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FISCAL MULTIPLIERS IN BULGARIA AND CENTRAL AND EASTERN EUROPE COUNTRIES

The importance and possibilities of fiscal policy have been neglected by academics and politicians for decades after the macroeconomic revolution of 1970-1980. However, the Great Recession, the crisis in the European Union and the prolonged recession in many European economies have once again put fiscal policy, and especially its stabilizing role, at the centre of expert and public discussions. In countries with a high share of the public sector in the economy and whose monetary policy is constrained by various structural features of the economy and the financial system, the role of fiscal policy is particularly important, and it is a key lever of economic policy. These features characterize most countries in Central and Eastern Europe (CEE), which makes this region convenient for analyzing the effectiveness of the fiscal policy. The study empirically establishes the effects of shocks in budget expenditures and tax revenues on GDP in Bulgaria, Estonia and Lithuania for the period 1995-2018, applying the vector autoregression technique known as the Vector Autoregressive Model (VAR) as well as other, non-econometric valuation methods. Key factors that affect the dynamics in the size of fiscal multipliers are presented numerically and graphically.
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Introduction

One of the most important issues in formulating macroeconomic policy is the size of fiscal multipliers. The direction in which fiscal policy will take – towards expansion or restriction – largely depends on the magnitude of what is traditionally called a "fiscal multiplier". Although different researchers often have different content in this concept, the correct calculation of the fiscal multiplier is extremely important, especially in the downward phase of the business cycle, when it is crucial to accurately assess the short-term effects of fiscal consolidation decisions.

The macroeconomic effects of fiscal policy are of great importance for both economic theory and economic practice, and much research has been devoted to this issue. Despite the abundance of publications on the subject, there is no theoretical consensus on the size and even the impact of fiscal multipliers. This is largely due to the peculiarities of neoclassical and Keynesian macroeconomic models, which predict various changes in personal

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consumption, employment and real incomes after a fiscal shock. Numerous studies published since the onset of the global crisis do not strongly support any of the theoretical models.

The object of the present study are the fiscal multipliers presented by a budget expenditure multiplier and a tax multiplier in Bulgaria, Estonia and Lithuania.

The subject of the study is the size, dynamics and strength of the impact of fiscal multipliers (multiplier of budget expenditures and tax multiplier) in periods of recession and expansion.

The main **purpose** of the study is to contribute to the analysis of the macroeconomic impacts of fiscal policy by providing empirical calculations of the size of fiscal multipliers (budget expenditure multiplier and tax multiplier) and their impact on macroeconomic activity (economic growth) in Bulgaria and to compare the results with the economies of Estonia and Lithuania for the period 01.01.1995 – 31.12.2018, reflecting the impact of important economic events for Bulgaria such as the introduction of a currency board in 1997 and the global financial crisis of 2008. Bulgaria is an interesting example because, in addition to being a small open economy, it also faces the challenge of how to promote economic growth under a currency board arrangement when traditional monetary policy instruments are not available. Estonia and Lithuania are also small open economies, which in their economic development passed through the conditions of a currency board, later gaining membership in the euro area during the study period.

To achieve this goal, the following **tasks** are required:

- Presentation of the definitions for the fiscal multipliers, their fundamental definition and specific features, clarification of the consequences of their application;
- The study of the impact of fiscal multipliers in the countries of Central and Eastern Europe, as well as highlighting the common features between them;
- Establishing and evaluating the possibilities for application of VAR models in relation to the studied data, based on pre-set criteria; analysis of the results achieved in the application of the used models;
- Systematization of empirical evidence on the size and impact of fiscal multipliers (budget expenditure multiplier and tax multiplier) for Bulgaria, Estonia and Lithuania. Drawing conclusions about:
    - the object and the subject of research;
    - the applicability of VAR models to the studied variables (budget expenditures, tax revenues (net) and GDP);
    - the impact of fiscal multipliers on macroeconomic activity.

We defend **the research thesis** that there is a global tendency to reduce the size of fiscal multipliers, which has serious implications for economic policy. The effectiveness of fiscal stimulus is becoming increasingly uncertain. Moreover, there are real fears that multipliers will become even lower due to the global trend of increasing the debt burden. In addition, we argue that the strength of the impact of fiscal multipliers is significantly greater in periods of recession than in periods of expansion, the increase in household loans as a percentage of

GDP leads to lower multipliers; the level of public indebtedness has an inverse proportion to the size of the fiscal multiplier, and the openness of the economy implies lower fiscal multipliers.

1. Fiscal multipliers – an important element of economic policy

1.1. Definition of "fiscal multiplier"

Fiscal multipliers measure the short-term impact of discretionary fiscal policy on output. The fiscal multiplier is measured by the ratio of the change in GDP or other measure of production to the exogenous change in the fiscal variable that caused the effect on output. For example, the expenditure multiplier represents the change in GDP due to a discretionary increase in government spending (fiscal shock), and the tax multiplier represents the change in GDP due to a discretionary increase in taxes. Thus, if the fiscal multiplier is larger or smaller than one, the fiscal expansion will collect or displace some component of aggregate demand and produce output accordingly. Depending on the fiscal variable selected for the assessment, the multiplier can be defined as a government consumption multiplier, a government investment multiplier, a tax multiplier (which can be further broken down into a direct or indirect tax multiplier), a net tax multiplier, etc.

The idea of the so-called "multiplier" was first introduced by Kahn (1931) in his article justifying the world economic crisis. He presented the concept as a coefficient determining the growth of employment of each unit of investment (government expenditure), directed to a number of public activities. Later, Keynes (1948) modified the idea of an "employment multiplier" into an "income multiplier", which he presented as a coefficient showing the quantitative ratio of the growth of national income to the growth of the investment.

Fiscal multipliers can be measured in different ways. In general, they are defined as the ratio of the marginal change in aggregate income (ΔY) to the marginal change in government expenditure or tax revenue (ΔG or ΔT) (Spilimbergo et al., 2009). Thus, the fiscal multiplier measures the effect of BGN 1 change in government expenditures or BGN 1 change in tax revenues on the level of gross domestic product (GDP).

Fiscal multipliers are important elements that must be taken into account when designing fiscal policy. Underestimating the role of multipliers can lead countries to set unattainable fiscal targets, as well as miscalculate the amount of adjustment needed to limit the size of their government debt (Eyraud et al., 2013). This may affect the reliability of fiscal consolidation programs. In addition, the authorities can tighten measures in an attempt to bring fiscal variables (balance, debt) as close as possible to the goals officially set in government programs, undermining citizens' trust, and creating a vicious circle of slow economic growth, deflation and greater subsequent tightening.

According to Ignatov (2016) the result is at the same time, in addition to the losses of GDP experienced in the short term, but also a possible negative effect in the long term. These possible effects of the economic downturn emphasize the importance of the labour market as a transmission channel for transmitting the effects of fiscal policy. Therefore, the lack of sufficient fiscal support during a crisis and high multipliers will further suppress economic

activity, and the GDP trend, despite widespread views, may be affected by a deep and prolonged recession (DeLong et al., 2012). Dell'Erba et al. (2014) support with evidence the negative medium-term effect of fiscal consolidation on the unemployment rate and employment.

According to Batini et al. (2014) better estimation and use of multipliers can play a key role in ensuring the accuracy of macroeconomic forecasts. Many countries experienced extremely dramatic changes in their fiscal stance during the last financial crisis of 2008, moving from stimulus to consolidation. In this context of large-scale fiscal action, GDP growth can be driven primarily by fiscal policy. It is, therefore, important to accurately measure the relationship between these two variables in order to plan and forecast the effect of fiscal policy actions. In their study, Blanchard et al. (2013) found that underestimation of fiscal multipliers at the beginning of the crisis contributed significantly to errors in growth forecasting.

The actions of the monetary authorities also contribute significantly to the effectiveness of fiscal measures. The coordinated use of fiscal and monetary policy could significantly predetermine the rapid coping with economic difficulties, and the lack of coordination may lead to pro-cyclical effects on the economy (Zlatinov, 2016). As monetary accommodation increases, multipliers tend to increase due to the indirect impact of fiscal policy on real interest rates. Coenen et al. (2012) summarize that fiscal expansion is most effective in the medium term and in combination with monetary policy because it manages to neutralize the wealth effect.

As Zubairy (2010) argues, monetary policy is crucial in determining interest rate movements which play a role in how the economy responds to fiscal shocks. The higher nominal interest rate increases the expenditure multiplier and the corporate income tax multiplier, while the labour income tax multiplier decreases. The cases of the first two multipliers can be explained by the fact that the higher value of the nominal interest rate means that monetary policy-makers increase their real interest rates more slowly, increasing the expansionist effect of fiscal measures. Although inflation has a limited response to fiscal shock, if it increases, the greatest effect is on the negative income tax multiplier. The reduction of the labour income tax leads to an increase in the supply of labour by households, generating a decrease in the amount of wages, lower marginal costs, which leads to a decrease in inflation.

Also, fiscal expansions would be stronger if monetary conditions were more adaptable, i.e., if the nominal interest rate does not increase after fiscal expansion (does not generate crowding out investment and consumption); if the exchange rate is fixed; and if the fiscal position of the particular country after the stimulus has been applied is stable, which will reduce the effect that higher debt has on interest rates (Spilimbergo et al., 2009). In the particular case, when the nominal interest rate reaches zero lower bound, the multipliers increase significantly, which according to Woodford (2010) and Christiano (2011) is due to the full monetary accommodation of the positive fiscal shock. These considerations highlight the question of the role and importance of coordination between fiscal and monetary policy in restoring sound public finances. For Cottarelli (2012), as long as fiscal adjustment continues, monetary policy must support aggregate demand.

Christiano (2009) argue that when monetary policy is constrained by virtually zero nominal interest rates (which in real inflation conditions make real interest rates constant), even if there is no high relative share of households with liquidity constraints, the fiscal multiplier can be significantly above one. Freedman et al. (2009) also confirm that with sufficient monetary policy support, the fiscal multiplier (depending on the specific instrument) can be close to 2 units and even higher. They also show that in the conditions of zero nominal interest rates, the inclusion of a financial accelerator, defined in Bernanke et al. (1999), strengthens the fiscal multiplier and makes it more sustainable over time.

In his report on the analysis of the coordination of fiscal and monetary policy for stabilization purposes, Zlatinov (2014) concludes that the financial and economic crisis of 2008 unequivocally showed that even in a favourable economic environment, the parallel reporting of the effects and possibilities of both macroeconomic policies (fiscal and monetary), is the most appropriate approach for conducting macroeconomic policy, in which the presence of sufficient buffers and a real non-dogmatic idea of the possibilities of stabilization policy allows to quickly overcome crisis processes. According to him, the main function of fiscal policy is to stabilize the economy in the short term, while maintaining economic equilibrium is within the capabilities of monetary policy and such coordination of the two macroeconomic policies would lead to their common goal of maintaining sustainable economic growth.

