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Fiscal Multipliers for Bosnia and Herzegovina

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Abstract

The aim of this paper is to determine the size of fiscal multipliers (spending and tax multipliers) using a structural vector autoregressive model for Bosnia and Herzegovina (BiH). This is the first attempt of its kind for the BiH economy. The results show that the spending multiplier is higher than the tax multiplier, as expected. The tax multiplier has a negative effect on output and does not have any positive effects on other variables. The spending multiplier has positive effects, but they are limited to the first year after the shock. Both multipliers are within the set of values obtained in other studies on emerging economies.



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1. Introduction

This paper investigates the relationships between government consumption, government revenues, and economic activity in terms of two types of fiscal multipliers: expenditure and revenue multipliers. This subject has become particularly important since the 2008 financial and economic crisis. The relevance of fiscal multipliers became even more significant with the emergence of the sovereign-debt crisis in Europe in 2010. Empirical work conducted at that time showed that austerity had a negative effect on economic activity and that increases in government expenditures, had a positive effect on economic activity. The aim of this paper is to estimate the effect of expenditure and revenue fiscal multipliers on economic activity using a structural VAR model. This paper is the first attempt to measure a fiscal multiplier for Bosnia and Herzegovina (BiH). The paper focuses on determining the size of the expenditure and revenue multipliers using data on indirect taxes, which are the most significant source of government revenues, and current government spending, which represents more than half of total government expenditures. In light of the IMF's proposed fiscal consolidation and structural reforms, measuring the size of the fiscal multiplier would help policy makers in BiH ensure a better reallocation and decomposition of the expenditure side of the fiscal budget.

In the first section, we describe the fiscal system in BiH; the structure of government expenditures, explaining each of the expenditure variables in more detail; and the functioning of the tax system. This description is particularly important for the identification of the SVAR model. The second section describes the identification and model estimation. The third section presents the results, and the final section provides the conclusion and recommendations for further research.

2. Overview of the fiscal system in BiH

BiH is classified a medium-income country with a small open market economy. Monetary policy is defined by a currency board arrangement (CBA), whereby the sole instrument of monetary policy is the required reserve ratio. While adjustment to the reserve ratio are effective during a time of credit expansion and high-level of economic activity, this monetary policy instrument was not effective in stimulating economic activity after the global financial crisis. In such an economic environment, fiscal policy plays a crucial role.

After the war and especially before the global crisis, BiH experienced a relatively high growth rate, which was mainly associated with a credit boom and a significant increase in private consumption. At the same time, public spending also increased, particularly for salaries and other benefits. With the outbreak of the global financial crisis, BiH started experiencing external financial constraints, and BiH authorities requested three stand-by arrangements from the IMF (in 2009 and 2012, and the government is currently undergoing a new three-year IMF-supported programme). The objective was to improve the composition and quality of public spending and gradually decrease public debt, which is currently at 42% of GDP.

During the pre-crisis period (before 2008), the BiH government was faced with a surplus (revenues exceeded expenditures). One of the main contributors to increasing revenues was the replacement, on 1 January 2006, of the sales tax on goods and services by a value added tax (VAT) at the single rate of 17%. The Law on Payments into a Single Account and Revenue

Allocation requires that revenues are allocated daily to other levels of the government; therefore, they have an immediate effect. Budgets are primarily financed through indirect tax revenues (i.e., over 90% of the budget is financed by indirect taxes), and the greatest portion (approximately 83%) of indirect tax revenues are from the VAT. Since revenues were increasing, the government had sufficient funds to finance all its expenditures. However, when the financial crisis began, revenues declined while government expenditures continued to increase, leading to an increase in public debt. Because of this problem, BiH authorities committed to fiscal consolidation but also to undertaking the necessary reforms to provide fiscal sustainability. However, a major problem for the government was the structure of its expenditures; these were more current-spending oriented than capital-spending oriented. Medium-term fiscal consolidation should encompass a certain amount of restructuring in terms of shifting from current spending to favour more capital spending. One of the objectives included broadening the tax base to improve revenues in the long run.

The IMF's concluding statement in the 2015 Mission of Article IV noted that "fiscal policy will need to strike a balance between ensuring medium-term sustainability and supporting the nascent recovery". One of the IMF recommendations is fiscal consolidation to continuously reduce the level of public debt. This also means that the composition of government spending should be altered. In 2015, the overall budget deficit was projected to decline by 2.5% of GDP, and this objective was recognized in the National Programme of Economic Reforms for 2015. Determining the size of the fiscal multiplier would assist policy makers in defining the targets for fiscal reform and the structure of expenditures. This is particularly important because the national strategy is based on reforms related to the fiscal sector, which are needed to enhance the competitiveness of the country, attract FDI and enhance social inclusion.

