

FISCAL AND MONETARY DETERMINANTS OF THE GROWTH AND THE CYCLICAL RECURRENCE OF THE BULGARIAN ECONOMY

Petar Yurukov¹

Received: 18.06.2019, Accepted: 30.06.2019

Abstract

The objective of this article is to study the opportunities for managing Bulgaria's economic growth and business cycle under a currency board arrangement. The fiscal and monetary determinants of growth and cyclical recurrence of Bulgaria's economy, their size and impact direction have been identified by vector autoregression (VAR). Recommendations have been made on macroeconomic policies, which stimulate growth and smooth out the cyclical fluctuations of the Bulgarian economy.

Keywords: *Bulgaria; economic growth; business cycle; fiscal policy; monetary policy; currency board arrangement; vector autoregression*

JEL Codes: *E32, E52, E62, F43, 047*

1. Introduction

There are many studies on the economic growth and business cycle of Bulgaria in the process of transition to a market economy – Ganev (2005), Minassian (2008), Pirimova (2001 and 2014), Raleva (2013), Statev (2009), Todorov and Durova (2016), Todorov, Durova and Aleksandrov (2018) etc.

Under a currency board, the opportunities for managing the growth and cyclicity of the economy are limited. The exchange rate fixation does not allow the absorption of external shocks through its change and the control over money supply is lost. There is no autonomous exchange rate policy and monetary policy becomes ineffective. Fiscal policy continues to operate effectively but is limited by the requirement to avoid simultaneously a current account deficit and a fiscal deficit (so-called twin deficits).

The objective of adopting the single European currency further complicates the task of Bulgarian macroeconomic governance as it implies compliance with the

¹ PhD Student, South-West University "Neofit Rilski", Faculty of Economics, Department of Finance and Accounting, email: petaryurukovofficial@gmail.com

Maastricht criteria for inflation, budget deficit, government debt, interest rate and exchange rate. Since joining the European Union (EU) in 2007, Bulgaria has always met convergence requirements for government debt, budget deficits and exchange rate stability. Bulgaria's experience has shown that an expanding economy may face difficulties covering the criterion of inflation, while in a decline the interest rate criterion is likely to be a problem. These empirical facts have their theoretical explanation. In the conditions of a catching-up economic development and fixing of the lev to the euro, the price level during an expansion ought to grow faster in Bulgaria than in the Euro area (EA), which could impede the fulfillment of the inflation criterion. In times of crisis, markets become sensitive to the solvency of government, and this may make it more difficult to meet the requirement of the interest rate on the ten-year government bonds.

The Bulgarian Currency Board has constructive features that Bulgarian macroeconomic management should know and use. As for monetary policy, money supply is not determined by the Central Bank (CB), but depends on the size of its foreign exchange reserves. The Bulgarian National Bank (BNB) does not perform open market operations (OMO) and does not control the base interest rate (BIR) but defines the minimum required reserves (MRR) for commercial banks' deposits. The discount policy and the refinancing of commercial banks (the fulfillment of the lender of last resort function) are subject to serious limitations (Minassian, 2008):

- There must be a liquidity risk for the stability of the entire banking system;
- The commercial bank experiencing temporary liquidity problems must be solvent and provide a collateral at the amount of 125% of the refinancing;
- The loan must be fully repaid in three months at an interest rate exceeding the market one;
- The loan must not exceed the deposit of the Banking Department in the Issue Department of the BNB.

The BNB has the potential to indirectly influence money supply through the management of foreign exchange reserves, the regulation and the supervision of commercial banks. The good management of foreign exchange reserves, the quality regulation and supervision of commercial banks increase the confidence in the national currency and banking system and stimulate business agents to switch from euro to lev positions. This in turn expands the foreign exchange reserves of the BNB and the money supply. In this sense, the bankruptcy of the Corporate Commercial Bank in 2014 severely hit the authority of the BNB.

Under a fixed exchange rate regime, such as the currency board, fiscal policy functions efficiently in contrast to monetary policy, despite the ban on financing the budget deficit by the central bank. The low size of the Bulgarian government debt allows expansionary fiscal policy and formation of budget deficits as an anti-crisis measure during a recession. The Bulgarian government has the opportunity to conduct monetary policy with fiscal funds, changing the amount of its deposit in the BNB Issue Department

(the so-called fiscal reserve). By reducing the amount of this deposit and moving part of it into a commercial bank, the government can increase money supply and its revenues, but this action may lead a loss of government funds and violates the rules of the currency board.

The purpose of this study is to analyze the options for macroeconomic management of growth and cyclicity under the conditions of the Bulgarian currency board. The aim of the study is achieved through the fulfillment of the following tasks:

- Review of literature on the Bulgaria currency board (section two);
- Outlining the specificities of the Bulgarian currency board arrangement (section three);
- Identification of fiscal and monetary determinants of Bulgaria's economic growth (section four);
- Identification of fiscal and monetary determinants of Bulgaria's business cycle (section five);
- Formulation of advisable macroeconomic policies, which encourage growth and smooth out the cyclical fluctuations of the Bulgarian economy (conclusion section).

In this study, a Vector Autoregression (VAR) is applied in an attempt to identify macroeconomic policies, which facilitate the growth and minimize the fluctuations of the Bulgarian economy. Quarterly Eurostat seasonally adjusted data are used for the period from the first quarter of 2000 to the fourth quarter of 2017. All indicators are calculated as a percentage of actual real GDP, except for the output gap, which is presented as a percentage of potential GDP. Potential GDP is estimated via the Hodrick-Prescott filter.

All variables are tested for stationarity. If they are found to be integrated of the first order, tests are made for the optimal number of lags and co-integration of Johansen. The optimal number of lags is used in the Johansen test and in the construction of the vector autoregression. If the Johansen test demonstrates a cointegration link between variables, a restricted VAR, also known as a Vector Error Correction (VEC), is applied. Otherwise, an unrestricted VAR is employed.