Despite the expected benefits of their implementation, in practice, fiscal multipliers are not widely used by economists in drawing up budget programs. The main reason for this is that their calculation is difficult and misleading. In particular, it is difficult to isolate the direct impact of fiscal measures on GDP due to the two-way links between these variables. Costs and taxes usually respond automatically to the business cycle through the so-called "automatic stabilizers". They also respond to the cycle in a discretionary manner; for example, countercyclical policies can raise tax rates and reduce costs when the gap between actual and potential gross domestic product increases. Researchers have tried to solve this problem by focusing on the subset of exogenous fiscal shocks[2]. However, according to Batini et al., (2014), there is no generally agreed methodology for identifying such shocks or for extracting the exogenous component from the observed fiscal outcomes.

1.1 Determinants of fiscal multipliers

According to Batini et al. (2014), two types of determinants of multipliers have been identified in the scientific literature: 1) structural characteristics of the country that influence the reaction of the economy to fiscal shocks in “normal time” and 2) *conjunctural* (temporary factors), under the influence of which the multipliers deviate from the “normal” levels.

[2] In the economic literature, the term 'exogenous shock' refers to a change in costs or revenues that is not caused by the macroeconomic environment.

1.1.1 Structural characteristics[3]

Some structural features influence the economy's response to fiscal shocks in "normal" times. Empirical estimates of fiscal multipliers vary widely, although the increasing effect of structural factors on multipliers is largely unknown. The main structural features generally include:

The openness of the economy. Countries with a lower propensity to import (i.e., large countries and/or countries that are only partially open to trade) tend to have higher fiscal multipliers because the outflow of demand through imports is less pronounced (Barrell et al., 2012; Ilzetzki, 2013; IMF, 2008), while in more open economies the multipliers are lower and even negative for highly open economies, such as the Bulgarian one (Yotzov, 2018). In support of these results Ilzetzki (2011), Corsetti et al. (2012) point out that the high degree of openness of the economy has a declining effect on the value of the multiplier, as some of the effects of the fiscal shock flow abroad through trade flows.

Degree of economic development. According to the results of some recent studies (Ilzetzki, 2013), the multipliers of direct impact in developing countries have negative values, while in developed countries, they generally have positive values. The same conclusions were drawn for cumulative multipliers. In their study, Karagyozova-Markova et al. (2013) found that the degree of development of the financial markets in the country may also affect the size of fiscal multipliers. Limited credit availability would lead to a higher share of liquidity-constrained households and companies that would spend the additional income associated with the fiscal stimulus to increase their consumption or cover their investment needs.

Rigidity of the labour market. Countries with more rigid labour markets (i.e., stronger labour unions and/or stronger labour market regulation) have larger fiscal multipliers because such rigidity implies reduced wage flexibility, as hard wages tend to increase the response of aggregate production to shocks in aggregate demand (Cole et al., 2004; Gorodnichenko et al., 2012).

The size of the automatic stabilizers. According to Ignatov, (2016), automatic stabilizers also have a relation to the multiplier, because they limit its value. According to him, this fact is not irrelevant for the government's intentions to strengthen fiscal sustainability. With a fiscal contraction of 1% of GDP, the actual improvement in the budget balance is reduced by a value that directly depends on the size of the automatic stabilizers (as well as the fiscal multiplier), which increases social transfers and reduce tax revenues. Larger automatic stabilizers reduce fiscal multipliers because the automatic response to transfers and taxes mechanically compensates for some of the initial fiscal shocks, thus reducing its effect on GDP (Dolls et al., 2012).

The exchange rate regime, and in particular the degree of exchange rate flexibility, is an important determinant of the size of the multipliers. Countries with flexible exchange rate regimes usually have smaller multipliers because exchange rate movements can offset the impact of discretionary fiscal policy on economics (Born et al., 2013; Ilzetzki, 2013). And

[3] In the context of the present study, "structural" refers to characteristics that are inherent in the way the economy operates over longer periods of time.

vice versa, fixed (or predetermined) exchange rate economies have long-term multipliers that are greater than one, while in floating-rate economies, multipliers (both impact and long-term) have negative values. According to Yotzov (2018), the differences in the multipliers in countries with different exchange rate regimes are determined by the degree of adjustment of monetary policy to fiscal shocks. The author argues that the declining value of the fiscal multiplier is an unfavourable trend, as in the conditions of a currency board fiscal policy is the only tool for influencing economic processes. This brings to the fore the question of the efficiency of public spending, as it is impossible and economically impractical to seek an impact on macroeconomic variables only with their continuous growth.

The size of government debt. Excessively high or rapidly rising levels of government debt can negatively affect the effectiveness of fiscal policy to stimulate economic production, as demonstrated by Kirchner et al. (2010) and Nickel et al. (2013). In his study, Yotzov (2018) shows that in periods when the debt exceeds 60% of GDP, the impact multiplier is close to zero and has negative values in the longer-term horizon. Higher debt levels are associated with low and even negative multiplier values.

Persistence of government activity. This factor is directly related to the size of the multipliers. For Ignatov (2016) harder and more persistent fiscal policy is associated with lower multipliers and reduces output in the long run, which is explained by the large increase in the net present value of taxes and the negative effect of wealth, which pushes out private costs.

Government expenditure management and revenue administration. Multipliers are expected to be smaller when tax collection difficulties and cost inefficiencies limit the impact of fiscal policy on output.[4]

1.1.2 Conjunctural factors

Conjunctural (temporary) factors tend to increase or decrease the multipliers from their "normal" level[5]. Two conjunctural factors have been identified in the modern scientific literature:

The state of the business cycle. In their study, Jorda et al. (2013) demonstrated that fiscal multipliers are usually larger in a recession than in an expansion. According to Batini et al. (2014) one stimulus is less effective in expansion, as at its full capacity the increase in public demand pushes out private demand, leaving production unchanged (with higher prices). Conversely, in a recession, multipliers have a stronger effect because supply contraction is asymmetric. While the rise of fiscal policy is limited by the nonelastic supply of resources (and ultimately weakens when the economy reaches its maximum production capacity at full employment), this limitation does not exist when there is stagnation in the economy, but additional resources, provided by the government have a more direct impact on production. Against this background, the study by Corsetti et al. (2012) stands out in support of the claim that an unexpected positive cost shock is significantly more effective in times of crisis than

[4] This argument suggests that fiscal multipliers measure the effect of planned fiscal measures on output rather than the effect of actual changes in revenues or expenditures.
[5] "Conjunctural" refers to a series of temporary, non-structural circumstances.

in a boom. On the other hand, according to Ignatov (2016) the economic cycle has a relatively small contribution to the formation of the multiplier estimate, but it is still present and in sharp declines, the probability of playing a more important role is very high.

Degree of monetary adjustment to fiscal shocks. Expansionary monetary policy and lower interest rates may limit the impact of fiscal contractions on demand. In contrast, multipliers can potentially be larger when the use and/or influence of monetary policy is disrupted – as is the case with zero interest rates (Erceg et al. (2010); Woodford (2011). This effect is due to a number of factors. Erceg et al. (2010) show that the size of the fiscal shock has an impact at zero interest rates: the more discretionary spending increases, the shorter the economy will remain at zero interest rates and therefore at higher interest rates – low fiscal multiplier. Christiano (2011) found that in order for the multiplier to be significantly larger than in "normal times", it is crucial that the zero interest rate is still present when the shock cost "hits" the economy.

According to Batini et al. (2014) the composition of the fiscal adjustment can also be considered as a conjunctural factor influencing the size of the "overall" multiplier.

1.2 Fiscal multipliers in the countries of Central and Eastern Europe as a tool for manifesting the effects of fiscal policy – a literature review

At this point, we focus on the forecasts and research results of fiscal multipliers, specific to some of the countries of Central and Eastern Europe and especially to Bulgaria.

In his report, Mirdala (2009) analyzes the effects of fiscal policy shocks in six European emerging economies – the Czech Republic, Hungary, Poland, Slovakia, Bulgaria and Romania in the period 2000-2008, as well as the effect of discretionary changes in fiscal policy (related to increased government spending) and the role of automatic stabilizers (related to increased tax revenues), applying VAR model. The author concludes that after the shock in government spending, the output increases significantly only in Bulgaria, followed by the Czech Republic. Moderate but slight gradual increases are observed in Hungary and Slovakia. In Poland and Romania, the positive impact of the government spending shock on aggregate output is lagging behind. Focusing on the intensity with which the government spending shock affects output, quite different outcomes are observed among countries. In Hungary and Bulgaria, the government spending shock affected aggregate production only for a short period (three and four quarters, respectively) and then stopped. In the Czech Republic and Slovakia, the immediate positive effect of the budget expenditure shock accelerates real production for about three and four years, respectively, and then stopped operating. Despite an initial lag of a quarter, the total production in Poland reacted to the shock of budget expenditures, much like the scenario in Slovakia, with the overall effect of the shock coming to a halt about a year later. On the other hand, in Romania, the output responded to the shock of government spending with a significant delay of one year, but on the other hand, its intensity was the strongest compared to other countries, and its positive effect was exhausted after a relatively long period of 7 years.

In addition, the authors observe that after the shock of initial tax revenues, actual production reacted differently from the second quarter in all countries. The response of output in all

transition economies (except Poland) seems quite interesting and generally contradictory compared to other research studies targeting western developed countries. In the Czech Republic, Hungary, Slovakia, Bulgaria and Romania, output increases after the shock tax revenue (with varying intensity and durability). As they consider tax revenues to be an automatic stabilizer, the output is expected to decline in response to the positive shock tax revenue. On the other hand, since the increase in tax revenues does not necessarily have to be associated with higher tax rates, they accept that higher tax revenues should not inevitably slow down the economy. Higher output can thus increase tax revenues without subsequently damaging economic growth. At the same time, real production in Poland seems neutral to the shock tax revenue.

Deskar-Skrbic (2017) et al. conducted an empirical analysis of the impact of government consumption on economic growth through the concept and size of the fiscal multiplier in eleven selected countries in Central, Eastern and South-Eastern Europe, namely Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia and Slovenia. The purpose of their study was not only to assess the size and sign of the fiscal multiplier in these countries, but also to analyze the determining factors for its size based on different characteristics of the selected economies: the size of the economy, level of government debt, level of the tax burden, openness of the economy, sustainability of the labour market, monetary regime and the business cycle phase. Their methodological approach relied on panel VAR analysis by introducing exogenous "control" variables, which allows them to: 1) estimate the size of the fiscal multiplier within the panel and 2) analyze the effect of the above determinants on the size of the fiscal multiplier, i.e. for the efficiency of government consumption. The study covers eleven economies and a ten-year period (2006-2015), which gives a relatively small but still acceptable sample size. The results presented by Deskar-Skrbic et al. (2017) indicate that fiscal policy is an important determining factor for increasing the economic growth of the surveyed countries, as the increase in government consumption has a positive and relatively strong (fiscal multiplier is about 0.8) effect on aggregate income. The results state that fiscal policy is particularly important in countries whose monetary policy is limited and in which the government influences a large part of the economy, as is the case with the countries included in their study.

In addition, the conclusions they reach confirm the theoretical assumptions about the impact of different structural characteristics of the countries on the efficiency of fiscal consumption. Specifically, their analysis shows that larger countries, which have a more sustainable labour, have a fixed exchange rate (or are a member of a monetary union) and facing recession tend to have larger multipliers. On the other hand, the effectiveness of the fiscal policy is limited in highly open economies, economies with a high level of public debt and economies with a high tax burden.

