THE TWIN DEFICIT HYPOTHESIS: THE CASE OF BULGARIA

Gancho Todorov GANCHEV, PhD*
South-West University, Blagoevgrad
gtganch@yahoo.com

Article**
JEL: F32
UDC: 514.7

Abstract

Recent developments in the Bulgarian economy bring into question the validity of the twin deficit hypothesis. This paper analyses the theoretical foundations of and alternative explanations for this hypothesis and uses different econometric approaches to test its validity on a sample of the Bulgarian data. A Granger causality test suggests the existence of dual causality between the fiscal and current account deficits. A vector autoregressive and a vector error correction model both reject the twin deficit hypothesis in the short run, but indicate that it might be valid in the long run.

Keywords: current account targeting, twin deficit hypothesis, Granger causality, vector autoregressive analysis, vector error correction

1 Introduction

The twin deficit hypothesis, i.e. the belief that fiscal deficits are closely associated with current account deficits, has been the cornerstone of fiscal policy in Bulgaria since the introduction of the currency board in mid-1997. 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. This would imply virtually total control over the domestic economy – if the twin deficit hypothesis were true, balanced or surplus budgets would guarantee external and internal equilibrium. Yet in spite of significant fiscal surpluses generated in recent years, the current account deficit in Bulgaria expanded continuously, exceeding 20% of GDP in 2008. Only under the impact of the global financial

* The author would like to thank two anonymous referees for their useful comments and suggestions.
** *Received:* April 1, 2010
Accepted: November 2, 2010

crisis in 2009 did the current account deficit narrow in parallel with the fiscal surplus. These developments contradict the conventional twin deficit hypothesis and require an in-depth analysis of the interplay between the fiscal and external sectors.

The principal goal of this paper is to test the twin deficit hypothesis on a sample of Bulgarian data from 2000-2010. 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 research is relevant because the twin deficit hypothesis has not been previously studied in the context of the Bulgarian economy, and because the existing empirical research on other economies often yields 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 Granger causality, vector autoregression and vector error-correction 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 situation 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 the monetary approach to the balance of payments.[1] 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, 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 economic policy should try to avoid crowding-out of the private sector, it is essential to avoid fiscal deficits in order to achieve external stability and economic growth.

Another strand of the twin deficit hypothesis comes from neo-Keynesian attempts at 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 attain 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

[1] Polak distinguishes between two monetary approaches to the balance of payments: the short-term Keynesian and a long-term approach developed by Harry Johnson.

to spend.[2] 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 M stands for imports, X for exports, A_p is absorption (i.e., investment and consumption of the private sector), Y_d is disposable income of the private sector, G stands for government expenses, and T 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 V_p stands for net financial assets of the private sector and α is a coefficient. By definition, net financial assets vary proportionately to the difference between income and expenses of the private sector, $\Delta V_p = Y_d - A_p$. If, in addition, we assume that $\Delta V_p = \alpha \Delta Y_d$, $\Delta Y_d = gY_d$, where g 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.[3]

The New Cambridge School further assumes that the expression $(1 - \alpha g)$ represents the marginal propensity to spend. If the coefficient α from equation (3) is small – i.e., if the financial surplus of the private sector is small and constant – then the coefficient $(1 - \alpha g)$ 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).

[2] This presentation of the New Cambridge School approach is based on Gandolfo (1987).

[3] 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).

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 react 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 the investment 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.[4] 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)[5], then a statistical test may establish

[4] 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.

[5] 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).

a causal relationship from the current account to the fiscal surplus and not vice versa (Summers, 1988). 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) postulate the existence of a causal relationship between fiscal and current account deficits. The neoclassical or the rational expectations approach postulates 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 established 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 financing 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