The short-term cause-and-effect relationships between the variables are analyzed through Pairwise Granger Causality Tests, while long-term via the Granger Causality/Block Exogeneity Wald Tests. Impulse Response charts have been produced to illustrate how target variables (real GDP growth rate and output gap) respond to fiscal and monetary shocks.

Recommendations have been made on macroeconomic policies, which support the growth and smooth out the cyclical fluctuations of the Bulgarian economy. In selecting the explanatory fiscal and monetary variables involved in the vector autoregression, the general principles of macroeconomic management under a currency board and the specifics of the Bulgarian currency board have been taken into account.

2. Literature review

Bulgaria's CBA is heavily debated in economic literature (Minassian, Nenova and Yotzov, 1998; Avramov, 1999; Miller, 1999; Dobrev, 1999; Ialzanov and Nenovsky, 2001; Carlson and Valev, 2001; Nenovsky and Hristov, 2002; Nenovsky and Dimitrova, 2002; Nenovsky, Hristov and Mihaylov, 2002; Hristov, 2004; Desquilbet and Nenovsky, 2004; Chobanov and Nenovsky, 2004; Moheput, 2008; Hardouvelis and Monokrousos, 2009; Todorov, 2013; Fabris and Rodic, 2013; Marinova, 2016; Minassian, 2018 etc.). Hanke and Schuler (1991) suggested that a currency board be introduced in Bulgaria in order to achieve a convertibility of the Bulgarian lev in foreign currency. This proposal was implemented on 1 July 1997 following a severe financial crisis involving bank failures and a serious internal and external depreciation of the Bulgarian lev.

Avramov (1999) reviewed the common features of the CBAs, their internal and external vulnerability, the peculiarities of the Bulgarian CBA and possible exit strategies.

Miller (1999) analyzed the first two years of the functioning of the currency board in Bulgaria in terms of its organizational structure and the strengths and weaknesses characteristic of the currency boards.

Dobrev (1999) focused on the specifics of monetary policy, financial system and management of foreign exchange reserves under the conditions of the Bulgarian currency board.

Ialzanov and Nenovsky (2001) discussed the advantages and disadvantages of maintaining the currency board until Bulgaria enters the Eurozone. As an alternative to the currency board, the authors offered the so-called Euroization (the introduction of the euro in Bulgaria unilaterally or on the basis of a bilateral agreement before Bulgaria's entry to the European Monetary Union).

Carlson and Valev (2001) explored the effects of change of the exchange rate regime in 1997 on the inflation expectations in Bulgaria. The authors found that the introduction of a currency board had lowered inflationary expectations, but to varying degrees for individual business agents.

Nenovsky and Hristov (2002) empirically tested the options for discretionary monetary policy under the conditions of the Bulgarian currency board, which is part of the new generation of currency boards. The authors concluded that there were such options under the Bulgarian currency board and that the automatic adjustment mechanism, characteristic of the orthodox CBAs, did not work.

Nenovsky and Dimitrova (2002) examined the sources and dynamics of inflation in Bulgaria. They found dynamic but not static Balassa-Samuelson effect. The authors concluded that the main factors of the inflation dynamics in Bulgaria under the currency board are imported inflation and temporary differences between money supply and demand for money.

Nenovsky, Hristov and Mihaylov (2002) performed a comparative and descriptive analysis of the currency boards in Bulgaria, Estonia and Lithuania. Their conclusions were that the three CBAs did not function in a similar way and differed significantly in the reasons for their introduction, their institutional design and their available macroeconomic instruments.

Hristov (2004) tried to empirically answer the question whether the flexibility of macroeconomic instruments in Bulgaria to deal with external shocks would have been greater in a classical central bank than in a currency board arrangement. Hristov concluded that conditions for an effective discretionary monetary policy of a classical central bank in Bulgaria during the period 1997-2004 did not exist for two reasons: first, the economic dynamics during this period was determined mainly by structural rather than by cyclical factors and second, there is no confidence of economic agents in discretionary monetary policy.

Desquilbet and Nenovsky (2004) compared the Gold Standard and the Currency Board as monetary regimes with a high degree of confidence in monetary authorities and an automatic adjustment mechanism. The authors made two important conclusions: first, the credibility of the Gold Standard was determined by endogenous, and in the currency board by exogenous factors, and secondly, asymmetries in economic adjustment are much higher in the currency board than in the Gold Standard.

Chobanov and Nenovsky (2004) analyzed empirically the liquidity of the money market in Bulgaria under a currency board. The imbalances in the Bulgarian money market could not be overcome by adjusting interest rates, as in hard CBAs, but required management of government reserves in the Central Bank balance sheet. This management allows the government to pursue a discretionary monetary policy by fiscal means.

Moheeput (2008) explored the CBAs in the context of a comprehensive analysis of the problems of choosing a currency-exchange regime. The author claimed that currency boards were created for three reasons: first, to quickly deal with financial chaos, second, as part of the medium-term stability program and third, as a long-term monetary strategy. The currency board in Bulgaria was created for the first reason - as an urgent measure to overcome a severe financial crisis and a loss of confidence in the monetary authorities.

Hardouvelis and Monokrousos (2009) and Todorov (2013) explored the stability of the Bulgarian currency board. The conclusions of both studies were that the Bulgarian currency board was stable and the most likely scenario was to maintain it until Bulgaria entered the Eurozone.

Fabris and Rodic (2013) analyzed the effectiveness of CBAs as fixed exchange rate regimes compared to floating exchange rates. The current account deficit, measured as a percentage of GDP, and the rate of inflation were higher in currency board countries than in countries with floating exchange rates, indicating poor performance of the currency board as a form of exchange-rate regime.

Marinova (2016) compared monetary and fiscal policy in the Eurozone and Bulgaria. The author asserted that the main risks to the stability of public finances in Bulgaria and the Euro area were political: the frequent change of governments in Bulgaria and the lack of fiscal discipline in the currency union.

According to Minassian (2018), the currency board provided financial stability, but became an obstacle to economic growth in Bulgaria. The author recommended a change of the exchange rate regime in order to stimulate the growth and convergence of the Bulgarian economy with the developed economies of the Eurozone.

