НАУЧНИ ТРУДОВЕ НА УНСС (5) 2020, ИК – УНСС
ISSN (online): 2534-8957; ISSN (print): 0861-9344; http://unwe-research-papers.org/

FISCAL SPENDING MULTIPLIER IN SELECTED EUROPEAN UNION COUNTRIES

Nikolay Velichkov[1]
e-mail: nn_velichkov@unwe.bg

Abstract

This paper estimates the fiscal spending multiplier in Bulgaria, Poland, Romania, Estonia, Denmark, Germany, Greece, and Italy for the 2000-2018 period. It is calculated by algebraically transforming the traditional Keynesian multiplier formula. In addition, the formula is subjected to further modification to take into account the impact of various structural and conjunctural factors, such as business cycle, trade openness, exchange rate regime, and fiscal sustainability, which all have an impact on the multiplier effect.

Key words: fiscal multiplier, business cycle, trade openness, exchange rate regime, fiscal sustainability

JEL: E32, E62, H50

Introduction

Economic theory generally defines fiscal multipliers as measures of the impact of discretionary fiscal policy on macroeconomic activity. Therefore, their size is essential for the development and implementation of fiscal policy and accurate forecasting of its effects on the real economy.

The importance of the issue of fiscal multipliers is also indisputable in the midst of the ongoing COVID-19 pandemic. This is explained by the fact that a number of discretionary fiscal measures are being taken to limit and overcome the economic consequences of the pandemic. In addition, the issues of the impact of these measures on the fiscal positions and the subsequent risks to the sustainability of public finances play an important role in the debate on the effective management of the state of emergency. In this respect, accurate estimates of the multipliers play a significant role in supporting the specific fiscal targets, as well as for the necessary package of fiscal instruments for macroeconomic stabilization.

Despite the significant information derived from fiscal multipliers, they are not widely used in government policy. The main reason for this is the difficulties associated with their empirical evaluation. When measuring them, it is necessary

---

[1] Chief Assistant Professor, PhD. Department of Economics, University of National and World Economy, ORCID: https://orcid.org/0000-0001-6368-0507

to distinguish between discretionary and non-discretionary changes in budget revenue and expenditure. This is particularly important as macroeconomic activity depends on both fiscal discretion and automatic budgetary stabilizers. Therefore, different methodological approaches are used to isolate exogenous fiscal shocks. Empirical analyzes use both broad-based econometric models (Auerbach et al., 2010; Coenen et al., 2010; Hall, 2009) and smaller model constructions based on VAR models (Fatas, Mihov, 2000; Blanchard, Perotti, 2002; Ramey, Shapiro, 1998; Velichkov, 2016; Karagyozova-Markova et al., 2013). It should be noted that the size of the multipliers varies greatly among different studies due to the adopted specification of the model.

In order to overcome the disadvantages associated with the construction of various complex model structures, simplified methods for calculating fiscal multipliers are applied, such as bucket approach, algebraic calculation using the marginal propensities to consume, save, import and tax, etc. (Batini et al., 2014; Nizam, 2019 et al.) The results of these studies also vary widely. This is the reason for the lack of consensus on the specific size of the fiscal multipliers.

Furthermore, the literature emphasizes that the size of the multipliers depends on a number of factors, which affects the effectiveness of the implemented fiscal policy (Velichkov, Stefanova, 2019). These factors refer both to the specific structural characteristics of individual economies and to the conjunctural circumstances which can lead to an increase or decrease of the multipliers from their „normal" level.

Significant role is given to the cyclical state of the economy with the multipliers being higher in times of economic downturns and recessions than in times of upturn and recovery. The reason is that during economic recovery and the economy approaching full capacity, the effect of displacement is very pronounced. Moreover, empirical results suggest that multipliers increase more in recession than they do in a recovery (Auerbach, Gorodnichenko, 2011, 2012; Batini et al., 2012; Baum et al., 2012; Canzoneri et al., 2012, Owyang et al., 2013). An additional argument for the higher values of the multiplier in times of recession is the manifestation of the so-called monetary-fiscal mix, i.e. higher degree of monetary accommodation to fiscal shocks (Erceg, Lindé, 2010; Woodford, 2011).