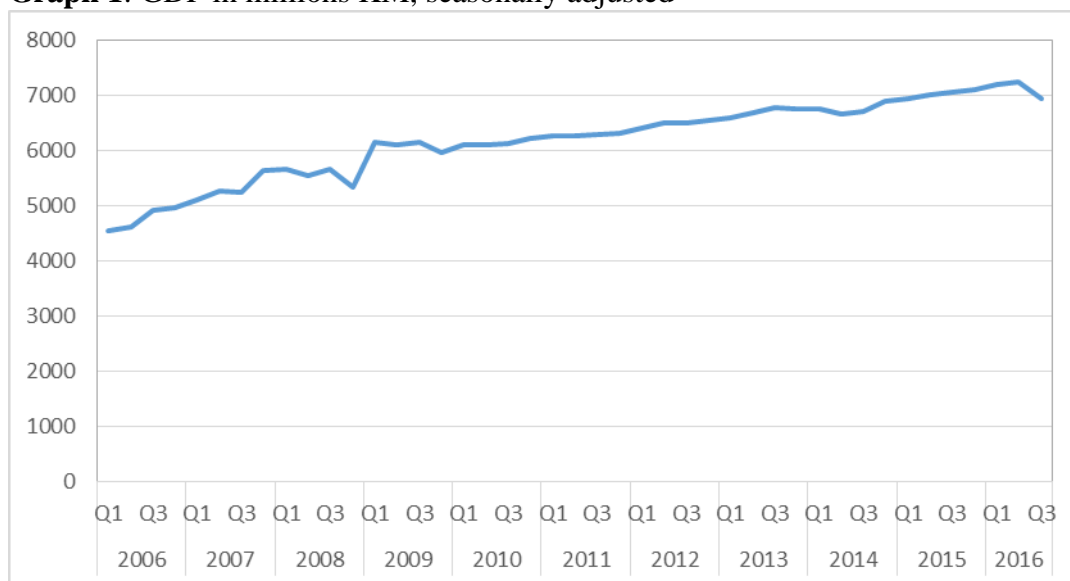
Revenues have fluctuated because of variations in the structure of indirect tax rates: the VAT was introduced in January 2006 at a single rate of 17% and contributed to a large and immediate increase in public revenues. These variations stem from a continuous widening of the tax base due to the implementation of a reform agenda; fiscal authorities began taking a more proactive role in fighting the shadow economy. Some legal changes were made to excise duties that also explain the variations in indirect tax revenues. These changes also appear as structural shocks. The new Law on Excise Duties in BiH as of 1 July 2009 introduced specific excise duties on cigarettes. According to the provisions of the law, over next few years, this tax will be continuously increased. During the first few years, the increase in the excise rate increased total revenues from excise duties. High growth rates from excise duties were thus recorded in early years, particularly in 2010, when due to the smaller tax base, they increased by 37.1%. As of 2011, growth rates have slowed, and in 2013, revenues from excise duties recorded negative growth (4.1%).

The main cause for this decrease in revenues from excise duties is differentiated taxation of cigarettes and cut tobacco. On 1 August 2014, amendments to the Law on Excise Duties came into force. The introduction of a specific excise duty increased the excise burden of one kilo of cut tobacco by 212% and the total excise burden (excise + VAT) by 184%.

New trends in the tobacco market in BiH led to an increase in revenues from excise duties. During the last five months of 2014, excise revenues increased by 15.6%. A historic maximum in revenue collection from excise duties occurred in 2012, and positive trends in excise collection continued in 2015. Revenues from road tolls followed the same the trend as excise revenues, except for in 2009, when there was an enormous increase in revenue from road tolls due to the introduction of specific road tolls mid-year.

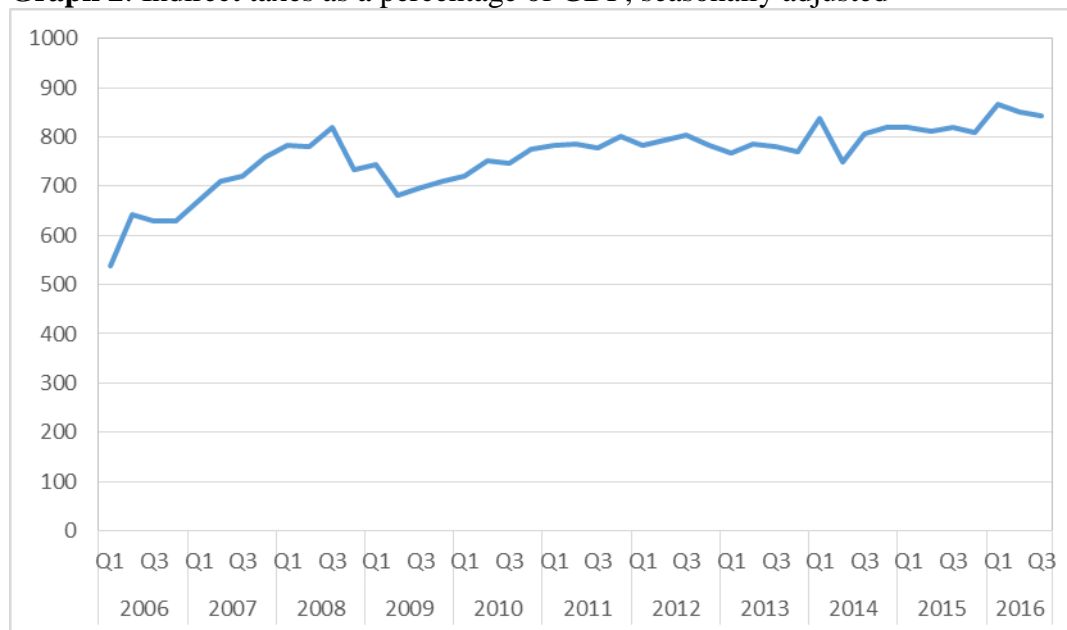
Below, three series are presented for the variables included in the model: GDP, indirect taxes and public consumption. The development of the time series, including the spikes, is then explained. The global economic crisis in 2008-2009 illustrated the extreme vulnerability of the BiH economy to external shocks, which consequently led the country into recession and caused a sharp decline in growth; this is easy to observe in the chart below. In addition, in 2014, the country suffered from a natural disaster that had severe consequences for the economy and caused a sharp slowdown in growth, an increase in the government deficit and an increase in external debt (Graph 1).

Graph 1: GDP in millions KM, seasonally adjusted



Source: National Institute for Statistics in BiH

From 2006-2008, indirect tax revenues increased (Graph 2). However, in 2009, revenues from indirect taxes substantially declined because taxes largely depend on foreign trade trends, which experienced a considerable decline during that time. From 2009 onward, indirect taxes recorded increases at a slower rate, with the exception of 2014 (floods effect).

