Original Paper

The Fiscal Policy of Bulgaria from the Standpoints of the Business Cycle and the Twin Deficits Hypothesis

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ABSTRACT

Macroeconomic management of a small open economy in a currency board arrangement faces two serious problems: first, under a fixed exchange rate, fiscal policy is the only effective macroeconomic instrument for smoothing out the business cycle; second, the twin deficits phenomenon, if it exists, may jeopardize the stability of the currency board arrangement. This paper uses quarterly seasonally adjusted Eurostat data for the period of 1999–2019, the Hodrick–Prescott filter and a vector autoregression (VAR) to answer the three questions that are of utmost importance to Bulgarian policy-makers: first, is the discretionary fiscal policy of the Bulgarian government procyclical or countercyclical? Second, do the automatic stabilizers in the Bulgarian state budget function properly? Finally, is the twin deficits hypothesis valid for Bulgaria? Our findings imply that the fiscal discretion of the Bulgarian government is procyclical, while the automatic fiscal stabilizers do not work effectively. The first part of the twin deficits hypothesis (the causal link between the fiscal balance and the current account balance) is confirmed but the second part of the twin deficits hypothesis (the positive relationship between the fiscal balance and the current account balance) is rejected for Bulgaria. It may be inferred that both sides of the Bulgarian state budget (revenue and expenditure) need to be improved in order to increase the effectiveness of Bulgaria's fiscal policy. Low budget deficits (not higher than 3% of GDP) are recommended for improving the current account balance and encouraging economic growth.

Оригинальная статья

Фискальная политика Болгарии с точки зрения делового цикла и гипотезы двойного дефицита

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АННОТАЦИЯ

Макроэкономическое управление малой открытой экономикой в рамках механизма валютного регулирования сталкивается с двумя серьезными проблемами: во-первых, при фиксированном обменном курсе фискальная политика является единственным эффективным макроэкономическим инструментом для сглаживания делового цикла; во-вторых, явление двойного дефицита, если оно существует, может поставить под угрозу стабильность механизма валютного управления. С помощью квартальных сезонно скорректированных данных Евростата за период 1999–2019 гг., фильтра Ходрика – Прескотта и векторной авторегрессии (VAR) настоящее исследование пытается ответить на три вопроса, имеющих первостепенное значение для руководителей Болгарии: во-первых,

дискреционная фискальная политика правительства Болгарии имеет проциклический или антициклический характер; во-вторых, сделать функциональными автоматические стабилизаторы в болгарском государственном бюджете; и, в-третьих, верна ли гипотеза двойного дефицита для Болгарии? Результаты исследования показывают, что фискальные полномочия болгарского правительства являются проциклическими, а автоматические фискальные стабилизаторы не работают. Таким образом, для Болгарии первая часть гипотезы двойного дефицита (причинно-следственная связь между бюджетным балансом и балансом текущего счета) подтверждается, но вторая часть гипотезы двойного дефицита (положительная связь между бюджетным балансом и балансом текущего счета) отклоняется. Можно сделать вывод, что обе части болгарского государственного бюджета (доходы и расходы) должны быть улучшены, чтобы повысить эффективность налогово-бюджетной политики страны. Низкий бюджетный дефицит (не более 3% ВВП) рекомендуется для улучшения баланса текущего счета и стимулирования экономического роста.

КЛЮЧЕВЫЕ СЛОВА
Болгария, цикличность налогово-бюджетной политики, гипотеза двойного дефицита, фискальная свобода, автоматические фискальные стабилизаторы

1. Introduction

Macroeconomic managers of small open economies with currency boards cannot use monetary policies but only fiscal policies to mitigate cyclical fluctuations. A fiscal policy, which smoothes out the business cycle, is countercyclical. If a fiscal policy amplifies business cycle fluctuations, it is procyclical. For a small open economy in a currency board arrangement, it is essential to have a properly formulated and carefully implemented countercyclical fiscal policy.

An actual fiscal policy is a combination of an active fiscal policy (administrative discretion) and a passive fiscal policy (functioning of automatic fiscal stabilizers). For example, an actual fiscal balance is a sum of a trend in the fiscal balance (a proxy of active fiscal policy) and a cyclical fiscal balance (a proxy for the work of automatic fiscal stabilizers). Statistical filters can be used to decompose fiscal variables into a direct (discretionary, active) component and a cyclical (passive, automatic) component.

When designing and implementing a fiscal policy, policymakers have to consider the relationship between the fiscal balance and the current account balance. If this relationship is positive and significant, i.e. if an increase in the fiscal deficit leads to an increase in the current account deficit, then the twin deficits hypothesis holds true and fiscal surpluses need to be run to prevent worsening of the current account balance and to maintain the stability of the currency board.

