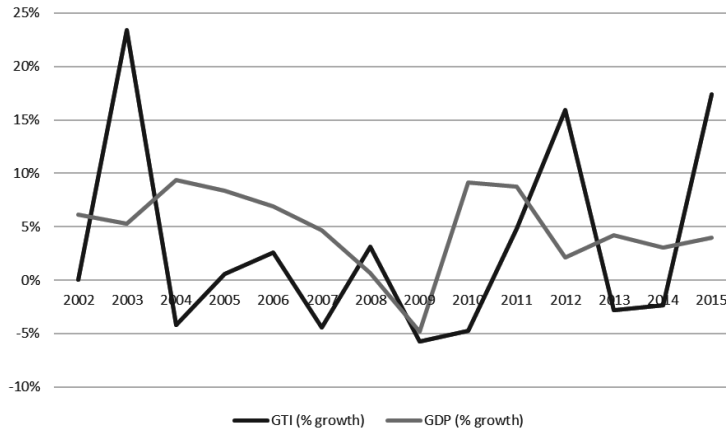
The comparison of global terrorism index (growth %) and the number of arrivals (% growth) in Turkey (Figure 5) reveals that there is a relationship between the two indicators. During the period of low GTI score, the number of international tourism arrivals shows high growth rates. Similar to GDP growth rates, the number of international tourism arrivals shows different trends during the global financial crisis

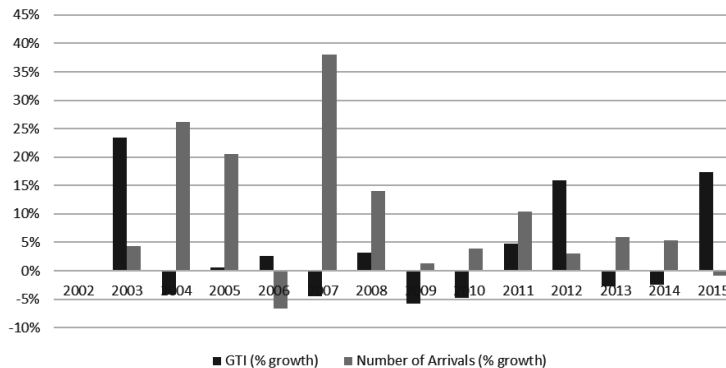*Figure 3* Global Terrorism Index (growth %) of Turkey
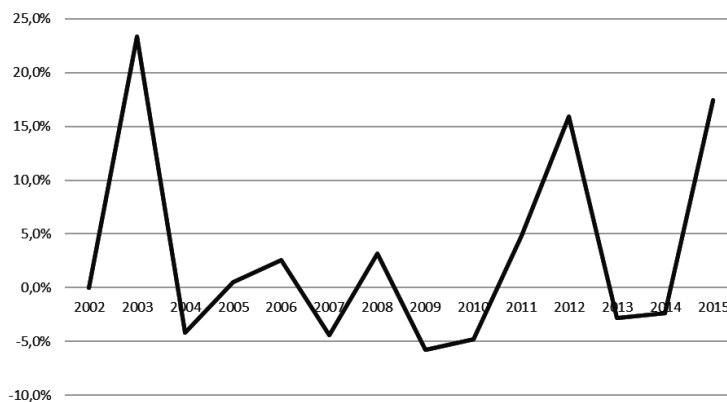
Source: IEP (2016)

Figure 4 The comparison of Global Terrorism Index growth rate and GDP growth rate in Turkey, 2002-2015

Source: own construction based on IEP (2016) and World Bank (2017) data

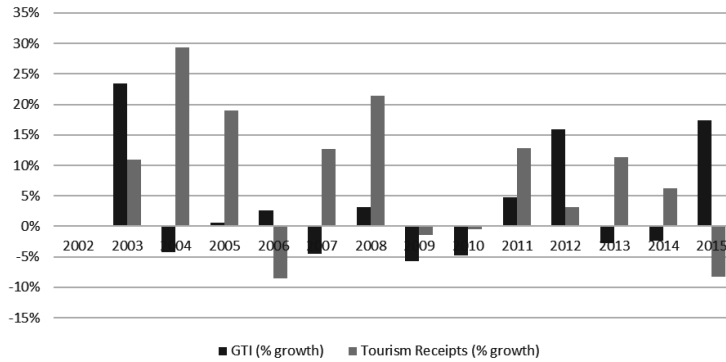*Figure 5* The comparison of Global Terrorism Index growth rate and growth of arrivals in Turkey

Source: own construction based on IEP (2016) and UNWTO (2017) data

period. Still, we may emphasise that there is a positive relationship between the number of international tourist arrivals with low or negative GTI growth rate.

Figure 6 illustrates the same trend for the comparison of global terrorism index (growth %) and tourism receipts (% growth) in Turkey as the growth trend analysis of the number of arrivals. A drop in GTI score leads to a higher growth rate in tourism receipts. In contrast, increase in the GTI score leads to a decline in growth rates of

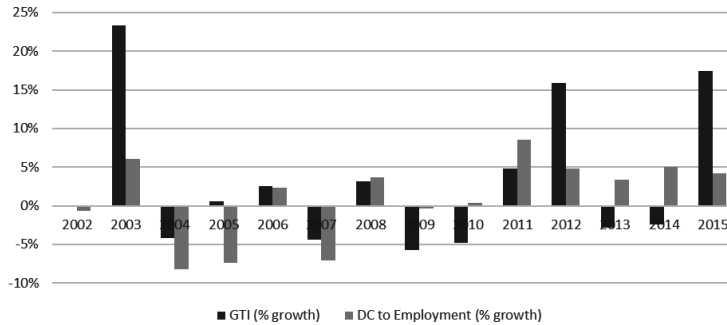*Figure 6* The comparison of Global Terrorism Index (growth %) and Tourism Receipts (% growth) in Turkey

tourism receipts in Turkey. Again, the trend is not borne out in 2009 and 2010, due to the consequences of the 2008 global financial crisis. The results of the analysis shown in Figure 5 and Figure 6 forms a solid basis for in-depth analysis of the effect of terrorism on Turkish tourism, as it shows a relationship between GTI scores and tourism indicators. However, the observed changes are limited to immediate effects, and still further analysis is required to compare the delayed effects. As suggested by Neumayer (2004), sometimes it is difficult to appreciate the effects of a particular crisis on tourism, as it takes 3 to 9 months to see a drastic decrease in tourist arrivals, because many tourists may not have the chance to change their existing travel arrangements.

The comparison of global terrorism index (growth %) and direct contribution to employment (% growth) in Turkey (Figure 7) does not reveal any significant trend. Terrorism may have no direct impact on employment in Turkey, or the effect is not immediate. However, the comparison of global terrorism index (growth %) and direct contribution to GDP (% growth) in Turkey shows signs of correlation (Figure 8). The highest growth rates of direct contribution to GDP are observed during periods of lower or negative GTI growth rates. During a period of higher GTI growth rates, the direct contribution to GDP growth rates tends to decline.