Graph 2: Indirect taxes as a percentage of GDP, seasonally adjusted

Source: Indirect Taxation Authority in Bosnia and Herzegovina

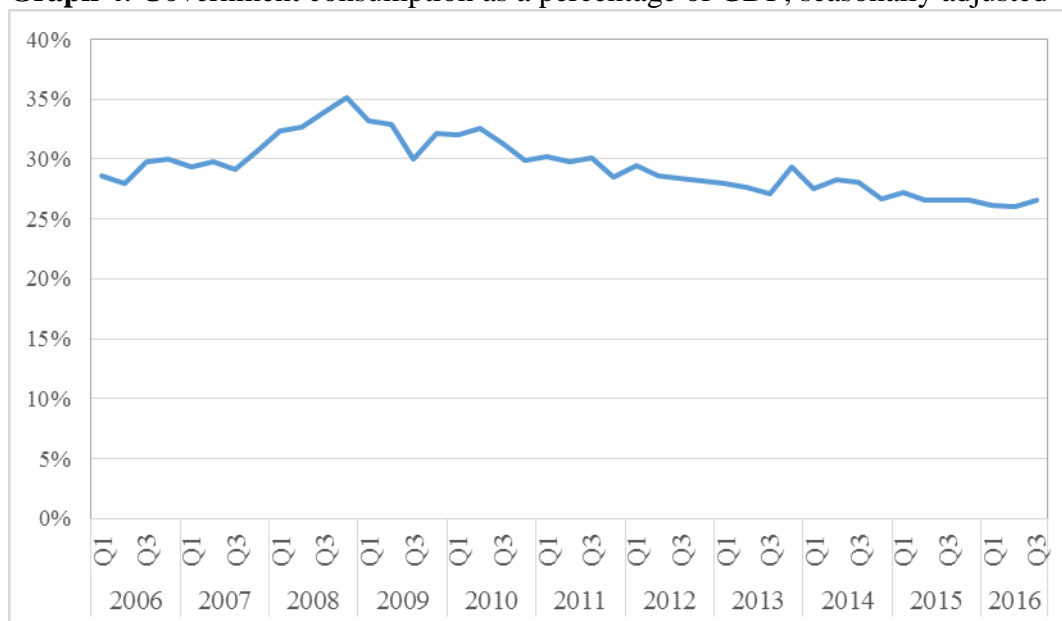
Graph 3: Total government revenues as a percentage of GDP, seasonally adjusted

Source: Central Bank of Bosnia and Herzegovina

Before the crisis, the average share of government expenditures for employee compensation was recorded at 28.7%. During the years following the crisis, it decreased to 28.2%, which aligns with fiscal consolidation requirements. The average share of total expenditures before the crisis for goods and services was 23.9%, while in the following years, this decreased to 18.7%, which is also in accordance with fiscal reforms. Government consumption reached its peak immediately after the crisis began (Graph 4). Just before and during the crisis and almost until the end of 2010, government consumption had an upward trend, with numerous spikes that are difficult to explain. As previously stated, the government was unable to adjust its expenditures when the crisis hit and thus was increasing both its deficit and external debt. After 2010, the government commenced the consolidation process, which resulted in stagnation with several spikes. In 2011, the second wave of the crisis led to decreased consumption, but after

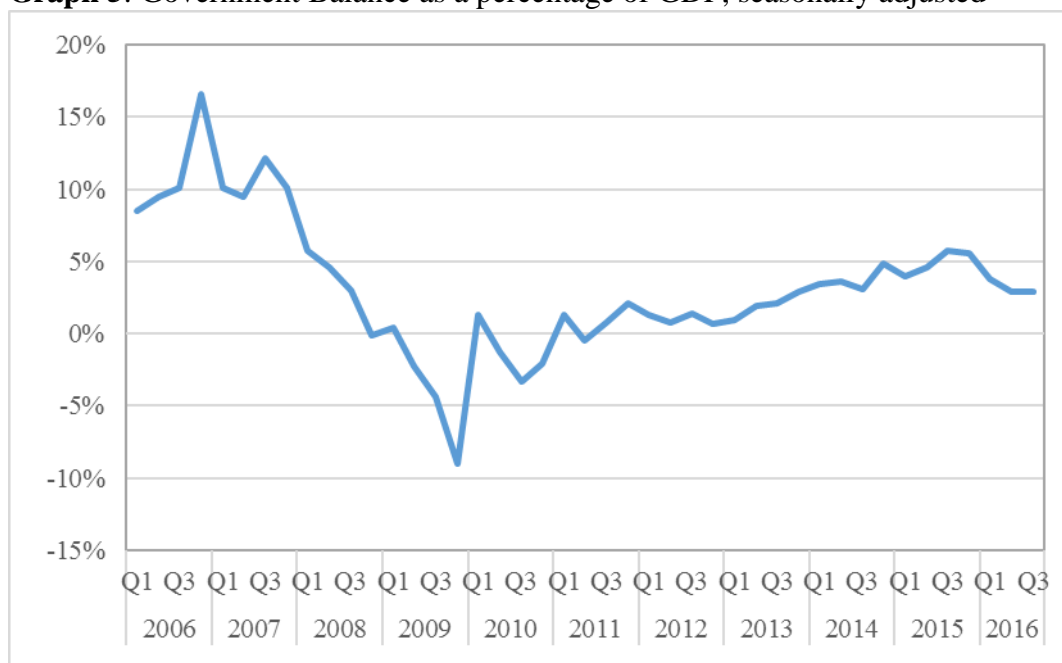
2014, when the floods occurred, there was a slight increase in government consumption of goods and services.

Graph 4: Government consumption as a percentage of GDP, seasonally adjusted



Source: Central Bank of Bosnia and Herzegovina

Graph 5: Government Balance as a percentage of GDP, seasonally adjusted



Source: CBBH

To summarize, it can be concluded that the fiscal stimulus or consolidation at the time of the crisis is highly significant. This is particularly important and applicable for BiH, as because of the scarcity of monetary policy instruments, fiscal policy plays a crucial role.

3. Literature review

There is a limited number of studies related to fiscal multipliers in emerging economies, although there is substantial empirical evidence for advanced economies. Following a review of various studies, the question about the size of fiscal multipliers in transition economies remains without a precise answer.

Šimović and Škrbić, (2013) estimate a fiscal multiplier for Croatia. They show that the size of the multiplier varies for government spending and tax revenues among three levels of government: the consolidated central government, the consolidated general government and the government budget. This variation occurs mainly because capital spending, social transfers and current spending are visibly in accordance with the government level. Ilzetzi *et al.* (2011) show that the size of the fiscal multipliers strongly relates to the main characteristics of the economy under study. In that respect, this study shows that in general terms, spending and revenue multipliers are lower in emerging economies.