This study relies on the quarterly seasonally adjusted Eurostat[1] data for the period 1999–2019, the Hodrick–Prescott filter and a vector autoregression (VAR) to address the following three questions, which are of huge importance to Bulgarian macroeconomic managers: first, what is the cyclical impact of Bulgarian government's discretionary fiscal policy (procyclical or countercyclical); second, whether the automatic stabilizers in the Bulgarian state budget work or not; and, third, whether the twin deficits phenomenon really exists in Bulgaria.

The study has two goals: first, to estimate the cyclical impact of discretionary and automatic changes in total government expenditure and revenue and, second, to test the validity of the twin deficits hypothesis in Bulgaria. The research has two working hypotheses. The first hypothesis is that discretionary and automatic changes in total government expenditure and revenue are procyclical. The second hypothesis is that the twin deficits hypothesis does not hold true for Bulgaria.

The paper is structured as follows. In Section 2, the theoretical and empirical

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[1] The statistical office of the European Union, https://ec.europa.eu/eurostat/data/database

studies on the cyclicality of a discretionary fiscal policy, functioning of the automatic fiscal stabilizers and the twin deficits hypothesis are systematized. In Section 3, the cyclicality of Bulgarian government's fiscal discretion is empirically investigated. In Section 4, functioning of the automatic fiscal stabilizers is analyzed. Section 5 provides an empirical check of the validity of the twin deficits hypothesis for Bulgaria. The final section presents conclusions.

2. Literature review

2.1. Cyclicality of fiscal policy

Neycheva [1, pp. 237–240] examines the discretionary budget policy in 1994–2003 in Bulgaria, assessed by looking at the dynamics of the structural primary budget balance. She aims to describe the trends in the applied fiscal policy in the Bulgarian economy and draws a conclusion about the pro-cyclical nature of government spending, typical of emerging economies and countries in transition.

Halland and Bleaney [2] analyze the relative advantages of competition theories, taking into account alternative methods for assessing the cyclicality of fiscal policy and the differences between developing countries and OECD countries. Less clear is the authors' conclusion that income inequality and net external debt are important for fiscal pro-cyclicality in developing countries; these variables usually reach only a 10% significance level. The authors' conclusions about corruption and democracy are more justified than those concerning social inequality or net external debt. However, this result is not quite obvious, as the corruption index is closely linked to bad credit ratings. On the other hand, in OECD countries, the cyclicality of fiscal policies largely reflects the strength of automatic stabilizers.

Alesina et al. [3, pp. 1006–1036] explain the failure of policy in developing countries due to the pro-cyclical nature of fiscal policy driven by voters seeking to "starve for Leviathan" to reduce political rents. Voters monitor the state of the economy, but not the rents appropriated by corrupt governments. In the time of economic prosperity, voters optimally demand more public goods or lower taxes, and this causes a pro-cyclical bias towards the fiscal policy. The authors' empirical evidence is consistent with the following explanation: the pro-cyclicality of fiscal policy is more pronounced in more corrupt democracies.

Alesina and Tabellini [4] seek to demonstrate why many countries, especially developing ones, are pursuing pro-cyclical fiscal policies, namely spending increases (taxes decrease) in the period of expansion (growth) and expenditures decrease (taxes increase) in the period of recession. They provide an explanation for this suboptimal fiscal policy, based on political distortions and incentives less favorable for a government to find adequate rents. Voters have incentives similar to the classic Leviathan starvation argument and demand more public goods or fewer taxes to prevent governments from renting out when the economy is doing well.

Andersen and Nielsen [5] address the question why fiscal policy is pro-cyclical in developing and developed countries. They introduce the concept of fiscal transparency into a model of retrospective voting, in which pro-cyclical biases arise as a result of a problem with the political agency between voters and politicians. The introduction of fiscal transparency generates two new forecasts: 1) pro-cyclical biases in fiscal policy arise only in good times; and 2) a higher degree of fiscal transparency reduces bias in good times. The authors find strong empirical support for the first forecast in OECD countries, but also find encouraging results in favor of the second forecast in OECD countries as well as in a wider sample of countries: better access to information on government policies reduces pro-cyclical prejudices in government spending in good times.

Aliyev [6] analyzes the pro-cyclicality of fiscal policy in resource-rich countries. For developing countries, there is a strong U-shaped link between the pro-cyclicality of government capital expenditures and the indicator of resource wealth, which corresponds to the share of mineral exports in total exports of goods. This link

has proven to be robust to different methodologies and checks. The author considers two hypotheses: the hypothesis of political economy and the hypothesis of limiting loans. His empirical observations appear to be consistent with both hypotheses. A model has been created that can generate a U-shaped effect, combining political economy and borrowing constraint hypoheses.