Figure 7 The comparison of Global Terrorism Index growth rate and the growth rate of Direct Contribution to Employment in Turkey

Source: own construction based on IEP (2016) and WTCC (2017) data

Figure 8 The comparison of Global Terrorism Index (growth %) and Direct Contribution to GDP (% growth) in Turkey
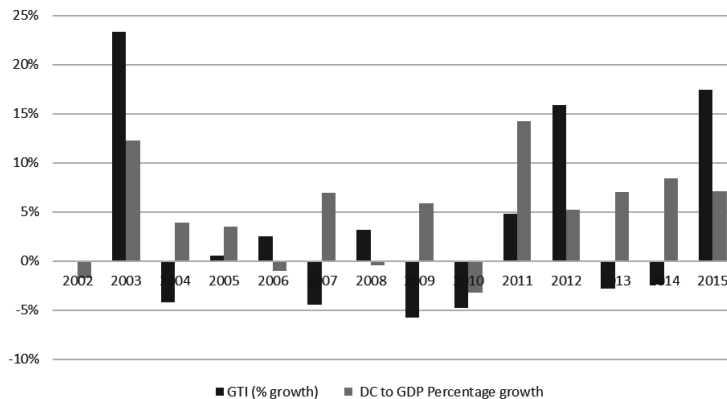
Source: own construction based on IEP (2016) and WTCC (2017) data

5. Conclusion

This study applies graph analysis of major tourism indicators, and compares their growth rates with global terrorism index to shed light on the effects of terrorism and political conflict on the tourism industry in Turkey. The findings confirm the existing effect of terrorism in tourism flows, tourism receipts, direct contribution to GDP, and as well as on the GDP of Turkey in particular. It is observed that a rising trend in global terrorism index leads to a decline in the main tourism indicators, while, the

decline in global terrorism index of the country leads to improvements of main tourism indicators. However, we were able to observe a significant, direct contribution of tourism to employment in Turkey when compared with the GTI growth rate. In addition, it should be emphasised that international tourism arrivals and international tourism receipts in Turkey showed increasing trends from 2002 to 2015 with some fluctuations. However, the growth rates over the period were significantly different. Overall, the persistently high GTI score of Turkey for many years and observed relationship between GTI scores and main tourism indicators make Turkey an important subject for studying the effect of conflict and terrorism on tourism.

The findings from the graph analysis in this study have highlighted the significance of researching the effects of political conflict and terrorism on tourism. It is observed that terrorism and conflict in the country challenge the competitiveness of Turkey's tourism industry among its competitors. It is obvious that tourism plays a significant role in the economy of Turkey, and it has a substantial economic contribution to the country. Consequently, it is important for the country's destination managers to understand the real consequences of conflict and terrorism on the tourism industry. Furthermore, it will be vital to determine the factors and other indirect effects of conflict and terrorism on the country to create effective tools to eliminate or minimize negative consequences.

6. Further research and limitations

There are several important suggestions for future implications and further research in this topic. The effects of terrorism on tourism should be seriously considered in tourism planning. Moreover, while the study focused on the main tourism indicators of a country, the effects on different sub-sectors of the tourism industry and each region may respond differently, and should be studied separately. The index used to define the level of conflict and terrorism in Turkey was global terrorism index, as presented by the Institute for Economics and Peace. More measurements of terrorism and conflict should be added to the research to better appreciate the problem and provide more insight to destination managers. Consequently, new trends require the addition of new attributes to the measurement methods used, and the development of new concepts in approaching tourism in conflict-ridden regions.

Some other limitations of the study should be noted. The data for GTI scores of Turkey was available only from 2002. However, more information regarding the level of conflict and terrorism in the country would be required to validate the patterns observed, and to conduct more detailed and in-depth analysis of the effects of political conflict and terrorism on tourism. Meanwhile, the literature in the field of tourism and hospitality is still limited. Therefore, more studies are needed in this area to provide further insights into how terrorism effects tourist figures. Our research was limited only to the analysis of the immediate effects of recent negative events in Turkey.

Future research should go on to investigate the delayed effects of terrorism on tourism growth with a combination of qualitative research methodologies.

Our research focused only on local conflict in Turkey and their effect on tourism growth of this destination. However, the effects of negative events and conflicts in other regions were not included in the research. As Turkey is among the top tourism destinations in the world, tourism growth in the country is affected by global events such as 9/11 in 2001, the global financial crisis, the Arab Spring, and the ongoing crisis in the Middle-East. Adding the effects of global crises in future studies will contribute greatly to the understanding of the relationship between tourism and economic growth.

References

Alvarez, M. D. – Campo, S. (2014): The influence of political conflicts on country image and intention to visit: A study of Israel's image. *Tourism Management*, 40, 2, 70–78.

Alvarez, M. D. – Korzay, M. (2008): Influence of politics and media in the perceptions of Turkey as a tourism destination. *Tourism Review*, 63, 2, 38–46.

Bauer, R. (1960): Consumer behavior as risk-taking. *Dynamic marketing for a changing world*, 43, 1, 389–398.

Claveria, O. – Poluzzi, A. (2016): Tourism trends in the world′s main destinations before and after the 2008 financial crisis using UNWTO official data. *Data in Brief*, 2016, 7, 1063–1069.

Clements, M. – Georgiou, A. (1998): The impact of political instability on a fragile tourism product. *Tourism Management*, 19, 3, 283–288.

Cui, F. – Liu, Y. – Chang, Y. – Duan, J. – Li, J. (2016): An overview of tourism risk perception. *Natural Hazards*, 82, 1, 643–658.

Dwyer, L. – Forsyth, P. – Spurr, R. (2004): Evaluating tourism's economic effects: new and old approaches. *Tourism Management*, 25, 3, 307–317.

Drakos, K. – Kutan, A. M. (2003): Regional effects of terrorism on tourism in three Mediterranean countries. *Journal of Conflict Resolution*, 47, 5, 621–641.

Faulkner, B. (2001): Towards a framework for tourism disaster management. *Tourism Management*, 22, 2, 135–147.

Gartner, W. C. – Shen, J. (1992): The impact of Tiananmen Square on China's tourism image. Journal of Travel Research, 30, 4, 47–52.

Hall, C. M. (2010): Crisis events in tourism: Subjects of crisis in tourism. *Current Issues in Tourism*, 13, 5, 401–417.

IEP (2016): Global Terrorism Index 2016. Institute for Economics and Peace. http://economicsandpeace.org/wp-content/uploads/2016/11/Global-Terrorism-Index-2016.2.pdf Accessed: March 20, 2017.

Ivanov, S. – Webster, C. (2007): Measuring the impact of tourism on economic growth. *Tourism Economics*,13, 3, 379–388.

Lepp, A. – Gibson, H. (2003): Tourist roles, perceived risk and international tourism. *Annals of Tourism Research*, 30, 3, 606–624.

Ministry of Culture and Tourism of the Republic of Turkey (2017): Tourism statistics. https://www.kultur.gov.tr/EN,153030/tourism-receipt-expenditure-and-average-expenditure.html. Accessed: March 20, 2017.

Neumayer, E. (2004): The impact of political violence on tourism: Dynamic cross-national estimation. *Journal of Conflict Resolution*, 48, 2, 259–281.

Parsons, W. (1996): Crisis management. *Career Development International*, 1, 5, 26–28.

Richter, L. K. (1999): After political turmoil: The lessons of rebuilding tourism in three Asian countries. *Journal of Travel Research*, 38, 1, 41–45.

Ritchie, B. W. (2004): Chaos, crises and disasters: A strategic approach to crisis management in the tourism industry. *Tourism Management*, 25, 6, 669–683.