Another factor influencing the multiplier effect is the openness of the economy. The more open the economy, the lower the multiplier. This is due to the fact that demand leakage through imports is more pronounced (Barrell et al., 2012; Ilzetzki et al., 2013; IMF, 2008). This is the reason empirical research emphasizes that fiscal policies in small open economies are less effective than those in large economies, where imports have traditionally been less significant.

In an open economy, the exchange rate regime is also the determining factor of the strength of the multiplier effect. Countries with flexible exchange rate regimes

are characterized by lower multiplier values. This is due to the fact that fiscal expansion leads to an increase in interest rates, which stimulates capital inflows. The development of this process leads to an increase in demand for national currency and its appreciation, which has a negative impact on net exports. In contrast to flexible exchange rate, in a fixed exchange rate regime the multiplier effect is very pronounced. The result of fiscal discretion is then complemented and enhanced by changes in money supply, which are determined by the central bank's obligation to maintain a constant exchange rate (Born et al., 2013; Ilzetzki et al., 2013).

The presence or absence of fiscal sustainability significantly affects the size of the multipliers. In general, fiscal sustainability is defined as the ability to continue servicing government debt without significant adjustments in the revenue and expenditure side of the budget (IMF, 2007). That is why a number of studies focus on the levels of budget deficits and government debt, emphasizing that fiscal sustainability is an important prerequisite for a favorable economic development. In this regard, empirical results show that countries with a high level of government debt are characterized by lower multipliers, which is due to the negative impact on the expectations of economic entities, the interest rate premium, as well as on aggregate supply (Ilzetzki et al., 2013, Kirchner et al., 2010; Sutherland, 1997; Alesina et al., 2002) This is why many empirical studies introduce the so-called critical level of government debt, beyond which the manifestation of the negative effects of fiscal expansion is assumed to begin. The literature even supports the expansionist effects of fiscal consolidations hypothesis (Giavazzi, Pagano, 1990; Giavazzi et al., 2000).

It should be emphasized that there are a number of criticisms regarding the determination of the specific critical level of debt. Given the specific conditions of individual countries, these thresholds can vary considerably. Empirical results show that critical debt levels in Advanced Economies are higher than in Emerging Market Economies and Low-income Countries (et al., 2007; Conway, Orr, 2002; Belhocine, Dell'Erba, 2013). In addition, it worth noting that the level of government debt is not an exhaustive indicator of the presence or absence of fiscal sustainability, so it can be examined in conjunction with other leading indicators and not on its own.

Considering all of the above, this paper focuses on the fiscal spending multiplier, which is calculated by algebraically transforming the traditional Keynesian multiplier formula. It is subjected to further modification in order to take into account the influence of the structural and conjunctural factors discussed above, which influence the multiplication effect.

The time scope of the analysis covers the 2000 – 2018 period. Annual data are used, the source being World Bank and Eurostat. In terms of geographical

coverage, data for the following EU countries are included – Bulgaria, Poland, Romania, Estonia, Denmark, Germany, Greece and Italy. The inclusion of these countries aims to cover both old and new EU member states. In addition, countries from both the „periphery" and the „core" of the EU are involved. Moreover, there are representatives of member states from within and outside the Eurozone, including countries of the European Exchange Rate Mechanism (ERM) II.

Methodology

In order to calculate the spending fiscal multiplier (M) in this study, the traditional formula for its determination is used as a starting point:

$$M = \frac{1}{1 - MPC + MPC.t + MPImp} \tag{1}$$

where:

MPC – marginal propensity to consume;

t – marginal tax rate;

MPImp – marginal propensity to import.

In order to avoid many methodological difficulties in calculating the marginal propensities and the marginal tax rate, a kind of algebraic transformation of the formula above is made, multiplying the numerator and denominator by the gross national disposable income, which is the sum of gross national income (GNI) and net foreign transfers (NFT). As a result, the following algebraic expression for calculating the multiplier is obtained (some conditions apply):

$$M = \frac{GNI + NFT}{GS + Imp} \tag{2}$$

where:

GS – gross savings;

Imp – import.