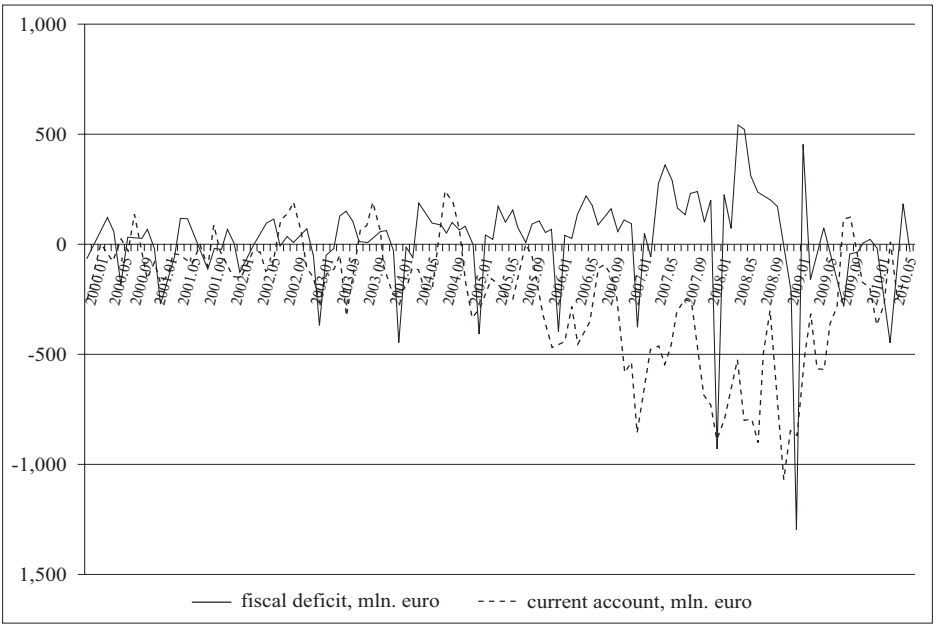
The existing econometric tests of the twin deficit hypothesis provide mixed results. The main conclusion is that the nature of this relationship varies across countries and periods. This is true in the case of the Middle East and North African countries (Hashemzadeh and Wilson, 2006), as well as in the 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. This paper presents such an analysis for the case of Bulgaria.

Graph 1 depicts Bulgarian monthly data on current account and budget balances in current prices (in millions of euro) from 2000 to 2010. It is easy to see that no clear conclusion about the relationship between the current account and fiscal balances can be drawn from this graph.

Graph 1: Bulgaria's fiscal and current account deficits (-) and surpluses (+) (01.2000 – 05.2010, in million euro)



Source: Agency for Economic Analysis and Forecasts.

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.

Since we use monthly data, dealing with the seasonality problem is of vital importance. The admissible form of any cointegration depends crucially on the univariate unit root properties of the series. When the time series on current account and fiscal deficits are conventionally integrated, only non-periodic cointegration is possible (Osborn, 2002). In other words, if our time series are conventionally integrated (which happens to be the case; see below), we can use the conventional cointegration analysis. We nevertheless applied a seasonal adjustment technique (the U.S. Census Bureau's X12 seasonal adjustment program) to remove cyclical seasonal movements from the series and extract their underlying trend components.

We perform the Granger causality test with seasonally adjusted monthly time series of current account and budget deficit data. The equations for the Granger causality test are of the form:

$$y_1 = \alpha_0 + \alpha_1 y_{t-1} + .. + \alpha_l y_{t-l} + \beta_1 x_{t-1} + .. \beta_l x_{t-l} \quad (6)$$

$$x_1 = \alpha_0 + \alpha_1 x_{t-1} + .. + \alpha_l x_{t-l} + \beta_1 y_{t-1} + .. \beta_l y_{t-l} \quad (7)$$

where x and y are the two deficits. We test for the null hypothesis that $\beta_1 = \beta_2 = .. \beta_l = 0$. The results of the Granger causality test on seasonally adjusted series (CA_SA for current account data and BD_SA for the budget deficit) are given in appendix table A1.

With lags from two to seven months, there is a strong Granger causality from the budget deficit to the current account: the probability that the budget deficit does not Granger cause the current account deficit is less than 1%. By contrast, the causality from the budget deficit to the current account deficit is much weaker: the probability that the current account does not Granger cause the budget deficit is much higher (appendix table A1). We can observe Granger causality from the current account to the fiscal deficit with high probability only for lags of 12 months or longer.

These results suggest that the authorities in Bulgaria may have indeed followed the policy of short-term current account targeting, i.e., that they tended to raise fiscal surpluses based on expectations of rising current account deficits. In the long run, however, current account deficits do seem to lead to fiscal deficits. The first result seems to confirm the twin deficit hypothesis; the second one is compatible with the structural gap hypothesis.

These results do not give us information about the size of correlation between the two deficits, nor do they indicate what kind of interdependence can be expected in the long term. To address these issues we apply the vector autoregressive (VAR) and vector error-correction analysis (VEC). The former provides a measure of the correlation in the short term, while the latter helps discover the long-term interdependencies reflecting the equilibrium convergence properties of the system.