A study by Stoian (2012) examined the macroeconomic effects of fiscal policy in Romania for the period 2000-2011 on the basis of quarterly data. The author calculates fiscal multipliers using various identification schemes and valuation techniques such as the approach of Blanchard et al. (2002) and the SVAR model with sign constraint (QR decomposition algorithm). The conclusions, drawn in the report, reduce to the fact that during the period under review, discretionary fiscal policy and automatic stabilizers move in

opposite directions. The fiscal policy in Romania is pro-cyclical during both the economic boom and the recession, and this is one of the main reasons for the small size of fiscal multipliers (the multiplier of government spending in the first year varies around 0.25). The author points to the liberalization of the capital account in 2005 as a possible reason that contributed to the reduction of the size of the fiscal multipliers.

In their report, Klyuev et al. (2011) assess the impact of fiscal consolidation on the Czech economy using a version of the IMF GIMF model for the period 2010-2016. The model used is firmly established in economic theory and rich enough to allow quantitative policy analysis. The analysis found out that fiscal multipliers are quite small, ranging from virtually zero to 0.5, depending on the instrument and ancillary assumptions, in terms of the impact on real GDP in the first year. These results reflect the openness of the Czech economy to trade and capital flows, as well as the flexibility of its exchange rate.

The study emphasizes that the effect of fiscal consolidation cannot be summarized in one number. There are several reasons for this and they come down to:

- The impact exceeds one year;
- The subject of the study are several variables – current account, exchange rate, interest rates, inflation rate – and not just real GDP in response to fiscal shock;
- The reaction depends not only on the size of the reduction of the budget deficit, but also on the instrument – the category of expenditures or revenues, through which the reduction is achieved;
- The impact of monetary policy which may be limited if the policy rate is close to zero interest rates;
- It is important whether the tightening is short-term or long-term, as well as the attitude of the private sector regarding the durability of the adjustment in the event of consolidation lasting for several years.

For these reasons, the authors take into account the reactions of output to standardized fiscal shock (1% of GDP) for different instruments (three different taxes and four different ways to reduce budget expenditures), consolidation time horizons and monetary policy assumptions and the reliability of the adjustment. As a conclusion, the results show that the reduction in total transfers has the least negative impact on output, while the reductions in government investment have the greatest. Among taxes, for long-term consolidation, higher consumption taxes have the lowest negative impact in the first few years, and labour taxes have the highest. Monetary policy has the ability to counteract the restrictive effect of fiscal consolidation, but the compensation it provides is relatively small in the short term for most instruments. Higher reliability of the fiscal adjustment reduces the negative impact of fiscal tightening in the short run for all instruments except labour taxes and corporate income.

A study by Staehr (2013) on the impact of austerity measures taken by the governments of the three Baltic States – Lithuania, Latvia and Estonia to recover from the crisis – concluded that the increase in government spending in Lithuania and Estonia in most cases has a negative impact on GDP, employment and foreign direct investment. In Latvia, the

conclusion is less definite. However, government investment has had a positive impact on economic growth in all three Baltic economies.

In her study, Klyvienė (2014) examines the impact of expenditure multipliers and tax multipliers on GDP, foreign direct investment and employment in the Baltic countries of Lithuania, Latvia and Estonia over a period of 10 years, covering the period before the global economic crisis of 2008, during and after the crisis, using SVAR models. In the course of its research, it examines in depth the independent impact of each of the components of the expenditure multiplier (government consumption and government investment) and the components of the tax multiplier (direct (profit tax and labour tax) and indirect taxes). The most important conclusions about the impact of fiscal multipliers reached by the author are:

- Tax increases in Lithuania have a negative impact on GDP, employment and foreign direct investment. In Latvia, only the increase in corporate tax has a negative impact on macroeconomic indicators, while in Estonia GDP, employment and FDI are relatively insensitive to changes in tax policy. The macroeconomic effects of shocks on tax revenues in Latvia lead to a lasting decline in corporate and labour tax revenues, while in the case of indirect taxes, revenues increase. In Estonia, the effects are similar, except that the shock taxes on corporate profits have a negligible effect.
- Increased government spending in Lithuania and Estonia in most cases has a negative impact on GDP, employment and foreign direct investment. In Latvia, this conclusion is less definite. The assumptions about the negative multiplier of government spending in the Baltic States are only partially confirmed. The possibility of a negative reaction of macroeconomic variables to the positive shock from government spending in the Baltics is a consequence of a combination of a negative multiplier of government consumption and a positive multiplier of government investment. This also supports the argument that public investment can have an additional positive impact on aggregate supply, not only through the direct purchase of goods and services.

Karpavičius (2009) conducted a study of fiscal multipliers in Lithuania based on new Keynesian assumptions with flexible prices and flexible nominal wages. According to the applied DSGE models, the reduction of capital taxes had a positive impact on real GDP in both the short and long term in all scenarios. The impact varied from 0.03 to 0.08% in the long run. Reducing labour taxes also had a positive effect on the economy, but the results were not so indisputable. The impact of the tax reduction on consumption in different scenarios did not show much clarity. In general, tax cuts mean positive profits for the Lithuanian economy in the long run. The conclusion on the government expenditure multiplier is less stable, the sign varies and depends on the source of financing the deficit.

Bulgaria is an interesting example of research on quantifying the effect of fiscal policy on aggregate output, as it is not only a small open developing economy, but also faces the challenge of how to promote growth while maintaining a currency board arrangement. The report of Muir et al. (2013) is one of the few attempts to estimate the fiscal multipliers for Bulgaria for the period 1999-2011. They use SVAR model that assesses the historical relationship between fiscal policy and output, given that multipliers may differ during expansion and during the recession. They then calibrate the IMF's GIMF model for Bulgaria to give an idea of the likely effects of future fiscal consolidation on the economy.

As it might be expected for a small open economy, their results show that the impact of fiscal policy on aggregate output was modest in the past. However, empirical results show that the effect of fiscal policy on output does not depend on the underlying state of the economy, as fiscal multipliers are larger in a recession than in an expansion. This is logical, because, during a decline in the output, the share of households and companies with limited liquidity that limit their expenditures in response to a change in disposable income is higher.

The authors establish a clear ranking of fiscal instruments in terms of their impact on growth. On the expenditure side, capital expenditures have the largest multiplier, followed by government consumption and transfers. In terms of revenue, corporate income taxes have the greatest impact on the output, followed by income taxes and consumption taxes.

The GIMF analysis also shows that multipliers have a much greater or lasting effect if they are consolidations that are not immediately and completely plausible to economic agents. Therefore, policy changes work best when they are transparent and carried out in a policy framework with a reputation for upholding previously announced plans. The fact that the multipliers differ significantly according to the tool is important for drawing up an optimal budget. The obtained results show that the Bulgarian budget is favourable for growth in terms of revenues; the amount of direct taxes is low and most revenues are collected through indirect taxes. However, the tradition of lagging capital costs is clearly undesirable. From the perspective of future plans, the analysis suggests a reluctance to increase government consumption, and on the other hand, the strategy of higher capital expenditures financed by increasing the collection of indirect taxes, expanding their base, has significant growth effects in the medium and long term plan.

Karagyozova-Markova et al. (2013) analyze the impact of fiscal policy on real economic activity in Bulgaria and provide a set of estimates for tax and expenditure multipliers. They compare the results of SVAR models with a recursive approach and the structural approach applied by Blanchard et al. (2002) with the results obtained using base simulations to calculate VAR models with time-varying coefficients, the so-called Bayesian VAR, in order to study the changes in the effectiveness of fiscal shocks in Bulgaria in the period 1999 – 2011.

The study presents the results of the application of linear VAR models, which show that the effectiveness of fiscal policy to stimulate economic activity is usually low, as the cost multipliers for the first year do not exceed 0.4. The results concerning tax multipliers are characterized by great inconsistency, as indicated by the data obtained by applying VAR models with different identification techniques, but in general, the effect of tax measures on economic activity seems small and short-lived. These findings are in line with most surveys of EU Member States in Central and Eastern Europe and support the general view that fiscal multipliers are usually small in small open economies.

The results that Karagyozova-Markova et al. (2013) obtain from linear VAR models are fully confirmed by the result of using base simulations to calculate VAR models with time-varying coefficients, all emphasizing the very limited effect of the application of government spending shocks on economic activity. However, the TVP-VAR model reveals important information about changes in the budget expenditure multiplier over time. The size of the expenditure multiplier gradually decreases from levels of about 0.3 in 1999 to a level close

to 0.15 in 2007. With the beginning of the global financial crisis, the size of the multiplier doubled in less than two years before shrinking again to pre-crisis levels, along with a period of economic recovery (2010-2011). These results show that the underlying state of the economy appears to be a determining factor for the nonlinear effects of fiscal policy on economic growth in Bulgaria, although further research is needed to support this view.

In terms of political implications, the results of the study by Karagyozova-Markova et al. (2013) suggest that the effect of discretionary fiscal expansion on real economic activity in Bulgaria appears to be relatively small and short-lived, even during an economic downturn. Similarly, in case of need, fiscal contractions are not expected to put significant pressure on economic activity, even in the short term. Therefore, they believe it is reasonable to take into account the size of fiscal multipliers when developing fiscal consolidation or expansionary strategies. Although the appropriate pace and effectiveness of fiscal adjustment depends on a number of other factors, the small size of fiscal multipliers in Bulgaria suggests that fiscal consolidation with a focus on the tax burden at the beginning of the process would in most cases be preferable to fiscal consolidation with a focus on taxation burden at the end of the process, given the limited effects on output and the favourable impact on government debt dynamics, interest payments and fiscal sustainability. They argue that the increase in the tax burden at the end of fiscal consolidation is often motivated by the expectation of lower fiscal multipliers in the future associated with improved economic prospects. However, such a strategy carries certain risks, as fiscal multipliers are an inconspicuous variable and there is great uncertainty about their size. This uncertainty is strengthened by the fact that the estimate of the size of fiscal multipliers is based primarily on forecasts. In addition to their reasoning, imposing a tax burden at the end of the fiscal consolidation process requires much greater efforts for cumulative consolidation in the medium term, which in turn leads to a high level of public debt and correspondingly higher interest costs. Moreover, the postponement of the consolidation process is usually accompanied by significant implementation risks related to the uncertainty about the materialization of the expected economic recovery, as well as to greater political risks related to the postponement of consolidation measures for the next election cycle.

In conclusion, their results are rather unconvincing in terms of the composition of the preferred consolidation strategy, but at least in terms of impact, it seems that spending restraints would have less of a negative effect on growth than tax increases. However, more research is needed to establish the size of the multipliers of the various sub-components of government spending and their dependence on the state of the economy. It is reasonable to assume that a discretionary increase or decrease in some sub-components of budget expenditures may yield greater results than a discretionary increase or decrease in others.

Nevertheless, the conclusions made in the study by Karagyozova-Markova et al. (2013) have an important political impact on the desired fiscal policy throughout the cycle in the case of Bulgaria. In general, the results of empirical models suggest that very little (almost nothing) can be gained in terms of the economic outcome of active fiscal policy, even in times of economic downturn.

