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The external and internal balance in Hungary and Czech Republic

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

Keywords: twin deficit, budget balance, current account balance

1. Introduction

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

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

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

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

2. Literature review

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. Review of the two countries

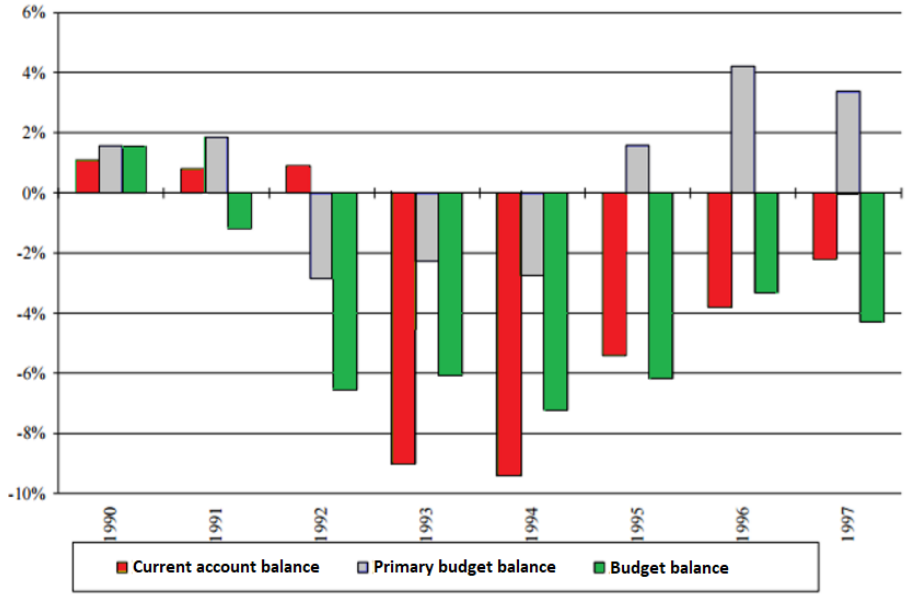
In this chapter, we briefly introduce the main attributions and economic processes of Hungary and the Czech Republic, dividing the last nearly three decades into three subsections.

3.1. From transition to millennium

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

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

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



Source: Barabás et al. (1998, p. 10)

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

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

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

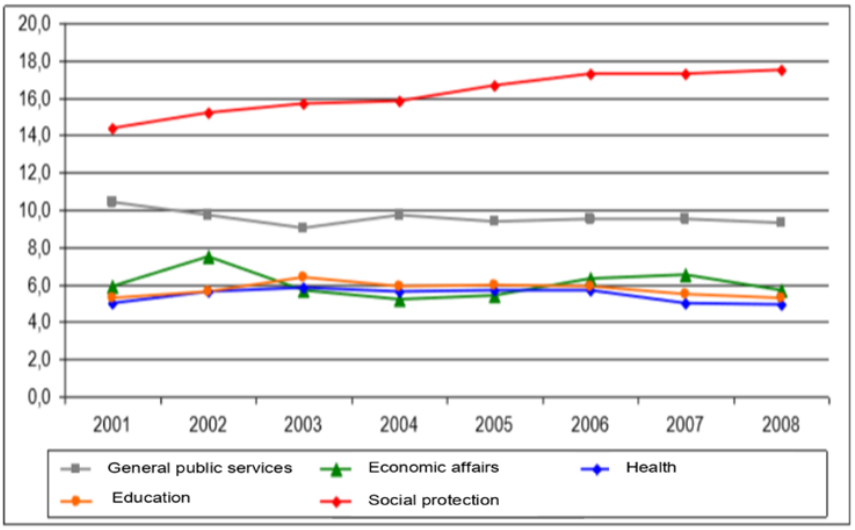
Source: Eurostat (2018)

3.2. Main characteristics before the crisis

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

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

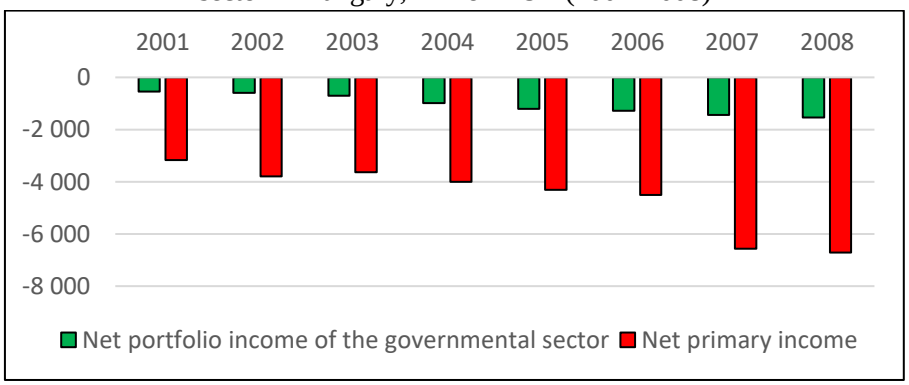
Figure 2 Government expenditures to GDP in Hungary, 2001–2008 (%)