The VAR model has the standard form:

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

where y_t is a vector of endogenous variables, x_t is a vector of exogenous variables, A_1... A_p 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 A2. None of the variables is statistically significant in explaining the budget deficit, but all variables with a lag of more than two months are statistically significant in explaining the current account deficit. Appendix graph A1 shows that the impact of lagged values of the current account on itself is quite important (lower right-hand panel). The fiscal deficit strongly affects the current account deficit (lower left-hand panel). This impact slowly declines over time but does not converge on zero. The short-term relationship between the fiscal and current account balances is negative: higher fiscal surpluses (negative deficits) are associated with higher and not the lower current account deficits postulated by the twin deficit hypothesis.

One possible explanation of this result is that fiscal surpluses are accumulated as liabilities on the balance sheet of the Issue Department of the Bulgarian National Bank. Thus, fiscal surpluses, ceteris paribus, diminish the quantity of money in circulation. To compensate for this, the private sector engages in additional borrowing abroad, which leads to additional imports and widening of the current account deficit.[6]

The current account deficit also affects the fiscal deficit in the short term, but this effect is very small and converges virtually to zero over time (appendix graph A1, upper right-hand panel). The lagged values of fiscal balances affect the size of the balance at time *t*, but this impact declines to zero over time (upper left-hand panel).

The variance decomposition provides further interesting results. Nearly 30% of variations of the current account deficit can be explained by variations of the fiscal deficit (appendix graph A2, lower left-hand panel). The rest is due to variations of lagged values of the current account deficit (lower right-hand panel). In the case of the budget deficit, the impact of variations in both fiscal and current account deficits is virtually nil (upper panels). The results of the vector autoregressive analysis are thus only partly compatible with the results of the Granger causality analysis.

In order to proceed with the VEC we need to apply a unit root test to check stationarity of the time series used in the analysis. At least one of the variables should be an $I(1)$ process in order to obtain correct results from cointegration analysis (Granger, 1981). We applied the Augmented Dickey-Fuller test. The results are summarized in appendix tables A3-A5. The results show that the first differences of the current account with a three-month lag and the levels of the fiscal deficit (also with a three-month lag) are stationary. Thus, the (seasonally adjusted) current account series is an $I(1)$ process – evidently, in the sample period there was a trend increase in the current account deficit. On the other

[6] This is not a confirmation of the traditional monetary approach to the balance of payments, since the latter assumes that the quantity of money in circulation will increase to a new equilibrium via the improved current account balance and not through additional capital inflows.

hand, the fiscal deficit series, also seasonally adjusted, is an *I*(1) process. Consequently, cointegration between these two variables is possible.

The results from the VEC analysis are presented in appendix table A6. The basic co-integration equation is of the type:

$$CA = \beta BD \tag{9}$$

Where *BD* is the budget deficit, *CA* is the current account deficit, and β is the regression coefficient. The simplest form of the corresponding vector error correction equation is of the type:[7]

$$\Delta CA_t = \alpha_1 (CA_t - \beta BD_t) + \in_{1,t} \tag{10}$$

$$\Delta BD_t = \alpha_2 (CA_t - \beta BD_t) + \in_{2,t} \tag{11}$$

where α_1 and α_2 are speeds of adjustment to a long-run equilibrium, and $\in_{1,t}$ and $\in_{2,t}$ are error terms.

If we ignore the adjustment process for a moment and stick to the long-term equilibrium relation $CA - \beta BD = 0$, we obtain:

$$(S - I) + (BD) = \beta(BD) \tag{12}$$

If the difference between saving and investment $(S - I)$ in the private sector is not zero, the coefficient β can take any value, since we have from (12) the equality $(S - I) = BD(\beta - 1)$.

If, on the other hand, the private sector is in equilibrium – that is, if $(S - I) = 0 = BD(\beta - 1)$ – then must equal unity. We can use this result as a test for the validity of the New Cambridge School hypothesis, given that b=1 in the above equation gives equation (5).

If $\beta > 1$, then the current account deficits vary in the same direction as the fiscal deficits in the long run. The current account deficit however "overreacts" because the private sector adds to both fiscal and current account deficits. This is possible if capital inflows (i.e., the current account deficit) can simultaneously finance both the private and public sector deficits. The bigger the coefficient β, the stronger the effect of the fiscal position on the excess of private sector saving over investment. This type of relationship clearly requires a strong impact of the world economy on the domestic economy, as postulated by the structural gap hypothesis. The twin deficits are nevertheless present in the long run because we should observe a simultaneous increase or decrease in both deficits depending on the direction of capital flows.