Next, an adjustment is made to the size of the multiplier, taking into account the influence of its various determinants. The determinants included in the analysis are those that were described at the beginning of the this study and which are identified as the most significant based on findings from empirical studies. A multiplicative formula is applied to account for the combined effect of the factors included in the analysis on the multiplier size. The study gives preference to the multiplicative formula because it is assumed that the individual factors are

interdependent and have cumulative effects on the fiscal multiplier. As a result, the final multiplier estimate is obtained as follows:

$$M = \frac{GNI + NFT}{GS + Imp} \times (1 + BC) \times (1 + ERR) \times (1 + FS) \tag{3}$$

where:

BC – business cycle factor;

ERR – exchange rate regime factor;

FS – fiscal sustainability factor.

The formula constructed this way projects the influence of the leading structural and conjunctural factors on the size of the fiscal multiplier. With regard to the openness of the economy, its effect is projected indirectly through the inclusion of imports in the denominator of the formula. In this way, higher imports reduce the size of the spending multiplier, and lower imports increase it.

When taking into account the impact of the business cycle, the asymmetric assumption is adopted, ie. the multiplier effect is more sensitive to the presence of a recessionary decline than to an economic boom. In this regard, at maximum negative output gap based on the time series, BC assumes a value of 0.60, while at maximum positive output gap the value of BC is 0.4. When the output gap is zero, no adjustment is made and BC accepts zero value. For all other cases, an interpolate adjustment is made within the accepted limits. The asymmetry of the cyclical effect thus reported indirectly projects the influence of the degree of monetary accommodation to fiscal shocks. The reason is that the degree of monetary accommodation to fiscal shocks is significantly higher in a recession, which makes the fiscal multiplier higher. In order to avoid double counting, no adjustment is made independently for the monetary policy stance.

The effect of the exchange rate regime is taken into account, presuming that if it is fixed, the ERR assumes a value of 0.3. If it is flexible, no adjustment is made. It should be noted here that for countries within a single currency area, such as the Eurozone, an adjustment by 0.3 is also made. In a number of studies, the effect of the exchange rate is usually perceived as stronger than predicted in the this study. The reason for the adopted approach is that all countries included in this study are members of the EU, and some of them of the Eurozone. This suggests the possibility of the fiscal shock happening in all countries simultaneously, which would most likely trigger cross-country spillover effects, and for Eurozone countries a common exchange rate response. This is directly related to the strengthening of the process of increasing coordination of fiscal measures in the individual member states. It should also be emphasized that for countries with

fixed exchange rates over the studied period that are not part of the euro area typically have their national currency fixed to the common European currency. Therefore, the presumed common exchange rate response has an indirect impact on their economies.

This study uses the level of government debt as an indicator of fiscal sustainability. Based on the prevailing empirical results, it is assumed that the critical level of government debt in the old member states of the union, which are included in the study, is 100% of GDP, while in the new member states it is 50%. Furthermore, this study takes into account the volatility of debt, as it is perceived that it also has a significant impact on the expectations of economic operators and the risk premium. As a result, the following assumptions are made: if the debt level is higher than its critical value plus one standard deviation, then FS assumes a value of -0.6; if the debt level is below the critical value reduced by half a standard deviation, no adjustment is made. If the debt level is between the specified two endpoints, an interpolation between 0 and -0.6 is made.

It should be noted that the obtained empirical estimates for fiscal spending multipliers should not be taken as an absolute research result. The reason is that this study does not claim to be exhaustive of the determinants of the multiplier effect included in the analysis. Moreover, the specific numerical values used in the empirical measurement of the impact of individual factor influences cannot be accepted completely indisputably, as they are the result of the prevailing theoretical and empirical research on the issues under consideration.

