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Testing the Twin Deficit Hypothesis: The Case of Central and Eastern European Countries

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Abstract

Recent developments in the economies of the CEE countries bring into question the validity of the twin deficit hypothesis since we observed combination of high current account deficits and prevailingly stable fiscal positions before the crisis and just the opposite combination after it. The paper starts with the analysis of the theoretical foundations of the twin deficit hypothesis and the alternative explanations about the relationship between current account and fiscal deficits. Different econometric techniques are applied to test the validity of diverse theoretical approaches on the basis of panel data for CEE countries. OLS panel regression shows relatively modest positive connection between current account and fiscal deficits what confirms the twin deficit paradigm. On the other hand, the twin deficit hypothesis can be rejected in the case of Bulgaria and Estonia. The vector autoregressive analysis is also not compatible with the twin deficit hypothesis. Further research is necessary to overcome these contradictory results.

Keywords: *current account targeting, twin deficit hypothesis, panel regression, vector autoregressive analysis*

JEL Codes: *F32*

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1. Introduction

The twin deficit hypothesis, i.e. the belief that fiscal deficits are positively related to current account ones, has been the cornerstone of the fiscal policy in many CEE countries. The twin deficit assumption was considered especially important in the case of economies such as Estonia and Bulgaria where currency board monetary regimes were introduced. The reason is that the currency board establishes an automatic link between the balance of payments and domestic money supply, so if the twin deficit hypothesis is true, policymakers can control both the balance of payments and money supply via the fiscal position. Consequently, balanced or surplus budgets would guarantee external and internal equilibrium. Yet, in spite of the significant fiscal surpluses generated in the first decade of the 21-st century, the current account deficits in Bulgaria and Estonia expanded continuously, exceeding in some years 20% of GDP. Only under the impact of the global financial crisis in 2009 did the current account deficits narrow in parallel with the decline of fiscal surpluses. Developments in the other CEE countries were similar. These patterns contradict the conventional twin deficit hypothesis and require an in-depth analysis of the interplay between fiscal and external sectors.

The principal goal of this paper is to test the twin deficit hypothesis on a panel data sample for CEE countries members of EU (Bulgaria, Check Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) for the period 1998-2009. The paper first discusses the theoretical foundations of the twin deficit hypothesis and the main competing theories. It then applies different econometric techniques to test the validity of these theories. This study is evocative as the twin deficit hypothesis has not been recently in the focus of the research in the context of CEE economies, and because the existing empirical papers often yield contradictory results.

The paper is organised as follows. Section 2 discusses the origin and the main assumptions of the twin deficit hypothesis. Section 3 presents the main alternative explanations: the Ricardian equivalence and the structural gap hypotheses. Section 4 presents the results of econometric tests of different hypotheses using panel regression, vector autoregression and other techniques. Section 5 summarizes the main findings.

2. The Origin of the Twin Deficit Concept

The idea that the current account deficit may be connected in some way to the fiscal position and that having internal and external deficits at the same time may be risky for the economy is usually associated with the IMF and the name of Jacques J. Polak (2001), one of the founders of the monetary approach to the balance of payments (Polak distinguishes between two monetary approaches to the balance of payments: the short-term Keynesian and a long-term approach developed by Harry Johnson). According to Polak, the increase in domestic credit could have a lasting negative impact on the current account, while increases in exports and output have transitory positive effects (Polak, 1997). Consequently, the control over domestic credit is of crucial importance for guaranteeing external balance. Since domestic credit consists of credit to the government and credit to the private sector and since the economic policy should try to avoid crowding-out of the private sector, it is essential to prevent fiscal deficits in order to achieve external stability and economic growth.

Another strand of the twin deficit hypothesis comes from the neo-Keynesian attempts of constructing an economic policy model allowing for simultaneous external and internal equilibrium. The traditional neo-Keynesian thesis assumes that the exchange rate should be used to attain external equilibrium while fiscal policy should be used to achieve internal equilibrium.

This conventional neo-Keynesian target-instrument assignment is challenged by the so-called New Cambridge School, which argues that in many cases it would be more appropriate to use fiscal policy to sustain the external equilibrium, and exchange rate policy to manage the internal balance. While Polak's analysis focused on domestic credit, the New Cambridge School emphasized the role of the private sector's marginal propensity to spend (This presentation of the New Cambridge School approach is based on Gandolfo (1987)). In particular, the New Cambridge School builds its conclusions on a specific variant of the main macroeconomic identity:

$$(M - X) = (A_p - Y_d) + (G - T) \tag{1}$$

where stands for imports, for exports, is absorption (i.e., investment and consumption of the private sector), is disposable income of the private sector, stands for government expenses, and are taxes.