If $0 < \beta < 1$, we should have a positive relationship between the fiscal and current account deficits, i.e. higher fiscal surpluses imply lower current account deficits and vice versa. This implies a negative relationship between the financial position of the private sector (as reflected in the current account balance) and of the government (as reflected in the fiscal balance). These interdependencies would confirm the traditional Keynesian theory and the monetary approach to the balance of payments.

[7] We can also assume a relationship of the type $BD_t = \beta^* CA_t$ where $\beta = 1/\beta^*$.

Finally, if $\beta < 0$, we should observe a strong negative relationship between the fiscal deficit and the private sector (i.e., the current account) surplus, which would support Ricardian equivalence.

These considerations imply that the estimate of the size of the coefficient β in a cointegration equation may be viewed as a test for the validity of different theoretical interpretations of interdependence between the current account and fiscal deficits, or more broadly the public and private sector balances. In our case the estimated value of the coefficient β is greater from unity:

$$CA_t = 1.170054BD_t \tag{13}$$

The standard error and t-statistics of this coefficient estimate are good (the coefficient is significant within 1% confidence interval).

As we can see from (13), in the case of Bulgaria the twin deficit hypothesis in its hard form cannot be confirmed on the monthly data for 2000-2010. To make reasonable conclusions about the remaining possible theoretical explanations, we should take into account other parameters from cointegration equations, namely the coefficients α_1 and α_2 from equations (10) and (11), which reflect the speed of adjustment to equilibrium. As can be seen from appendix table A6, cointegration equation 1, our estimates of these coefficients have a negative sign. The coefficients are statistically significant at a 1% test level. The equations, taking into account only error correction terms, take the following numerical form:

$$\Delta CA_t = -0.105896(CA_t - 1.170054BD_t) + ... + \in_{1,t} \tag{14}$$

$$\Delta BD_t = -0.555948(CA_t - 1.170054BD_t) + ... + \in_{2,t} \tag{15}$$

This means that deviations from equilibrium relation (9) are negatively correlated with changes in fiscal and current account deficits. In particular, when the current account balance is negative and the fiscal balance is positive, a situation that has prevailed in Bulgaria during 2000-2010, additional fiscal surpluses will be associated with increases in current account deficits. This result explains the negative short-term impulse response between the current account and fiscal deficits (appendix graph A2, lower left-hand panel) and is consistent with findings of Fidrmuc (2002). It also allows us to reject the traditional Keynesian interpretation that in the short run higher fiscal surpluses are associated with higher current account deficits; as well as the Ricardian equivalence interpretations that changes in the fiscal balance do not affect the current account balance. By contrast, the estimates from equations (13) – (15) support the structural gap hypothesis concerning the influence of the global economy on current account and fiscal deficits in the long run.

5 Conclusions

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

The Granger causality tests confirm that fiscal deficit has a significant impact on current account deficit, as postulated by the twin deficit hypothesis and the New Cambridge School. In the short run, however, the results of VAR analysis show that higher fiscal surpluses are associated with higher current account deficits, which is contrary to the twin deficit hypothesis.

In the long run, according to the results of a VEC model, fiscal deficits seem to lead to additional private sector and current account deficits. This is possible only when foreign saving actively affects the domestic economy, facilitating the financing of both public and private sector deficits. This result supports the so-called structural gap hypothesis on internal and external equilibrium. The VEC analysis allows us to reject the strong form of the twin deficit hypothesis as well as the Ricardian equivalence view for the Bulgarian data. Nevertheless, in the long run we can expect some positive correlation between fiscal and current account deficits, as postulated by the twin deficit hypothesis.

These findings differ from earlier results in the literature, which mainly validated the twin deficit hypothesis for countries in Central and Eastern Europe. At the same time, the present paper confirms the negative correlation between fiscal and current account deficits discovered by Fidrmuc (2002).

The finding that the twin deficit hypothesis in its hard form (the equality between current account deficits and fiscal surpluses) does not hold in the specific case of Bulgaria, has several implications for economic policy.

First, the policy of generating additional fiscal surpluses in order to reduce the size of current deficits, which has been pursued by Bulgarian authorities in the 2000s, may be effective only in the long run. Furthermore, this policy should be applied in a measured way. In particular, while the policy of generating fiscal surpluses at a level of 5-6% of GDP for considerable periods has clearly helped eliminate net public debt, it has done so at the expense of a worsening of public infrastructure and a deterioration of the quality of public services in general.