The above mentioned studies can be classified according to different criteria - methodology, territorial scope, conclusions, etc.

According to their methodology, the examined studies can be divided into predominantly theoretical and predominantly empirical. The theoretical element dominates in the research of Avramov (1999), Miller (1999), Dobrev (1999), Ialzanov and Nenovsky (2001), Nenovsky, Hristov and Mihaylov (2002), Desquilbet and Nenovsky (2004) and Moheeput (2008). Mostly empirical are the investigations of Carlson and Valev (2001), Nenovsky and Hristov (2002), Nenovsky and Dimitrova (2002), Hristov (2004), Chobanov and Nenovsky (2004), Hardouvelis and Monokrousos (2009), Fabris and Rodic (2013), Todorov (2013), Marinova (2016) and Minassian (2018).

According to their territorial scope, the reviewed sources can be grouped research on one country and research on more than one country. The first group includes the investigations of Avramov (1999), Miller (1999), Dobrev (1999), Ialzanov and Nenovsky (2001), Carlson and Valev (2001), Nenovsky and Hristov (2002), Nenovsky and Dimitrova (2002), Hristov (2004), Chobanov and Nenovsky (2004), Hardouvelis and Monokrousos (2009), Todorov (2013) and Minassian (2018). The second group consists of the analyses of Nenovsky, Hristov and Mihaylov (2002), Desquilbet and Nenovsky (2004), Moheeput (2008), Fabris and Rodic (2013) and Marinova (2016).

According to their findings, the above examined sources can be divided into studies that recommend the introduction or retention of the CBAs and studies that offer their removal. The first group includes Avramov (1999), Miller (1999), Ialzanov and Nenovsky (2001), Nenovsky and Hristov (2002), Hristov (2004), Hardouvelis and Monokrousos (2009), Todorov (2013) and others, and the second group - Fabris and Rodic (2013), Minassian (2018) etc.

Three important conclusions can be drawn from the review and the systematization of literature on the currency board in Bulgaria. First, there is a balance between theory and empirics in research. Second, there is no universal optimum currency-exchange regime. The optimum exchange rate regime is determined by specific circumstances and varies by time and country. Third, while in earlier examinations dominates the view that the currency board in Bulgaria operated successfully and had to be preserved, the number

of surveys recommending a change in the currency-exchange regime of Bulgaria has increased in recent years.

3. Specificities of the Bulgarian CBA

3.1. Legal framework

The principles of the functioning of the currency board were laid down in the Law of the BNB, adopted in June 1997. Under this law, the lev was fixed to the German mark (the reserve currency of the currency board) at a rate of 1 mark = BGN 1,000 and neither the CB nor the government could change the exchange rate at will. This could only be done by a qualified majority decision of the National Assembly.

The 1997 Law on the BNB provided that: firstly, the CB's liabilities were 100% covered by the currency board reserves; secondly, the CB converted the national and reserve currency on demand at the fixed exchange rate without any restrictions; third, the disbursement of loans from the CB to the government and the refinancing of commercial banks ceased. The clear legal regulation of the functioning of the currency board helped to ensure transparency and confidence in the newly created currency board institution (Berlemann and Nenovsky, 2003).

3.2. Institutional design

The specific design of the currency board in Bulgaria has attracted the attention of researchers around the world due to its considerable differences with the classical hard (orthodox) currency board. The central bank in Bulgaria is divided into Banking Department and Issue Department, each of which has its own balance sheet. The Issue Department is directly responsible for the functioning of the currency board, and the Banking Department is authorized to perform the function of "lender of last resort".

The Currency Board in Bulgaria has a structure similar to that in Estonia where there is a division between the Issue Department and the Banking Department. There is also a third Department in Bulgaria - Banking Supervision. The Banking Supervision Department regulates the commercial banks. The Banking Department has reserves that can be used in crisis situations to help banks. The heart of the currency board is the Issue Department (Enoch, Gulde and Hardy, 2002).

3.3. Balance sheet structure

All foreign currency assets are recorded in the Issue Department balance sheet. An important difference between this balance sheet and the typical currency board balance sheet is the presence of government deposits and deposits of the Banking Department in the liabilities of the Issue Department. Theoretically, the only liability of a hard currency board arrangement should be the monetary base. In practice, at the Bulgarian currency board, the sum of the government deposits and the deposits of the Banking Department exceeds the monetary base (M0). The deposits of the Banking Department represent a

reserve that can be used to refinance commercial banks in liquidity crises, which bear systemic risk for the banking system (Fatas and Rose, 2001).

The liabilities of the Issue Department (notes and coins in circulation in circulation, deposits of commercial banks, fiscal reserves and deposit of the Banking Department) are fully secured with reserves in foreign currency. The deposit of the Banking Department in the Issue Department liabilities is the net value of the currency board, i.e. the currency board holds a surplus of foreign exchange reserves equal to the amount of that deposit.

In the event of a liquidity crisis in the banking system, the Banking Department may grant short-term (up to 3 months) lev-denominated loans to solvent banks up to the surplus of foreign exchange reserves of the currency board. In the new generation of currency boards, the lender of last resort function has been retained (Grigonyte, 2003).

An important specific feature of the Bulgarian Currency Board is the existence of fiscal reserves (government deposit) in the liabilities of the Issue Department. Loans from the IMF and other international financial institutions, as well as privatization revenues, accumulate there upon receipt. IMF loans are also assets (foreign exchange reserves) in the Issue Department balance sheet. The central bank may officially give the government the loans received by the IMF only if the maturity of the government debt to the BNB coincides with the maturity of the BNB's debt to the IMF. If the government decides not to use the loans from the IMF and international financial institutions, these loans may accumulate in the Banking Department deposit, providing to the Banking Department more funds to act as lender of last resort (Grimm, 2007).