Rittichainuwat, B. N. – Chakraborty, G. (2009): Perceived travel risks regarding terrorism and disease: The case of Thailand. *Tourism Management*, 30, 3, 410–418.

Sönmez, S. F. (1998): Tourism, terrorism, and political instability. *Annals of Tourism Research*, 25, 2, 416–456.

Sönmez, S. F. – Apostolopoulos, Y. – Tarlow, P. (1999): Tourism in crisis: Managing the effects of terrorism. *Journal of Travel Research*, 38, 1, 13–18.

Thapa, B. (2004): Tourism in Nepal. *Journal of Travel & Tourism Marketing*, 15, 2–3, 117–138.

Um, S. and Crompton, J. L. (1990): Attitude determinants in tourism destination choice. *Annals of Tourism Research*, 17, 3, 432–448.

UNWTO (2016): *UNWTO Annual Report 2015*. Madrid: UNWTO.

UNWTO (2017): *World tourism indicators*. http://www2.unwto.org/content/data Accessed: March 20, 2017.

World Bank (2017): World development indicators. http://data.worldbank.org/ Accessed March 20, 2017.

WTCC (2017): World tourism indicators. https://tool.wttc.org/, Accessed: March 20, 2017.

The PLS-SEM path analysis of foreign students' motivation and expectations at a Hungarian university

Anita Kéri

The current research paper focuses on the PLS-SEM path analysis of foreign student motivation and expectations at a Hungarian university, the University of Szeged. Conducted in this setting, the results of the study introduce a new perspective by looking at international students from a Hungarian viewpoint. Based on initial pilot studies, the aim of this study is to test the hypothetical model of motivation and expectations of foreign students in Hungary, which includes hypotheses that motivations and expectations are closely related. PLS-SEM analysis is used to determine these connections and to test the hypotheses. Quantitative data is obtained in the form of an online questionnaire and is processed with IMB SPSS and SmartPLS 3 software.
It was found that five motivation types influence expectations, which are reference groups, self-realization, getting to know the culture, integration into the Hungarian community and gaining knowledge. These motivation factors influence five expectation factors, which include social, personal, cultural, labour market and educational expectations. Based on these findings, a final model for motivation and expectations among foreign students is drawn.

Keywords: motivation, expectations, foreign studies, internationalization, higher education

1. Introduction

One of the most important concepts today regarding higher education is internationalization. It can be observed in many countries throughout the world. However, the development of national higher education institutions (HEIs) and their foreign student education vary from country to country. In terms of education and research, Europe once had a competitive advantage over North America, but this was lost, and there has been a new tendency towards Asian countries (Japan, China, the Republic of Korea, and Hong Kong) making great strides in terms of research and student numbers. European universities have been trying to keep up and take part in this process of internationalization.

Our target country, Hungary, has been part of the European Union since 2004. Consequently, Hungarian universities have had the chance to participate in the international competition for foreign students, with several scholarships available for students to go to Hungary. In the following paper, one institution, the University of Szeged will be studied. The University of Szeged bears the status of a Research University, one of the most prestigious titles in Hungary. It has always been the objective of this university to strengthen its foreign student basis, and nowadays it is

even a bigger aim. More and more international programmes are available at the twelve university faculties. However, to investigate how the university can be even more successful in attracting foreign students, the motivation, expectations and future plans of these students must be examined. In order to identify and understand these factors, the first part of the study discusses the theoretical background of motivation and expectations, gives insight into the Hungarian educational system and its scholarships, and summarizes the main findings of the field, after which the pilot and the current studies are presented with various methodology.

2.   Theoretical framework

In the following section, the theoretical notions relevant to the current research are discussed. These include motivation, expectations, relevant secondary research articles and an introduction to the Hungarian higher education system.

2.1. Motivation

When investigating studying abroad, motivation is the key element in determining why students wish to pursue international education. Motivation is defined as "those psychological processes that cause the arousal, direction, and persistence of voluntary actions that are goal directed" (Elliot–Fryer 2008). Motivation is divided into two main categories, intrinsic and extrinsic. Intrinsic motivation means the expression of the person, while extrinsic motivation is based on reaching an outer goal (Deci–Ryan 1985). These two categories of motivation were researched by Areepattamannil and colleagues in the case of Indian emigrant foreign students. They found that students who went abroad had higher level of intrinsic motivation and better grades than those, who stayed at home. Students, who stayed in their country had stronger extrinsic motivation (Areepattamannil et al. 2011).

The most widespread model of motivation is Maslow's hierarchy of needs, which states that there are certain needs that have to be satisfied before another need can be satisfied as well. The basic needs are physiological needs, after which come security needs, belonging, esteem and self-actualization needs (Maslow 1987). One of the most relevant motivational theories to education and learning is Maehr's theory of continuing motivation, which is a behavioural norm in which the subject goes back to his task without having any pressure from outside (Kaplan et al. 2009). This type of motivation can account for much student behaviour.

To test the motivation of students learning abroad, Nyaupane et al. (2011) observed American students engaged in their studies. They conducted a questionnaire among 136 students before they departed for an international programme lasting five weeks. The findings showed that ninety-three percent of these students had already been abroad to study and when determining how they chose a target destination, the results also showed that motivation was a key factor, together with past travel

experience and social ties. Their concept is shown as a model in Figure 1, which includes those factors that helped students decide which destination they were going to choose for their study-abroad experience.

Cubillo et al. (2006) also created a theoretical model of motivational factors behind student willingness to go abroad. They determined several factors that account for student decisions when going abroad. They came to the conclusion that the decision of students depended on five factors: personal reasons, effects of the country image, city image, institution image and the evaluation of the programme of the study. These factors were used to weigh the options of the potential international student and used to make decisions based on these regarding choice of institution and target country.

In the study by Griner and Sobol (2014), Chinese student motivation to study abroad was researched. The findings show that students would be more likely to participate in foreign programmes, if they were not so complex. Other than complexity, parents played the most important role in student motivation, because those students whose parents had already studied abroad, would be more willing to study abroad themselves, while those students with good English language skills would rather go abroad than those students lacking the same. In another country, the willingness of Kuwaiti students to study abroad was studied by Hackney et al. (2013) in the form of a questionnaire. Willingness was measured on a 6-point Likert scale. Results show that students were more likely to study abroad for a longer period of time, and their most likely destinations were Europe and North-America. It is also a common finding that students would rather be accompanied by peers and friends, if they chose to study abroad.

2.2. Expectations

Motivation is a key factor for foreign students when going abroad to study, but expectations and their being met or not are equally important. Once motivated to take such a step, students have certain expectations towards an institution and country. The following research is presented in order to understand the concept of expectations in terms of studying abroad. Student expectations of studying abroad have been a

Figure 1 Conceptual model of mediating role of destination choice on pre-trip attitude formation
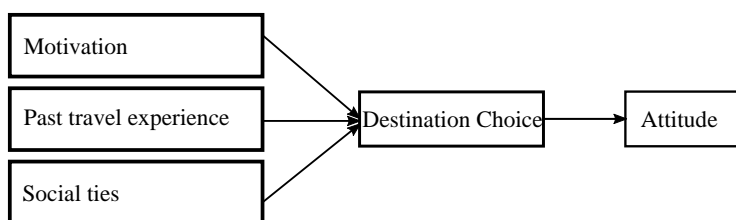
Source: Nyaupane et al. (2011, pp. 205–217)

narrowly studied topic. In her dissertation, Anderson (2007) refers to it in similar terms. Firstly, the main findings of the field are summarized, then Anderson's model of expectations is introduced.