Petrovic, Arsic, and Nojkovic (2014) show that fiscal multipliers are negatively associated with the openness of the economy, the size of automatic stabilizers, and the level of public debt and are positively associated with the size of the economy. They also provide evidence that different exchange rate regimes have a significant impact on the size of spending multipliers in emerging EU countries and that fiscal multipliers are high under fixed exchange rates and near zero under flexible exchange rates.

Corsetti *et al.* (2012) analyse fiscal multipliers for 17 OECD countries by studying the determinants of fiscal multipliers and transmission mechanisms for fiscal shocks. They also propose a method for estimating impulse responses depending on different economic conditions; thus, they studied economies by considering their exchange regimes, public finances and financial systems.

Blanchard and Leigh (2013) estimate fiscal multipliers in the fiscal consolidation episodes implemented after the global financial crisis and find that fiscal consolidation in advanced economies had a large negative impact on economic activity. The results suggest that the actual fiscal multipliers were larger than forecasters assumed because they assumed the fiscal multiplier was roughly 0 before the crises. Now, it is estimated that the actual fiscal multiplier during the crisis was above 1 and that early on in the crisis, it was 0.5.

The European Commission (2012) compares the impact of consolidation on the final debt ratio, for which the baseline is the condition without consolidation. The empirical evidence has shown that the fiscal multiplier is mainly responsible for the unfavourable effects of consolidation on debt dynamics. The study shows that for most EU countries, which are not heavily indebted, debt will increase following consolidation. In the short run, it takes at least three years to phase out the effect of a higher debt ratio because of consolidation.

As IMF (2009) explains, fiscal multipliers are larger for countries that have accommodative monetary policies, that are partially open to trade and where automatic stabilizers are small; furthermore, the spending multiplier is larger than the tax multiplier. Data on fiscal multipliers, among other multipliers, indicate that the smallest multipliers were 0.3 for revenue, 0.5 for capital spending and 0.3 for other spending. The highest multipliers reported were 0.6 for

revenues, 1.8 for capital spending and 1.0 for other spending for developed countries, and negative multipliers were reported for low-income countries.

Chinn (2013) surveys a number of theoretical and empirical studies and finds that the multiplier for goods and services is higher than spending on social transfers. The findings show that if the multiplier is higher than one, it will also increase private consumption in addition to government spending on goods and services. If the multiplier is less than one, government spending will have a crowding out effect on private spending. Depending on the openness of the economy, fiscal multipliers should be smaller in open economies and in small economies.

Kaldara (2011) derives analytical relationships between the output elasticities of tax revenues, government expenditures, and fiscal multipliers. Using different empirical strategies and a dynamic stochastic general equilibrium (DSGE) model, the impact tax multiplier for the US economy is found to be close to zero, and the spending multiplier is between 0.35 and 1. The identification scheme for the structural VAR is the most effective for determining fiscal multipliers. Caldara proposed that automatic stabilizers (elasticities) are a type of probability distribution. This analytical framework is useful for VAR, time varying models and regime switching models.

4. Empirical work

Data description

We use quarterly series for GDP, government consumption (government consumption on goods and services and government expenditures for wages), and indirect taxes. Our sample includes data from 2006 Q1-2016 Q3 (43 observations).¹

Table 1: Summary statistics

Variables	Y	T	G
Mean	8,723	0,198	0,294
Median	8,745	0,193	0,293
Maximum	8,889	0,230	0,351
Minimum	8,420	0,175	0,261
Std. Dev.	0,122	0,016	0,023
Skewness	-0,832	0,756	0,557
Kurtosis	2,868	2,397	2,558
Jarque-Bera	4,996	4,745	2,573
Probability	0,082	0,093	0,276
Sum Sq.Dev.	0,627	0,010	0,022
Observations	43	43	43

Source: Authors

Estimation method

¹ GDP production data are obtained from the Institute for Statistics of Bosnia and Herzegovina (BHAS). Data on government expenditures are compiled by the Central Bank of Bosnia and Herzegovina (CBBiH) and obtained from the IMF's Government Finance Statistics (GFS) Manual. Indirect tax data are obtained from the Indirect Taxation Authority.

Fiscal multipliers measure the short-term impact of discretionary fiscal policy on output.² They are defined as the ratio of a change in output (ΔY) to a discretionary change in government spending or tax revenues (ΔG or ΔT). In this paper, we use a structural vector autoregressive (SVAR) model to estimate the size of the multipliers and the extent of their effects in BiH. The approach used in this study can be used in two different, partially overlapping, directions: the interpretation of business cycle fluctuations based on a small number of significant macroeconomic variables and the identification of the effects of different policies.³ SVAR models are more effective for analysing a fiscal shock than for identifying a monetary shock, but they are dependent on identifying the appropriate structural shocks.

SVAR models are the standard method used to evaluate the effects of fiscal policy on economic activity. The major issue is the identification problem because restrictions must be imposed on information related to the functioning of the fiscal system. To identify the effects of fiscal policy shocks, we follow Blanchard & Perotti (2002) who use information on the institutional elements of the fiscal system, thus setting restrictions on the automatic responses of government revenues and expenditures to economic activity.

The first step in the analysis is the estimation of the reduced-form VAR model:

$$X_t = C + Tt + \sum_{i=1}^p A_i X_{t-1} + \mu_t$$

X_t vector of variables of interest: GDP, value added taxes and government consumption

C constant, deterministic variable included in the model

Tt linear time trend

μ_t vector of reduced form innovation $U_{t=}(t, g, y)$, which is mutually correlated

$X_t = (Tt, Gt, Yt)$ and represents a three-dimensional vector that includes indirect taxes relative to GDP (Tt), government consumption of goods and services and expenditures for salaries relative to GDP (Gt), and gross domestic product (Yt). All three variables of interest are deflated with a GDP deflator and seasonally adjusted with ARIMA X13. Data are at quarterly frequency, since this frequency is essential for the process of identification. Time series are stationary processes according to the breakpoint unit root test (at the usual statistical significance levels). According to tests that select the appropriate time lag (SC, HQ and LR tests), the recommended lag is 1 quarter.

The BP approach is used to identify the structural shocks using a reduced-form VAR model. In the process of identification, it is essential to recognize that reduced-form innovations have no economic meaning and are mutually correlated.