Riascos et al. [7] examine differences in the pro-cyclicality of government consumption, which corresponds to a standard neoclassical model of fiscal policy in which policymakers make optimal choices about both the level of government consumption and taxes. The results show that in the overall markets the correlation between government consumption and output is zero (as in the G-7 countries). However, with only risk-free debt, this correlation is usually above 0.7, which suggests that the lack of a sufficiently rich menu of financial assets may be a major factor in the way fiscal policy is implemented in developing countries.

Lane [8, pp. 2661–2675] demonstrates that the level of cyclicality varies across different cost categories and OECD countries. In line with the leading theories of fiscal cyclicality, the author concludes that countries with volatile outputs and dispersed political power are the most inclined to govern pro-cyclical fiscal policies. Government spending on wages is highlighted as the most important channel through which these variables affect fiscal cyclicality.

Alberola-Ila et al. [9] analyze the stabilizing role of discretionary fiscal policy at a time of fiscal financing and fiscal rules for a sample of eight Latin American economies. The analysis shows three main results: 1) fiscal policies became countercyclical during the crisis, but they have become pro-cyclical again in recent years; 2) the financing conditions have been confirmed as the main driver of the fiscal position, but their relevance has been declining recently; and 3) fiscal rules are associated with a more stabilizing role for fiscal policy.

Manasse [10] assesses the role of shocks, rules and institutions as possible sources of pro-cyclicality in fiscal policy by using parametric and nonparametric techniques. As a result, the following four main conclusions are made. First, politicians' reactions to the business cycle vary depending on the state of the economy – fiscal policy is "acyclic" during bad economic times, while it is largely pro-cyclical in good times. Second, fiscal rules and fiscal liability laws typically reduce deficit bias on average and appear to improve rather than weaken countercyclical policies. Third, strong institutions are associated with a lower deviation from deficit, but their impact on pro-cyclicality is different in good and bad times and is subject to declining returns. Fourth, unlike developed countries, fiscal policy in developing countries is even pro-cyclical during a (moderate) recession; in "good times", however, fiscal policy is actually more pro-cyclical in developed economies.

Bova et al. [11] examine the spread of fiscal rules in the developing world and the relationship between fiscal rules and pro-cyclical fiscal policy. The paper concludes that developing countries outperform advanced economies as consumers of fiscal rules, but greater use of fiscal rules has not prevented these countries from being pro-cyclical, as fiscal policy remains pro-cyclical after the adoption of fiscal rules. The article also found partial evidence that some features of second-generation rules, such as the use of cyclically-adjusted targets, well-defined escape clauses, together with stronger legal rules and implementing provisions, may be related to less procyclicality.

The reviewed literature sources can be systematized as follows:

1. According to their territorial scope, they are divided into studies on one country [1] and on more than one country [2–11].

2. According to their methodology, the reviewed literature sources can be divided into using those correlation coefficients [7] and those employing regression coefficients [1; 2–6; 8–11].

3. According to their results, the studies are divided into those demonstrating that fiscal policy is predominantly pro-cy-

clical [1; 2–6; 8; 10; 11]; mainly countercyclical [9] and acyclical [7].

The majority of authors agree on several important conclusions about the cyclical nature of fiscal policy:

● The cyclical nature of fiscal policy depends on many factors such as the phase of the business cycle, the quality of institutions and governance and others;

● During the time of growth and prosperity, fiscal policy is predominantly procyclical, and in times of recession – mostly acyclical. Cases of countercyclical fiscal policy are rare, even in times of crisis;

● Fiscal policy is much more procyclical in developing countries than in developed countries. In developed economies, higher quality institutions and governance help limit the propensity of politicians to increase government spending in the years before elections and to reduce them in the years after elections.

2.2. Twin deficits hypothesis

Mitra and Khan [12, pp. 10–23] analyze the double deficit hypothesis in India for the period from April 1994–1995 till July 2013–2014. The methods used in the article are descriptive statistics to check for the presence of normality in the frequency distribution, followed by a unit root test. The existence of a short-term and long-term relationship between the respective variables, current account balance and fiscal balance was tested by applying the cointegration test, followed by the error correction mechanism, Wald test and Granger causality test. The article also estimates the growth rate of the variables for the period, applying a simple regression model. The results of the Wald test and Granger test suggest that there is a two-way causal relationship between the variables in the short run, while the results of the cointegration test and the error correction mechanism show instability in the long run. In addition, there is a positive growth of both variables, as the fiscal balance grows at a higher rate. Therefore, the double deficit hypothesis is confirmed for India in the post-liberalization period.