The specific design of the Bulgarian currency board mitigates the effects of the loans from international financial institutions and foreign debt payments on money supply. Unlike the hard currency board, changes in foreign exchange reserves related to IMF loans and foreign debt payments do not affect the monetary base, which reduces money supply fluctuations (Miller, 1999). However, the inclusion of the government deposit in the liabilities of the Issue Department has a drawback: the automatic link between the balance of payments and the monetary base is interrupted, and the government causes unintentional changes in money supply through its fiscal policy. For example, a fall in tax revenue and/or an increase in government spending causes unintentional monetary expansion and vice versa (Nenovsky and Hristov, 2002).

Since its very inception, the Bulgarian currency board has been situated in a wider context. It has been conceived (and imposed by a broad national consensus) as a cultural shock, a tool for imposing financial discipline, and not just as a stabilization scheme. The currency board is seen as a clear separation from the past, as a treaty designed to overcome the deep-rooted reluctance to modernize the Bulgarian economy after seven years of partial, incoherent and inconclusive reforms, as an ambitious plan to tackle institutional failures in the beginning of the transition to a market economy (Gulde, Ghosh and Wolf, 1998).

The general principles of the Bulgarian Currency Board are in line with the institutional arrangements of such monetary systems. However, several of its specifics can be highlighted (Hanke and Sekerke, 2003):

- Bulgaria did not create a new monetary institution (as did Hong Kong), but used the institutional design of the existing central bank (BNB). The traditional model of the English central bank was adopted and two separate departments - Issue and Banking - were set up. The residual deposit of the Banking Department in the Issue Department provides the accounting link between them. The deposit is the positive net value of the currency board - the surplus of foreign exchange reserves above the monetary base and other liabilities of the Issue Department.

- The monetary base must be covered at least 100% by foreign exchange reserves, but there is no fixed rate of cover. The surplus is intended to be used by the BNB as a lender of last resort in the event of a systemic liquidity crisis in the banking system. The lender of last resort function is applied with very strict constraints and to solvent banks only (Gulde, Kahkonen and Keller, 2000).

- The BNB is left with only one discretionary instrument for regulating the liquidity in the banking system - the minimum required reserve ratio.

- A government deposit is included in the CBA liabilities. On the one hand, the deposit accumulates incoming financial flows from the IMF and other international financial institutions and is covered by the liquid assets of the Issue Department. This is the most serious guarantee that debt payments will be made to international financial institutions. On the other hand, the existence of a government deposit in the currency board liabilities indirectly affects the monetary base. The increase of government deposits causes a reduction in the monetary base and vice versa. The balance on the state budget is crucial for the overall stability and liquidity of the currency board (Hanke and Schuler, 2015).

- In the first years of the currency board, the government deposit included foreign currencies (mainly US dollars) that were different from the reserve currency. This implied that part of the Issue Department's assets was not denominated in the reserve currency. In order to reduce the exchange rate risk for the Issue Department, the law provides that the difference between the assets and the liabilities, which are denominated in currencies other than the reserve one, must not exceed 2%.

- A peculiarity of the Bulgarian Currency Board is the legally guaranteed right of the BNB to grant a direct credit to the government upon the purchase of Special Drawing Rights (SDR) from the IMF. The maturity of the government debt to the BNB, denominated in SDR, entirely coincides with that of the BNB's debt to the IMF. This right is in line with the function of the BNB to act as an agent of the government and formalize its financing against loans from the IMF (Hardouvelis and Monokrousos, 2009).

Not only provides the Bulgarian currency board a strict financial discipline, but also allows for some flexibility in cases of external shocks and systemic banking crises. For example, the soft Bulgarian currency board arrangement has retained a traditional monetary policy instrument – the minimum required reserve ratio. In addition, the "lender of last resort" function may be applied in the event of liquidity risk endangering the stability of the banking system (Hristov and Zaimov, 2003).

Under the classical hard currency boards, only the monetary base M0 is backed with reserve assets and the changes in foreign exchange reserves affect the monetary base and the money supply. With large foreign debt payments, which reduce the country's foreign exchange reserves, the monetary base and money may seriously shrink, leading to a recession. In the Bulgarian currency board version, this danger is avoided by providing cover with reserve assets not only on the monetary base but also on the deposits of the government and the Banking Department (Irwin, 2004).

In addition to providing a reserve for refinancing commercial banks in case of need and eliminating the risk of sudden fluctuations in the monetary base and money supply due to changes in foreign exchange reserves, the specific structure of the balance sheet of the Bulgarian currency board (Issue Department of the BNB) has two additional consequences:

1. The changes in the monetary base are not equal to the total surplus or deficit on the balance of payments when the government conducts international transactions. International government transactions are automatically sterilized, no matter if they are tranches from the IMF, foreign debt payments or revenues from privatization deals with foreign investors (Miller, 1999).
2. Budget deficits are automatically funded through money issuance. The rise in government spending expands the monetary base and has the same effect on money supply as the purchase of government bonds by the central bank. Routine government receipts and payments affect the size of the monetary base and create additional fluctuations in money supply (Kalcheva, 2003).

According to Nenovsky and Hristov (1998) this problem may be solved by keeping government deposits at a commercial bank rather than at the central bank. Nenovsky and Hristov's proposal is debatable since providing government deposits to commercial banks poses the risk of losing public assets and expands the monetary base and the money supply by increasing the reserves in the banking system.

Another possible solution to this problem is that a part of government deposits (related to foreign debt service) is held at the central bank and a second part (related to routine government operations) is invested in private commercial banks (Miller, 1999). This option also has its weaknesses - a risk of losing public assets, albeit partial, and an opportunity for the government to influence the size of the monetary base by transferring funds from one of its accounts to another.

4. Fiscal and monetary determinants of Bulgaria's economic growth

The fiscal and monetary determinants of economic growth in Bulgaria are identified by a vector autoregression involving the following variables: **GDPGR** – rate of growth of real GDP on the previous year; **FISC_BAL** – fiscal balance; **FOREX_RES** – foreign exchange reserves (total amount of the assets of the Issue Department of the Bulgarian National Bank); **GOV_DEBT** – government debt; **GOV_DEP** – government deposit on the balance sheet of the Issue Department of the Bulgarian National Bank; **MRR** – minimum required reserve ratio. The target variable is **GDPGR**.