In his report on the study and evaluation of fiscal multipliers in Bulgaria, Yotzov (2018) made calculations of the fiscal multiplier for a relatively long period of time (1996-2017), applying both the standard approach and the approach based on internal absorption. The

results of the study of the dynamics of the fiscal multiplier show that its values throughout the period are positive and remarkably high and, using the internal absorption approach, they even register values above 1 during most of the study period. The obtained results meet the theoretical expectations and are generally in line with other similar studies.

Based on the calculations made, the author concludes that there is a clear tendency to reduce the size of the fiscal multiplier in Bulgaria. According to the author, this trend is unfavourable, as in the conditions of a currency board fiscal policy is the only tool for influencing economic processes. This brings to the fore the question of the efficiency of public spending, as it is impossible and economically impractical to seek an impact on macroeconomic variables only with their continuous growth.

Ignatov (2016) calculated empirical values of the fiscal multiplier for Bulgaria for the period 2000-2015 by considering only the Keynesian cost multiplier. The author's motives for this are related to the fact that often in the empirical literature, the conclusions about tax multipliers are hesitant and very heterogeneous. The obtained results confirm the theory of the Keynesian multiplier, which exceeds 1. The results report a decreasing trend of the multiplier in the period 2000-2008. The reasons for these dynamics are reduced to the strong increase in imports and the more modest increase in gross national savings. The multiplier reached its minimum of 1.12 in 2008, followed by a significant increase of 25.4% to 1.41 in the following 2009. This jump in the multiplier is due to the shrinking imports as a result of the crisis for Bulgaria. In 2010-2011, imports began their path of recovery to pre-crisis levels, and the multiplier again adopted a downward trend. In the last 2013-15 years of the study period, the multiplier stabilized and restored its pre-crisis levels. Characteristic of the entire period of this study was that gross national savings had a predominantly negative effect on the cost multiplier.

The author applies an exemplary decomposition of the already calculated cost multiplier by analyzing the relative importance of various factors (current account, seizures, cash effect, business cycle, trade openness and real cash flow rate) related to the value of the multiplier. There are two subperiods in which the multiplier shows a downward trend (before and after 2009), and the dividing line between them is the beginning of the crisis. An attempt is made to establish the cumulative effect of each constituent factor determining the size of the multiplier for each subperiod.

The investigations made by Ignatov (2016) indicate that during the first sub-period, the greatest influence is exerted by the structural component speed of real money circulation. The degree of economic openness, which, together with the current account, reflect the outflow of expenditures from the economy, has almost as strong an impact. The growth of the money supply and the increase of the real absorption cause a positive effect on the multiplier. The study emphasizes the relatively insignificant effect of the economic cycle on the multiplier, which, to some extent contradicts the results of other empirical works, giving a significant influence to this factor.

The results studied during the second subperiod show again that the trend of the multiplier is negative, but there is a certain change in the degree of influence of various factors. Although the three most influential factors remain the same, the difference in this sub-period is that the economic openness acquired leading meaning for the multiplier. The monetary effect

remains with the same diminishing effect, while the velocity of money loses more than half of its weight. The upward dynamics of exports explains the positive impact of the current account, but also of the allowance-withdrawal factor. The business cycle during this period shows a negligible cumulative effect.

The economic effects of fiscal policy are of great importance for both economic theory and economic practice, and much research has been devoted to this issue. Accurate evaluation of fiscal multipliers is essential for the development and implementation of fiscal policies. Despite the abundance of publications on the subject, there is no theoretical consensus on the size and even the impact of fiscal multipliers. This is largely due to the peculiarities of neoclassical and Keynesian macroeconomic models, which provide for various changes in personal consumption, employment and real incomes after a fiscal shock. Numerous studies published since the onset of the global crisis do not strongly support any of the theoretical models.

Regarding the importance and size of fiscal multipliers in Central and Eastern Europe, there is a small amount of research on the subject. From a theoretical point of view, it is not entirely clear whether their multipliers should be expected to be higher or lower than in other European countries. Based on the above, **Error! Reference source not found.** summarizes the factors causing an increase and the factors causing a decrease in fiscal multipliers in the countries of Central and Eastern Europe.

Table 1

Determining factors of fiscal multiplicators in Central and Eastern European countries

Factors increasing multipliers in Central and Eastern European countries	Factors decreasing multipliers in Central and Eastern European countries
There are fewer stimuli for consumption because: 1) liquidity constraints arise in less developed financial markets; and 2) agents look less into the future if there is too much instability.	Precautionary saving may be larger in a more uncertain environment.
	Economies are smaller and more open.
Monetary policy response is less effective.	Inefficiencies in public expenditure management and revenue administration.
Automatic stabilizers are lower.	Some Central and Eastern European countries may sustain lasting positive output gaps due to supply constraints.
Government debt tends to be lower.	With higher interest spreads there is more room for credibility and confidence effects.

Source: Batini et al., (2014). A Simple Method to Compute Fiscal Multipliers, Authors' calculations.

2. Dynamic effects of the budget expenditure shocks and tax revenue shocks on the economic activity in Bulgaria, Estonia and Lithuania for the period 1995-2018

2.1. General characteristics of the data used and the applied methodology for conducting the empirical analysis

2.1.1. Data description

For the purposes of this study, quarterly fiscal data are analyzed (based on the definition of the European System of National and Regional Accounts 2010), as it allows us to compare the results obtained with the results of other surveys of fiscal multipliers for European economies, most of which are based on ESA 95 and ESA 2010 data. In addition, these fiscal data take into account the lagging of tax revenues in the state budget, offer better processing of data on EU transfers and take into account the accumulation of public arrears. The data for all fiscal variables cover a relatively long period from 01.01.1995 to 31.12.2018, taking into account the impact of the global financial crisis of 2008 and are taken or calculated on the basis of the quarterly non-financial reports of the general government[6]. We use quarterly fiscal data for Bulgaria, Estonia and Lithuania. We chose to study these countries for two reasons: a) They are all part of the former COMECON (Union for Mutual Economic Assistance) and have similar economic characteristics (openness of the economy, lack of active monetary policy, fixed exchange rate[7]); and (b) they joined the European Union relatively soon and at the same time (Estonia and Lithuania joined in 2004 and Bulgaria in 2007). In an attempt to achieve a more in-depth and comprehensive analysis, the studied variables are presented in a regression equation, divided for each of the analyzed countries separately. We believe that this division will give us answers to the questions: Do and to what extent direct budget expenditures and tax revenues affect the values of the gross domestic product of the investigated countries?; Is there a coincidence between the results for Bulgaria and the results of the other countries and is there a deviation from the general trend?.

Of particular importance in the research of fiscal multipliers is that the specific definition of cost and revenue aggregates should be included in the models. To determine the fiscal variables in our study, we refer to the approach applied in the fundamental study of Blanchard et al. (2002), where government expenditures are defined as the sum of the value of government consumption and government investment, and net tax revenues are presented as the difference between total tax revenues and social transfers (including interest payments). A similar approach was used by Karagyozova-Markova (2013) when calculating the fiscal multipliers for Bulgaria.

Further details on the data, including the identification of the variables, their sources and processing, are presented in Table 2.

[6] Quarterly Non-Financial Accounts for General Government - QNFAGG

[7] A currency board was introduced in Bulgaria in 1997, Lithuania and Estonia introduced a currency board in 1992 and 1994, respectively, which lasted until 1999, when the countries practically left the currency board and began to issue national currency. They maintain their fixed exchange rate until their entry into the Eurozone (Estonia (2011), Lithuania (2015)).

Table 2

Data description

Variable	Code	Description and calculations	Measure	Treatment	Source
Output	GDP	GDP – expenditure approach Output (ESA code B.1GQ)	Millions of domestic currency	Seasonal adjustment	National Statistical Institute – Quarterly Non-Financial Accounts of the General Government
Government expenditure	GE	Compensation of employees (ESA code D.1) + Intermediate consumption (ESA code P.2) + Gross fixed capital formation (ESA code P.51)	Millions of domestic currency	Seasonal adjustment	National Statistical Institute – Quarterly Non-Financial Accounts of the General Government
Tax revenues (net)	NT	Indirect taxes (ESA code D.2) + Direct Taxes (ESA code D.5) + Social Security Contributions (ESA code D.611) + Capital taxes (ESA code D.91) – Social payments (ESA code D.60) – Subsidies (ESA code D.3)	Millions of domestic currency	Seasonal adjustment	National Statistical Institute – Quarterly Non-Financial Accounts of the General Government

Source: Eurostat, Autors' calculation

2.1.2. Details on the econometric methodology

The calculation of the government expenditure multiplier and the tax multiplier for Bulgaria, Estonia and Lithuania goes through three stages.

On the first stage, we calculate the impact of the government expenditure multiplier and the tax multiplier on the gross domestic product, applying a linear vector autoregressive (VAR) model based on the Cholesky decomposition of innovations, which allows the identification of shocks of fiscal policy. The model includes three endogenous in real terms: government expenditure, net taxes and GDP. The application of this model specification is one of the most widely used approaches in the scientific literature for measuring fiscal multipliers. It was used in the studies of Fatás et al. (2001), Mirdala (2009), Karagyozova-Markova et al. (2013), etc.

We chose this approach for several reasons: First, VAR-based techniques do not require as many calculations as structural models for capturing the nonlinear nature of the multiplier

size. Second, among the available techniques, the use of VAR models to estimate time-varying parameters offers significant advantages, as they allow greater flexibility in modelling nonlinearity and heterogeneity over time (Pereira et al., 2010). This approach allows us to test for non-linear effects on fiscal policy in Bulgaria, Estonia and Lithuania, which may be caused by structural changes that, on the one hand, cannot be easily identified and, on the other hand, can take the form of processes that last several years (Kirchner, 2010). For the time being, we refrain from applying other models, largely due to the limitations on data availability or reservations regarding the assumptions they require.

In the second stage of the study, we apply the standard concept for calculating the government expenditure multiplier, applied by Yotzov (2018) and Ignatov (2016), so that we can provide estimates of the absolute change in the gross domestic product after a single change in the fiscal variables of government expenditures in a longer-term dynamics covering the period under review.

In the third stage, we analyze the impact of some key factors such as private sector debt, consolidated government debt, economic openness and output gap whose role explains the dynamics of fiscal multipliers during key stages of the study period.

Details on the methodology for calculating, evaluating and validating standard VAR models and the Impulse response function are provided below.

As Box et al. (1994) recommend, before calculating VAR models, it is necessary to eliminate and adjust the seasonality of the data. For this purpose, in our study, we apply the Tramo / Seats method, which is applied only for quarterly and monthly series. The procedure requires at least 3 full years of data and can correct up to 600 observations. In our case, these requirements are met in terms of data, which makes its application possible.

The next procedure in the econometric survey is the stationary check. It requires testing for the presence of a unit root in the time series of data. An analyzable process can be defined as stationary when a segment of it has a mean, standard deviation and correlation equal to the mean, standard deviation and correlation of any other segment of this process. We can assume that a process is non-stationary, when in its change it does not seek to return to some constant value, i.e., there is no process of return to the average value.