Durusu-Ciftci [13, pp. 51–69] considers a dynamic causal link between the government budget deficit and the current account for five heavily indebted European countries: Greece, Ireland, Italy, Portugal and Spain (GIIPS) with newly developed econometric techniques. The study uses an analysis of the Toda-Yamamoto causal relationship and then its Fourier approximation to examine structural changes. The results reveal that addressing structural changes is important for the relationship between GIIPS fiscal and current account imbalances. The results of the analysis, which does not take into account structural changes, show that the double deficit hypothesis is supported by the Keynesian hypothesis (for Spain) or the current account targeting hypothesis (for Greece and Portugal), but the equivalence theory is also recognized of Barro – Ricardo Equivalence for Ireland and Italy. On the other hand, the analysis of causation, which takes into account structural changes, shows that the current account hypothesis is supported by all countries except Ireland.

Lonevskyi and Klimaitis [14] investigate the double deficit hypothesis for countries of the Eastern European group. The relationship between the budget balance and the current account balance is analyzed throughout the sample and three groups of sub-samples, based on the level of development, the structure of tax revenues and the level of debt. The effect of the budget balance is studied by using the model with fixed effects and the generalized method of moments. The initial findings of the study reject the double deficit hypothesis for the sample of Eastern European countries. However, the results for the sub-samples are drastically different. The study found a positive and statistically significant effect of the budget balance for economies in transition, countries with mostly indirect tax revenues and countries with a level of debt below the median sample.

Sobrino [15, pp. 9–15] examines a causal relationship between the current account and the fiscal surplus and the fiscal expenditures of the commodity-based economy of Peru. Using quarterly data on the open economy, the results reject

the double deficit hypothesis. Instead, the evidence suggests reverse causality, i.e. the current account causes the fiscal account. However, unlike previous empirical evidence on this issue, for one year the causal feedback shows a negative causal relationship, as fiscal consumption is not smoothed out when positive permanent current account shocks occur. In the short run, fiscal policy has no effect on the current account, but improvements in the current account increase the likelihood of achieving a lower limited fiscal deficit. This evidence is consistent with a small open commodity-based economy that is highly exposed and sensitive to external price shocks.

Kiran [16, pp. 59–66] examines the long-term relationship between the trade deficit and budget deficit in Turkey in the context of the factional approach to cointegration. This approach facilitates the assumption in conventional cointegration analyzes that cointegrating residuals must be integrated to zero and allows it to take any real value. Empirical results from the annual data for the period 1975–2009 show that there is little evidence of the partial correlation between the trade deficit and budget deficit, and therefore the validity of the double deficit hypothesis in Turkey.

Lau and Baharumshah [17, pp. 213–226] investigate the double deficit hypothesis using data from a panel of nine SEACEN countries. Their empirical results show that the Asian budget deficit causes the current account deficit both directly and indirectly. Moreover, their statistical analysis suggests that budget deficit management offers opportunities to improve the current account deficit. However, this finding does not support the policy of manipulating intermediate variables to reduce deficits to a sustainable level, as these variables appear to be endogenous in the system.

Ganchev [18, pp. 357–377] studies the validity of the double deficit hypothesis in Bulgaria. He analyzes the theoretical foundations and alternative explanations for this hypothesis and uses various econometric approaches to test its validity in

Bulgaria. Granger's causality test assumes the existence of a double causal relationship between fiscal and current account deficits. An autoregressive vector and a vector error correction model reject the hypothesis of a double deficit in the short run, but this conclusion may be valid in the long run.

Epaphra [19, pp. 2–34] examines the relationship between the current account and general government deficit in Tanzania. The article tests the validity of the double deficit hypothesis using annual time series data for the period 1966–2015. Empirical tests have failed to reject the double deficit hypothesis, which shows that rising budget deficits are hampering Tanzania's current account deficits. In particular, the results of the vector error correction model support the conventional theory of a positive relationship between fiscal and external balance, with a relatively high rate of adjustment to equilibrium. This evidence is the same for small open economies. To address such a problem, which may be caused by this type of relationship, the author recommends using appropriate policy variables to reduce the budget deficit, for example, improving the collection of domestic revenues and actively fighting corruption and tax evasion. The government should also target export-oriented companies and encourage the import substitution industry by creating favorable business environments.

Tosun et al. [20, pp. 141–160] empirically examine the existence of a long-term relationship and the direction of the causal link between budget deficits and the current account for some economies in Central and Eastern Europe (Bulgaria, Latvia, Lithuania, Poland, Romania, Serbia and Slovenia). Empirical analysis depends on the bounds testing approach of Pesaran, Shin, and Smith to co-integration and noncausality. No evidence has been obtained in favor of the double deficit hypothesis for the selected countries, with the exception of Bulgaria, as the results support causality.

Bolaman and Yucel [21, pp. 467–476] analyze the hypothesis of a double defi-

cit in Turkey for the period 1950–2011. In the empirical part, Engle Granger's cointegration method and Toda Yamamoto's Causality Test are applied. The conclusion they reach is in line with the Keynesian proposal, and it can be said that the budget balance must prevail over the current account balance in the fight against the double deficit hypothesis. Internal balance is achieved by maintaining budget balance, which, as the authors argue, improves indirectly the current account balance.