The group unit root tests (see Table 1) show that the variables are stationary (integrated of order zero), which requires the application of unlimited VAR. The test for the optimal number of lags in the vector autoregression shows that according to the Schwarz criterion, this number is one (see Table 2). The vector autoregression is estimated with one lag.

Table no. 1: Tests for stationarity of the variables in the vector autoregression

Method	Statistic	Probability	Cross-sections	Observations
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.31980	0.0005	6	422
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.34520	0.0000	6	422
ADF - Fisher Chi-square	52.4440	0.0000	6	422
PP - Fisher Chi-square	72.1046	0.0000	6	425

Source: Prepared by the authors

Table no. 2: Optimal lag length in the VAR model

Number of lags	SC
0	36.13043
1	27.16292*
2	28.14493
3	28.91504
4	29.29056
5	29.88104
6	29.63968

* Shows the optimal number of lags according to the respective criterion

Source: Prepared by the authors

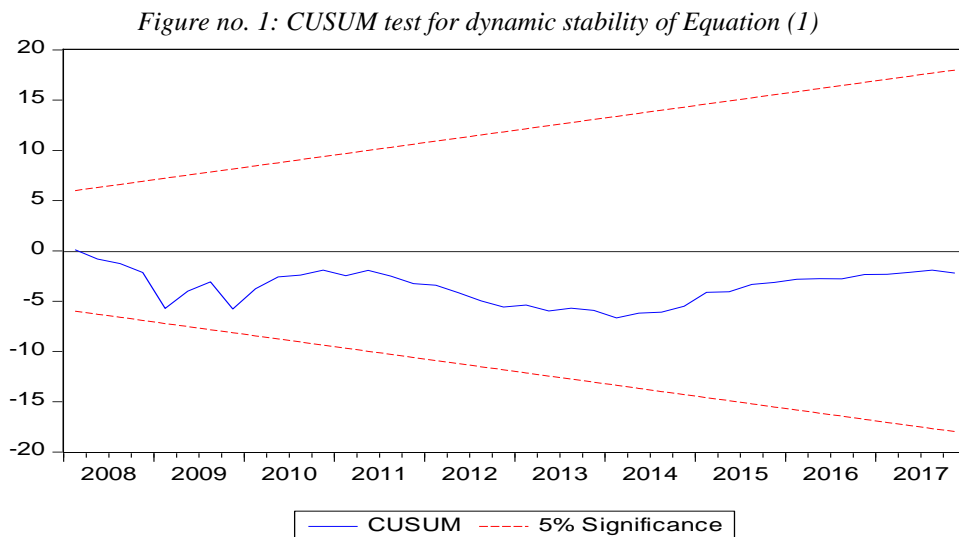
The equation for the target variable in the VAR model **GDPGR** after the step-by-step removal of statistically insignificant variables is

$$(1) \text{ GDPGR} = 3.13 + 0.24*\text{GDPGR}(-1) + 0.07*\text{FISC_BAL}(-1) - 0.26*\text{MRR}(-1)$$

The economic growth in Bulgaria is influenced by its own past value and the lagged values of the fiscal balance and the minimum required reserve ratio. The coefficient before the fiscal balance is positive, while the coefficient before the minimum required reserve ratio is negative. The signs of the regression coefficients imply that the growth rate of Bulgaria's real GDP can be encouraged by improving the fiscal balance and by decreasing the minimum required reserve ratio.

The value of the coefficient of determination ($R\text{-squared} = 0.36$) indicates that 36% of the variation of Bulgaria's real GDP growth 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 but simply adequately reflects the relationship between the dependent and the independent variables.

The CUSUM test results imply that Equation (1) is dynamically stable (see Figure 1), as the actual CUSUM values are within the confidence interval at the 5% significance level. The Ramsey RESET test results (probability of the F-statistic 0.5651) suggest acceptance of the null hypothesis of a lack of errors in the specification of Equation (1).



Source: Prepared by the authors

The results from the Pairwise Granger Causality Tests show that in the short term there are causal links from the minimum required reserve ratio and the fiscal balance to Bulgaria's economic growth (see Table 3). The results from the Granger Causality / Block Exogeneity Wald Tests indicate that in the long run the fiscal balance and the minimum required reserve ratio Granger-cause the growth of real GDP (see Table 4).

Table no. 3: Results from short-term causality tests

Independent variables	Probability
FISC_BAL	0.0014
FOREX_RES	0.1165
GOV_DEBT	0.0510
GOV_DEP	0.6400
MRR	0.0009

Source: Prepared by the authors

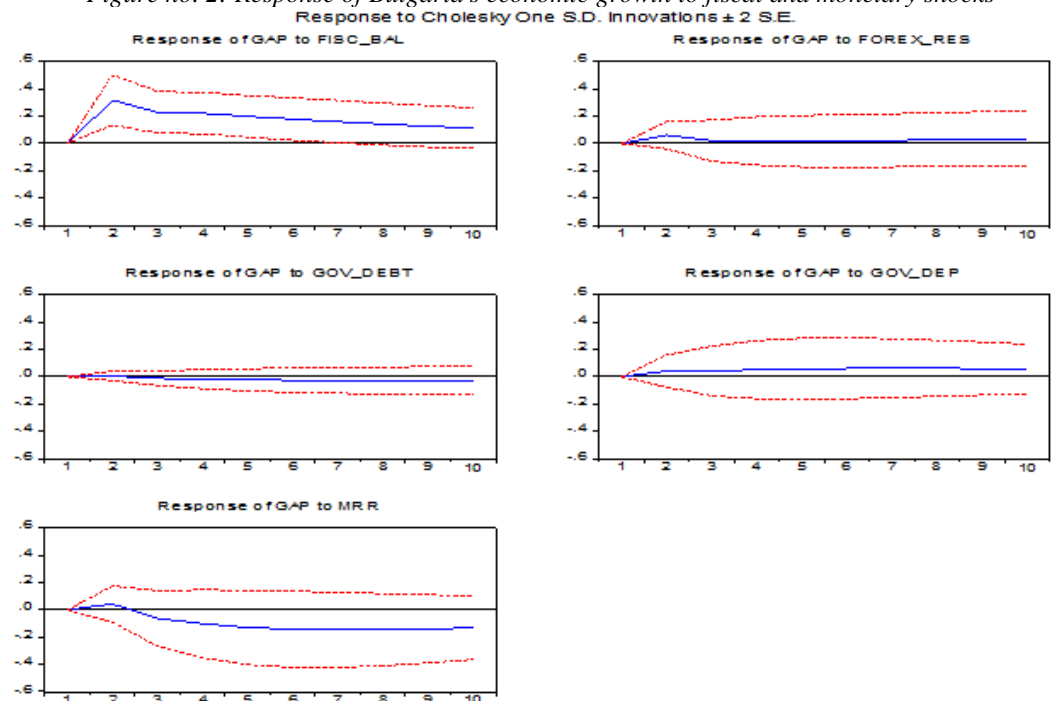
Table no. 4: Results from long-term causality tests