Second, fiscal policy should not be used as a substitute for monetary policy in maintaining the internal equilibrium when cyclical fluctuations in the domestic economy are mainly the result of global economic and financial developments. This conclusion is based on the finding that fiscal and current account deficits are negatively correlated in the short run. Instead, it would be more efficient to pursue a policy of a broadly balanced budget.

Third, the current global financial crisis should have a positive impact on the current account (i.e., the current account deficit should narrow) and a negative impact on the fiscal position (i.e., the fiscal deficit should widen). This is precisely the development that has been observed in Bulgaria over the past two years. In this context, the emergence of fiscal deficits in Bulgaria after many years of surpluses should not be considered a negative phenomenon, but rather an outcome of the operation of automatic fiscal stabilizers.

APPENDIX

Table A1: Granger causality tests

Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	122	0.74600	0.4765
BD_SA does not Granger cause CA_SA		8.46197	0.0004

Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 3			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	121	1.93840	0.1274
BD_SA does not Granger cause CA_SA		10.7574	3.E-06

Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 5			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	119	2.73157	0.0230
BD_SA does not Granger cause CA_SA		9.04313	3.E-07

Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 6			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	118	2.20490	0.0482
BD_SA does not Granger cause CA_SA		7.46413	1.E-06

Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 7			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	117	1.97774	0.0653
BD_SA does not Granger cause CA_SA		6.65123	2.E-06

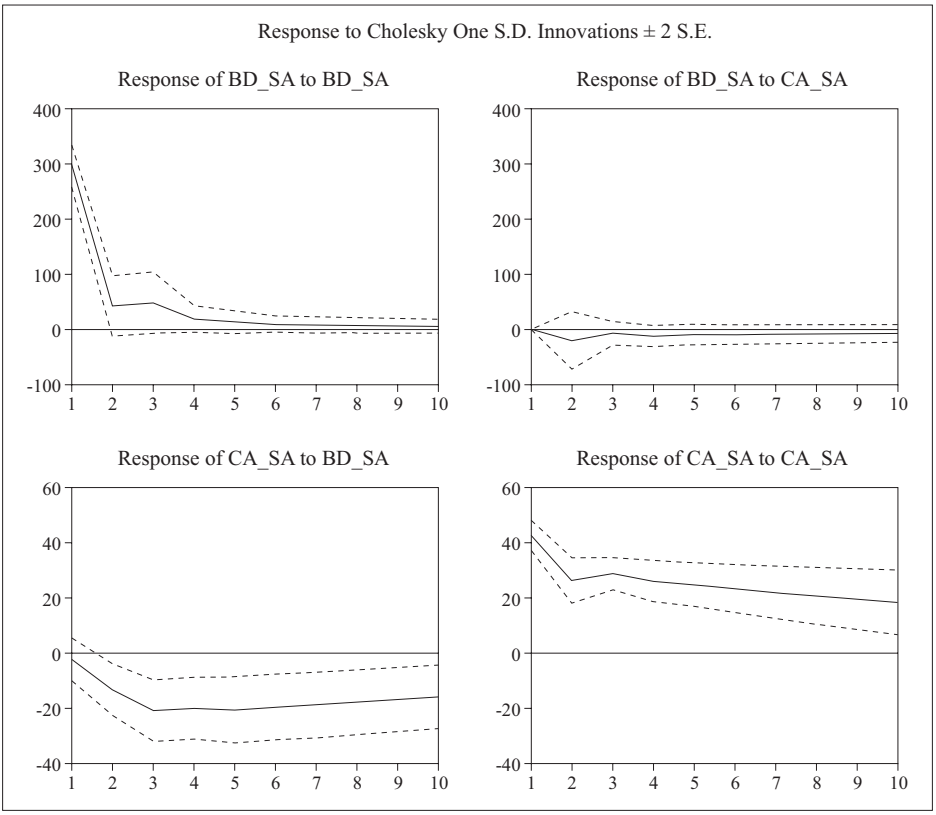
Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 12			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	112	3.87130	0.0001
BD_SA does not Granger cause CA_SA		6.04138	1.E-07

Pairwise Granger causality tests			
Sample: 2000M01 2010M04			
Lags: 14			
Null hypothesis:	Obs	F-Statistic	Prob.
CA_SA does not Granger cause BD_SA	110	2.70352	0.0027
BD_SA does not Granger cause CA_SA		5.91386	8.E-08