One of the most commonly used tests to detect the presence of a unit root is the extended test of Dickey et al. (1979), the so-called ADF (Augmented Dickey-Fuller Test). It is based on the assumption that the time series has the characteristics of an autoregressive process of order ρ. The economic evaluation of this test is performed by using an auxiliary equation, including the differences of ρ– past values, also known as lag values of the dependent variable. From what has been mentioned, the following equation can be derived:

$$\Delta Y_t = \alpha_1 + \alpha_2 + \delta Y_{t-1} + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \beta_\rho \Delta Y_{t-\rho} + \mathcal{V}_t, \quad (1)$$

where

$\mathcal{V}_t$ is white noise,

$\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$...;

$\delta = (\rho - 1)$;

The null hypothesis of the ADF test states that when δ=0, H_0: δ=0, the time series has a single root, i.e. it is nonstationary. Accordingly, the alternative hypothesis states that the time series of data is stationary at H_1: δ<0. To test the null hypothesis t-distribution for δ is used (i.e. the estimate of δ to the standard error), where t_δ=δ⁄s e (δ) applying here the simulated critical values of Davidson et al. (1989) and not the Student's t-distribution.

Provided that it is proved that there is a single root, it is necessary to convert the rows by logarithmizing or calculating the growth rate, first or second difference, respectively. The allowable level of first-order errors is 5%. The length of the lags of the dependent variable that are included in the test is determined based on the minimization of the Schwartz information criterion. When a dependence is found in which the presence of a unit root is not observed, it is possible to proceed to a procedure for applying a linear regression method. The calculations related to establishing the presence of a single root were performed with econometric software EViews.

The results for all analyzed variables (government expenditure, tax revenue and GDP) for all countries show the presence of a unit root (i.e. the data are non-stationary) (Table 3).

Table 3

Unit root test

Indicators/ Countries	GDP		GE		NT	
	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.
Bulgaria	-0.172681	0.9327	0.032770	0.9586	-1.548583	0.5048
Estonia	0.495230	0.9857	0.049615	0.9601	-0.504719	0.8846
Lithuania	0.330769	0.9788	-0.354259	0.9114	-1.484533	0.5372

Source: Eurostat, Authors' calculation

For this purpose, we use first differences. When using first differences instead of levels calculations show that all data are stationary (Table 4).

Table 4

Unit root test 1st difference

Indicators/ Countries	GDP		GE		NT	
	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.
Bulgaria	-6.980828	0.0000	-9.245969	0.0000	-12.47720	0.0001
Estonia	-3.591612	0.0077	-5.962826	0.0000	-12.18285	0.0001
Lithuania	-6.319025	0.0000	-4.247807	0.0009	-10.99492	0.0000

Source: Eurostat, Authors' calculation.

After the unit root testing procedure, the regression equation is modelled. To quantify the studied variables, we apply the popular in recent years empirical approach the Vector Autoregressive Model (VAR). This methodology is appropriate because the variables are considered throughout the system and are not divided into endogenous and exogenous, which is typical of structural econometrics. In the VAR model, each of the variables is represented as a linear function of its past values and the past values of the other variables, characterized by non-random behaviour such as constant and time trend.

In order to set the optimal number of lags in the VAR model, it is necessary to check for the optimal lag structure of the model. We perform this check using the Lag Length Criterion function. The table with the results of the inspection shows different information criteria for information for all lags up to the specified maximum (If there are no exogenous variables in the VAR model, the lag starts at 1; otherwise the lag starts at 0). The table shows the selected lag of the criterion (its smallest value) on each column with an "*" sign (asterisk). The most appropriate is the lag to which the lowest value with the sign "*" corresponds.

According to the theory, when using quarterly data, which we use in our study, it is recommended that the optimal number of lags be between 1 and 8, so as not to lose the degrees of freedom. Checking our data shows that the most appropriate number of lags to be set in the VAR model is four (Table 5).

Table 5

VAR Lag Order Selection Criteria – endogenous variables (GDP GE NT)

Countries	Bulgaria		Estonia		Lithuania	
Coefficients	Lag	Coefficient	Lag	Coefficient	Lag	Coefficient
LR	1	683.9302*	1	624.6861*	1	814.8128*
FPE	2	97430421*	3	97983070*	4	98357431*
AIC	4	42.47138*	4	33.87281*	4	34.74344*
SC	1	42.86389*	1	34.44050*	2	35.73184*
HQ	2	42.57305*	2	33.99072*	4	35.18576*

** indicates lag order selected by the criterion*
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Eurostat, Authors calculation

To determine whether there are logical causal relationships between the variables in our VAR model, we apply the so-called Granger causality test. The data from our study show that for all countries there is an alternative hypothesis, according to which the data are stationary and there is a Granger causality between government spending and tax revenues and GDP (Table 6).

Table 6

Granger Causality Test – dependent variable (GDP)

Countries	Bulgaria			Estonia			Lithuania		
Indicator	Chi-sq	df	Prob.	Chi-sq	df	Prob.	Chi-sq	df	Prob.
GE	877.9233	4	0.0000	40.79399	4	0.0000	15.51618	4	0.0037
NT	15.45627	4	0.0038	13.43830	4	0.0093	28.10487	4	0.0000

Source: Eurostat, Authors calculation

The standard formula for the Vector Autoregressive Model (VAR) econometric model used is as follows:

$$y_t = A_1 y_{t-1} + ... + A_p y_{y-p} + Bx_t + \varepsilon_t \quad (2)$$

where:

y_t – vector of endogenous variable;

x_t – vector of exogenous variable;

$A_1 \dots A_p$ and B – matrices of the calculated coefficients;

ε_t – vector of residuals;

Since only the lag values of the endogenous variables appear on the right side of the equations, simultaneity is not a problem and the least-squares method gives consistent estimates (Table 7).

Table 7

VAR models calculations

Countries Variables	*GDP – Bulgaria*			*GDP – Estonia*			*GDP – Lithuania*		
	Coeff.	Standard errors	t-Stat.	Coeff.	Standard errors	t-Stat.	Coeff.	Standard errors	t-Stat.
GE(-1)	0.996183	0.03858	25.8199*	0.184237	0.11221	1.64194*	0.289181	0.17401	1.66190*
GE(-2)	-0.800883	0.10633	-7.53203*	-0.207163	0.13058	-1.58643*	-0.147468	0.26114	-0.56471
GE(-3)	-0.312464	0.07665	-4.07633*	-0.112466	0.13157	-0.85482	0.074675	0.25234	0.29593
GE(-4)	0.342366	0.05915	5.78807*	0.032386	0.09096	0.35604	-0.206137	0.14788	-1.39398
NT(-1)	-0.003679	0.03794	-0.0967	-0.015955	0.03111	-0.51284	-0.090698	0.03038	-2.98509*
NT(-2)	-0.086747	0.04172	-2.07948*	-0.011354	0.03478	0.32649	0.027079	0.03199	0.84644
NT(-3)	0.050389	0.04208	1.19741	0.026828	0.03475	0.77204	0.061725	0.03386	1.82298*
NT(-4)	-0.031866	0.03463	-0.92008	0.016796	0.03120	0.53842	-0.017721	0.02632	-0.67328

** Statistically significant values at 5%, 10% and 15% critical values*
Source: Eurostat, Authors' calculation

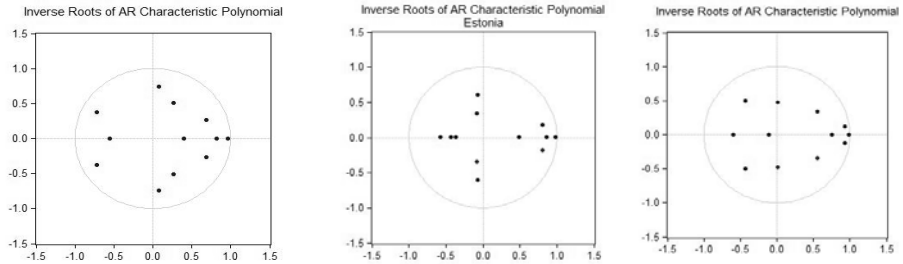
In order to verify the appropriateness of the calculated VAR model, the lag structure of the obtained calculations is checked. This test takes into account the opposite roots of the characteristic autoregressive polynomial (Inverse Roots for AR characteristic polynominal) (Lütkepohl, 1991). The calculated values of the VAR model are stable (stationary) if all roots have a modulus up to one and are located inside the single circle. If the test shows that the VAR model is not stable, it means that the calculated results (such as standard impulse response errors) are not valid. This indicates the presence of *κp* roots, where *k* is the number of endogenous variables and *p* is the largest lag.

The calculations in our example show that all roots have a modulus to unity and are inside the unit circle (Figure 1).

Figure 1

Check for stability of VAR model – Inverse Roots of AR

Bulgaria Estonia Lithuania



Source: Eurostat, Authors' calculation

After calculating the VAR models and checking its appropriateness using the diagnostic test Inverse Roots for AR characteristic polynominal, we calculate the Impulse response function (Figures 2 and 3), which monitors the effect that causes a single shock in a selected variable on the current and future values of other endogenous variables. If the changes ϵ_t are simultaneously uncorrelated, the interpretation of the impulse response is clear. The shock in the variable $\epsilon_{i,t}$ causes a change in the homogeneous variable $y_{i,t}$. Changes are usually related and can be considered as having a common component that cannot be related to a specific variable. In order to interpret the impulses, it is appropriate to apply the transformation P to the changes so that they become uncorrelated:

$$\nu_t = P_{\epsilon t} \sim (0, D) \quad (3)$$

where D is където е diagonal covariance matrix.

2.2. Analysis of GDP reactions after fiscal shocks

This chapter presents numerically and graphically the results obtained from the calculation of standard VAR models – the main VAR model with three endogenous variables – gross domestic product, budget expenditures and tax revenues for Bulgaria, Estonia and Lithuania for the period 1995-2018. In addition, by applying a standard approach, the absolute value of the government expenditure multiplier was calculated, since the impulse responses obtained from the application of the Impulse response function do not directly reveal its size. An attempt is made to interpret and analyze the results, taking into account the factors that help explain the dynamics of the size of fiscal multipliers in different periods of economic development, which go through the studied countries – from the transition from a planned economy to a market economy, the period the introduction of a fixed exchange rate, the great global crisis of 2008 and the recovery period thereafter.

2.2.1. GDP reaction after fiscal shocks

Table 8 and Table 99 summarize basic information on the data and results of the calculation of the VAR models, reflecting the effects of government expenditures and tax revenues on the gross domestic product for Bulgaria, Estonia and Lithuania for the period 1995-2018. Detailed information is available in the previous section 2.1 "General characteristics of the data used and the applied methodology for conducting the empirical analysis " (Table 7).

The results of the applied standard VAR model regarding the impact of the government expenditure multiplier on the GDP for the three analyzed countries indicate that the most significant is the impact for Bulgaria, where the highest statistically significant values were registered in the four quarters. Data for Estonia show statistically significant multiplier values in the first two quarters, and for Lithuania only for the first quarter. The reaction of the gross domestic product to the shocks in government expenditures is similar for all three housekeepers. In the first quarter it is positive, in the second it immediately becomes negative, decreasing in the third and fourth quarters.