Each reduced-form shock is a linear combination of the selected structural shocks, which are mutually uncorrelated and need to be determined.

$$tt = a1 yt + a2 e_t^g + e_t^t \quad (1)$$

$$gt = b1 yt + b2 e_t^t + e_t^g \quad (2)$$

$$yt = c1 tt + c2 gt + e_t^y \quad (3)$$

² IMF(2014), Fiscal Multipliers: Size, Determinants and use in Macroeconomic projections, IMF

³ Lutz Kilian (2011), Structural Vector Autoregressions, University of Michigan

The first reduced-form equation indicates that unexpected movements in taxes are due to unexpected changes in GDP, a response to a structural shock in spending and structural shocks in taxes.

The second equation indicates that unexpected movements in government consumption are due to unexpected movements in GDP, structural shocks in taxes and structural shocks in spending. The third equation indicates that unexpected movements in GDP are due to unexpected movements in taxes, unexpected movements in government spending and other unexpected shocks.

As mentioned earlier, the crucial identifying assumptions relate to the quarterly data frequency. Parameters $a1$ and $b1$ capture the effects of unexpected movements in output that affect changes in taxes and spending. Based on Blanchard and Perotti, these parameters can be captured in such a way that the result can only be the automatic response of taxes or government spending to changes in output in the form of elasticity. It is highly important to recognize that $a1$ and $b1$ capture the contemporaneous responses of these variables to economic activity.

In terms of contemporaneous responses, the reactions of policy makers to a change in economic activity within the same quarter must also be considered. Policy makers cannot react to changes in GDP within one quarter because there are procedures and legislation that they must adopt to undertake fiscal measures as a response to shocks in output.

Indirect taxes can automatically (within the same quarter) react to changes in output because collection and allocation are almost automatic. Therefore, the automatic response of indirect taxes to changes in economic activity is calculated (elasticity). This elasticity is estimated using an OLS regression, where changes in indirect taxes are dependent on changes in Y . Tax elasticity is calculated to be 0.75 for indirect taxes, which aligns with the empirical evidence on small emerging EU countries⁴. Furthermore, we added government spending on goods and services to expenditures for wages and used this as a variable for government spending.

Therefore, $b1 = 0$, which would not have been the case if we used total government expenditures with social transfers included. Social transfers would almost certainly play a role as an automatic stabilizer.⁵ To identify $a2$ and $b2$, we must determine whether taxes respond to an increase in government consumption or government consumption reacts to changes in taxes. We assumed that government consumption can react to changes in taxes; therefore, we set $a2 = 0$. It is assumed that a shock in government does not affect government taxes; therefore, unexpected shocks in spending and taxes are no longer correlated with e_t^y . With these restrictions imposed, it is now possible to recover all the elements and estimate the model. The model is finally identified and then tested for stability. All the roots of the characteristic polynomial are inside the unit circle, which means that the model meets the basic criteria of stability. Furthermore, the residuals are tested, there is no serial correlation according to the LM test, and the residuals are multivariate normal.

5. Results

⁴ Pavle Petrović, Miloško Arsić and Aleksandra Nojković (2014), Fiscal Multipliers in Emerging European Economies, Fiscal Council, Republic of Serbia, Faculty of Economics, University of Belgrade

⁵ As an extension of this research, in the future, scholars can develop this in detail using VECM.

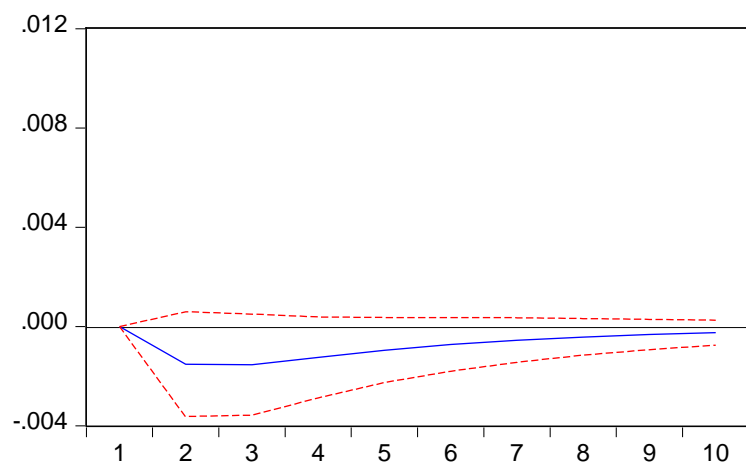
The results are presented in the form of an impulse response function plots which allow us to observe the path of the shock. Fiscal shocks in the impulse response functions (IRFs) represent the response to an increase in the “independent variable” by one standard deviation. The original IRFs are divided by the standard deviation of the shocked fiscal variable. If this ratio is then multiplied by the average share of each fiscal variable in GDP, the value of the multiplier can be obtained.⁶

$$\text{Multiplier for GDP} = \frac{\text{GDP Response}}{\text{Fiscal Shock}} / (\text{Average fiscal Variable share of GDP})$$

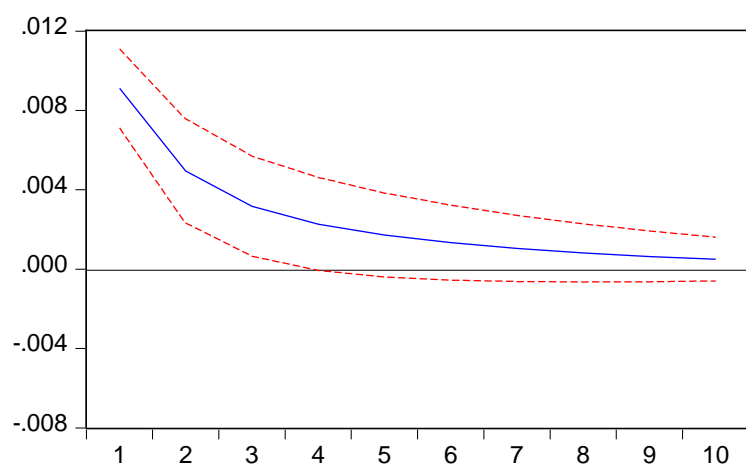
In Table 2, the spending and tax multipliers are presented in terms of the highest and lowest value of the multiplier and the value of the multipliers after one year (4 quarters) and after two years (8 quarters). In the presentation of the results, the IRF is the starting point.