The New Cambridge School assumes that the private sector maintains a constant proportion of its net financial assets in relation to disposable income:

$$V_p = \alpha Y_d \tag{2}$$

where stands for net financial assets of the private sector and is a coefficient. By definition, net financial assets vary proportionately to the difference between income and expenses of the private sector, . If, in addition, we assume that , , where is the growth rate of the disposable income, we obtain:

$$\Delta V_p = \alpha g Y_d \tag{3}$$

After some transformations we can represent private sector expenditure as a function of private sector disposable income:

$$A_p = (1 - \alpha g) Y_d \tag{4}$$

One special feature of equation (4) is that the relationship between expenditure and income in the private sector is derived from a ratio between the stock (net financial assets) and flow (disposable income). This is not typical of the Keynesian school and is closer to monetarism and the monetary approach to the balance of payments (A modern variant of the New Cambridge School is not limited to the twin deficit hypothesis and is based on a more general concept of so-called stock-flow consistent models (Dos Santos and Silva, 2009)).

The New Cambridge School further assumes that the expression represents the marginal propensity to spend. If the coefficient from equation (3) is small – i.e., if the financial surplus of the private sector is small and constant – then the coefficient will be close to unity so long as is also a small number. If this is

the case, the marginal propensity to spend equals unity, i.e. disposable income is equal to expenditure:

$$M - X = G - T \tag{5}$$

In other words, the (internal) fiscal deficit equals the (external) current account deficit. We must emphasize, however, that equation (5), unlike equation (1), is not an identity – it is an equation that is valid under certain assumptions. We must also add that all variants of the neo-Keynesian theory assume, perhaps not in such extreme form, a close relationship between the fiscal and current account deficits (Abell, 1980).

3. Alternative Interpretations of the Twin Deficit Hypothesis

The New Cambridge School is not the only theoretical interpretation of the interaction between the fiscal and current account deficits. The main competing theories include the monetary approach to the balance of payments, the so called Ricardian equivalence and the structural gap approach.

The conclusions of the Monetary Approach to the Balance of Payments (Johnson, 1977) are similar to neo-Keynesian theory, but they are based on the idea that fiscal deficits may increase the money supply. When money holdings exceed the economic agents' desired long-term real monetary balances, spending and acquisition of foreign assets expand, which leads to the worsening of the current account (Harberger, 2008).

The other critiques of the New Cambridge School and theories with similar conclusions follow two main lines of argument. First, equation (5) can hold only if the private sector does not react to fiscal policy measures. If, for example, the government intends to generate fiscal surpluses in order to narrow the current account deficit, the private sector may respond by cutting savings in such a way that the effect of fiscal tightening will be offset. This is the critique from the point of view of the theory of rational expectations and the so-called Ricardian equivalence. In an influential paper, Barro (1989) argued that economic agents rationally expect that a higher fiscal deficit will result in higher taxes in the future, and therefore react by increasing their current savings. This leaves the interest rate, investment and the current account balance unchanged. Accordingly, there should be no connection between the fiscal and current account deficits.

The second critique of the New Cambridge School focuses on foreign investors' behaviour. Equation (5) assumes not only that the internal propensity to save is low and constant, but also that the external sector has a low and constant propensity to invest in the respective country. The latter assumption is rejected by the so-called structural gap hypothesis, which argues that, by filling the gap between investments and saving of the domestic private sector, foreign saving can be an active factor in the financing of the current account deficit. The main insight of the structural gap hypothesis is that the world financial system is closed. The fact that the world financial system is closed has another interesting consequence: if the twin deficit hypothesis is true in its strong form, then the sum of current account deficits of all countries in the world should equal the sum of all fiscal deficits, and the sum of current account surpluses should equal the sum of fiscal surpluses. Put differently, the twin deficit hypothesis means that all countries cannot have simultaneously fiscal deficits. This means that the increase in saving above investment in one country, e.g., in China, leads to an increase in investment and current account deficit in another country or countries (Feyrer and Scambaugh, 2009). The size of external imbalances is determined by the relative competitiveness of individual economies.

It must be emphasized that, from a statistical point of view, a causal relationship between the fiscal and current account deficits may be just the opposite of the assignment of instruments to targets normally assumed in economic policy. For example, if the government considers that running a fiscal surplus is a way to reduce the current account deficit (the so-called current account targeting), then a statistical test may establish a causal relationship from the current account to the fiscal surplus and not vice versa (Summers, 1988). If the government is targeting the current account, it should generate fiscal surpluses in case domestic investment exceeds domestic saving, and deficits in the opposite case. Current account targeting also implies a negative correlation of the private and public saving/investment gaps (Kohler, 2005). This follows from the fact that at, least in the short run, changes in the current account precede the reactions of fiscal policy, so that the current account deficit may be related to the fiscal surplus by Granger-type causality.

In general, when the government reacts to the current account deficit at time t (or t-1, t-2, etc.) by increasing the fiscal surplus at time t (or t+1, t+2, etc.), the causality from the current account deficit to the fiscal surplus is likely to

strengthen as the time lag increases. If, however, the government anticipates a worsening of the current account at time t+1 and starts running fiscal surpluses at time t, a causal relationship could be established from the fiscal surplus to the current account deficit.