Empirical results

Over the studied time period, the highest average value of the spending multiplier was reported in Germany – just over 2 (Fig. 1). The situation in Italy is the opposite, where the lowest average value is registered – under one. The highest multiplier among the new EU member states is observed in Bulgaria, as its average value for the period is about 1.77. In Romania, on the other hand, the lowest average value was reported among the CEE countries included in the study. In Germany, during the crisis of 2009, the highest level of the multiplier was registered – about 3.65. This is the year in which the highest levels of the spending multiplier are observed in most countries, with the exception of Greece, Poland and Romania, where the maximum value of the multiplier was registered in 2011, 2003 and 2000, respectively.

The spending multiplier demonstrates the strongest variability in Poland, where for the 2000-2018 period the difference between its maximum and minimum value is 2.51. Relatively high discrepancies are also typical for Germany and Denmark. The weakest fluctuations were registered in Italy, with the discrepancy

between the maximum and minimum values of the multiplier amounting to only 29% of the discrepancy observed in Poland.
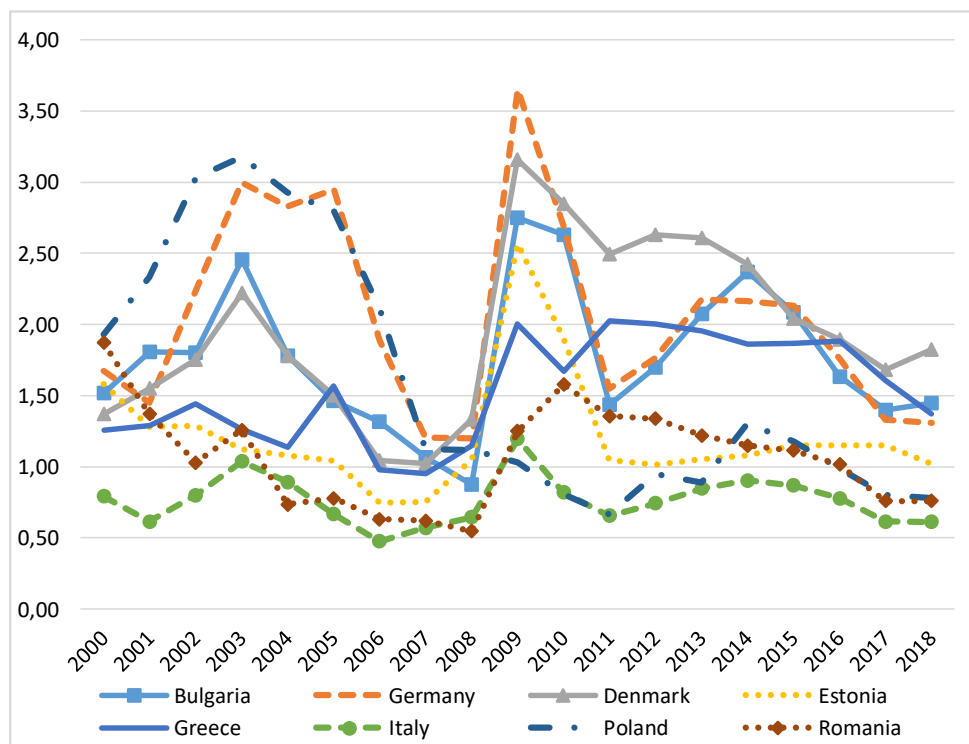
Source: Author' calculations based on World Bank data.

Figure 1: Fiscal spending multiplier

Looking at the dynamics of the multipliers in the studied countries during the considered time interval, strong peculiarities are observed. This is a reason to distinguish two periods, the first of which lasts until 2008, and the second covers the time of the economic crisis and the post-crisis years. For the first period, the average levels of the multiplier are higher than for the period after 2008, with an exception observed only in Poland. It should be noted that for the period up to 2008, Poland has the highest average value of the spending multiplier, while at the same time featuring the most pronounced instability. One of the explanations for the relatively high values of the spending multiplier in Poland is related to the fact that the Polish economy typically has a lower relative importance of imports than most other EU member states from CEE. For comparison, it can be noted that the average relative share of imports in the GDP of Poland for the 2000-