Dwyer (2004) researched the impact of programme duration on the experience of studying abroad. In general, the outcome of the research supported the widespread idea that the longer a student stays abroad, the better. It was also found that summer students, who only spent the summer studying abroad, were more likely to gain sustainable benefit than those students who spend a semester abroad. This might be due to summer programmes being especially well-designed. Other than the summer and semester programmes, evidently, the students who gain the most from international studies are those who stay in a foreign country for at least one year.

US college students and their participation in study abroad programmes through their college career were examined by Goldstein and Randi (2006). 179 undergraduate students were monitored during their 4-year college career. Different questionnaires were given to them during these four years. First, they had to complete one regarding their expectations of studying abroad. In their senior year, data about their participation in any foreign study programme was gathered. Findings showed that participating in international studies helped students to modify their expectations, to decrease ethnocentrism and prejudice, and to value the study of foreign languages.

Martin et al. (1995) created a longitudinal study in which they compared student expectations before departure to a foreign country and their reports after coming back from abroad. 248 students participated in the two questionnaires, out of which the first was concerned with the students' expectations about studying abroad, while the second one, after their return home, measured if their initial expectations had been met or not. They found that the expectations of students had been met or positively influenced, and that this was related to the place where they studied and the gender of the student. A positive relationship was determined between the overall evaluation of the studies and disappointment of expectations.

The above works of research are very important from the viewpoint of the current research, however, neither of them creates a model for the expectations of potential foreign students. In her extensive secondary data analysis, one author, Anderson (2007) presented her own model of foreign student expectations in her dissertation, as can be seen in Figure 2.

In this model, the main factors determining expectation are location and travel, educational attainment, social environment, institutional climate and characteristics, personal growth, financial variables, aspirations, cultural exposure and language development. These final results were based on interviews conducted by Anderson herself. She states that the factors that influence students to participate in study abroad are linked directly to their expectations of the study abroad experience. This model bears key importance for the current study, as it presents a basis for creating an own model of motivation and expectation in the current research.

Figure 2 Anderson's Study Abroad Expectation Model
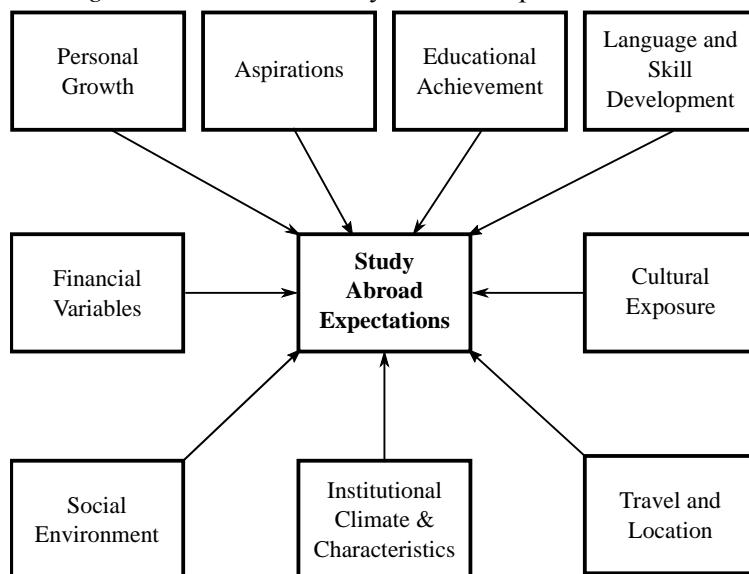
Based on the model of Anderson (2007) and on pilot research work, five main expectation categories were determined, comprising social, personal, intercultural, labour market and educational expectations. In the following paragraphs, these categories are examined in more detail.

2.2.1. Social development

The first expectation level is social development. These expectations include a wider range of friends, making international friends, having a wide-circle of acquaintances and getting to know local people better. This might result in their much more active social life, including being present on school events, parties or gatherings.

In their study, Ding and Li (2012) researched social network formation among Chinese students studying abroad in the US, and found that the international openness of the university played an important role in the acceptance of Chinese students. They also suggested that social networks can be very useful and that social connections also play a huge role in the decision of students to study abroad.

Another study conducted by Dewey et al. (2013) investigated social network formation when studying abroad. They conducted their research on 71 students in the Middle East and found that the most common way of making contact with other people was to engage in arbitrary conversations with strangers on the street. Time spent with native speakers and the personality of the student were the two main factors in getting to know local people and expanding their social network abroad.

This shows that the culture and the country where you come from and where you intend to stay, determine the way you are going to communicate and build a social network in the destination country for your studies abroad.

2.2.2. Personal(ity) development

When deciding to study abroad, there might be certain expectations of students towards themselves related to their own personal development. This personal development might include knowing themselves better.

This aspect of overall expectations was studied by Firmin et al. (2013). They defined personal development as the broadening views of students. They conducted qualitative research on maturity and personal development among 23 American students who spent time abroad at Oxford University. This study proved that personal development was broadened thanks to the widened horizons of the students, and also by the long-lasting experience and impressions they gained while abroad. Therefore, personal or personality development is a very interesting aspect in conducting research on foreign students. It includes their own personality development and how their views on the world differ after a certain time spent studying abroad.

2.2.3. Intercultural experience

Students coming to Hungary might also have expectations towards the culture and the cultural experiences they are going to have. Coming from different cultures can also involve different expectations of culture.

In their study, Czerwionka et al. (2015) studied the intercultural knowledge and language development of international students participating in short-term study programmes. They conducted interviews with students at the beginning and at the end of the programme, which constituted the basis for qualitative research, which was later backed by quantitative research as well. They found that intercultural knowledge significantly grew over the study programme, including in such areas as of daily life, food and drink, culture, history, values and politics.

In the current study, intercultural experience is also included as one of the student expectations, in particular their expectations of travelling, getting to know numerous cultures and more specifically, the Hungarian culture, and participating in the cultural life of Szeged.

2.2.4. Labour-market/Career prospects

When students start higher education in a foreign country, they might also have an expectation towards their career in the future. This might include staying in the target country, going back to the home country, or even going to a third country to work. These prospects are also important in analysing the overall expectations of foreign students, in light of the fact that the students studied in the current research are planning to complete their degree in Hungary.

Bryla (2015) looked at the employment and professional careers of former Erasmus students. The study involved 2450 former students five and six years after their study abroad experience. The study found that only 1.6% of these people had never worked, and that the majority of the participants were engaged in white-collar or managerial jobs. According to the respondents, higher education and proficiency were highly important for their career development. One-third of the respondents also stated that their international student mobility had an influence on their professional development and current position.

2.2.5. Educational advancement

When deciding about studying abroad, one of the highest expectations the student can have is that of educational advancement. This might be one of the main reasons why the student decides to go abroad and live in another country for a certain period. In the case of the participating students, they initially accept they will have to spend the whole duration of their studies in Hungary, which would mean at least six semesters. Therefore, in the current study, educational expectations are also researched.

In her study, Cheng (2014) examined the perceived values and preferences of study abroad programmes. She examined short-term study abroad programmes and found that participating students thought that the most beneficial effect of studying abroad was their personal development. In second place was the expectation of academic and professional advancement.