We can summarize this discussion in the following way. Neo-Keynesian theory and the New Cambridge School in particular (but also monetarist theory) postulates the existence of a causal relationship between fiscal and current account deficits. The neoclassical or the rational expectations approach assumes the existence of an opposite relationship: as the government increases its budget deficit, the private sector saves more, which leads to a reduction in the current account deficit. Finally, the structural gap approach argues that in small open economies the current account deficit must lead in the long run to fiscal surpluses.

These considerations imply that the relationship between the fiscal and current account deficits needs to be determined empirically because established theories do not provide a clear guidance. In analytical terms, this relationship should be considered from both long-run equilibrium and short-run adjustment perspectives. In the long term, the relationship between the fiscal and current account deficits in an open economy can be expected to be positive, because foreign capital inflows facilitate the financing of fiscal deficits, while the outflows of capital make the funding of fiscal deficits more difficult and force governments to cut spending or raise taxes. In the short-term however, the widening of the current account deficit can be correlated with a reduction of the fiscal deficit, given that capital inflows typically boost economic growth and fiscal revenue while capital outflow is correlated with economic decline and worsening of the fiscal position.

4. Econometric tests of the Twin Deficit Hypothesis

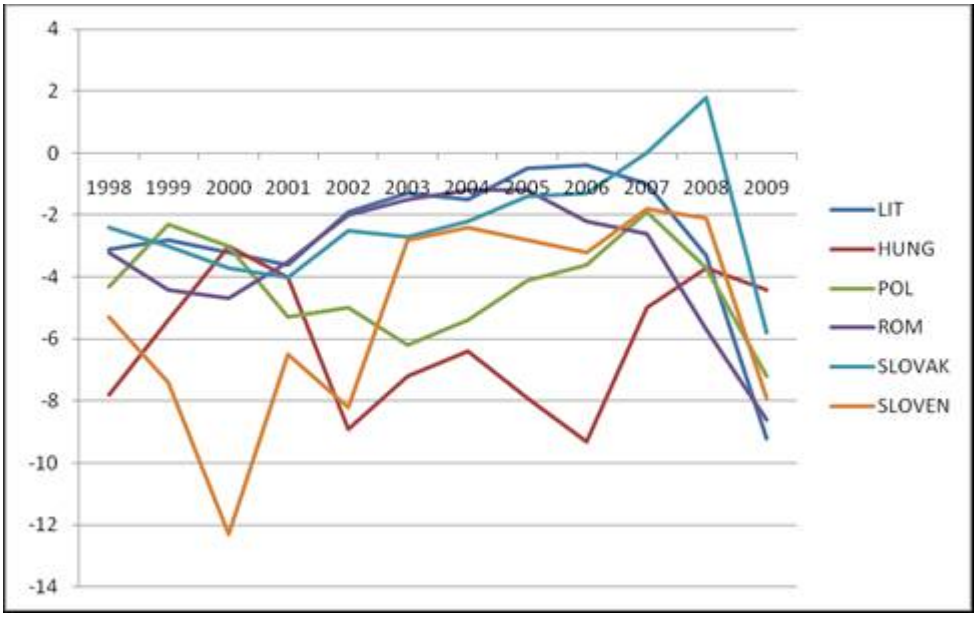
The existing econometric tests of the twin deficit hypothesis provide mixed results. The main conclusion is that the nature of this relationship varies across countries and periods. This is true in the case of the Middle East and North African countries (Hashemzadeh and Wilson, 2006), as well as in the case of the USA (Grier and Haichun, 2009). Different studies come to different conclusions depending on data sets and methodologies applied (Barbosa-Filho et. al., 2006).

There are relatively few studies on the twin deficit hypothesis in Central and Eastern Europe. Most studies confirm the twin deficit hypothesis, especially

those using panel data sets, but at the same time find that the relationship between the current account and fiscal deficits varies among countries. Fidrmuc (2002) even discovered a negative correlation between the fiscal and current account deficits in Bulgaria and Estonia. The research of Aristovnik and Zajc (2001) is also inconclusive. By contrast, a strong confirmation of the twin deficit hypothesis was found in the case of Ukraine (Vyshnyak, 2000). Herrmann and Jochem (2005) also found evidence in support of the twin deficit hypothesis in Central and Eastern Europe. One explanation for these divergent results could be the different degrees of integration of Central and Eastern European countries with the global financial markets (see Kohler, 2005). Countries with a higher degree of integration with the global financial markets may enjoy greater confidence in domestic financial system and hence a higher level of domestic saving. This makes Ricardian equivalence and structural gap theories more probable explanations of the current account-fiscal deficit interdependencies. If this is the case, a country-specific analysis may be required in addition to the panel data analysis. See for example Ganchev (2010).