2008 period is about 41%, while in Bulgaria it is 58%, and in Estonia – 72%.[1] Therefore, the limitation of the multiplier effect of trade openness is relatively weaker in Poland. It can be noted that, like Poland, Romania also has a relatively low relative weight of imports in GDP. At the same time, however, imports to Romania marked the strongest increase among all EU member states, increasing by about 18.7% between 2000 and 2008.[2] This is indicative of a clear suppressive role of imports into Romania for the development of the multiplier effect over time. With regard to trade openness, it can also be stated that its negative effects have different strengths in relation to the new and old EU member states, and for the latter they are generally more pronounced. This is true both for a specific point in time and in dynamics, due to the higher relative importance of imports and their higher growth in the new Member States.

For the period after 2008, the strongest increase of the spending multiplier is observed in Bulgaria, as its average growth rate is about 17.5%. A double-digit positive average rate of change is also observed in Germany. The most significant increase in multipliers in both countries was reported in the crisis year of 2009. The situation in Poland is the opposite, where in 2009 the rate of change of the cost multiplier was negative, decreasing by nearly 8%. Unlike the first period, in the second period the multiplier in Poland demonstrated greater stability, with the difference between its maximum and minimum value being only 0.64. Reduction of the variability in the size of the spending multiplier is also reported in Bulgaria and Romania. In the other five countries included in the study, there were more pronounced fluctuations in the size of the multipliers in the second period compared to the first period, with the deviation between the maximum and minimum being the highest in Germany.

Most years of the first time period are characterized by a negative impact of the state of the business cycle on the value of the spending multiplier in the analyzed countries (Fig. 2). The only exception is Poland, where in seven of the nine years for the period a negative GDP gap was reported, which has a stimulating effect on the size of the multiplier. Greece and Italy are the countries in which positive values of the GDP gap were observed in all years of the first time interval, which impacts restrictively the multiplier effect.

---

[1] Author's calculations based on Eurostat data.
[2] Author's calculations based on Eurostat data.
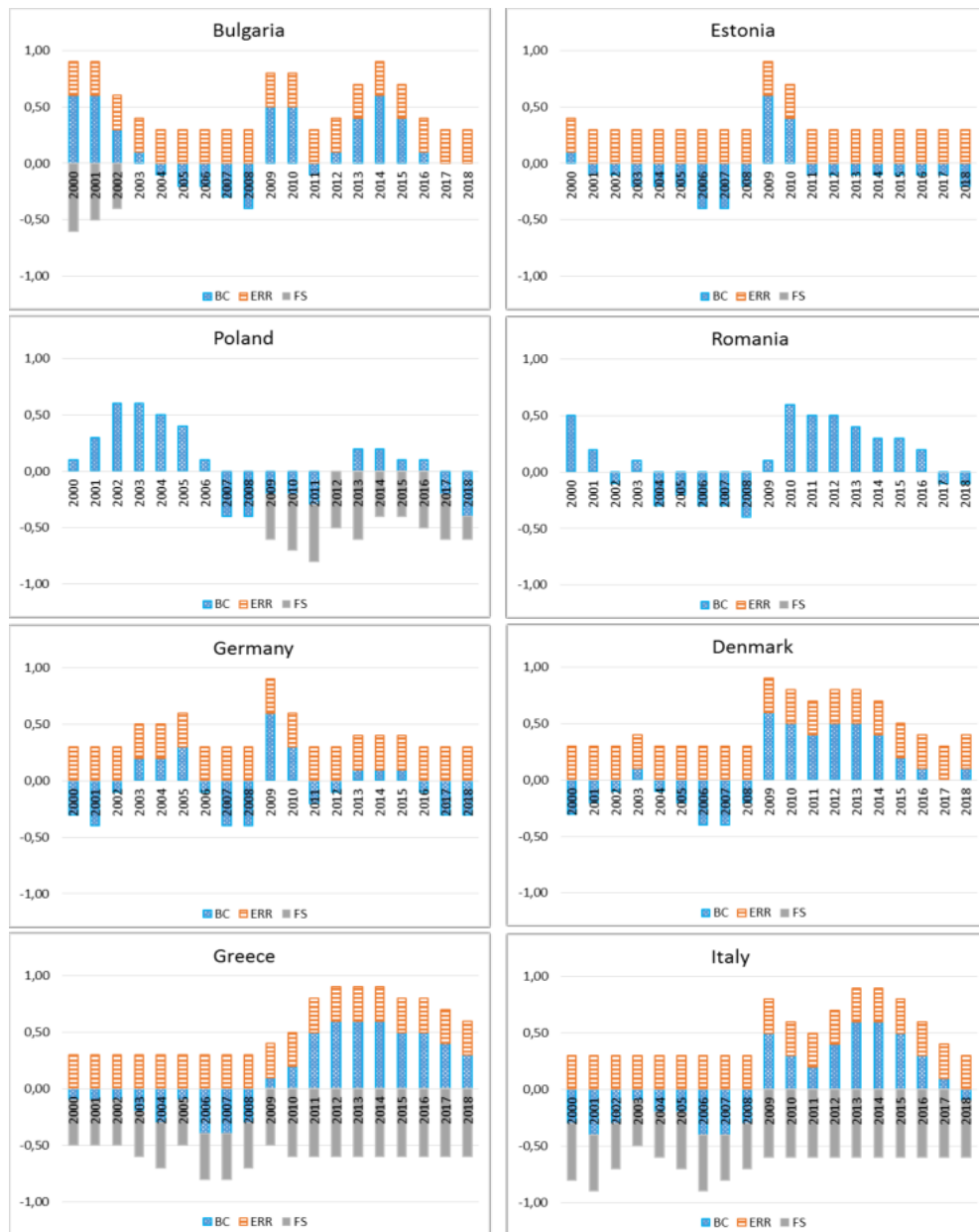
Source: Author' calculations based on Eurostat data.