⁶ Mountford and Uhlig (2009), What are the Effects of Fiscal Policy Shock?“, Journal of Applied Econometrics **24**: 960–992 (2009), Daškar and Šimović (2013), Dynamic Effects of Fiscal Policy and Fiscal Multipliers in Croatia, University of Rijeka

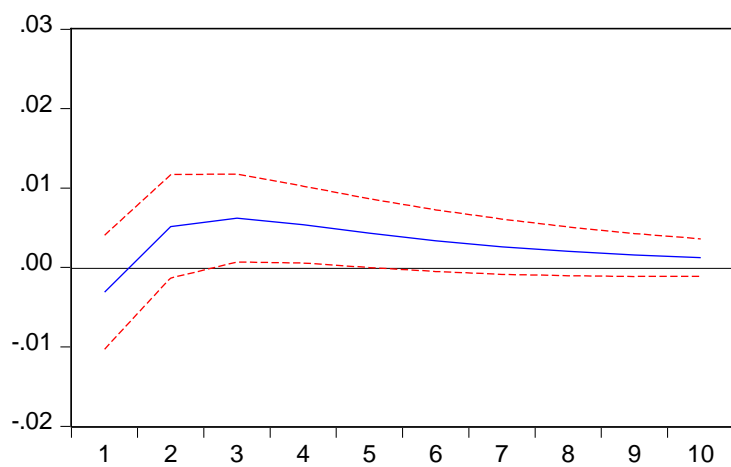
Graph 6: Response of variables to a spending shock
Response of tax



Response of spending



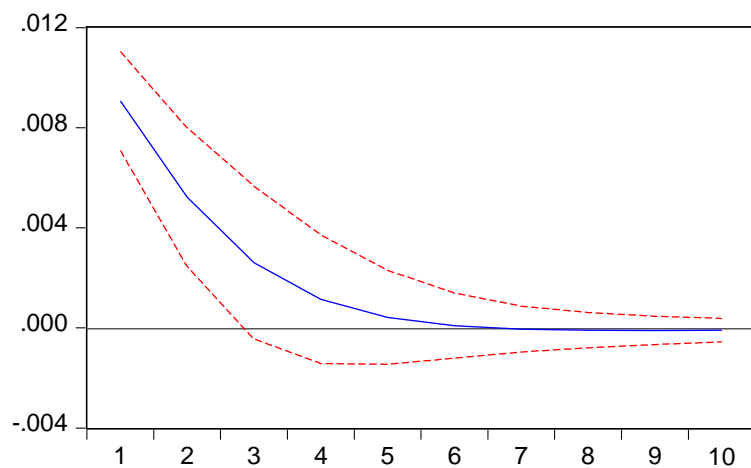
Response of output



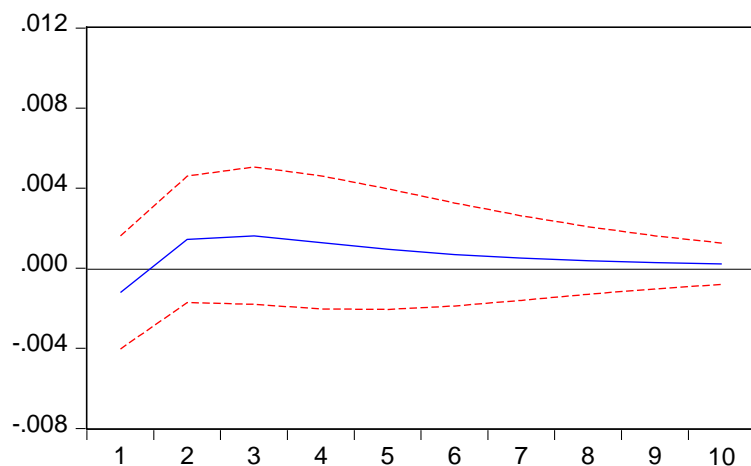
Note: Impulse responses represent a shock in government consumption and an increase in the “independent variable” by one standard deviation. Dotted lines represent 95% confidence intervals.

The impulse responses in Graph 6 are the reactions of all three selected variables to the spending shock. The reaction of taxes to the spending shock is not statistically significant; however, the spending shock has a negative effect on taxes and has its peak in the second quarter. The effects of the shock last for about 8 quarters. When we set $b_2 = 0$, which means that government spending cannot respond to changes in taxes, the results do not change from the basic findings. It appears that an increase in spending lasts for about 4 quarters.. The reaction of output to the spending shock is negative only in the first quarter, and afterwards, it has a positive effect that lasts for the next three quarters, after which it has a declining path, although it remains positive.

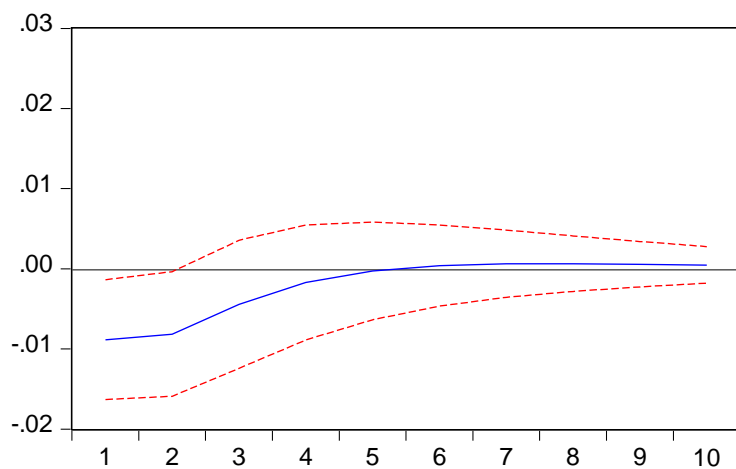
Graph 7: Response of variables to a tax shock
Response of tax