Table A2: Vector autoregression estimates of BD_SA and CA_SA

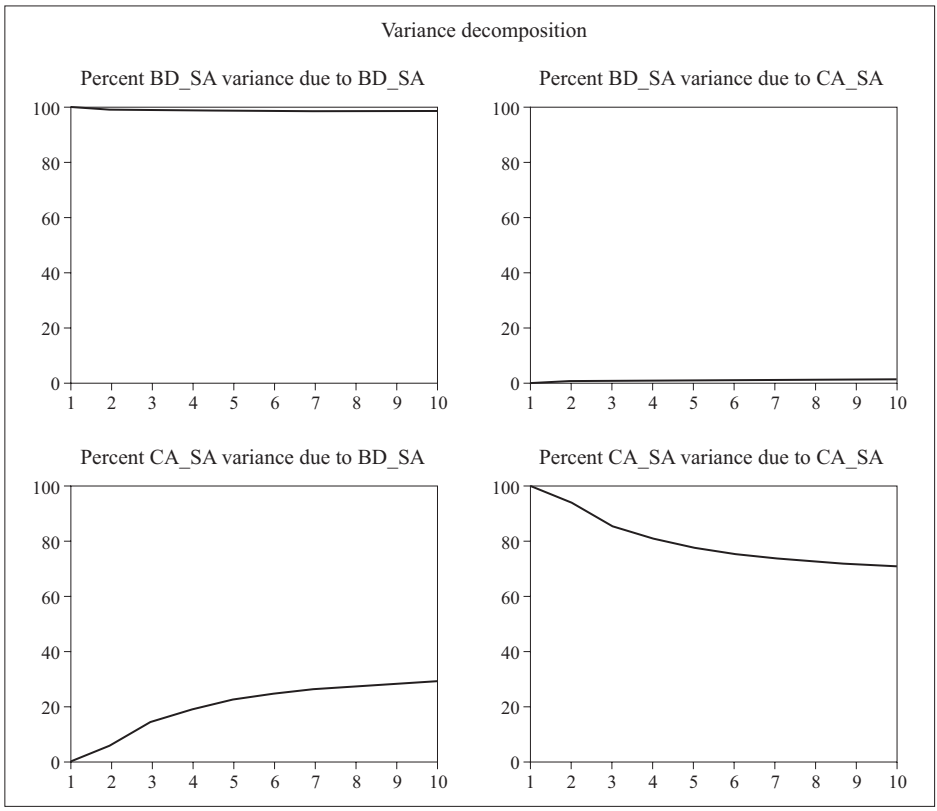
Sample (adjusted): 2000M03 2010M04		
Included observations: 122 after adjustments		
Standard errors in ( ) & t-statistics in [ ]		
	BD_SA	CA_SA
BD_SA(-1)	0.141972	-0.039294
	(0.09194)	(0.01337)
	[1.54411]	[-2.93930]
BD_SA(-2)	0.123549	-0.034577
	(0.09625)	(0.01399)
	[1.28360]	[-2.47073]
CA_SA(-1)	-0.459077	0.622337
	(0.60185)	(0.08751)
	[-0.76277]	[7.11178]
CA_SA(-2)	0.185380	0.274048
	(0.58816)	(0.08552)
	[0.31519]	[3.20459]
C	-6.760087	-9.521530
	(39.2744)	(5.71040)
	[-0.17212]	[-1.66740]
R-squared	0.069186	0.869564
Adj. R-squared	0.037364	0.865105
Sum sq. resids	1	219016.0
S.E. equation	297.5694	43.26583
F-statistic	2.174125	194.9985
Log likelihood	-865.4268	-630.1761
Akaike AIC	14.26929	10.41272
Schwarz SC	14.38421	10.52764
Mean dependent	37.36621	-121.0905
S.D. dependent	303.2893	117.8005
Determinant resid covariance (dof adj.)		1.65E+08
Determinant resid covariance		1.52E+08
Log likelihood		-1495.485
Akaike information criterion		24.68008
Schwarz criterion		24.90991

Graph A1: Impulse responses



Note: Horizontal axis measures number of months since the initial shock.

Graph A2: Variance decomposition of BD_SA and CA_SA



Note: Horizontal axis measures number of months since the initial shock.