Figure 2: Factors determining the size of the fiscal spending multiplier

The second period is characterized by peculiarities in the direction and strength of the impact of the business cycle on the value of fiscal multipliers in the selected countries. The first two years of the period, associated with the strongest manifestation of the effects of the then global economic crisis, were characterized by strong recessionary gaps in GDP, which led to an increase in fiscal multipliers and increased the effectiveness of expansionist fiscal discretion. Again, the only exception is observed in Poland, where there are positive gaps in GDP and a corresponding reduction in the strength of the multiplier effect. It should be noted that Poland is the only EU Member State with a positive economic growth rate in 2009 (2.8%).[1]

In 2009, the fiscal multipliers reached their peak values in a number of countries – over 3 in Germany and Denmark, and over 2.5 in Bulgaria and Estonia. Despite these conditions of strong multiplier effects, the results of empirical studies show that in general the EU member states of CEE do not undertake fiscal incentives to limit the recessionary decline and their discretionary fiscal policies are pro-cyclical (Velichkov, 2015). As a result, fiscal restrictions combined with the relatively high values of multipliers in these countries lead to a deepening of the negative effects of the global economic crisis. In the following years of the second period, the recovery of the economies was accompanied by a limitation of the positive and/or formation of a negative impact of cyclical development on the size of the multipliers in the studied countries.

Positive effects of the exchange rate regime on the spending multiplier are observed in six of the selected countries – Bulgaria, Estonia, Germany, Denmark, Greece, and Italy. The reason is that within the study period these countries are either members of the Eurozone or have a currency pegged to the common European currency. Poland and Romania are with a floating currency, which suggests a more limited multiplier effect than the other countries in the study.

The impact of fiscal sustainability is most pronounced in Greece and Italy. In both countries, in all years of the time period, government debt to GDP is over 100%. This implies a negative impact on the value of the spending multiplier. In practice, the negative impact of the business cycle on the multiplier effect in Greece and Italy in the first period is complemented by the negative impact of fiscal sustainability. For the second period, the negative effect of government debt severely limits and to some extent neutralizes the positive role of the GDP gap for the size of the multiplier in both countries. Compared to other countries, fiscal sustainability has a limiting effect on the multiplier effect in Bulgaria during the first three years of the period, as well as in Poland during the years of the second time period.