Response of spending



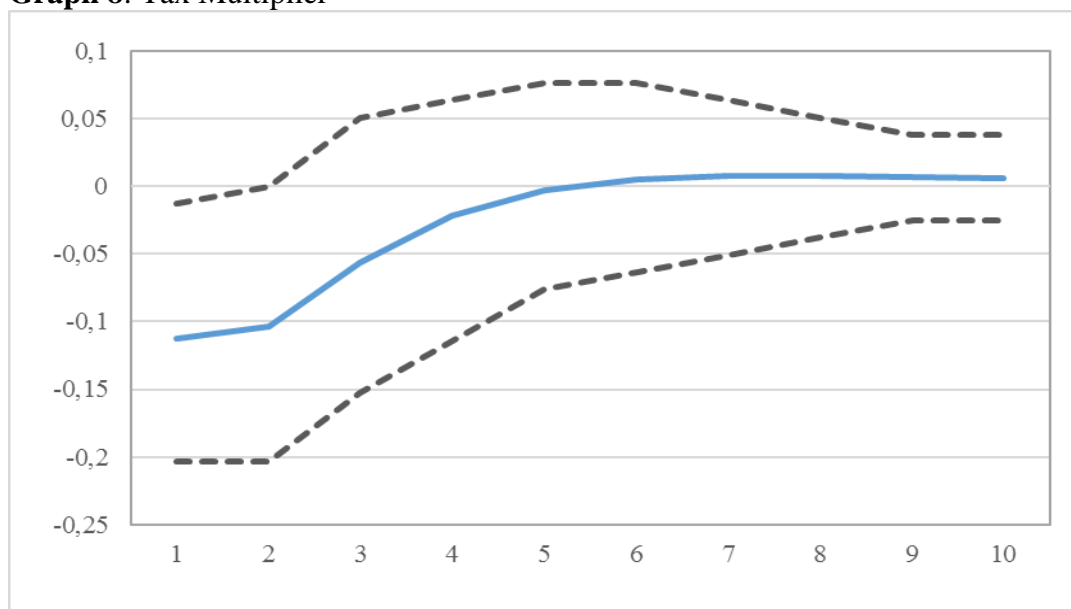
Response of output



Note: Impulse responses represent shocks in the VAT (an increase in the “tax variable” by one standard deviation). Dotted lines represent 95% confidence intervals.

The reactions of variables in Graph 7 are due to the tax shock; whereas an increase in taxes lasts for 5 quarters. The response of spending to the tax shock is negative on impact. In the second quarter, the effect turns positive and has a peak in the second and third quarters, after which the effects of the shock start to vanish. The tax multiplier is constructed from the impulse response.

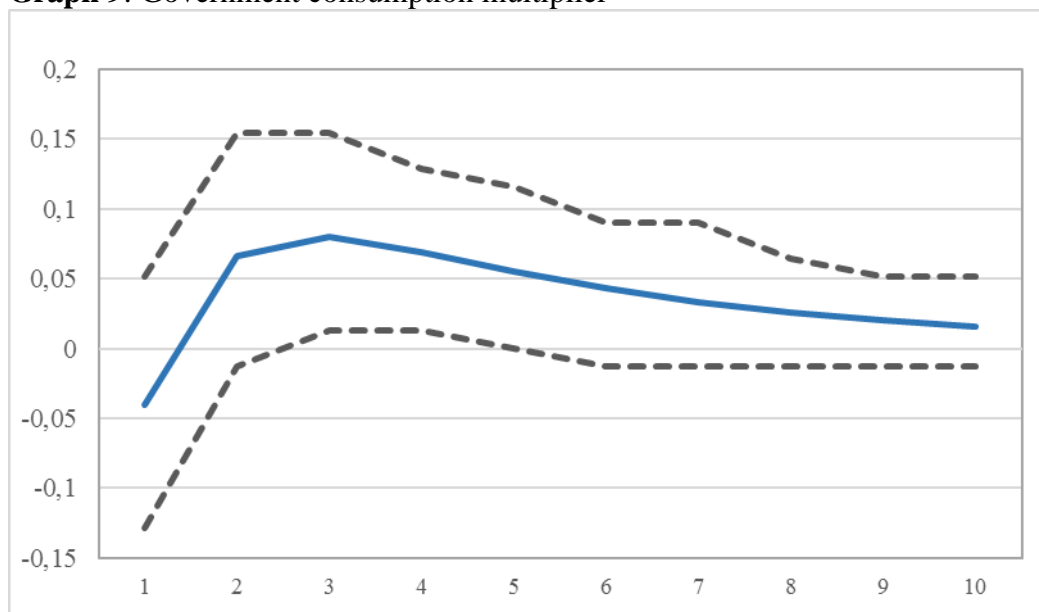
Graph 8: Tax Multiplier



Source: Authors; dotted lines represent the 95% confidence interval

By analysing the tax multiplier (Graph 8), first, it can be noted that the tax multiplier is negative until the fifth quarter. The size of the tax multiplier and the negative value is in accordance with results obtained for emerging economies⁷. After the fifth quarter, the tax multiplier is positive, but its positive effects on output are very small. After the negative effect is recorded, the effect of the shock disappears. It is also important to note that the tax multiplier is not statistically significant throughout the entire analysed period. In future research that analyses this issue further, if more data are available and dummy variables are used, this problem could be resolved. The worst effect is recorded in the first two quarters after the shock. When there is an increase in the indirect tax revenues, the effect on consumption is indirect. This effect is caused, first, by an increase in excise duties, especially because increases in taxes on oil, tobacco and alcohol increase the value of imports. Second, household consumption is reduced in response to the increase in excise duties. When tax authorities broaden the tax base, the consumption and investments of the private sector decrease. In light of the fiscal consolidation, the increase in revenues from indirect taxes is used to cover the government deficit and consequently has a limited effect on output.