Table 8

VAR model – Effects of government expenditure on GDP

Countries	Period	Quarters				Numer of observations
		1st	2nd	3rd	4th	
Bulgaria	1995 Q1-2018 Q4	1,00*	-0,80*	-0,31*	0,34*	92
Estonia	1995 Q1-2018 Q4	0,18*	-0,21*	-0,11	0,03	92
Lithuania	1995 Q1-2018 Q4	0,29*	-0,15	0,07	-0,21	92

** Statistically significant values*
Source: Eurostat, Authors' calculation

The results from Table 9, presenting the values of the VAR model concerning the impact of tax revenues on GDP show that the values are low for all countries. For Bulgaria, a close to zero negative statistically significant value was registered in the second quarter. There is no statistically significant value for Estonia. Statistically significant values were registered for Lithuania in the first and third quarters.

Table 9

VAR model – Effects of tax revenues on GDP

Countries	Period	Quarters				Numer of observations
		1st	2nd	3rd	4th	
Bulgaria	1995 Q1-2018 Q4	0,00	-0,09*	0,05	0,03	92
Estonia	1995 Q1-2018 Q4	-0,02	-0,01	0,03	0,02	92
Lithuania	1995 Q1-2018 Q4	-0,09*	0,03	0,06*	-0,02	92

** Statistically significant values*
Source: Eurostat, Authors' calculation

The summaries that can be made on the basis of the results of the VAR analysis are that the values of the government expenditure multiplier for all countries are significantly higher than the values of the tax revenue multiplier. The reaction of GDP to the shock in government expenditures is displayed in the first quarter for all countries, while the reaction of GDP to

the shock in taxes is displayed with a delay for Bulgaria (second quarter) and Lithuania (third quarter).

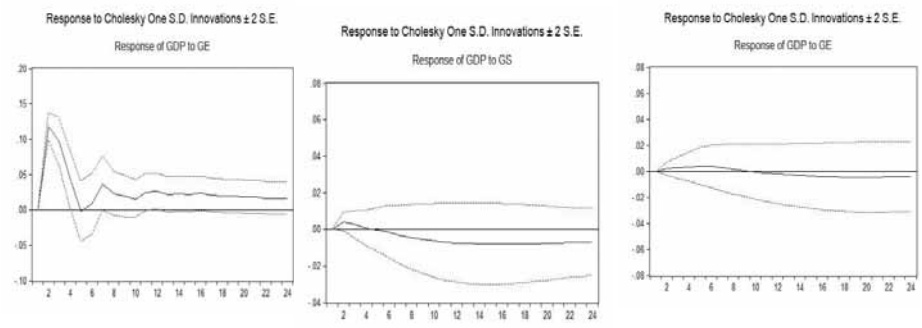
- ***Reaction of GDP after the government expenditure shock***

The results of the Impulse response function, which show the response of the gross domestic product to the shocks in the budget expenditures for Bulgaria, Estonia and Lithuania (Cholesky identification scheme) are presented in The results need to be looked at with caution, as countries often borrow from international creditors during a crisis, which can distort the results to some extent.

Figure 2

GDP reaction after government expenditure shock

Bulgaria Estonia Lithuania



Source: Eurostat, Authors' calculation

The results for Bulgaria show that the strongest reaction of the gross domestic product (0.12) is manifested in the second quarter after the shock in the government expenditures and takes the form of a peak. There follows a period of weakening of the influence as the size of the multiplier reaches its bottom with negative values (-0.002) in the fifth quarter. Then there was again an increase and a slight retention in the seventh and eighth trimesters (0.4), but already to lower values than those recorded immediately after the shock. After the fourth quarter, i.e. after the second year, there is a slowdown in the response of GDP as the results are positive, but do not differ significantly from zero.

With regard to Estonia, the impulse responses show a weak reaction to GDP as a result of the shock to government expenditures. The positive shock is almost insignificant and extremely short-lived – in the second and third quarters. The values then become negative, increasing from -0.002 to -0.008 and retaining their value until the end of the study period.

In all quarters after the shock expenditures, there was no significant response of the gross domestic product to the shock in the budget expenditures in relation to the results for Lithuania. Fiscal multiplier values gradually increased until the fifth quarter (0.005) and after

this fall. The positive GDP response, although insignificant, persists for a relatively long period of just over two years, after which the multiplier persists until the end of the period.

Comparing the results concerning the reaction of the gross domestic product caused by the shock in the government expenditures for the three surveyed countries – Bulgaria, Estonia and Lithuania, we can make the following summaries: The highest and most significant values of the government expenditure multiplier – (0.12) are registered in the results for Bulgaria, and the lowest in the results for Estonia (-0.008). In the results for Bulgaria, the values of the government expenditure multiplier are entirely positive, and in the results of Estonia and Lithuania, the negative values prevail.

The increase in government spending in all three countries – Bulgaria, Estonia and Lithuania – has a positive impact on GDP immediately after the shock, but it is short-lived (especially for Estonia and Lithuania). One of the reasons for the short-term effect of spending shocks on GDP is that the process of integration of Bulgaria, Estonia and Lithuania into the EU single market significantly increases the openness of economies, which expands the so-called "import outflow" of the fiscal stimulus. This "leakage" stems from the fact that in this way, part of the positive impact on GDP due to the stimulus is offset by the increase in imported goods and services. Usually, the greater the openness of the economy, the greater the outflow.

Another point that is important in the analysis of the impact of government expenditure multipliers on GDP is the issue of expenditure-effectiveness. Guided by the understanding that government expenditures are a burden on the economy rather than a stimulus, countries are more likely to rely on limited government expenditures. According to Minasian (2018) the unconditional treatment of this understanding doesn't correspond to modern trends. What is crucial here is not the amount of government expenditure, but the way in which the latter is used. The fiscal regulatory strategies should focus on increasing public investment, which stimulates economic growth and cuts inefficient current government spending.

The results need to be looked at with caution, as countries often borrow from international creditors during a crisis, which can distort the results to some extent.

- ***GDP reaction after-tax revenues shock***

The data for Bulgaria (Figure 3) show that the positive reaction of GDP after the tax shock is short-lived and weak. The peak of the positive reaction occurs in the third quarter (0.03), after which the values decrease and after the fourth quarter they are completely negative, with the highest negative value being -0.04.

In terms of the response of GDP to the shock in tax revenues, the results for Estonia show a weak but predominantly positive response, which starts after the third quarter. The highest value of 0.012 is maintained in four quarters, after which it decreases.

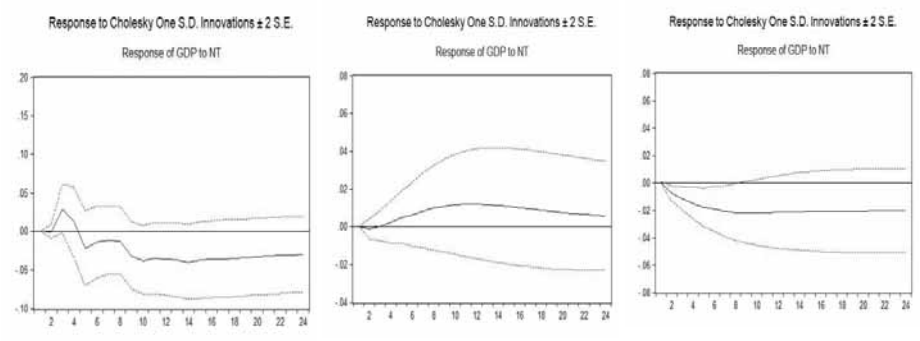
The reaction of the GDP to the tax shock in the results for Lithuania is completely negative for the whole analyzed period. The values decrease gradually until the seventh quarter and then the reaction remains constant until the end of the period.

In summary, we can conclude that the results are identical to some other empirical studies based on emerging economies on the response of GDP to tax shocks, which show lower values of tax multipliers compared to government expenditure multipliers. Low,

predominantly negative values of the tax multiplier are registered in the values for Bulgaria and Lithuania, and only in Estonia they are entirely positive. Nevertheless, the positive reaction in the results for Bulgaria, although short-lived, shows the highest results for all three countries. Reactions for Bulgaria suggest that the shock from tax revenues leads to greater collection of tax revenues only in the short run, while in the long run revenues are declining due to lower tax bases. The relatively low sensitivity of GDP to tax shocks in the three countries can be explained by a more balanced fiscal policy and a more stable environment of the tax system, as well as structural and cultural differences. For Bulgaria, the low tax rate on direct taxes is also essential, which at the governmental level is seen as a prerequisite for increasing the country's competitiveness (Beleva, 2019) and attracting foreign investors (Tasev et al., 2017), as well as way to fight the grey economy, which will reflect on the expansion of the tax base. However, there are a number of problems in the tax system of Bulgaria, among which is the weak redistributive function of the budget (Yotsov et al., 2020). These phenomena require additional research, which involves the study of individual components of tax revenues (direct and indirect taxes).

Figure 3

GDP reaction after-tax revenues shock



Source: Eurostat, Authors' calculation.

2.2.2. Cumulative fiscal multiplier

The direct values of the fiscal multipliers are revealed by the VAR model, and the impulse responses show us the dynamic response of GDP. For greater certainty and to provide estimates of the absolute change in the gross domestic product after a single change in fiscal variables of budget expenditures, we use the standard concept for calculating the multiplier of budget expenditures, applied by Yotzov (2018) and Ignatov (2016). In the current study, the direction of dynamic development of the effect of expenditure and tax multipliers is of leading importance. It is important to determine whether the trend of change of the multiplier calculated by the VAR model and the trend of change of the fiscal model calculated by the standard approach have the same trend.

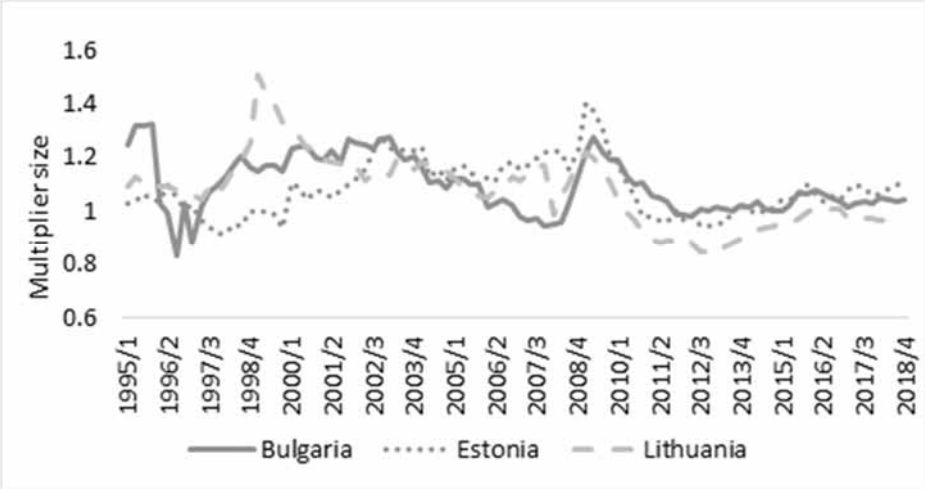
In a simplified model of an open economy, in which consumption and imports are accepted as an integral part of income ($c = \frac{C}{Y}$ и $m = \frac{M}{Y}$), where *c* and *m* are the marginal propensity to consume and the marginal propensity to import, respectively, the fiscal multiplier can be calculated as:

$$M = \frac{1}{1-c+m} \quad (4)$$

The obtained absolute values of the cumulative fiscal multiplier are summarized on Figure 4.