The above listed research and expectation factors provide insight into the expectations foreign students have of their target country and institution. It is therefore essential to consider these in the present study in order to determine the relationship between motivation and expectations.

2.3. Higher Education in Hungary

Hungarian higher education bears similar characteristics to other foreign countries' systems of higher education. Its universities are thoroughly modern, and can be called third-generation universities, which means the universities have a further aim in distributing knowledge to other members of society as well. Nowadays universities are the centre of knowledge regions, together with which they create the knowledge economy (Wissema 2009).

In Hungary, though, there are big regional differences between higher education institutions. According to data from the Hungarian Education Authority (2017), there are altogether 21 state-financed governmental HEIs, 7 non-governmental HEIs, 3 governmental colleges and 28 non-governmental colleges in Hungary at the moment. According to their data, in the 2014/2015 academic year, 217 thousand students were studying in HEIs as full-time students. This is 6.4 thousand people less than in the previous school-year, which reflects a decrease in the number of students finishing high-school education, due to demographic reasons. Getting into higher education is

therefore becoming easier. However, there has been an initiative to prevent the phenomenon of mass degrees, so there have been changes, such as the introduction of higher admission points to universities and tuition fees in certain fields of studies. These factors have led to the situation today, where HEIs are competing not only for domestic, but for foreign students as well (Gabaldón et al. 2004)

Examining the University of Szeged in more detail, it soon becomes evident that it is a prestigious university, with twelve Faculties hosting more than 2500 students from 98 counties. Szeged is the 8th university town in Europe, with the University of Szeged having more than 500 partner universities worldwide, including more than 432 Erasmus partner universities. It currently holds 19th place out of the 360 universities in the UI Green Metric Ranking. With 9 strategic industrial partners, the University of Szeged is a highly competitive university in Hungary and worldwide.[1]

Moreover, the University provides full-time study programmes in numerous foreign languages, and it also has exchange programmes and non-degree programmes. The oldest tradition of foreign study programmes is in the field of medicine, taught in English, which turned 31 years old in 2016. Since its launch, other faculties have also initiated foreign-student-targeted study programmes.[2]

Students, whose target country is Hungary and whose target institution is the University of Szeged, buy a certain service, when they enter this university. Therefore, attracting students is very important for the university. As Filip (2012) reasons in his study, it is very important to use the elements of a relevant marketing mix in creating various impressions in students, even though we are talking about a public institution. Education can be viewed as a type of service that has the features of heterogeneity, intangibility, perishability and inseparability (Mudie–Pirrie 2006).

With this short insight into the higher education system of Hungary and the University of Szeged, it is easier to see why is it so important for the institution to compete locally and worldwide for its students. However, to get to know why students choose Hungary and the University of Szeged, it is essential to study foreign students' motivation and expectations.

---

[1] http://www.u-szeged.hu/english/facts
[2] http://www.u-szeged.hu/english/education/where-knowledge-meets

3. Methodology

In this chapter, the data obtained during primary research is analysed with PLS-SEM path analysis. Firstly, the pilot studies that led to the current analysis are presented. Then the hypotheses are listed. The hypotheses are tested and the model of Motivation and Expectation of Foreign Students is introduced.
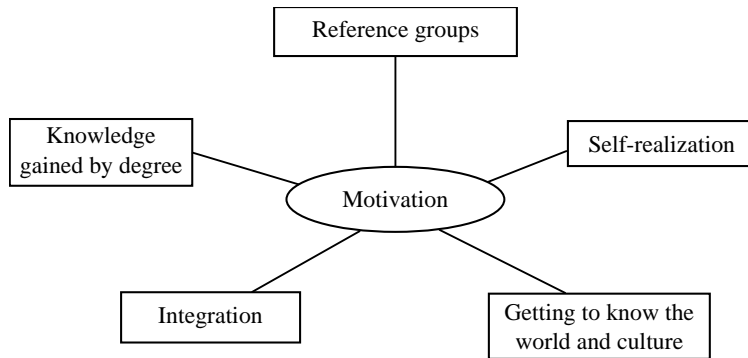
3.1. Pilot studies

As we could see from the previously discussed research, the reasons behind student choice of school can vary and can be very extensive, which is why investigating what factors affect their purchasing decision process and what motivates them the most is extremely interesting. In order to study and determine foreign student motivation, expectations and future plans, pilot studies were conducted at the University of Szeged between 2014–2016. Only the main results of these pilot studies are reported here, as they are essential for understanding the model of motivation and expectations in the current research.

Initially, three qualitative focus group discussions were organised with foreign students to get to know their motivations better. It was found that reference groups, the country's attractiveness, gaining knowledge, and the value of the Hungarian higher education influenced the students' motivation in choosing the target destination and country. The results of the focus group discussions constituted the basis of subsequent quantitative research. It was conducted in the form of an online questionnaire and the aim was to determine the main motivational factors that had influenced the respondents. Altogether 128 valid answers were evaluated, which was a substantial number compared to the overall foreign student population at the university (approximately 1,200). From the data obtained, factor analysis was conducted, and five main motivational factors were determined in students choosing Hungary: reference groups, self-realization, getting to know the culture, integrating into the community and gaining knowledge by means of a Hungarian degree. The results can be seen in Figure 3.

Now that the main motivational factors had been determined, the next area which had to be studied was expectations. In order to get a first insight into the expectations of foreign students, 17 in-depth interviews were conducted with foreign students from various faculties. The results of the in-depth interviews gave a better insight into the expectations of foreign students at the University of Szeged. Based on these results, the secondary data, and Anderson (2007)'s Study Abroad Expectation Model, five expectations types could be distinguished: social, personal, cultural, labour market and educational expectations.

Figure 3 Motivational factors

3.2. *Hypotheses*

Based on the findings of the pilot studies, several hypotheses were formulated regarding foreign student motivation and expectations. These hypotheses can be seen in Figure 4.

H1: Reference group motivation has an effect on:

H1a: social expectations

H1b: educational expectations

H2: Self-realization motivation has an effect on personal expectations.

H3: Cultural motivation has an effect on cultural expectations.

H4: Motivation for integration has an effect on:

H4a: personal expectations

H4b: cultural expectations

H4c: labour market expectations

H4d: educational expectations

H5: Motivation for gaining knowledge has an effect on educational expectations.

Further analysis needs to be conducted to test the model of motivations and expectations.

3.3. *Background of the study*

As the motivation and expectations of foreign students can vary hugely, a model is needed to understand these motivations and expectations better. It is also necessary to see whether motivations and expectations are related to each other, or not. The current research concentrates on only one higher education institution, the University of Szeged. Cubillo (2006)'s model of motivation and Anderson (2007)'s model of expectations constituted the basis of the current study. The relationships between

Figure 4 Motivation and Expectations of Foreign Students

Source: Own construction
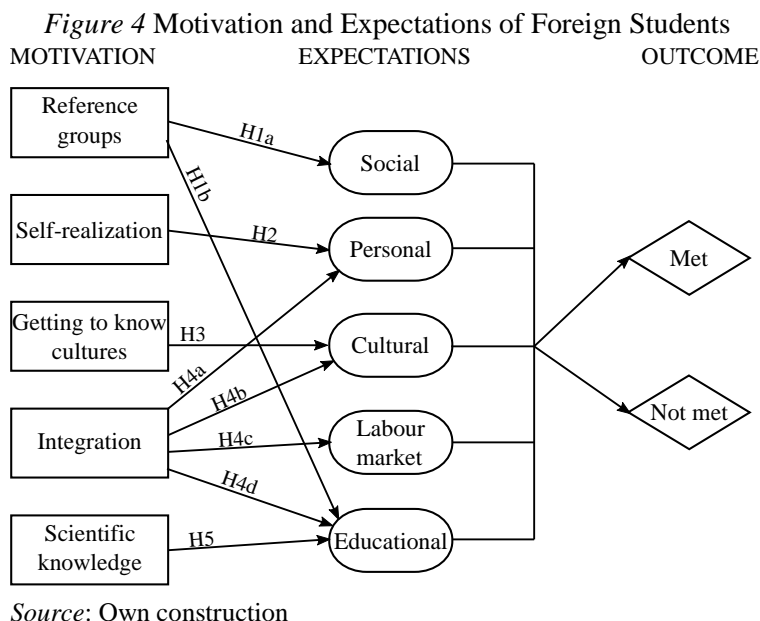
motivations and expectations were determined based on this previous research and on pilot studies.