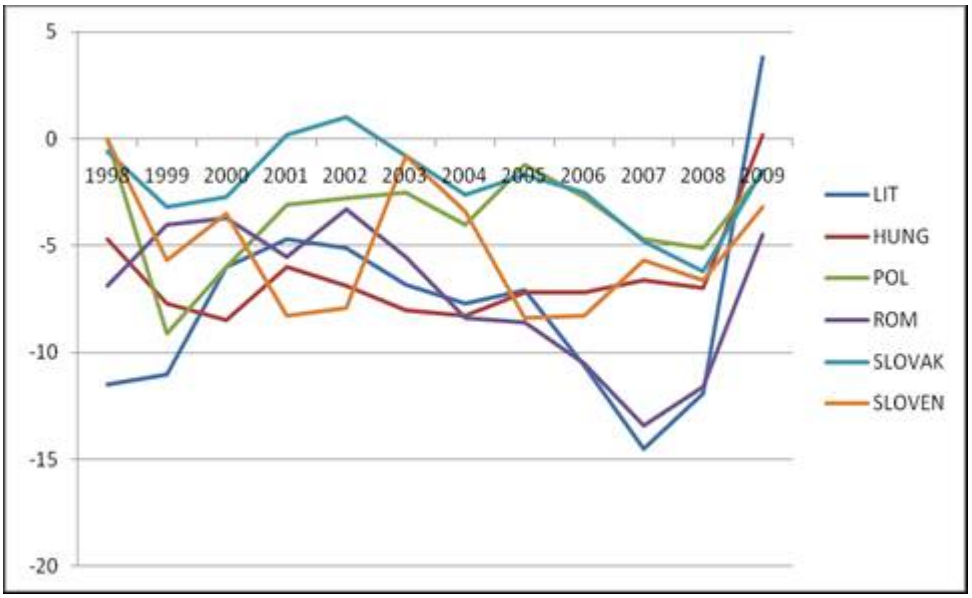
Graph 1 presents the dynamics of the budget deficits of selected CEE countries during the 1998-2009 period. The trend towards increasing deficits under the global economic crisis is clearly observable.

In its turn the Graph 2 depicts selected CEE countries current accounts developments. Here also a trend is observable but in terms of improving rather than worsening of deficits.



Graph 1: Selected CEE Countries Fiscal Deficits (-) and Surpluses (+) in % of GDP

The econometric analysis of the relationship between the fiscal and current deficits usually involves the application of Granger causality techniques (Chang and Hsu, 2009) and vector autoregression models (Hashemzadeh and Wilson, 2006). In addition to the evaluation of the relationship between the two deficits and their lagged values, the VAR models allow for the calculation of the so-called impulse responses and variance decompositions. The impulse response analysis informs us about the dynamic impact of certain variables, including their lagged values, on a given variable. The variance decomposition provides information about the percentage of variation of a given variable that can be explained by its own lagged values or other variables.



Graph 2: Selected CEE Countries Current Account Deficits (-) and Surpluses (+) in % of GDP

First we performed a standard panel regression of current account (dependent variable CAB) against the budget deficit (independent variable PB). The regression equation is of the following type:

$$y_{it} = \alpha + \beta x_{it} + u_{it} \tag{6}$$

Were y_{it} is the dependent variable, the current account balance of the i-th country in the period t and x_{it} is the independent variable, the budget balance of the i-th country in the period t.

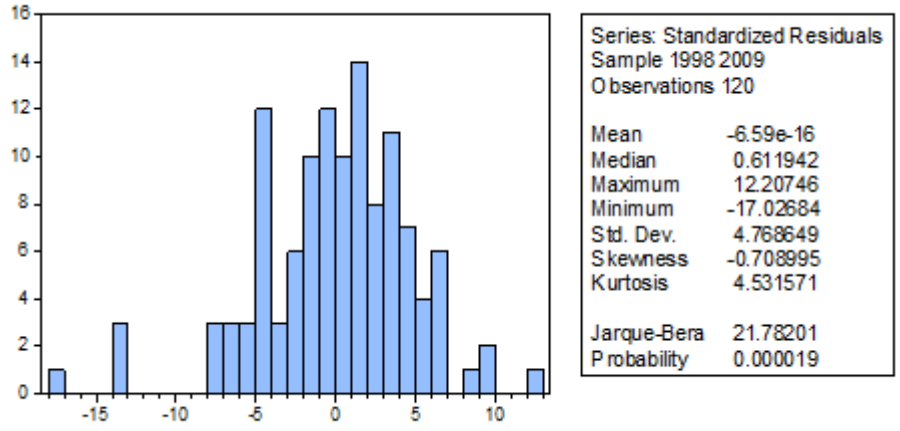
An important precondition for good results under OLS is to avoid the omission of explanatory variables. So we add a auxiliary dummy variable z_i. Finally we obtain an extended equation:

$$y_{it} = \alpha_i + \beta x_{it} + u_{it} \quad \text{where} \quad \alpha_i = \alpha + \gamma z_i \tag{7}$$

As a first step we perform and OLS regression without a dummy variable assuming that the current account balance (CAB) dynamics can be explained by fiscal balance variations (PB). The results are given in the Table A1 in the Appendix.

Data does not support the existence of strong dependence between current account and fiscal sector position- the value is relatively small. The values of the standard error of the regression and the standard deviation of the dependent variable also confirm that this type of regression equation does not give us a good explanation of the dynamics of the dependent variable.