Figure 4

Cumulative fiscal multiplier (1995-2018)



Source: Eurostat, Authors' calculation

The results of the calculation of the absolute values of the cumulative multiplier of budget expenditures show that its size for the studied period is in the range from 0.83 to 1.51. The values largely correspond to the findings of Pusch et al. (2011), Yotzov (2018), Ignatov (2016) and others and are comparable to most studies on the periphery of the EU. They support the argument that the low values of the fiscal multiplier are explained by the size of their economy, its openness[8], the conditions of a currency board, as well as cyclical effects. They share the thesis that these economies are usually characterized by small fiscal multipliers, as for Bulgaria and other developing EU countries they are close to and below 1. However, these values are significantly lower than the established expenditure multipliers in

[8] Rangelova (2014) examines the relationship between foreign trade and economic growth for 179 countries (according to the IMF data) and within the EU-27 (according to Eurostat data), focusing on the global financial and economic crisis.

the US and more the large (less open) economies in the euro area, which are usually found to be well above 1 (Burriel et al., 2009).

The results in Figure 4 show that the cumulative multiplier of government expenditures in Bulgaria realizes its peak value in the period before the introduction of the currency board (1.33) and to some extent, the same trend continues in the years after its introduction. In Lithuania and Estonia, values above 1 are again registered at the beginning of the analyzed period, which can be explained by the fact that a currency board is also adopted in these countries (Estonia – 1992; Lithuania – 1994). Similar peaks were observed again in 1999-2000, when the countries practically left the currency board and began to issue national currency freely, managing to maintain their fixed exchange rate until their entry into the Eurozone in 2014-2015.

The response to the aggregate output of budget expenditure shocks became weaker and shorter during the period 2000-2007. The multiplier values in all three countries are quite stable (both in terms of size and duration) and vary about 1.

With the beginning of the global crisis, the size of the multiplier rapidly increased back to levels above 1 since the beginning of the study, with the highest value reported for Estonia – 1.37, followed by Bulgaria – 1.20 and Lithuania – 1.19. Immediately after the crisis subsided, along with the economic recovery, the values of the budget expenditure multiplier shrank significantly to 0.8.

It is noteworthy that the values of the fiscal multipliers obtained by applying the VAR models and the values of the cumulative multiplier of budget expenditures calculated using the standard concept differ. The reason why this difference is observed is related to the fact that the way of calculation using VAR models is much more accurate, as a result, the values are more accurate. Leading, in this case, is the fact, that the trend of change of the multiplier calculated by the VAR model and the trend of change of the fiscal model calculated by the standard approach coincide.

2.2.3. Determinants/factors influencing the fiscal multiplier

Similar to the approach applied by Karagyozova-Markova et al. (2013), we analyze some factors such as private sector debt, consolidated government debt, economic openness and the gap between real and potential GDP, whose role explains the dynamics in the size of fiscal multipliers during key stages of the study period.

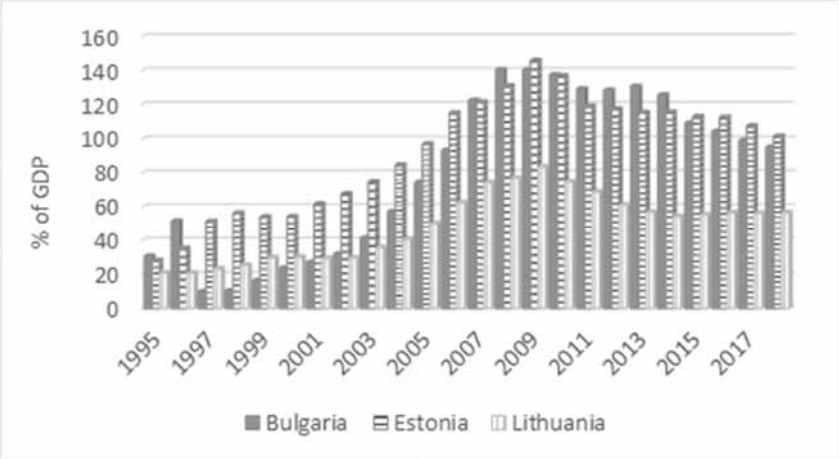
First, in the period 2000-2008, the economies of the three countries experienced high economic growth, accompanied by rapid changes in the economy. Consumption and investment are growing rapidly, aided by rapid credit growth and extremely low or even negative real interest rates. This significantly deepens the financial sector. Competition from foreign-owned financial institutions in an effort to expand market share led to a rapid and significant increase in the supply of low-interest loans (Figure). External indebtedness of the private sector was also growing steadily due to the good investment opportunities offered by both financial and non-financial corporations. The peak of lending is 2008-2009, when the size of private-sector loans (households, non-financial corporations and non-profit

institutions) reached huge levels of 146% of GDP for Estonia, 140% of GDP for Bulgaria and 83% of GDP for Estonia.

The mitigation of the credit constraints is among the factors that could explain the decline in the effectiveness of government spending to stimulate economic activity, as Perotti (2002) argues. According to Karagyozova-Markova et al. (2013), this leads to a gradual decrease in the share of households and companies that are liquid and credit constrained. Kirchner et al. (2010) also provide evidence that household access to credit is among the most important determinants of the size of fiscal multipliers. In particular, the authors conclude that increasing household credit as a percentage of GDP leads to lower multipliers.

Figure 5

Private sector debt (1995-2018)



Source: Eurostat, Authors' calculation.

Secondly, it is generally accepted that the effect of the fiscal multiplier is greater if the country's fiscal position remains stable after the stimulus. This is confirmed by the fact that in the years after the introduction of the currency board in Bulgaria, the conducted fiscal policy is restrictive, i.e. the effects are neo-Keynesian, as this is a period of economic recovery and a return to confidence in the fiscal framework. In addition, the high level of government debt at the beginning of the sampling period would make expansionary fiscal stimuli intolerable. However, sovereign debt sustainability problems have been successfully mitigated over the last fifteen years, with the government debt / GDP ratio for Bulgaria declining from almost 100% of GDP in 1997 to below 20% of GDP in 2012 (Figure 6), which is largely due to budget surpluses in the years before the recent crisis (Figure 7). For Estonia and Lithuania (and for Bulgaria after 2002) the rule in the economic literature is confirmed that in the periods when the debt is below 60% of GDP[9], the impact multiplier is about 1 and

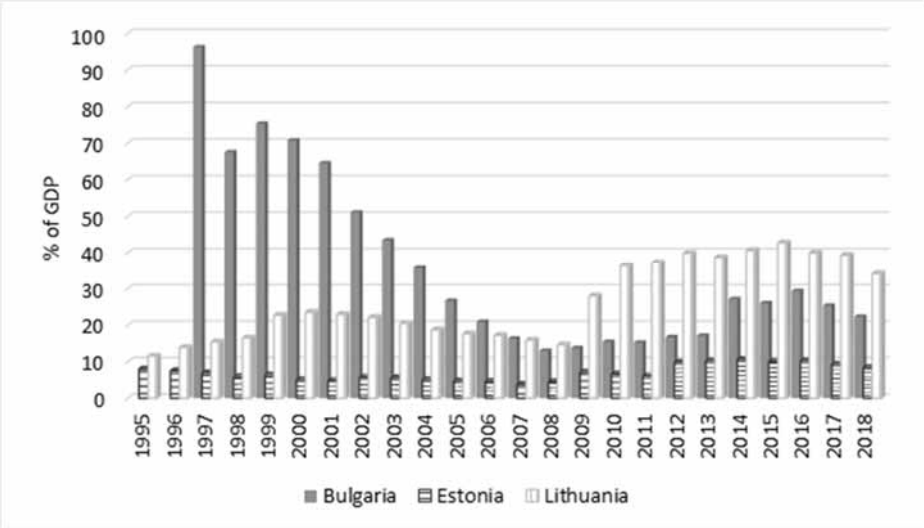
[9] The coincidence of the used debt-to-GDP benchmark with the well-known Maastricht convergence criterion is striking.

has positive values in the longer term. Higher debt levels are associated with low and even negative values of the multipliers (Yotzov, 2018);

As widely discussed in the literature, debt sustainability issues are among the important factors in determining the effect of budget expenditures on aggregate income. Perotti (2002) argues that high debt levels act as a signal for the necessary future fiscal adjustment as a result of current increases in government spending. Expecting a future fiscal tightening (i.e. an increase in taxation) would cause a decline in private consumption today, thus offsetting the widening impact of government consumption. There are numerous economic studies Ilzetzki et al. (2013), Koh (2017), Hory (2016), and Deskar-Škrbić et al. (2017), that support the theory that the level of public debt affects the size of the fiscal multiplier inversely, as countries with higher public debt have difficulty in securing financial support for stimulating fiscal policy due to rising interest rates. As a result, public finances are often under pressure.

Figure 6

Consolidated government debt (1995-2018)

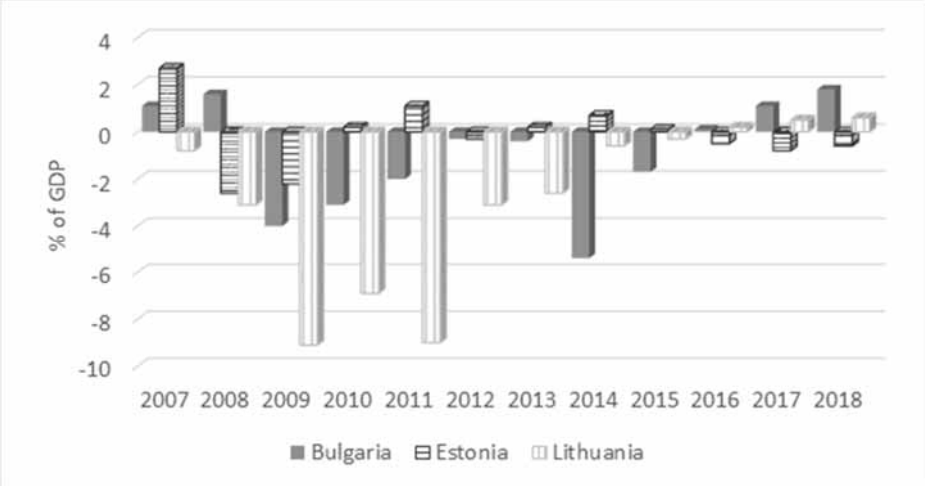


Source: Eurostat, Authors' calculation.

The increased share of public expenditure on interest payments can significantly reduce the financial potential for stimulating the use of fiscal instruments. The problem of high government indebtedness was exposed during the Great Recession, especially in the EU, where many member states encountered problems managing growing public debt. As a result, some member states were unable to implement counter-cyclical fiscal policies and were instead forced to pursue painful fiscal tightening. Therefore, member states should release public budgets in relatively stable times, but in times of economic downturn, they must boost aggregate demand to stimulate economic growth.