Table A3: Augmented Dickey-Fuller Test of BD_SA

Null hypothesis: BD_SA has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on SIC, MAXLAG=12)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller Test statistic			-9.091148	0.0000
Test critical values:	1% level		-3.484198	
	5% level		-2.885051	
	10% level		-2.579386	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(BD_SA)				
Method: Least Squares				
Sample (adjusted): 2000M02 2010M04				
Included observations: 123 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BD_SA(-1)	-0.814700	0.089615	-9.091148	0.0000
C	30.06817	27.10531	1.109309	0.2695
R-squared	0.405840	Mean dependent var		-1.919232
Adjusted R-squared	0.400930	S.D. dependent var		385.1039
S.E. of regression	298.0690	Akaike info criterion		14.24865
Sum squared resid	10750258	Schwarz criterion		14.29438
Log likelihood	-874.2922	Hannan-Quinn criter.		14.26723
F-statistic	82.64897	Durbin-Watson stat		2.054036
Prob(F-statistic)	0.000000			

Table A4: Augmented Dickey-Fuller Test of CA_SA

Null Hypothesis: CA_SA has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic based on SIC, MAXLAG=12)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller Test statistic			-1.743423	0.4070
Test critical values:	1% level		-3.484653	
	5% level		-2.885249	
	10% level		-2.579491	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(CA_SA)				
Method: Least Squares				
Sample (adjusted): 2000M03 2010M04				
Included observations: 122 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CA_SA(-1)	-0.063052	0.036166	-1.743423	0.0838
D(CA_SA(-1))	-0.235989	0.089448	-2.638295	0.0094
C	-7.645591	6.035635	-1.266742	0.2077
R-squared	0.094003	Mean dependent var		0.035765
Adjusted R-squared	0.078776	S.D. dependent var		47.82093
S.E. of regression	45.89873	Akaike info criterion		10.51503
Sum squared resid	250696.5	Schwarz criterion		10.58399
Log likelihood	-638.4171	Hannan-Quinn criter.		10.54304
F-statistic	6.173499	Durbin-Watson stat		2.032993
Prob(F-statistic)	0.002812			

Table A5: Augmented Dickey-Fuller Test of D(CA_SA)

Null Hypothesis: D(CA_SA) has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic based on SIC, MAXLAG=12)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller Test statistic			-9.609988	0.0000
Test critical values:	1% level		-3.485586	
	5% level		-2.885654	
	10% level		-2.579708	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(CA_SA,2)				
Method: Least Squares				
Sample (adjusted): 2000M05 2010M04				
Included observations: 120 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CA_SA(-1))	-1.805827	0.187912	-9.609988	0.0000
D(CA_SA(-1),2)	0.471120	0.145077	3.247371	0.0015
D(CA_SA(-2),2)	0.282312	0.089462	3.155654	0.0020
C	-0.617415	4.077299	-0.151427	0.8799
R-squared	0.668274	Mean dependent var		0.311093
Adjusted R-squared	0.659695	S.D. dependent var		76.55545
S.E. of regression	44.65913	Akaike info criterion		10.46876
Sum squared resid	231354.8	Schwarz criterion		10.56168
Log likelihood	-624.1256	Hannan-Quinn criter.		10.50649
F-statistic	77.89541	Durbin-Watson stat		2.027608
Prob(F-statistic)	0.000000			

Table A6: Vector error correction estimates of CA_SA and BD_SA

Sample (adjusted): 2000M04 2010M04		
Included observations: 121 after adjustments		
Standard errors in ( ) & t-statistics in [ ]		
Cointegrating Eq:	CointEq1	
CA_SA(-1)	1.000000	
BD_SA(-1)	1.170054	
	(0.15102)	
	[7.74789]	
C	75.54028	
Error Correction:	D(CA_SA)	D(BD_SA)
CointEq1	-0.105896	-0.555948
	(0.01796)	(0.12957)
	[-5.89737]	[-4.29088]
D(CA_SA(-1))	-0.367708	0.390396
	(0.08274)	(0.59700)
	[-4.44424]	[0.65393]
D(CA_SA(-2))	-0.210547	1.415025
	(0.08445)	(0.60934)
	[-2.49321]	[2.32223]
D(BD_SA(-1))	0.085905	-0.182223
	(0.01905)	(0.13747)
	[4.50889]	[-1.32551]
D(BD_SA(-2))	0.049504	-0.032522
	(0.01405)	(0.10136)
	[3.52413]	[-0.32086]
C	0.278848	-2.170908
	(3.73138)	(26.9238)
	[0.07473]	[-0.08063]
R-squared	0.297611	0.442788
Adj. R-squared	0.267072	0.418562
Sum sq. resids	193417.9	10070041
S.E. equation	41.01091	295.9148
F-statistic	9.745373	18.27696
Log likelihood	-617.9890	-857.1133
Akaike AIC	10.31387	14.26634
Schwarz SC	10.45250	14.40497
Mean dependent	-0.265123	-0.922043
S.D. dependent	47.90367	388.0743
Determinant resid covariance (dof adj.)		1.47E+08
Determinant resid covariance		1.33E+08
Log likelihood		-1475.086
Akaike information criterion		24.61300
Schwarz criterion		24.93648