The Durbin-Watson test also seems to confirm this conclusion since it validates the existence of important autocorrelation dependencies, not taken into account by the equation. The existence of fat tails in the distribution of residues (Graph 3) gives us additional reasons to conclude that substantial autocorrelations are not taken into account by equation (6).



Graph 3: Distribution of the residues uit

The results of the estimation of the equation (7) are given in the Table A2 in the Appendix. The comparison of the estimations of (6) and (7) shows that the results of the latter have significantly better statistical properties. The Akaike information criterion and Schwartz criterion as well as return much better values. We observe also slight decline of the standard deviation of the residues .

This leads us to the conclusion that we cannot explain the dynamics of CAB only by the variable PB. This is substantiated by the values of the regression coefficients α=-9.382630 and β=-0.904159 from the Table A2 which corresponds to the α и zi from (7). We can also raise the hypothesis that the current account is influenced not by some additional variable, but mainly by its own lagged values. In the same time we must admit, that the coefficients of the regression estimates of the equations (6) and (7) are significantly different from zero, so the relationship between the current account and the fiscal deficit wile relatively modest in terms of explanation of CAB dynamics, are nevertheless statistically meaningful.

Table 1 presents the statistical results of the regression coefficient before the variable PB by countries. The coefficients are negative for all countries with the exception of Bulgaria and Estonia. It means that the twin deficits hypothesis is confirmed for all countries (the rise of fiscal deficit generates decline of current account deficit and vice versa). Only in the case of Bulgaria and Estonia we observe an opposite relationship- fiscal deficits are correlated with improvement of current accounts and surpluses coincide with high current accounts deficits. The latter result coincides with the findings of Fidrmuc (2002) and Ganchev (2010). Since the two countries apply a currency board regimes and rigorous fiscal policy characterized by high fiscal surpluses in periods of intensive economic growth and minimal deficits under economic decline, we must conclude, that this type of policy mix is not consistent with the twin deficit paradigm.

Table 1: Descriptive statistics by countries of the equation (7)

ISOCODE	Mean	Std. Dev.	Obs.
BG	0.350000	1.844155	12
CZ	-4.150000	1.834270	12
EST	0.091667	1.989270	12

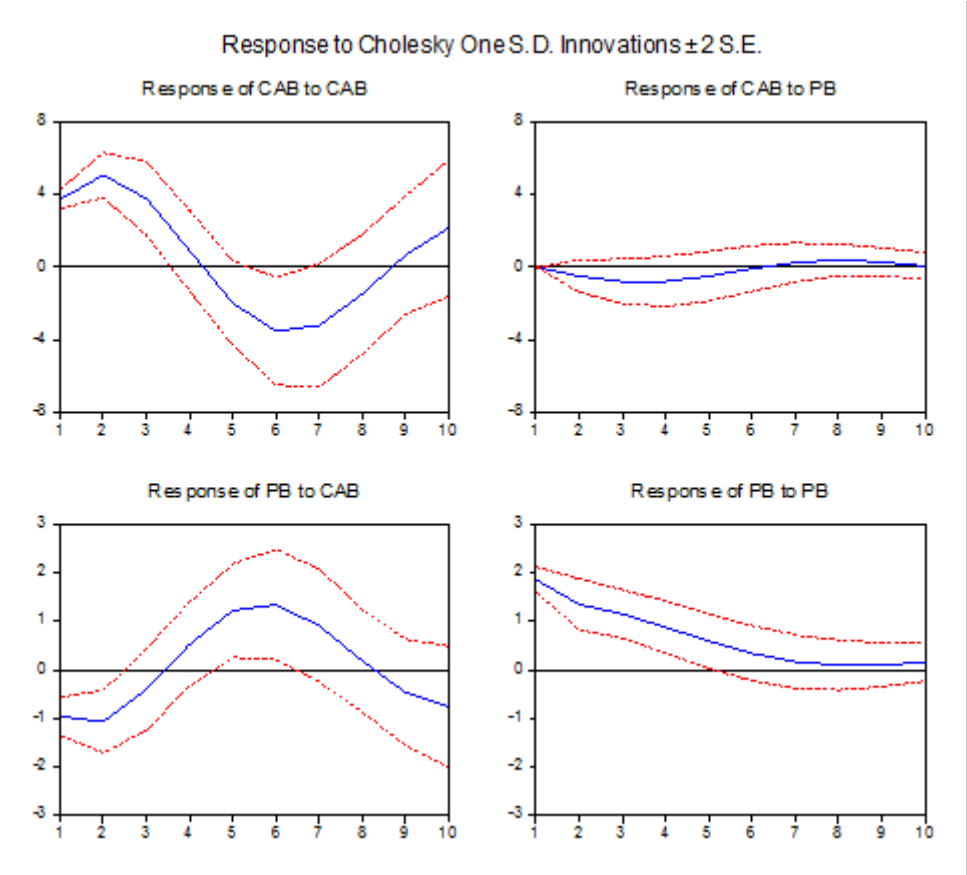
HNG	-6.083333	2.129376	12
LAT	-2.441667	2.811489	12
LIT	-2.650000	2.352368	12
POL	-4.333333	1.568052	12
ROM	-3.400000	2.182576	12
SLOVA	-5.225000	3.271954	12
SLOVE	-2.266667	1.947181	12
All	-3.010833	2.939439	120