Corsetti and Müller [22, pp. 597–638] review the international transmission mechanism in a standard two-digit business cycle model from two countries and find that fiscal expansion has no effect on the trade balance and thus on the current account i) if the economy is not very open to trade and ii), if fiscal shocks are not too constant. Under these conditions, the effect of pushing out fiscal shocks on private investment is stronger than is usually assumed. The authors examine the transmission of fiscal shocks in a VAR model calculated for Australia, Canada, the United Kingdom, and the United States. For the USA and Australia, which are less open to trade than Canada and the UK, the external impact of shocks on either government spending or the budget deficit has been found to be limited, while private investment has reacted significantly, according to theoretical forecasts. The opposite is true for Canada and the UK.

Vyshnyak [23] describes the experience with the double deficit hypothesis in Ukraine. The double deficit hypothesis is tested empirically by using Granger integration and causality tests. The study showed that the budget deficit and the current account deficit are co-integrated and the state budget deficit causes a current account deficit. The transmission mechanism between the two deficits works mainly through the exchange rate. The existence of a link to the double deficit implies certain policy recommendations needed to improve the situation. In particular, the development of a strong financial sector of the economy and the improvement of the investment climate

are essential for the development of this country and can serve to break the link between the two deficits.

Ganchev et al. [24, pp. 1–21] analyze the theoretical foundations of the hypothesis of double deficit in the countries of Central and Eastern Europe. The authors apply different econometric techniques to refine the validity of different approaches based on panel data for CEE countries. The regression of the OLS panel shows a relatively modest positive relationship between the current account and the final deficit, which confirms the double deficit paradigm. Another conclusion of the authors is that the hypothesis of a double deficit can be transferred in the case of Bulgaria and Estonia. Autoregressive analysis is no longer compatible with the double deficit hypothesis.

The reviewed literature sources can be systematized as follows:

1. According to the territorial scope, they are divided into studies on one country [14; 16; 18; 19; 21; 23; 24] and on more than one country [17; 19; 20; 22];

2. The reviewed literature sources use two main groups of research methods – tests for causal relationships and coefficients for movement (regression or correlation). Among the causal tests, Granger's tests for short-term causality (Pairwise Granger Causality Tests) and for long-term causality (Granger Causality / Block Exogeneity Wald Tests) predominate [12; 15; 17–20; 22; 23]. Other tests for causal relationships, such as Toda-Yamamoto, are also employed [13; 21]. The coefficients for co-movement are mainly regression coefficients, which are evaluated with the help of different variations of regression analysis – cointegration analysis [16; 21; 23], vector autoregression [13; 18; 22], vector error correction [12; 18; 19], generalized method of moments [14] and autoregressive distributed lag model [20].

3. According to the results, the reviewed literature sources are divided into those confirming the validity of the twin deficits hypothesis [12–13; 16; 19; 21; 23] and rejecting the validity of the twin deficits hypothesis [15; 18; 20; 22].

3. Empirical analysis of the cyclical impact of Bulgarian government's discretionary fiscal policy

The cyclical impact of Bulgaria's fiscal discretion was measured by two correlations:

1) The correlation between the output gap and the change in the trend share of total government expenditure in GDP. If this correlation is negative, the discretionary fiscal policy is countercyclical. If this correlation is positive, the discretionary fiscal policy is procyclical. A negative correlation between the output gap and the change in the trend share of total government expenditure in GDP may occur in two cases: first, a positive (inflationary) output gap and a negative change (decrease) in the trend share of total government expenditure in GDP; and second, a negative (deflationary) output gap and a positive change (increase) in the trend share of total government expenditure in GDP. In the first case the discretionary decrease in the government expenditure mitigates inflation and diminishes the risk of overheating of the economy. In the second case the discretionary increase in the government expenditure combats deflation and contraction. In both cases, a negative correlation means countercyclicality of the discretionary government spending.

2) The correlation between the output gap and the change in the trend share of total government revenue in GDP. If this correlation is positive, the fiscal discretion is countercyclical. If this correlation is negative, the fiscal discretion is procyclical. A positive correlation between the output gap and the change in the trend share of total government revenue in GDP may arise in two cases: first, a positive (inflationary) output gap and a positive change (increase) in the trend share of total government revenue in GDP; and second, a negative (deflationary) output gap and a negative change (decrease) in the trend share of total government revenue in GDP. In the first case the discretionary increase in government revenue mitigates inflation and diminishes the risk of overheating of the economy. In the second case

the discretionary decrease in government revenue combats deflation and contraction. In both cases, a positive correlation means countercyclicality of the discretionary government revenue policy.