Independent variables	Probability
FISC_BAL	0.0103
FOREX_RES	0.9796
GOV_DEBT	0.9385
GOV_DEP	0.4188
MRR	0.0160

Source: Prepared by the authors

The response of Bulgaria's economic growth to changes in fiscal and monetary parameters is shown in Figure 2.

Figure no. 2: Response of Bulgaria's economic growth to fiscal and monetary shocks



Source: Prepared by the authors

5. Fiscal and monetary determinants of Bulgaria's business cycle

The fiscal and monetary determinants of the business cycle of Bulgaria are identified by a vector autoregression, which includes the following variables: **GAP** – output gap; **FISC_BAL** – fiscal balance; **FOREX_RES** – foreign exchange reserves (total amount of the assets of the Issue Department of the Bulgarian National Bank); **GOV_DEBT** – government debt; **GOV_DEP** – government deposit on the balance sheet of the Issue Department of the Bulgarian National Bank; **MRR** – minimum required reserve ratio. The target variable is **GAP**.

The group unit root tests (see Table 5) show that the variables are stationary (integrated of order zero), which requires the application of unlimited VAR.

Table no. 5: Tests for stationarity of the variables in the vector autoregression

Method	Statistic	Probability	Cross-sections	Observations
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.54817	0.0002	6	422
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.24467	0.0000	6	422
ADF - Fisher Chi-square	61.5035	0.0000	6	422
PP - Fisher Chi-square	52.6093	0.0000	5	426

Source: Prepared by the authors

The test for the optimal number of lags in the vector autoregression shows that according to the Schwarz criterion, this number is one (see Table 6). The vector autoregression is estimated with one lag.

Table no. 6: Optimal lag length in the VAR model

Number of lags	SC
0	36.61188
1	26.80037*
2	28.03165
3	29.09941
4	29.27645
5	29.44068
6	29.87188

* 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 **GAP** after the step-by-step removal of statistically insignificant variables is

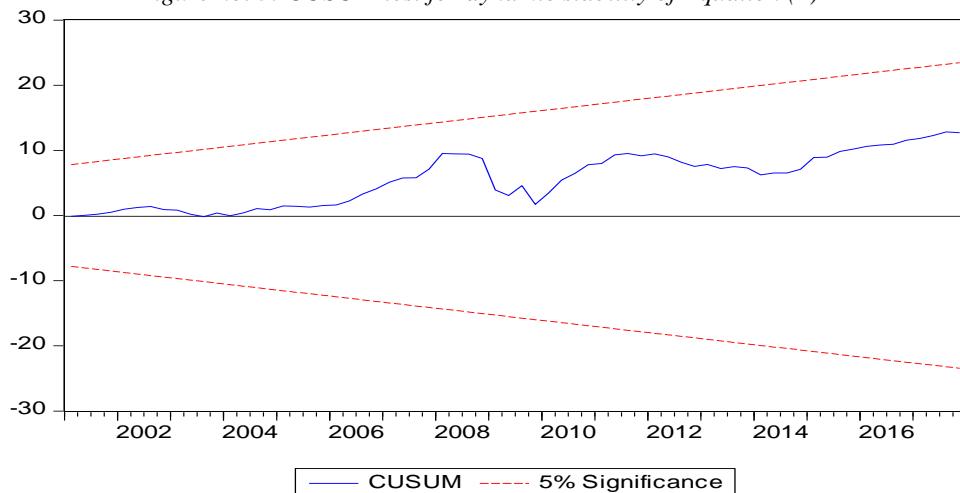
$$(2) \text{ GAP} = 0.004 + 0.84*\text{GAP}(-1) + 0.07*\text{FISC_BAL}(-1)$$

The output gap of Bulgaria is affected by its own past value and the lagged value of the fiscal balance. The positive sign of the regression coefficients before the fiscal balance suggests that an improvement in the fiscal balance contributes to an inflationary gap, while a deterioration in the fiscal balance contributes to a deflationary gap.

The value of the coefficient of determination (R-squared = 0.81) indicates that 81% of the variation of Bulgaria's output gap can be explained by changes in the independent variables in Equation (2). 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 but simply adequately reflects the relationship between the dependent and the independent variables.

The CUSUM test results imply that Equation (2) is dynamically stable (see Figure 3), as the actual CUSUM values are within the confidence interval at the 5% significance level. The Ramsey RESET test results (probability of the F-statistic 0.3084) suggest acceptance of the null hypothesis of a lack of errors in the specification of Equation (2).

Figure no. 3: CUSUM test for dynamic stability of Equation (2)



Source: Prepared by the authors

The results from the Pairwise Granger Causality Tests show that in the short term there is a causal link from the fiscal balance to Bulgaria's output gap (see Table 7). The results from the Granger Causality / Block Exogeneity Wald Tests show that in the long run the fiscal balance Granger-causes the output gap (see Table 8).