Source: Eurostat (2018)

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

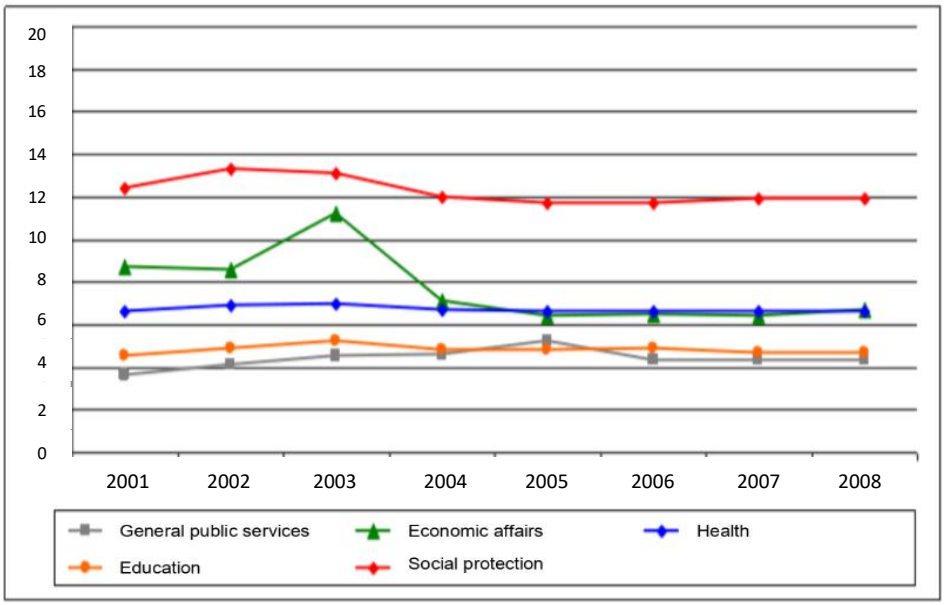
Figure 3 Primary income balance and the portfolio income balance of the governmental sector in Hungary, million EUR (2001–2008)



Source: MNB (2018)

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

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

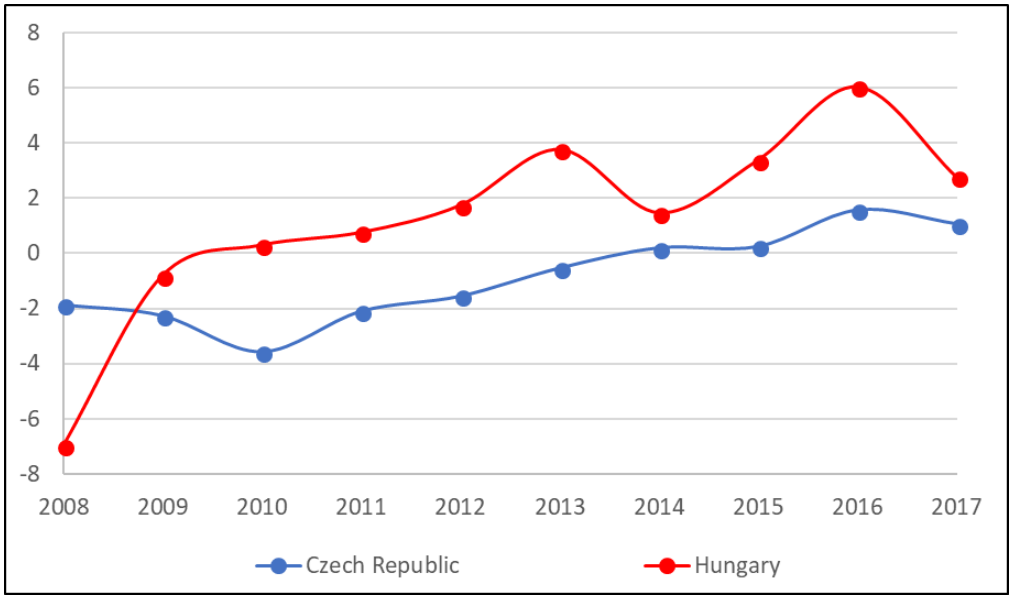


Source: Eurostat (2018)

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

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

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



Source: OECD (2018)

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

3.4. Hypotheses

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

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

4. Methodology and empirical results

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 2 Augmented Dicky-Fuller Tests for the budget balances

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

Source: own estimation

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

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

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

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

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

Source: own estimation

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

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

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

5. Summary and conclusion

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

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

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

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

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