Figure 7

Government deficit (-)/surplus (+)



Source: Eurostat, Authors' calculation.

Third, the process of integration of the three countries into the EU single market (Bulgaria (2007), Estonia and Lithuania (2004)) significantly increases the openness of their economies (Figure 8), which in turn expands the so-called "leakage" of the fiscal stimulus (Figure 9). This "leakage" results from the fact that part of the fiscal stimulus is spent on the consumption of foreign goods and services and thus part of the positive impact on GDP due to the stimulus is offset by the increase in imports. Usually, the greater the openness of the economy, the greater this outflow and the smaller the size of the fiscal multiplier. These statements are confirmed in the example of the countries in our study. The lowest values of the indicator were registered in 2009 (Estonia – 58% of GDP, Lithuania – 54% of GDP and Bulgaria – 47% of GDP), when the values of the fiscal multiplier were the highest.

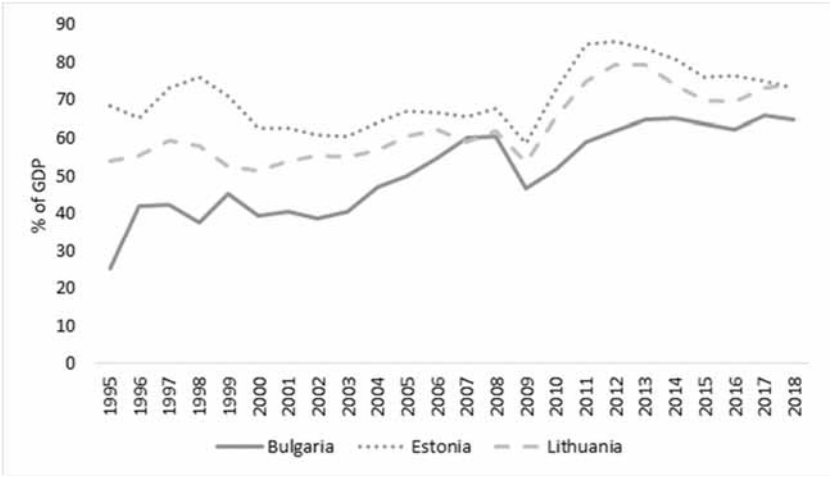
Economic theory also confirms the existence of higher fiscal multipliers in more closed economies, as the larger share of initial fiscal stimuli remains within countries due to lower import outflows. A significant number of researchers, such as Yotozv (2018), Karagyozova-Markova et al. (2013), Ilzetzki et al. (2013), Silva (2014) and Hory (2016), found a higher values of multipliers in more closed economies, than in open ones.

Another important factor that has a significant impact on the size of the fiscal multiplier is the so-called in the economic literature, "output gap" or gap between the actual and potential GDP. The size of the "output gap" helps to determine the phase of the business cycle, i.e., whether the economy is in expansion or recession. The difference in production is the measure most often used to identify economic cycles, as it is considered not only as a reliable indicator for subsequent assessment of the state of the economy, but also as a reliable indicator in real time for fiscal policy-makers. It is extremely important here that a decisive argument for fiscal policy to be more effective in a recession than in an expansion is that in

the event of a negative difference in production (production decline), there is unoccupied production capacity in the economy, which pushes out private investment lower. This situation continues as long as the output gap values are negative, which is difficult to catch from low or negative growth rates.

Figure 8

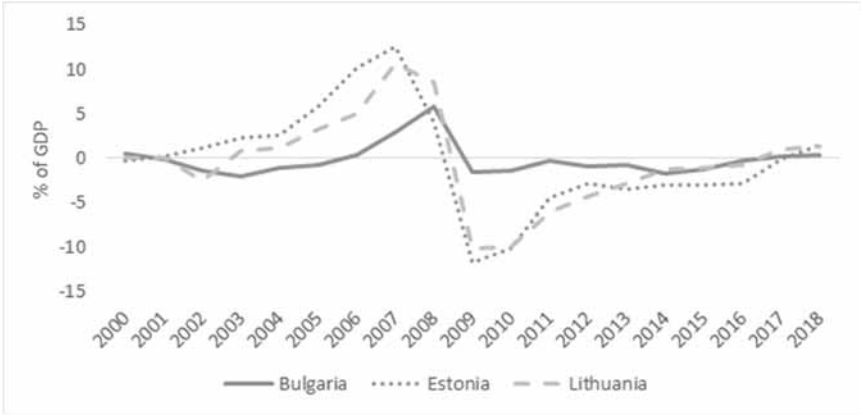
Import penetration* (1995-2018)



** Note: The index "import penetration" is calculated by the formula: Imports / (GDP-exports + imports) * 100. All series are seasonally adjusted.*
Source: Eurostat, Authors' calculation

Figure 9

Output gap (2000-2018*)



Source: OECD[10], Authors' calculation.

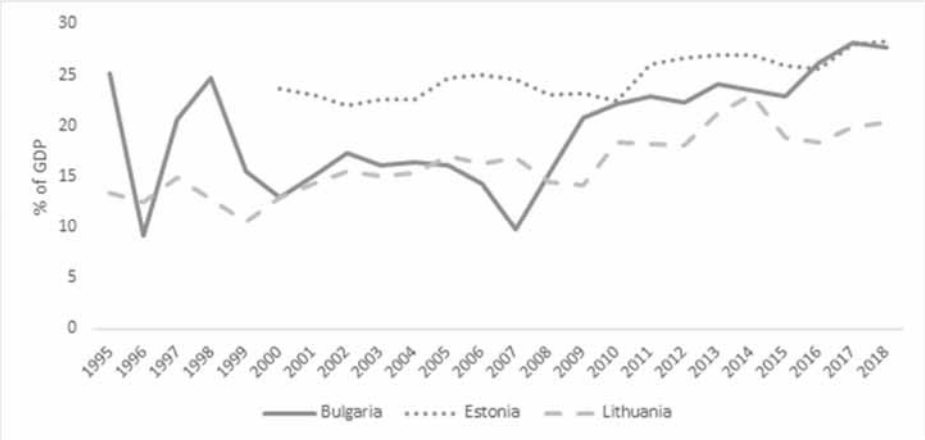
[10] Organisation for Economic Cooperation and Development

Figure 9 shows that with the onset of the global financial crisis, the output gap is rapidly declining for all three countries, consumer and corporate credit growth is declining (Figure 5 and 6), and import is shrinking (Figure 8). These developments explain the fact that the size of fiscal multipliers reaches their maximum values in the midst of the crisis (Karagyozova-Markova et al. (2013)). In the period of economic recovery after the crisis, the values of the "output gap" return to levels around zero and, accordingly, the values of the fiscal multiplier also return to lower levels.

The significant increase in the level of domestic savings is an important factor limiting the size of the fiscal multiplier (Karagyozova-Markova, 2011). Probably a significant increase in the level of domestic savings immediately after the introduction of the currency board and the global financial crisis for Bulgaria (in relation to Estonia and Lithuania this factor does not have such a strong influence), caused mainly as a result of protective incentives, is an important factor in limiting the increase in the size of the multiplier (Figure 10). Much of the fiscal stimulus to mitigate the negative effects of the crisis on the economy comes in the form of savings. As shown by Galí (2007), Corsetti et al. (2012) and (Karagyozova-Markova (2011)), the shock of budget expenditures may have a smaller effect on aggregate consumption as the financial crisis increases the share of liquidated households and firms.

Figure 10

Gross savings (1995-2018*)



** Data for Estonia are available from 2001.*
Source: Eurostat, Authors' calculations

3. Conclusion

The results of this study confirm that fiscal policy is an important determinant of growth in the region of Central and Eastern Europe and is particularly important for countries whose monetary policy is limited and in which the government influences much of the economy, such as the case of the countries included in our study.

The calculated values of fiscal multipliers for Bulgaria and Lithuania are in line with some other empirical studies based on economies in Central and Eastern Europe, where fiscal multipliers are usually small and cost multipliers are larger and therefore more efficient than tax multipliers, as the increase in government consumption has a positive, relatively strong and lasting effect on gross domestic product. However, the results for Estonia show a positive impact of the tax multiplier and a negative impact of the government expenditure multiplier. Which on the one hand could be due to the fact that many countries were forced to implement restrictive fiscal policy and most of the fiscal consolidation measures were related to reducing spending in the public sector and this was an option for effective policy. On the other hand, the negative reaction of GDP to the positive shock of government spending may be due to a combination of a negative current expenditure multiplier and a positive investment multiplier.

The first reason to consider that government expenditures are more efficient than tax measures in terms of stimulating economic activity is that very often in economies there is an "outflow" of the fiscal stimulus, which manifests itself both by increasing demand of imported goods, as well as in terms of increasing private savings (the so-called Ricardian model). The other reason is related to the contradictory results obtained in the scientific literature when calculating tax multipliers using linear VAR models. As Karagyozova-Markova (2013) note in their study, as a whole in the empirical literature there is less division in terms of the results obtained for the size of the expenditure multipliers, while the results for the tax multiplier cover a much wider range. Estimates for tax multipliers also prove to be much more sensitive to the choice of technique for identifying fiscal shock. To some extent, this is due to the problem of fiscal forecasting and the inability of VAR models to properly take into account the fact that changes in tax rates, for example, are often expected and known before the actual change in legislation (Caldara et al, 2008; Leeper, 2008).

In addition, the results of the study confirm the theoretical assumptions about the impact of various factors on the efficiency of fiscal consumption. Specifically, our analysis showed that countries facing a recession, having a fixed exchange rate or being a member of a monetary union tend to have larger multipliers. On the other hand, the effectiveness of fiscal policy is limited in highly open economies, economies with a high level of private and public debt and economies with a high share of gross savings.

The fiscal policy of the countries of Central and Eastern Europe would be successful if its formulation and implementation are subject to firm, sustainable and predictable rules and principles (Minassian, 2010). This means following not only theoretical statements, but also practical requirements and rules that lead to objective decision-making based on evidence and results. Taking into account the objectives of fiscal sustainability and combined with compliance with fiscal rules, countercyclical fiscal policy would have an undeniable positive effect in the long run on the economic development of emerging economies in Central and Eastern Europe, aimed at promoting economic growth (Yotzov, 2013). Otherwise, this would lead to an increase in social tensions with difficult consequences due to the poor quality of public services provided. Therefore, the priority of the fiscal authorities should be to focus on activities such as defining, managing and evaluating the policy in accordance with proven international practices and national requirements.

The performed estimates of the size and dynamics of the fiscal multipliers allow to make some recommendations to the conducted fiscal policy. It is clear that large fiscal packages aimed at stabilizing the economy can easily be "wasted" if countries are influenced by factors that significantly reduce the size of fiscal multipliers. In this case, managers need to look beyond the traditional cost-benefit analysis and take into account fiscal multipliers. On the other hand, in a number of cases, governments face strong opposition when offering a particular fiscal stimulus, or are under pressure to introduce another. In these cases, the decision must be based not on conjunctural effects, but on long-term ones, which implies precisely estimated multipliers. Last but not least, all discussions related to changes in fiscal policy and its highlights should be based on a systematic analysis and not on "fiscal alchemy" and conjunctural political interests.

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