LITERATURE

Abell, J., 1990. "Twin Deficits during the 1980s: An Empirical Investigation". *Journal of Macroeconomics*, 12 (1), 81-96.

Aristovnik, A. and Zajc, K., 2001. *Current Account Performance and Fiscal Policy: Evidence on the Twin Deficits in Central and Eastern Europe*. INFER, Annual Conference- Economics of Transition: Theory, Experience and EU Enlargement.

Barbosa-Filho N. [et al.], 2006. *Fiscal, Foreign and Private Net Borrowing: Widely Accepted Theories Don't Closely Fit the Facts.* Federal University of Rio de Janeiro, Department of Economic and Social Affairs (DESA), United Nations, and Schwartz Center for Economic Policy Analysis, New School.

Barro, R. J., 1989. "The Ricardian Approach to Budget Deficits". *Journal of Economic Perspectives*, 3 (2), 37-54.

Chang, J-C and Hsu, Z., 2009. *Causality Relationships between the Twin Deficits in the Regional Economy*. Department of Economics, National Chi Nan University.

Dos Santos, C. H. and Silva, A. C. M., 2009. "Revisiting "New Cambridge": the Three Financial Balances in a General Stock-Flow Consistent Applied Modeling Strategy". *Texto para Discussão. IE/UNICAMP, Campinas*, No 169.

Feyrer, J. and Scambaugh, J. C., 2009. "Global Saving and Global Investment: The Transmission of Identified Fiscal Shocks". *NBER, Working Paper Series*, June 2009.

Fidrmuc, J., 2002. "Twin Deficits: Implications of Current Account and Fiscal Imbalances for the Accession Countries". *Focus on Transition*, (2), 72-83.

Gandolfo, G., 1987. *International Monetary Theory and Open Economy Macroeconomics. International Economics II*. Berlin: Springer-Verlag, 280-285.

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

Grier, K. and Haichun, Y., 2009. "Twin Sons of Different Mothers: The Long and the Short of the Twin Deficit Debate". *Economic Inquiry*, 47 (4), 625-638.

Harberger, A., 2008. "Lessons from Monetary and Real Exchange Rate Economics". *Cato Journal*, 28 (2), 225-235.

Hashemzadeh, N. and Wilson, L., 2006. "The Dynamics of Current Account and Budget Deficits in Selected Countries in the Middle East and North Africa". *International Research Journal of Finance and Economics*, (5), 111-129.

Herrmann, S. and Jochen, A., 2005. "Determinants of Current Account Developments in the Central and East European EU Member States – Consequences for the Enlargement of the Euro Area". *Bundesbank, Discussion Papers, Series 1: Economic Studies,* No 32.

Johnson, H., 1977. "The Monetary Approach to the Balance of Payments: A Nontechnical Guide". *Journal of International Economics*, 7 (3), 251-268.

Kohler, M., 2005. "Capital Mobility and Current Account Targeting in Central and Eastern European Countries". *Centre for European Economic Research (ZEW), Discussion Paper,* No. 05-51.

Osborn, D., 2002. *Cointegration for Seasonal Time Series Processes*. Centre for Growth and Business Cycle Research, School of Economic Studies, University of Manchester.

Polak, J. J., 1997. "The IMF Monetary Model at Forty". *International Monetary Fund*, WP/97/49. Washington: International Monetary Fund.

Polak, J. J., 2001. "The Two Monetary Approaches to the Balance of Payments: Keynesian and Johnsonian". *International Monetary Fund*, WP/01/100. Washington: International Monetary Fund.

Summers, L. H., 1988. "Tax Policy and International Competitiveness" in J. Frenkel, ed. *International Aspects of Fiscal Policies*. Chicago: Chicago UP, 349-375.

Vyashnyak, O., 2000. *Twin Deficit Hypothesis: The Case of Ukraine*. Kyiv: National University Kyiv, Mohyla Academy.