The VAR model has the standard form:

$$y_t = A_1 y_{t-1} + .. + A_p y_{t-p} + Bx_t + \varepsilon_t \qquad (8),$$

where y_t is a vector of endogenous variables, x_t is a vector of exogenous variables, $A_1 \ldots Ap$ and B are matrices of coefficients and ε_t is a vector of innovations. In our case we have only endogenous variables.

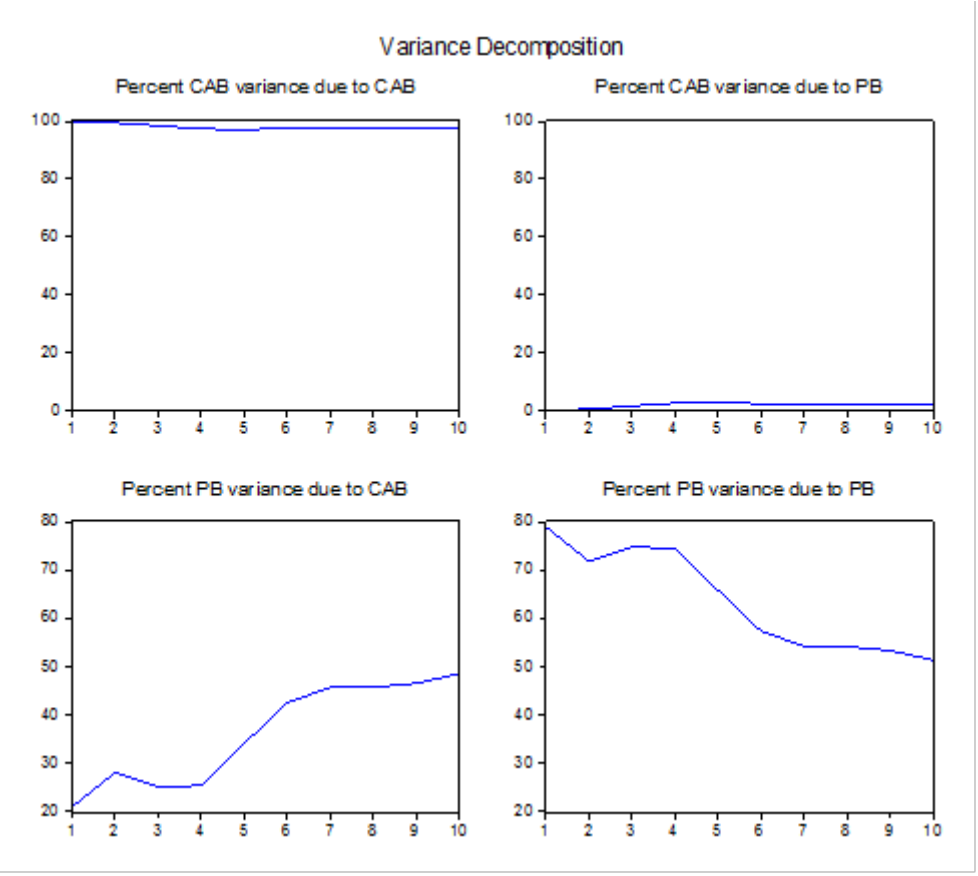
The results of the VAR analysis are presented in Appendix Table A3. The data from Table A3 can be completed with the information from the Graph 4, reflecting the impulse response of the variables CAB and PB to the residues of the regression equations of the studied variables. First of all we should distinguish the mirror type similarity of the response graphs of the CAB/CAB and PB/CAB impulse responses (upper left and down left graphs of Graph 4). The response of the current account (variable CAB) to its own dynamics is unstable. First we observe increasing positive reaction (lags of 2 and 3 years), then the reaction is declining and becoming negative (lags of 6 and 7 years) and finally obtaining positive values once again. The reaction of the budget deficit (PB) to current account (CAB) is similar but presents a kind of mirror reflection of the CAB/CAB dynamics. This means that there is an unstable connection between current account and the budget deficit. In principle this type of dependence contradicts the twin deficit hypothesis. Firstly, the twin deficit hypothesis presupposes impact from the budget deficit to the current account and not vice versa. Secondly, the relationship should be positive while the observed interdependencies are mixed. Finally the relationship between the current account and the fiscal deficit (upper left hand graph) is also unstable demonstrating alternating negative and positive connection between the two variables.



Graph 4: Impulse response

Finally we can discern relatively strong sensitivity of the budget deficits to their own lagged values, what reflects the sluggishness of the fiscal policies applied by the CEE countries.