The changes in the trend shares of total government expenditure and total government revenue in GDP result from the discretionary fiscal policy of the government, while the output gap indicates the cyclical position of the economy.

For Bulgaria, the calculated correlations between the output gap, on the one hand, and, the changes in the trend shares of total government expenditure and total government revenue in GDP, on the other hand, for 1999–2019 were 0.20 and –0.17 respectively. This means that discretionary changes in both total government expenditure and total government revenue in the period of investigation were procyclical.

The output gap was calculated by the following formula:

$$Gap = (Actual\ GDP - Potential\ GDP) \times {} \atop \times\ 100\ /\ Potential\ GDP \quad (1)$$

The potential GDP, the trend share of total government expenditure in GDP and the trend share of total government revenue in GDP were obtained via the Hodrick–Prescott filter.

4. Empirical assessment of the automatic fiscal stabilizers' functioning in Bulgaria

The empirical assessment of the automatic fiscal stabilizers' functioning in Bulgaria was made on the basis of two indicators:

1) The correlation between the output gap and the change in the cyclical share of total government expenditure in GDP. If this correlation is negative, it means that the fiscal stabilizers function well. If this correlation is positive, it indicates a failure in the functioning of the fiscal stabilizers. A negative correlation between the output gap and the change in the cyclical share of total government expenditure in GDP may occur in two cases: first, a positive (inflationary) output gap and a negative change (decrease) in the cyclical share of

total government expenditure in GDP; and second, a negative (deflationary) output gap and a positive change (increase) in the cyclical share of total government expenditure in GDP. In the first case the automatic decrease in government expenditure mitigates inflation and diminishes the risk of overheating of the economy. In the second case the automatic increase in government expenditure combats deflation and contraction. In both cases, a negative correlation means that the automatic fiscal stabilizers function effectively.

2) The correlation between the output gap and the change in the cyclical share of total government revenue in GDP. If this correlation is positive, it means that the fiscal stabilizers function well. If this correlation is negative, the fiscal stabilizers do not work well. A positive correlation between the output gap and the change in the trend share of total government revenue in GDP may arise in two cases: first, a positive (inflationary) output gap and a positive change (increase) in the cyclical share of total government revenue in GDP; and second, a negative (deflationary) output gap and a negative change (decrease) in the cyclical share of total government revenue in GDP. In the first case the automatic increase in government revenue mitigates inflation and diminishes the risk of overheating of the economy. In the second case the automatic decrease in government revenue combats deflation and contraction. In both cases, a positive correlation means that the automatic fiscal stabilizers function effectively.

3) The changes in the cyclical shares of total government expenditure and total government revenue in GDP are a result of the work of the automatic fiscal stabi-

lizers, while the output gap indicates the cyclical position of the economy.

For Bulgaria, the calculated correlations between the output gap, on the one hand, and, the changes in the cyclical shares of total government expenditure and total government revenue in GDP, on the other hand, for 1999–2019 were respectively 0.08 and –0.09. This means that automatic changes in both total government expenditure and total government revenue in the period of investigation were procyclical, i.e. that automatic stabilizers in both the expenditure part and the revenue part of the state budget did not function effectively.

The potential GDP, the cyclical share of total government expenditure in GDP and the cyclical share of total government revenue in GDP were obtained via the Hodrick–Prescott filter.

5. Empirical test of the twin deficits hypothesis for Bulgaria

According to the twin deficits hypothesis, a causal link and a positive relationship exist between the national government's budget balance and its current account balance. This implies that an increase in the government budget deficit will cause an increase in the current account deficit.

To check the validity of the twin deficits hypothesis for Bulgaria, a vector autoregression (VAR) of quarterly data for 1999–2019 was employed. The VAR model included two variables – *CAB* (current account balance) and *FISCB* (fiscal balance), which were measured as a percentage of GDP. The target (dependent) variable was *CAB*.

The group unit root tests (see Table 1) showed that as a group, *CAB* and *FISCB*

Table 1

Group stationarity tests of CAB and FISCB

Method	Statistic	Probability	Cross-sections	Observations
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	–2.34	0.01	2	165
Breitung t-stat	–1.52	0.06	2	163
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	–3.68	0.00	2	165
ADF – Fisher Chi-square	30.00	0.00	2	165
PP – Fisher Chi-square	30.74	0.00	2	166

Source: Prepared by the authors

were stationary at a level that required the application of unrestricted VAR.

The test for the optimal number of lags in the vector autoregression indicated that, according to all criteria, this number was two (see Table 2). The vector autoregression was estimated with two lags.