---

[1] Eurostat data.

Conclusion

Fiscal multipliers are essential for the development and implementation of fiscal policy, as well as for forecasting its effects on the real economy. However, their application in the conduct and support of government policy is very limited, which stems from the existing difficulties in their empirical calculation.

In this study, an approach for estimating the fiscal spending multiplier is applied in which an algebraic transformation of the formula for the traditional Keynesian multiplier is performed, including an additional modification in order to take into account the influence of various structural and conjunctural factors on the multiplier effect. The obtained empirical results show that within the studied time period the highest average value of the cost multiplier is observed in Germany, and the lowest – in Italy. Among the CEE countries, the highest average level of the multiplier is reported in Bulgaria. The high values of the spending multiplier are indicative of more significant macroeconomic effects of discretionary fiscal policy, but at the same time suggest greater susceptibility of economies to the effects of economic shocks.

The cyclical effect on the value of the multiplier during the 2000-2008 period for most of the studied countries is negative. Strong positive effects of the business cycle on the multiplier effect in most countries were present during the crisis of 2009. For the years since, there are typical significant differences in the direction and strength of the impact of the GDP gap on the value of the fiscal multiplier, both in terms of years and individual countries. The effect of the exchange rate regime has a positive sign in Bulgaria, Estonia, Germany, Denmark, Greece and Italy, as during the study period they were either members of the Eurozone or with currency fixed to the common European currency. In addition, the results show that in general the negative effects of trade openness are more pronounced in the new than in the old EU member states. In terms of fiscal sustainability, empirical results show that it has the most significant impact on spending multipliers in Italy and Greece, complementing and limiting respectively the negative and positive effects of other factors determining the strength of the multiplier effect.

References:

Величков, Н. (2016). Макроикономически ефекти на бюджетните разходи в България (иконометричен анализ), Икономически и социални алтернативи, 2, ИК-УНСС, с. 70-83. (Velichkov, N. (2016). Makroikonomicheski efekti na bjudzhetnite razhodi v Balgariya (ikonometrichen analiz), Ikonomicheski I sotsialni alternative, 2, IK-UNSS, s. 70-83)

Величков, Н., Стефанова, Кр. (2019). Факторна обусловеност на макроикономическото влияние на фискалната политика: теоретичен анализ, Научни трудове на УНСС, том 3, с. 95-110. (Velichkov, N., Stefanova, Kr. (2019). Faktorna obuslovenost na makroikonomicheskoto vliyanie na fiskalnata politika: teoretichen analiz, Nauchni trudove na UNSS, tom 3, s. 95-110)

Alesina, A., Ardagna, S., R. Perotti, F. Schiantarelli (2002). Fiscal Policy, Profits, and Investment, The American Economic Review, 92, pp. 571-589.

Ardagna, S., Caselli, F., Lane, T. (2007). Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries, B.E. Journal of Macroeconomics, Vol. 7, No. 1, pp. 28.

Auerbach, A., Gale., W., Harris, B., 2010. Activist Fiscal Policy, Journal of Economic Perspective, 4 (4), pp. 141-164.

Auerbach, A., Gorodnichenko, Y. (2011). Fiscal Multipliers in Recession and Expansion", NBER Working Papers, 17447.

Auerbach, A., Gorodnichenko, Y. (2012). Measuring the Output Responses to Fiscal Policy, American Economic Journal: Economic Policy, Vol. 4, pp. 1-27.

Barrell, R., Holland, D., Hurst, I., (2012). Fiscal Consolidation: Part 2. Fiscal Multipliers and Fiscal Consolidations, OECD Economics Department Working Paper, 933.

Batini, N., Eyraud, L., Weber, A. (2014). A Simple Method to Compute Fiscal Multipliers, IMF Working Paper, 93.

Batini, N., Callegari, G., Melina, G. (2012). Successful Austerity in the United States, Europe and Japan, IMF Working Paper, 190.