The variance decomposition, represented at Graph 5 confirms the above conclusions. We observe very weak (below 5%) reaction of the current account to the movements of the budget deficit (upper right hand graph).On the contrary, the fiscal deficit is characterized by increasing impact on the part of the current account (down left hand graph). The current account and the fiscal balance are strongly influenced by their lagged values.



Graph 5: Variance decomposition

We can conclude from VAR analysis, that the twin deficit hypothesis cannot be confirmed in the narrow sense. First of all, the impact is predominantly from the current account to the fiscal balance and not vice versa. Next, the interdependence is unstable and characterised by alternating positive and negative impulses. The dynamics of fiscal position is determined by the lagged values of the current account and its own lagged values, so there is no place for current account targeting type of fiscal policy. The two countries (Bulgaria and Estonia) applying especially tight fiscal policy that can be approximated as an attempt to use some kind of fiscal targeting, are obtaining contradictory results.

Additional results could be obtained via the application of VEC analysis (Ganchev 2010), but the panel data applied turn out to be stationary what precludes the use of vector error correction technique.

5. Conclusions

This paper studied the theoretical underpinnings of the twin deficit hypothesis and tested various interpretations of this hypothesis on a sample of CEE countries data. The main findings can be summarised as follows.

The panel type regression confirms the existence of positive connection between the current account and fiscal balance. The connection however is not very significant and the application of control dummy variable reveals that factors other than the fiscal deficit should affect the dependent variable. There are also two exceptions to the rule- Bulgaria and Estonia, were we can observe negative relationship between the current account and fiscal balance. The letter results coincide with the earlier findings of Fidrmuc (2002) and Ganchev (2010).

The VAR analysis gives additional interesting results. It does not confirm the existence of robust positive relationship between the current account and the fiscal balance but rather the opposite. In the same time it yields strong impact from the current account to the fiscal balance what contradicts in principle the twin deficit hypothesis. The fiscal position is determined by the current account dynamics and the lagged values of the fiscal deficit. Under these conditions we can assume some kind of current account targeting if and only if we accept the hypothesis, that the impact of the current account is disguising the deliberate policy of the fiscal authorities to use the fiscal instrument against the negative current account trends with lag between 4 and 8 years. Additional research is needed to confirm or reject this hypothesis.

At this stage the rational expectations and structural gap theories seem to be a better explanation of the existing data than the twin deficit hypothesis.

The results for Bulgaria and Estonia need additional explanation. In these two cases we can reject the twin deficits hypothesis because of the positive relationship between the current account and the fiscal balance on the basis of regression analysis. This rejection is especially intriguing given the fact that both countries are pursuing stringent fiscal policies with special emphasize on the current account targeting. Additional research is needed to clarify the connection between the currency board regimes imposed in these countries and the twin deficit concept based fiscal policies.

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Appendix

Table A1: Statistical results of the estimation of the equation (6)

Method: Panel Least Squares

Sample: 1998 2009
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.998813	0.627131	-14.34918	0.0000
PB	-0.776680	0.149345	-5.200587	0.0000

R-squared	0.186466	Mean dependent var	-6.660358
Adjusted R-squared	0.179571	S.D. dependent var	5.286976
S.E. of regression	4.788812	Akaike info criterion	5.986968
Sum squared resid	2706.061	Schwarz criterion	6.033426
Log likelihood	-357.2181	Hannan-Quinn criter.	6.005835
F-statistic	27.04610	Durbin-Watson stat	0.653164
Prob(F-statistic)	0.000001		

Table A2: Statistical results of the estimation of the equation (7)
Method: Panel Least Squares

Sample: 1998 2009
Periods included: 12
Cross-sections included: 10
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.382630	0.682996	-13.73745	0.0000
PB	-0.904159	0.184618	-4.897470	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.380616	Mean dependent var		-6.660358
Adjusted R-squared	0.323792	S.D. dependent var		5.286976
S.E. of regression	4.347579	Akaike info criterion		5.864305
Sum squared resid	2060.258	Schwarz criterion		6.119825
Log likelihood	-340.8583	Hannan-Quinn criter.		5.968073
F-statistic	6.698134	Durbin-Watson stat		0.845964
Prob(F-statistic)	0.000000			