Table no. 7: Results from short-term causality tests

Independent variables	Probability
FISC_BAL	0.0018
FOREX_RES	0.2086
GOV_DEBT	0.2254
GOV_DEP	0.0917
MRR	0.5458

Source: Prepared by the authors

Table no. 8: Results from long-term causality tests

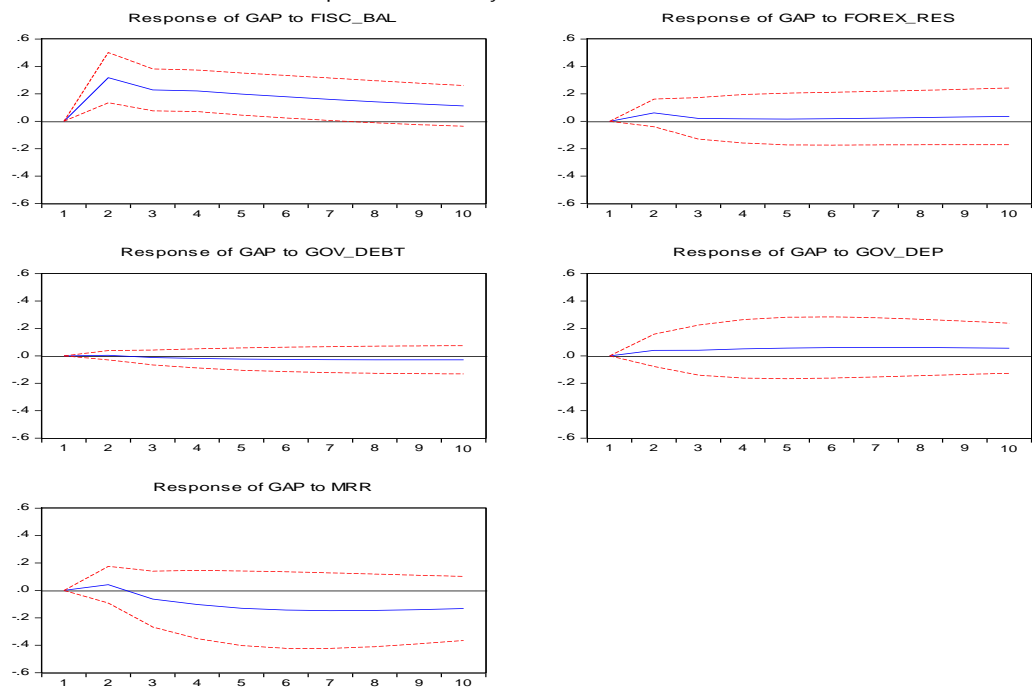
Independent variables	Probability
FISC_BAL	0.0009
FOREX_RES	0.8834
GOV_DEBT	0.7107
GOV_DEP	0.4054
MRR	0.5351

Source: Prepared by the authors

The responses of the output gap to fiscal and monetary impulses are shown in Figure 6.

Figure no. 6: Response of output gap to fiscal and monetary impulses

Response to Cholesky One S.D. Innovations ± 2 S.E.



Source: Prepared by the authors

6. Conclusions

The results of the study indicate that an improvement in the fiscal balance and a reduction in the minimum required reserve ratio can accelerate the growth rate of the real GDP of Bulgaria. The minimum required reserve ratio lacks the flexibility, reversibility and the dosed effect of other monetary instruments, therefore it ought to be used with extreme caution. Fine and dosed impact on the economy through MRR is impossible, so MRR should only be used when no other options are available. It is recommended that fiscal instruments (an improvement in the fiscal balance) be used to stimulate the growth of the Bulgarian economy.

The empirical results show that the only macroeconomic instrument with a significant impact on the cyclical position (output gap) is the fiscal balance. It may be inferred that the options of the Bulgarian macroeconomic policymakers to encourage economic growth and mitigate cyclical fluctuations are related to the improvement of the fiscal balance.

REFERENCES

- Avramov, R. (1999). The Role of a Currency Board in Financial Crises: The Case of Bulgaria. BNB Discussion Papers, dp/6/1999.
- Berlemann, M. and Nenovsky, N. (2003). Lending of First versus Lending of Last Resort: The Bulgarian Financial Crisis of 1996/1997. [Dresden Discussion Paper Series in Economics](#) 11/03.
- Carlson, J. A. and Valev, N. T. (2001). Credibility of a New Monetary Regime: The Currency Board in Bulgaria. *Journal of Monetary Economics*, 47(3): 581-594.
- Chobanov, P. and Nenovsky, N. (2004). Money Market Liquidity under Currency Board – Empirical Investigations for Bulgaria. William Davidson Institute Working Paper Number 693, May 2004.
- Desquilbet, J. B. and Nenovsky, N. (2004). Credibility and Adjustment: Gold Standards Versus Currency Boards. William Davidson Institute Working Paper Number 692, May 2004.
- Dobrev, D. (1999). The currency board in Bulgaria: design, peculiarities and management of foreign exchange cover. Discussion papers / Bulgarian National Bank. - Sofia, ZDB-ID 2169813-2. - Vol. 9
- Enoch, C., Gulde, A. and Hardy, D. (2002). Banking Crises and Bank Resolution: Experiences in Some Transition Economies. IMF Working Paper 02/56.
- Fabris, N. and Rodic, G. (2013). The Efficiency of the Currency Board Arrangement. *Journal of Central Banking Theory and Practice*, 2013 (1): 157-176.
- Fatás, A. and Rose, A. K. (2001). [Do Monetary Handcuffs Restrain Leviathan? Fiscal Policy in Extreme Exchange Rate Regimes](#). [CEPR Discussion Papers](#) 2692.