Table 2

Optimal lag length in the VAR model

Number of lags	FPE	AIC	SC	HQ
0	932.8944	12.51404	12.57538	12.53856
1	143.6098	10.64277	10.82678	10.71631
2	124.7729*	10.50187*	10.80854*	10.62443*
3	134.2447	10.57437	11.00372	10.74596
4	133.3627	10.56659	11.11861	10.78721
5	141.6631	10.62511	11.29980	10.89475
6	149.3572	10.67530	11.47266	10.99396
7	133.5826	10.55998	11.48000	10.92766
8	146.3736	10.64653	11.68923	11.06324

* Shows the optimal number of lags according to the respective criterion
Source: Prepared by the authors

The equation for the target variable in the VAR model *CAB* after the step-by-step removal of statistically insignificant variables is as follows:

$$CAB = -0.13 + 0.51 \times CAB(-1) + \\ + 0.43 \times CAB(-2) - 0.24 \times FISCB(-1)$$

The standard errors, t-statistics and probabilities of the regression coefficients in Equation (1) are shown in Table 3.

The current account balance of Bulgaria is affected by its own past values and the previous value of the fiscal balance. The negative value of the regression coefficient before *FISCB* (–0.24) means that the twin deficits hypothesis is not valid for Bulgaria since a 1% change in the fiscal balance will lead to a 0.24% change in the current account balance in the opposite direction. Hence, a 1% increase in the fiscal deficit will not raise the current account deficit but decrease it by 0.24%.

Table 3

Results from the econometric estimation of Equation (1)

Variable	Coefficient	Standard error	*t*-Statistic	Probability
C	–0.133830	0.401262	–0.333521	0.7396
CAB(–1)	0.506065	0.104621	4.837141	0.0000
CAB(–2)	0.427012	0.103196	4.137863	0.0001
FISCB(–1)	–0.242900	0.097330	–2.495638	0.0147

Source: Prepared by the authors

The value of the coefficient of determination (R-squared = 0.87) indicates that 87% of the variation of Bulgaria's current account balance can be explained by changes in the independent variables in Equation (1). The probability of the *F*-statistic (0,00) shows that the alternative hypothesis of adequacy of the model used is confirmed. It should be made clear that this does not mean that the model is the best possible one but simply that it adequately reflects the relationship between the dependent and independent variables.

The CUSUM test results imply that Equation (1) is dynamically stable (see Figure 1), as the actual CUSUM values are
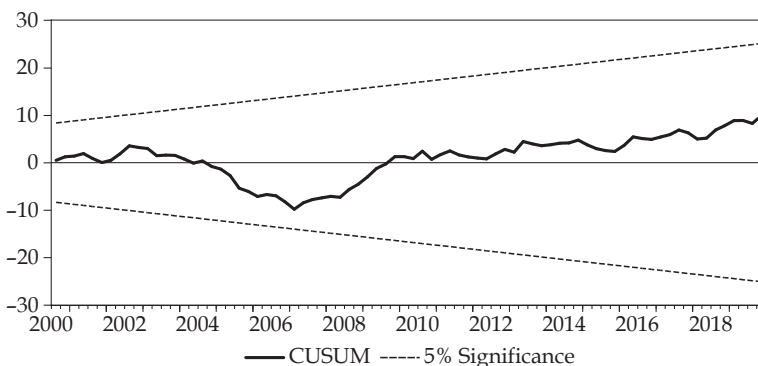

***Fig. 1.* CUSUM test for dynamic stability of Equation (1)**
Source: Prepared by the authors

within the confidence interval at the 5% significance level.

The results of the Ramsey test (probability of the F-statistic 0.16) give reason to accept the null hypothesis of lack of errors in the specification of Equation (1).

The probability of Jarque-Bera statistics is 0.53 (see Figure 2), which justifies the acceptance of the null hypothesis of normal distribution of the residuals in Equation (1).

The null hypothesis for the absence of a serial correlation of residuals in Equation (1) was confirmed (see Table 4). The results of the heteroscedasticity test of the residuals in Equation (1) listed in Table 5 gave reason to accept the null hypothesis for the lack of heteroscedasticity.

Table 4

Results from the serial correlation test of residuals in Equation (1)

F-statistic	0.42	Probability *F* (2.76)	0.66
Observations R^2	0.90	Probability Chi-square (2)	0.64

Source: Prepared by the authors

Table 5

Results from the heteroscedasticity test of residuals in Equation (1)

F-statistic	0.48	Probability *F* (3.78)	0.70
Observations R^2	1.48	Probability Chi-square (3)	0.69

Source: Prepared by the authors

The results from the Pairwise Granger Causality Tests (see Table 6) show that in the short term at the significance level of 10% Bulgaria's fiscal balance Granger-causes Bulgaria's current account balance but Bulgaria's current account balance does not Granger-cause Bulgaria's fiscal balance.