The study was conducted in the form of an online questionnaire. The main aim of the questionnaire was to get as many respondents as possible, as it is very hard to physically meet the target group, the foreign students of the University of Szeged. Therefore, it was shared mainly on social media sites and among relevant social media communities. The subjects of the questionnaire were foreign students studying at the University at that time. The questionnaire was available to them during September 2016. Altogether 121 valid responses were collected. For the analysis of the data, IBM SPSS and SmartPLS 3 software were used.

From Table 1 it can be seen that 56.2% of the respondents were male and 43.8% of them female. Regarding their age, they are mainly students between the ages of 18 and 25. This age group accounted for 70.3% of the respondents. People above 26 only constituted 29.7% of the respondents. The language of instruction among the respondents was mainly English, at 87.6%.

It can be seen in Table 2 that the students filling out the questionnaire came from various countries. The country represented with the highest number of respondents in the research was India (21), after which came China (11), Turkey (7), Vietnam (7), Algeria (6), Tunisia (6), and Germany (5). The "other" group comprises nations that were represented less than five times in the survey. These nations include: Austria, Azerbaijan, Brazil, Colombia, Ecuador, France, Greece, Hungary, Iran, Iraq, Israel, Italy, Jordan, Korea (South), Laos, Lebanon, Mongolia, Morocco, Namibia, Nigeria,

Table 1 Respondent characteristics

Variable		Frequency (person)	Percent (%)
Gender	Female	53	43.8
	Male	68	56.2
	Total	121	100
Age	18-25	85	70.3
	26-32	27	22.3
	33-41	9	7.4
	Total	121	100
Language of instruction	English	106	87.6
	German	3	2.5
	Hungarian	8	6.6
	Other	4	3.3
	Total	121	100

Source: Own construction

Table 2 Respondent Country of Origin

Country of Origin		
Country	Frequency	Percent
India	24	19.8
China	11	9.1
Turkey	7	5.8
Vietnam	7	5.8
Algeria	6	5
Tunisia	6	5
Germany	5	4.1
Other	55	45.4
Total	121	100

Source: Own construction

Norway, Seychelles, Spain, Syria, Taiwan, the United Kingdom, West Bank and Yemen.

Foreign students can study at any faculty of the University of Szeged. The questionnaire was filled in by foreign students from each faculty. Students from the Faculty of Medicine had the highest amount of responses at 30.6%. This can be explained by the fact that the highest number of foreign students enrol in this Faculty. They were followed by the Faculty of Arts, amounting to 12.4%, the Faculty of Economics and Business Administration, with 10.7%, and the Faculty of Dentistry, with 6.6%. The overall results can be seen in Table 3.

3.4. PLS-SEM analysis

After this description of the study's background, we now turn to investigating further the PLS-SEM analysis. To study if motivations have any effect on expectations, structural equation modelling was used (SEM). This process can be applied in investigating hypothetical models (Lei–Wu 2007). It has two types, the covariance-

Table 3 Respondent Faculty

Faculty	Frequency	Percent
Faculty of Agriculture	2	1.7
Faculty of Arts	15	12.4
Faculty of Dentistry	8	6.6
Faculty of Economics and Business Administration	13	10.7
Faculty of Engineering	2	1.7
Juhász Gyula Faculty of Education	2	1.7
Faculty of Health Sciences and Social Studies	1	0.8
Faculty of Law and Political Sciences	6	5
Faculty of Medicine	37	30.6
Faculty of Pharmacy	6	5
Faculty of Science and Informatics	29	24
Total	121	100

Source: Own construction

based (CB) and the partial least squares (PLS) method (Kazár 2014). The partial least squares method can be used if the sample is relatively small and the variables do not necessarily conform to a normal distribution (Hair et al. 2012, Kazár 2014). As this was the case here, the PLS method was used to analyse the current model. The outer and the inner model will be described in the following section.

3.4.1. Constructions, the outer model

The phenomenon of motivation and expectations were studied with a 5-point Likert scale. Scales were created based on previous research from secondary literature and pilot studies. In terms of motivation, reference groups, self-realization, cultural motivation, integration and gaining knowledge were examined. While in connection with expectations, social, personal, cultural, labour market and educational expectations were investigated.

The manifest variables related to the latent variables have a reflective indicator role, so they are the causation of the latent variables. Before the PLS-SEM analysis, three criteria were tested to prove the validity of the data (Kazár 2014). To test the credibility of the phenomenon, explorative factor analysis was used. The credibility of the latent variables was measured with Cronbach α, which had to be higher than 0.6 (Hair et al. 2009). From the first appendix, it can be seen that this is true for all variables. To analyse the latent constructs' convergence validity, the standardized factor weight (> 0.5), the average variance extracted ($AVE > 0.5$), and the composition reliability ($CR > 0.7$) were studied. Comparing the results of the current study, it can also be seen in the first appendix, that the existence of all the ten constructions is validated. Based on the test of Fornel and Larcker (1981), the discriminant validity was also examined, which means that the variables' AVE value had to be higher than the squares of the correlation coefficients between the construct

and the other constructs. As can be seen in the second appendix, this criterion is also met in all cases.

3.4.2. The inner model

In this section the testing of the standardized path coefficients is described. The aim of the path analysis is to determine the direct effects of motivation on expectations. The significance of the path coefficients was analysed by bootstrapping. The results of bootstrapping can be seen in the third attachment. From the P values in the table, it can be seen that at a five percent significance level, not every variable has a significant effect on the dependable variables related to it. In particular, reference group motivation does not have an effect on the educational expectations and self-realization motivation does not have an effect on personal expectations.

The final model was drawn up based on the significant effects, according to which the exogenous variables in the model are the reference group, self-realization, cultural, integration, and gaining scientific knowledge motivation, while the endogenous variables are the social, personal, cultural, labour market and educational expectations.

From Figure 5 it can be concluded that the effect between the latent variables are positive in all cases. The reference groups' motivation has an effect on social expectations ($\beta = 0.179$) and the motivation of self-realization also has an effect on social expectations ($\beta = 0.288$). Cultural motivation affects cultural expectation of foreign students ($\beta = 0.438$). The motivation of integration into the Hungarian community has an effect on four expectation types. Its weakest effect is on cultural expectations ($\beta = 0.244$), which is followed by its effect on educational expectations ($\beta = 0.275$), personal expectations ($\beta = 0.295$), and it has the biggest effect on labour market expectations ($\beta = 0.392$). The motivation of gaining scientific knowledge in Hungary has an effect on labour market expectations ($\beta = 0.237$) and on educational expectations as well ($\beta = 0.424$).