- Ganev, K. (2005). Measuring Total Factor Productivity: Growth Accounting for Bulgaria. Bulgarian National Bank Discussion Paper No. 48/2005.
- Grigonyte, D. (2003). Impact of Currency Boards on Fiscal Policy in Central and Eastern European Countries. *Economics of Planning* 36(2): 111–133.
- Grimm, O. (2007). Fiscal Discipline and Stability under Currency Board Systems. [CER-ETH Economics working paper series](#) 07/66, CER-ETH - Center of Economic Research (CER-ETH) at ETH Zurich.
- Gulde, A. Kahkonen, J. and Keller, P. (2000). Pros and cons of Currency Board Arrangements in the Lead-up to EU Accession and Participation in the Euro Zone. IMF PDP 00/1.
- Gulde, A., Ghosh, A. R. and Wolf, H. R. (1998). Currency Boards: The Ultimate Fix. IMF WP 98/8.
- Hanke, S. and Schuler, K. (2015). Currency Boards for Developing Countries: A Handbook. Revised Edition.
- Hanke, S. and Sekerke, M. (2003). How Bulgaria Is Destroying Its Currency Board. *Central Banking Journal*, 14(1): 81-84.
- Hardouvelis, G. A. and Monokrousos, P. (2009). Is Bulgaria's Currency Board Sustainable? *Economy & Markets*, Eurobank Research, Volume 4, Issue 7, July 2009.
- Hristov, K. (2004). The currency board: „the only game in town”. BNB Discussion Paper, DP/40/2004 (in Bulgarian).
- Hristov, K. and Zaimov, M. (2003). Shadowing the Euro: Bulgaria's Monetary Policy Five Years On. [BIS Papers chapters](#), in: Bank for International Settlements (ed.), *Regional currency areas and the use of foreign currencies*, volume 17, pages 61-78.
- Ialzanov, D. and Nenovsky, N. (2001). The Currency Board and Bulgaria's Accession to the European Monetary Union. *Kyoto University Economic Review*, 70(1/2): 31-48.
- Irwin, G. (2004). Currency Boards and Currency Crises. *Oxford Economic Papers*, 56(1): 64–87.
- Kalcheva, K. (2003). The Impact of the Euro-Dollar Exchange Rate on Countries with a Currency Board: The Case of Estonia and Bulgaria. *Eastern European Economics*, 41(2): 42-68.
- Kielyte, J. (2002). Exchange Rate Arrangements in the Run-up to the EMU: Some Experience in Currency Board Countries. [EERI Research Paper Series](#) EERI_RP_2002_01, Economics and Econometrics Research Institute (EERI), Brussels.
- Kiguel, M. A. (1999). The Argentine Currency Board. CEMA Working Papers: Serie Documentos de Trabajo. 152, Universidad del CEMA.
- Marinova, T. (2016). Comparative Study on Monetary and Fiscal Policy in the Eurozone and Bulgaria. *Economic Alternatives*, 2016(3): 367-378.

- Miller, J. B. (1999). The Currency Board in Bulgaria: The First Two Years. BNB Discussion Papers, dp/11/1999.
- Minassian, G. (2008). Is the Bulgarian Economy Overheating? *Economic Thought Journal*, 2008(3), pp. 3-29 (in Bulgarian).
- Minassian, G. (2018). Two decades of currency board in Bulgaria: how much more? In: "Bulgaria in Europe: lagging behind or catching up. Strategies for catch-up development". Institute for New Economic Thought, Sofia, pp. 60-98 (in Bulgarian).
- Minassian, G., Nenova, M. And V. Yotzov (1998) The Currency Board in Bulgaria, Gorex Press, Sofia (in Bulgarian).
- Moheput, A. (2008). Issues on the choice of Exchange Rate Regimes and Currency Boards – An Analytical Survey. *WARWICK ECONOMIC RESEARCH PAPERS* No 855.
- Nenovsky, N. and Dimitrova, K. (2002). Dual Inflation Under the Currency Board: The Challenges of Bulgarian EU Accession. William Davidson Institute Working Papers Series 487, William Davidson Institute at the University of Michigan.
- Nenovsky, N. and Hristov, K. (1998). Financial Repression and Credit Rationing under Currency Board Arrangement for Bulgaria. BNB Discussion Papers, dp/2/1998.
- Nenovsky, N. and Hristov, K. (2002). The new currency boards and discretion: empirical evidence from Bulgaria. *Economic Systems* 2002 (26): 55–72.
- Nenovsky, N., Hristov, K. and Mihaylov, M. (2001). A SIMPLE TEST OF CURRENCY BOARD AUTOMATIC MECHANISM IN BULGARIA, ESTONIA AND LITHUANIA. *Journal des Economistes et des Etudes Humaines*, XI (4): 575–616.
- Nenovsky, N., Hristov, K. and Mihaylov, M. (2002). Comparing the Institutional and Organizational Design of Currency Boards in Transition Countries. *Eastern European Economics*, 40(1): 6–35.
- Pirimova, V. (2001). Growth, cyclic recurrence, conjuncture. Sofia: Publishing Complex of the University of National and World Economy (in Bulgarian).
- Pirimova, V. (2014). Cyclic recurrence in the economy: forms, sources, mechanisms. Sofia: Publishing Complex of the University of National and World Economy (in Bulgarian).
- Raleva, S. (2013). Inflation and Economic Growth. Sofia: Publishing Complex of the University of National and World Economy (in Bulgarian).
- Statev, S. (2009). Financial development and economic growth. Sofia: Publishing Complex of the University of National and World Economy (in Bulgarian).
- Todorov, I. (2013). The Bulgarian Currency Board Arrangement in the Context of the Future Membership of Bulgaria in the Euro Area. *Ikonomicheski i sotsialni alternativi*, 2013(3): 112-124 (in Bulgarian).
- Todorov, I. and Durova, K. (2016). Economic Growth of Bulgaria and Its Determinants. *Economic Studies journal*, Volume 2016, Issue 4, pp. 3-35.

Todorov, I., Durova, K. and Aleksandrov, A. (2018). The Economy of Bulgaria: Structural Funds, Growth and Cyclical Recurrence. Sciendo: A De Gruyter company.

Website of Eurostat <https://ec.europa.eu/eurostat>

Website of the Bulgarian National Bank <http://www.bnb.bg/>