Table 6

Results from short-term causality tests

Null Hypothesis	Probability
FISCB does not Granger Cause *CAB*	0.0518
CAB does not Granger Cause *FISCB*	0.3774

Source: Prepared by the authors

The results from the Granger Causality / Block Exogeneity Wald Tests (see Table 7) indicate that in the long run at the significance level of 5% Bulgaria's current account balance is Granger-caused by Bulgaria's fiscal balance but Bulgaria's fiscal balance is not Granger-caused by Bulgaria's current account balance.

Table 7

Results from long-term causality tests

Null Hypothesis	Probability
FISCB does not Granger Cause *CAB*	0.0461
CAB does not Granger Cause *FISCB*	0.3727

Source: Prepared by the authors

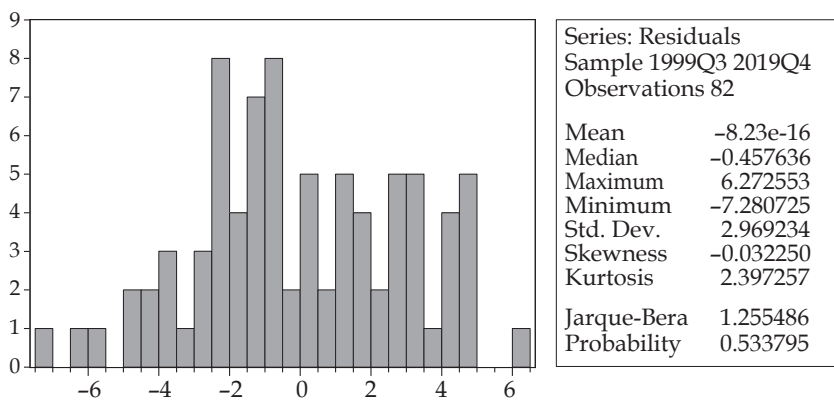The response of Bulgaria's current account balance to changes in Bulgaria's fiscal balance is shown in Figure 3.

Series: Residuals
Sample 1999Q3 2019Q4
Observations 82

Mean	–8.23e-16
Median	–0.457636
Maximum	6.272553
Minimum	–7.280725
Std. Dev.	2.969234
Skewness	–0.032250
Kurtosis	2.397257
Jarque-Bera	1.255486
Probability	0.533795

Fig. 2. **Test for normal distribution of residuals in Equation (1)**
Source: Prepared by the authors

Response of *CAB* to Cholesky
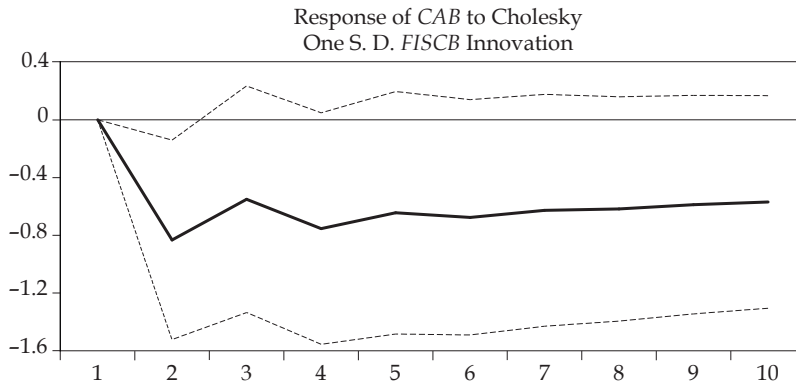One S. D. *FISCB* Innovation

***Fig. 3.* Response of Bulgaria's current account balance to changes
in Bulgaria's fiscal balance**

Source: Prepared by the authors

The study results imply that the fiscal discretion of the Bulgarian government is procyclical, while the automatic fiscal stabilizers do not work. The first part of the twin deficits hypothesis (the causal link between the fiscal balance and the current account balance) is confirmed but the second part of the twin deficits hypothesis (the positive relationship between the fiscal balance and the current account balance) is rejected for Bulgaria.

6. Conclusion

Our empirical results indicate that the Bulgarian government's fiscal discretion has a procyclical impact on Bulgaria's economy, whereas the automatic fiscal stabilizers do not function effectively. The discretionary and the automatic changes in both sides of Bulgaria's state budget (revenue and expenditure) are procyclical, which requires an improvement in the formulation and implementation of the fiscal policy.

As for the twin deficits hypothesis, our findings confirm the causal link between the fiscal balance and the current account balance but refute the positive relationship between them. The empirically ascertained negative relationship between the fiscal balance and the current account balance can be explained by the consumption-based tax system in Bulgaria and the non-functioning of the automatic adjustment mechanism of the Bulgarian currency board arrangement.

An important inference from this research is that it is not the fiscal surpluses but the fiscal deficits that improve Bulgaria's current account balance. The moderate fiscal deficits (below 3% of GDP) are advisable since they can both stimulate economic growth and decrease the current account deficits.

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