The strongest effect in the model are the effects of cultural knowledge motivation on cultural expectations ($\beta = 0.438$) and the motivation of gaining scientific knowledge on educational expectations ($\beta = 0.424$).

Figure 5 Model of Foreign Student Motivation and Expectations

MOTIVATION   **EXPECTATIONS**
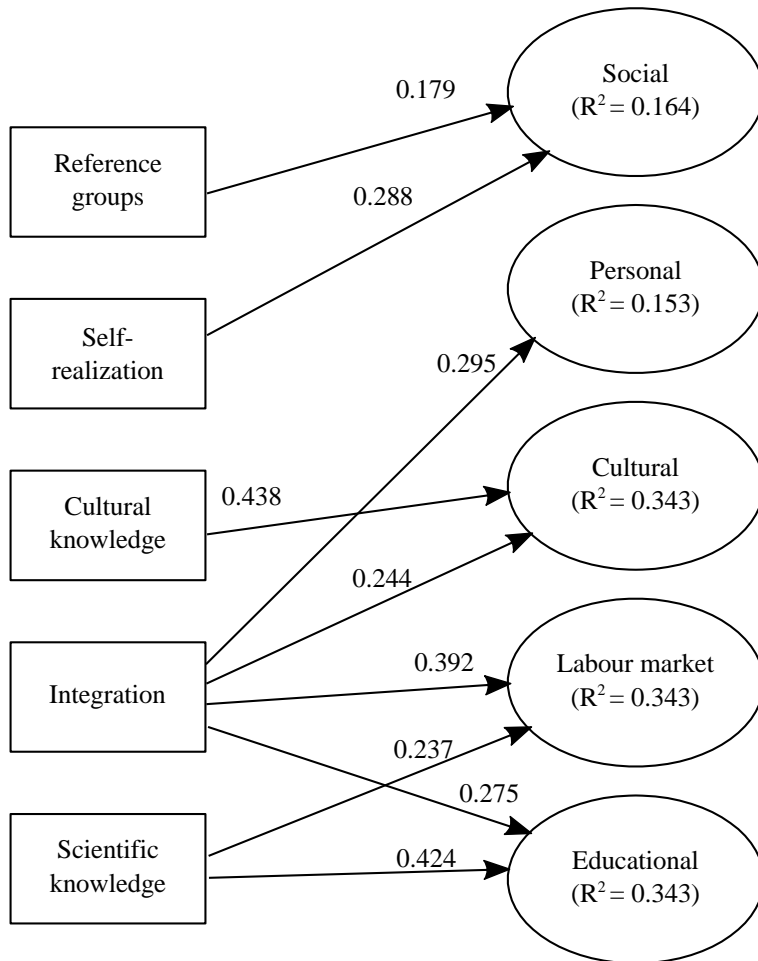
Source: Own construction

3.5. Results

In the following section the results of the study are presented and the hypotheses analysed. At the beginning of the current research, hypotheses were formulated, which can be accepted or rejected based on the outcome of the PLS-SEM analysis of the relationship between foreign student motivation and expectations. Table 4 summarizes the outcome of the study and tests each hypothesis.

Table 4 Testing the hypotheses of the current study

Hypotheses	Statement	Accepted	Rejected
H1a	Reference group motivation has an effect on social expectations.	X	
H1b	Reference group motivation has an effect on educational expectations.		X
H2	Self-realization motivation has an effect on personal expectations.		X
H3	Cultural motivation has an effect on cultural expectations.	X	
H4a	Motivation for integration has an effect on personal expectations.	X	
H4b	Motivation for integration has an effect on cultural expectations.	X	
H4c	Motivation for integration has an effect on labour market expectations.	X	
H4d	Motivation for integration has an effect on educational expectations.	X	
H5	Motivation for gaining knowledge has an effect on educational expectations.	X	

Source: Own construction

The above summary shows that only two hypotheses were rejected. Reference group motivation does not influence educational expectation, nor does the motivation for self-actualization have an effect on personal expectations. However, when testing the model, additional relations were found between the variables. These two additional effects in the model are the relationship between self-realization motivation and social expectations and the connection between scientific knowledge gaining and labour market expectations. Therefore, it can be stated that:

– Self-realization motivation has an effect on social expectations.
– Scientific knowledge gain has an effect on labour market expectations.

4. Conclusions

During the pilot studies, which included two qualitative and one quantitative analysis, the aim was to determine the main motivational factors of foreign students. Based on the results of these pilot studies, the hypothetical model of Motivation and Expectations of Foreign Students was drawn up, which was later tested in the current study with a PLS-SEM path analysis.

The results show that there are several connections between foreign student motivation and expectations. Their motivation has an effect on their expectations in many cases. However, the current research sample does not represent the whole population of foreign students at the University of Szeged. Additional research should be conducted to gain representative data from the University and possibly compare the Hungarian results with data from foreign students of a university from another

country. A comparative analysis would further determine the target-country-specific motivation and expectations of foreign students.

With the present results we are able to define the connection between the motivation and expectations of foreign students, which promises to be of key importance in creating future marketing strategies aimed at attracting and keeping foreign students at the University of Szeged. This would furthermore have budgetary advantages, as foreign students contribute significantly to the income of the University.

References

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.

Areepattamannil, S. – Freeman, J. G. – Klinger, D. A. (2011): Intrinsic motivation, extrinsic motivation, and academic achievement among Indian adolescents in Canada and India. *Social Psychological Education*, 14, 427–439.

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.

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.

Cubillo, J. M., Sánchez, J., and 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, 11, 80–99.

Deci, E. L. – Ryan, R. M. (1985): *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum.

Ding, L. – Li, H. (2012): Social networks and study abroad: The case of Chinese visiting students in the US. *China Economic Review*, 23, 3, 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, 2, 269–282.

Dwyer, M. M. (2004): More is better: The impact of study abroad program duration. Frontiers. *The Interdisciplinary Journal of Study Abroad*, 10, 3, 151–163.

Elliot, A. J. – Fryer, J. W. (2008): The goal construct in psychology. In Shah, J. Y. – Gardner, W.C. (Eds.): *Handbook of motivation science*. Guilford, New York: The Guilford Press, 235–250.

Filip, A. (2012): Marketing theory applicability in higher education. *Procedia – Social and Behavioral Sciences*, 46, 912–916.

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. – Larcker, D. F. (1981): Evaluation Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18, 1, 39–50.

Gabaldón, T. – Horta, H. – Meyer, D. M. – Pereira-Leal, J. B. (2004): *Career paths and mobility of researchers in Europe*. Göttingen, Germany: Culliver Verlag.

Goldstein, S. B. – Randi, I. K. (2006): Predictors of US college students' participation in study abroad programs: A longitudinal study. *International Journal of Intercultural Relations*, 30, 4, 507–521.

Griner, J. – Sobol, A. (2014): Chinese students' motivations for studying abroad. *Global Studies Journal*, 7, 1, 2–14.

Hackney, K. – Boggs, D. – Kathawala, Y. – Hayes, J. (2013): Willingness to study abroad: An examination of Kuwaiti students. *Proceedings for the Northeast Region Decision Sciences Institute*, 566.