Baum, A., Poplawski-Ribeiro, M., Weber, A. (2012). Fiscal Multipliers and the State of the Economy, IMF Working Paper, 286.

Belhocine, N., Dell'Erba, S. (2013). The Impact of Debt Sustainability and the Level of Debt on Emerging Markets Spreads, IMF Working Paper, 93.

Blanchard, O., Perotti, R. (2002). An Empirical Investigation of the Dynamic Effects of Shocks to Government Spending and Taxes on Output, The Quarterly Journal of Economics, pp. 1329-1368.

Born, B., Juessen, F., Mueller, J. (2013). Exchange rate regimes and fiscal multipliers, Journal of Economic Dynamics and Control, Vol. 37, No. 2, pp. 446-65.

Canzoneri, M., Collard, F., Dellas, H., Diba, B. (2012). „Fiscal Multipliers in Recessions", Discussion Papers, Department of Economics, 12-04.

Coenen, G., Erceg, C., C. Freedman, D. Furceri (2010). Effects of Fiscal Stimulus in Structural Models, IMF Working Paper, 10 (73).

Conway, P., Orr, A. (2002). The GIRM: A Global Interest Rate Model, Westpac Institutional Bank Occasional Paper.

Erceg, C., Lindé, J. (2010). Is There a Free Lunch in a Liquidity Trap?, International Finance Discussion Papers, 1003.

Fatas, A., Mihov, I. (2000). The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence, Working Papers.

Giavazzi, F., Jappelli, T., Pagano, M. (2000). Searching for Non-Linear Effects of Fiscal Policy: Evidence from Industrial and Developing Countries, European Economic Review, 44, pp. 1259-1289.

Giavazzi, F., Pagano, M., (1990). Can Severe Fiscal Contractions be Expansionary? Tales of Two Small European Countries, NBER Macroeconomics Annual, 5, pp. 75-111.

Hall, R. (2009). By How Much Does GDP Rise if the Government Buys More Output?, NBER Working Paper, 15496.

Ilzetzki, E., Mendoza, E., Vegh, C. (2013). How Big (Small?) Are Fiscal Multipliers?, Journal of Monetary Economics, Vol. 60, pp. 239-54.

IMF (2007). Manual on Fiscal Transparency, IMF, Washington DC, Glossary.

IMF (2008). World Economic Outlook, October, Chapter 5, Fiscal Policy as a Countercyclical Tool.

Karagyozova-Markova, K., Deyanov, G., Iliev, V. (2013). Fiscal Policy and Economic Growth in Bulgaria, BNB Discussion Papers, 90.

Kirchner, M., Cimadomo, J., Hauptmeier, S. (2010). Transmission Of Government Spending Shocks In The Euro Area: Time Variation and Driving Forces, ECB Working Paper Series, 1219.

Nizam, A. (2019). On the Algebraic Calculation of the Fiscal Multiplier, MPRA Paper, 91173.

Owyang, M., Ramey, A., Zubairy, S. (2013). Are Government Spending Multipliers Greater During Periods of Slack? Evidence from 20th Century Historical Data, NBER Working Paper, 18769.

Ramey, A., Shapiro, M. (1998). Costly Capital Reallocation and the Effects of Government Spending, Carnegie-Rochester Conference Series on Public Policy, 48, pp. 145-194.

Sutherland, A. (1997). Fiscal Crises and Aggregate Demand: Can High Public Debt Reverse the Effects of Fiscal Policy?, Journal of Public Economics, 65, pp. 147-162.

Velichkov, N. (2015). Fiscal Rules Versus Fiscal Discretions, Economic Alternatives, UNWE Publishing Complex, Issue 3, pp. 39-45.

Velichkov, N. (2016). Effects of Government Debt on Macroeconomic Activity (The Case of Bulgaria), Economic Alternatives, UNWE Publishing Complex, Issue 1, pp. 24-32.

Woodford, M. (2011). Simple Analytics of the Government Expenditure Multiplier, American Economic Journal: Macroeconomics, Vol. 3, No. 1, pp. 1-35.