Table A3: Statistical Results of the VAR analysis

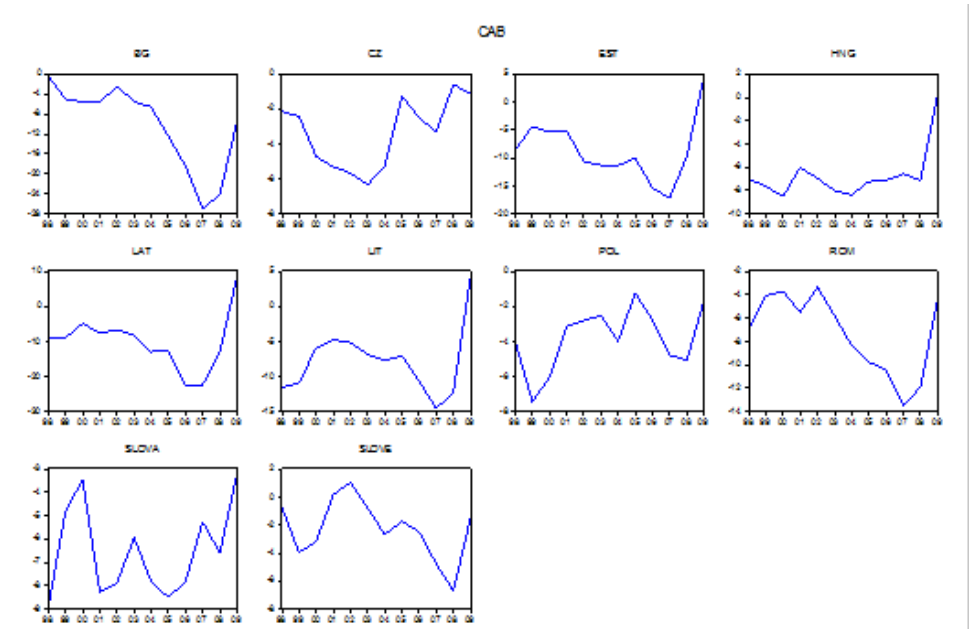
Vector Autoregression Estimates

Sample (adjusted): 2000 2009
Included observations: 100 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	CAB	PB
CAB(-1)	1.287700	-0.100042
	(0.14493)	(0.08143)
	[8.88483]	[-1.22855]
CAB(-2)	-0.781643	0.252151
	(0.15041)	(0.08451)
	[-5.19676]	[2.98375]
PB(-1)	-0.267067	0.726392
	(0.23425)	(0.13161)
	[-1.14011]	[5.51920]
PB(-2)	0.112966	0.065456
	(0.22971)	(0.12906)
	[0.49177]	[0.50716]
C	-3.184225	0.182276
	(0.96272)	(0.54091)
	[-3.30752]	[0.33698]
R-squared	0.577123	0.548340
Adj. R-squared	0.559318	0.529323
Sum sq. resids	1318.172	416.1180
S.E. equation	3.724982	2.092890
F-statistic	32.41297	28.83382
Log likelihood	-270.8354	-213.1838
Akaike AIC	5.516708	4.363676
Schwarz SC	5.646966	4.493934
Mean dependent	-6.806990	-2.946000
S.D. dependent	5.611276	3.050598

Determinant resid covariance (dof adj.)	47.99105
Determinant resid covariance	43.31192
Log likelihood	-472.2091
Akaike information criterion	9.644182
Schwarz criterion	9.904699

Graph A1: Public Deficits (PB) and current account (CAB) graphs of the CEE countries


CAB
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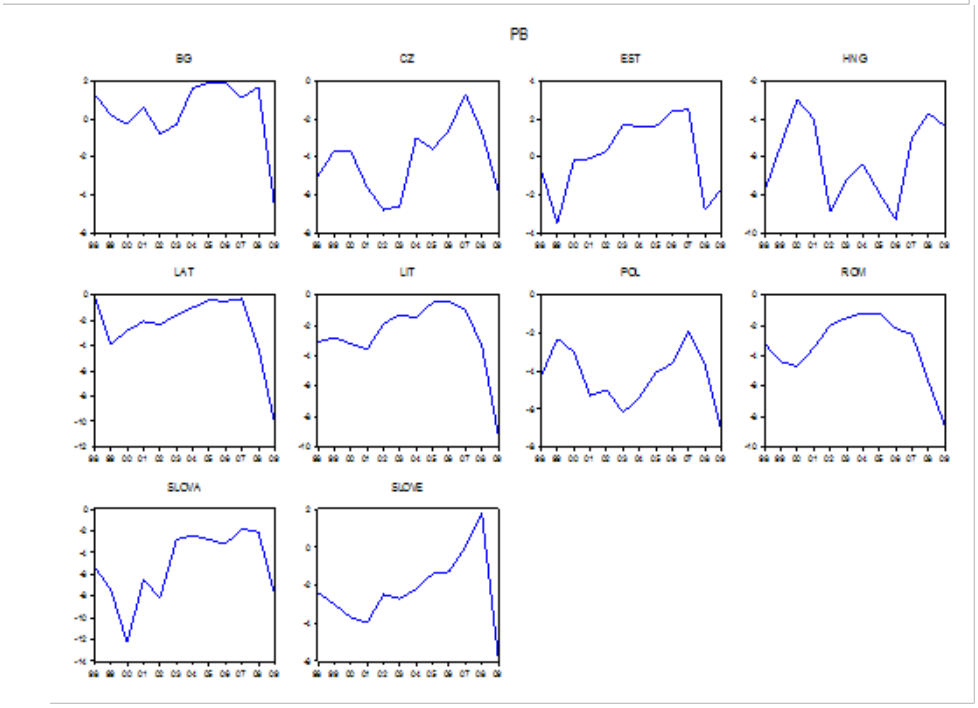
ROM
SLOVA
SLOVE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