Hair, J. F. – Balck, W. C. – Babin, B. J. – Anderson, R. E. (2009): *Multivariate data analysis*, 7th edition. Upper Saddle River: Prentice Hall.

Hair, J. F. – Sarstedt, M. – Ringle, C. M. – Mena, J. A. (2012): An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40, 3, 414–433.

Hungarian Education Authority (2017): Államilag elismert felsőoktatási intézmények.
https://www.oktatas.hu/felsooktatas/kozerdeku_adatok/felsooktatasi_adatok_kozzetetele/felsooktatasi_intezmenyek/allamilag_elismert_felsookt_int
Accessed: 2017.11.15.

Kaplan, A. – Karabenick, S. – DeGroot, E. (2009): *Culture, self and motivation: Essays in Honor of Martin L. Maehr*. Charlotte: Information Age.

Kazár, K. (2014): PLS path analysis and its application for the examination of the psychological sense of a brand community. *Procedia Economics and Finance*, 17, 183–191.

Lei, P. W. – Wu, Q. (2007): Introduction to structural equation modeling: Issues and practical considerations. *Educational Measurement: Issues and Practices*, 26, 3, 33–43.

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*. New York: Harper & Row.

Mudie, P. – Pirrie, A. (2006): *Services marketing management*. Oxford: Elsevier.

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.

Wissema, J. G. (2009): *Towards a third generation university*. Northampton: Edwar Elgar.

Appendices

Appendix 1. Constructions and indicators

Constructions (latent variables)	Items	Standardized factor weight	Mean	Standard deviation
Reference groups Cronbach α=0.703 AVE=0.523 CR=0.819	My family played a huge role in my choice of destination and school.	0.624	2.66	1.47
	My friends encouraged me to come to Hungary.	0.802	2.48	1.51
	I came to Hungary because other students recommended it to me.	0.790	2.50	1.37
	I chose Hungary, because I heard good things about it.	0.691	3.64	1.20
Self-realization Cronbach α=0.748 AVE=0.567 CR= 0.841	I had a clear aim, why I came here.	0.814	4.24	1.16
	Mostly, I have good grades at the university.	0.704	3.88	0.99
	I have/had high expectations of myself.	0.717	4.19	1.00
	I came here, because I would like to reach self-actualization	0.778	4.20	1.17
Getting to know cultures Cronbach α=0.613 AVE= 0.531 CR= 0.774	Getting to know other cultures is very important for me.	0.779	4.09	1.07
	I chose Hungary, because it is in Central Europe and I can travel from here.	0.670	3.01	1.25
	Learning languages motivated me a lot, when choosing Hungary.	0.739	3.38	1.27
Integration Cronbach α= 0.733 AVE=0.621 CR= 0.837	After I finish university, I would like to stay here, in Hungary.	0.885	2.36	1.25
	After I get my degree, I would like to get a job here, in Hungary.	0.868	2.55	1.38
	I chose my university, because I liked the city itself.	0.612	3.25	1.16
Gaining knowledge Cronbach α= 0.796 AVE= 0.684 CR= 0.868	I chose Hungary, because the teaching standards and the standards of the university were very important for me.	0.860	3.79	1.13
	I chose Hungary, because here, I get practical and valued skills with my degree.	0.875	3.86	1.24
	Learning played the biggest part in my decision to come to Hungary.	0.747	3.96	1.29
Social expectations Cronbach α=0.851 AVE= 0.698 CR= 0.903	In Hungary, at the University of Szeged, I expect that... [I will make new friends.]	0.867	4.44	0.75
	I will get to know Hungarian people.	0.808	4.22	0.95
	I would be in a reliable and great community.	0.836	4.29	0.88
	I will have long-lasting international relationships.	0.832	4.36	0.84
Personal expectations Cronbach α=0.858 AVE=0.711 CR= 0.909	I will be more open-minded with people.	0.911	4.46	0.85
	I get good experience for personality development.	0.865	4.43	0.89
	My language knowledge will improve.	0.732	4.12	0.99
	I will gain new skills related to my studies.	0.865	4.52	0.80
Cultural expectations Cronbach α=0.889 AVE=0.755 CR= 0.926	I will be able to travel to different foreign countries.	0.778	4.15	0.92
	I can get to know other cultures.	0.624	2.66	1.47
	I will participate in the cultural life of Szeged.	0.802	2.48	1.51
	I am going to get to know the Hungarian culture.	0.790	2.50	1.37
Labour market expectations Cronbach α= 0.755 AVE= 0.651 CR= 0.849	I will have good work opportunities abroad.	0.691	3.64	1.20
	I can work in the European Union.	0.814	4.24	1.16
	I will have good work opportunities in Hungary.	0.704	3.88	0.99
Educational expectations Cronbach α=0.906 AVE=0.787 CR= 0.937	The University of Szeged is well-equipped.	0.717	4.19	1.00
	There are well-educated teachers at the University of Szeged.	0.778	4.20	1.17
	I will gain useful knowledge at the University of Szeged.	0.779	4.09	1.07
	I am going to have interesting lessons and courses at the University of Szeged.	0.670	3.01	1.25

Source: own construction

196   Anita Kéri
Appendix 2. AVE indicator and the Correlation coefficient square values between the latent variables

Latent variable	AVE	Reference group motivation	Gaining knowledge motivation	Self-realization motivation	Personal expectations	Social expectations	Cultural expectations	Educational expectations	Labour market expectations	Cultural motivation	Integration motivation
Reference group motivation	0.523	1									
Gaining knowledge motivation	0.684	0.182	1								
Self-realization motivation	0.567	0.130	0.540	1							
Personal expectations	0.711	0.025	0.107	0.080	1						
Social expectations	0.698	0.043	0.181	0.114	0.520	1					
Cultural expectations	0.755	0.027	0.131	0.127	0.466	0.635	1				
Educational expectations	0.787	0.036	0.257	0.163	0.545	0.520	0.386	1			
Labour market expectations	0.651	0.054	0.134	0.107	0.270	0.343	0.263	0.310	1		
Cultural motivation	0.531	0.058	0.216	0.271	0.102	0.165	0.292	0.103	0.081	1	
Integration motivation	0.621	0.053	0.219	0.161	0.126	0.216	0.181	0.210	0.216	0.206	1

Source: own construction

Appendix 3. Results of bootstrapping

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
Cultural motivation -> Cultural expectations	0.438	0.449	0.093	4.730	0.000
Gaining knowledge motivation -> Educational expectations	0.424	0.417	0.096	4.403	0.000
Gaining knowledge motivation -> Labour market expectations	0.237	0.239	0.091	2.614	0.009
Integration motivation -> Cultural expectations	0.244	0.246	0.080	3.040	0.002
Integration motivation -> Educational expectations	0.275	0.279	0.063	4.363	0.000
Integration motivation -> Labour market expectations	0.392	0.399	0.082	4.792	0.000
Integration motivation -> Personal expectations	0.295	0.298	0.084	3.527	0.000
Reference group motivation -> Educational expectations	-0.050	-0.028	0.084	0.594	0.553
Reference group motivation -> Social expectations	0.179	0.206	0.087	2.047	0.041
Self-realization motivation -> Personal expectations	0.166	0.187	0.103	1.619	0.106
Self-realization motivation -> Social expectations	0.288	0.297	0.101	2.865	0.004

Source: own construction