⁷ Muir Dirk and Weber Anke (2013). Fiscal Multipliers in Bulgaria: Low but Still Relevant, IMF Working Paper

Graph 9: Government consumption multiplier

Source: Authors; dotted lines are 95% confidence interval

The spending multiplier seems to be statistically significant only from the third to the fifth quarters. The dynamics of the spending multiplier are such that in the first quarter after the shock, there is a small negative effect on output, after which a positive effect is recorded. This result also aligns with empirical evidence for the spending multiplier, since an increase in government spending has a direct effect on consumption and, therefore, on output. The spending multiplier peaks in the third quarter after the shock and afterwards has a declining path. The effect of the spending shock lasts for only five quarters. The results suggest that an increase in government consumption affects GDP mostly in the first half of the year after the shock.

Table 2: Tax and spending multipliers for Bosnia and Herzegovina

Fiscal Multipliers	1 quarter	4 quarters	8 quarters	High	Low
Tax Multiplier	-0,11	-0,02	0,01	0,01	-0,11
Spending Multiplier	-0,04	0,07	0,03	0,08	-0,04

Source: Authors

6. Conclusion

We find that the tax multiplier is negative (ie higher taxes reduce economic activity) but small. These findings will be valuable for guiding structural reform aimed at broadening the VAT base and restructuring of government expenditures.

Fiscal shocks can be determined in various ways; therefore, this research can be extended to assess the value of fiscal multipliers considering other variables (real exchange rates, debt to GDP ratio, etc.). Further research on this topic should be conducted, possibly focusing on how fiscal shocks affects the different components of GDP.

APPENDIX A

Stationary tests

Breakpoint Unit Root Test

Test the Null Hypothesis: Variables have a unit root with a break in intercept and trend.

Variable	T-statistics	Critical Value	
GDP	-7.916.274	1% critical value	-5.719.131
		5% critical value	-5.175.710
		10% critical value	-4.893.950
Government Expenditures	-5.491.355	1% critical value	-5.719.131
		5% critical value	-5.175.710
		10% critical value	-4.893.950
Government Taxes	-4.971.474	1% critical value	-5.719.131
		5% critical value	-5.175.710
		10% critical value	-4.893.950

Lag length Selection Criteria

VAR Lag Order Selection Criteria							
Endogenous variables: T G Y							
Exogenous variables: C TREND							
Sample: 2006Q1 2016Q3							
Lag	LogL	LR	FPE	AIC	SC	HQ	
0	3.140.190	NA	1.83e-11	-1.621.153	-1.595.296	-1.611.953	
1	3.472.483	57.71395*	5.13e-12	-1.748.675	-16.84033*	-17.25676*	
2	3.564.977	1.460.437	5.14e-12	-1.749.988	-1.646.561	-1.713.189	
3	3.674.733	1.559.686	4.78e-12*	-17.60386*	-1.618.174	-1.709.788	
* 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							

7. References

- Aguiar Mark and Gopinath Gita.* (2007) Emerging Market Business Cycles: The Cycle Is the Trend. *Journal of Political Economy*, Vol. 115, No. 1 (February 2007), pp. 69-102
- Amisano Gianni, Giannini Carlo* (1996). *Topics in Structural VAR Econometrics*, 2nd edition, University of Brescia and University of Pavia
- Baum Christopher F.* (2013), *VAR, SVAR and VECM Models*, EC 823: Applied Econometrics, Boston College
- Batini Nicoletta, Eyraud Luc, Forni Lorenzo, and Weber Anke,* (2014) *Fiscal Multipliers: Size, Determinants, and Use in Macroeconomic Projections*, IMF
- Batini Nicoletta, Eyraud Luc, and Weber Anke,* (2014) *A Simple Method to Compute Fiscal Multipliers*, IMF Working Paper
- Blanchard Olivier and Leigh Daniel.* (2013). *Growth Forecasts Errors and Fiscal Multipliers*, International Monetary Fund Working Paper
- Boussard§ Jocelyn, de Castro†Francisco Salto‡ Matteo.* (2012) *Fiscal Multipliers and Public Debt Dynamics in Consolidations*, European Commission
- Bogoev Jane, Petrevski Goran, Tevdovski Dragan* (2015) *Fiscal and Monetary Policy Effects in South Eastern European Economies*, National Bank of Macedonia
- Caldara Dario and Kamps Christophe.* (2008), *What are the Effects of Fiscal Policy Shocks, A VAR-Based Comparative Analysis*, ECB Working Paper
- Caldara Dario* (2011). *The Analytics of SVARs: A Unified Framework to Measure Fiscal Multipliers* Institute for International Economic Studies, Stockholm University, Stockholm
- Canova Fabio and Pérez Forero Fernando J.* (2014), *Estimating overidentified non-recursive, time varying coefficients structural VARs*, Centre for Economic Policy Research (CEPR)
- Canova Fabio* (2007). *Methods for Applied Macroeconomic Research*, University of Princeton
- Chinn Menzie,* (2013) *The New Palgrave Dictionary of Economics*
- Dai Qiang and Philippon Thomas.* (2004). *Government Deficits and Interest Rates: a No-Arbitrage Structural VAR Approach*, New York University
- Davies Gavyn ,* (2012), *High fiscal multipliers undermine austerity programmes* (2012). , *World Economic Outlook*, IMF
- Farhi Emmanuel and Werning Iv'an* (2009), *Capital Taxation Quantitative Explorations of the Inverse Euler Equation*, Harvard University and MIT

Gottschalk Jan (2001), An Introduction into the SVAR Methodology: Identification, Interpretation and Limitations of SVAR models, Kiel Institute of World Economics

Hall Robert E. and Auerbach Alan and Gorodnichenko Yuriy (2012). Discussion of Fiscal Multipliers in Recession and Expansion, Hoover Institution and Department of Economics, Stanford University

Ilzetzki Ethan, Mendoza Enrique G. and Végh Carlos A. (2011), How Big (Small?) are Fiscal Multipliers?, IMF Working Paper

Jemec Nataša, Strojjan Kastelec Andreja, Delakorda Aleš (2011), How do Fiscal Shocks Affects the Macroeconomic Dynamics in the Slovenian Economy, Bank of Slovenia

Kilian Lutz. (2011), Structural Vector Autoregressions, University of Michigan

Lütkepohl Helmut (2004). Vector Autoregressive and vector Error Correction Models, European University Institute, Florence

Mitra Pritha and Poghosyan Tigran. (2015). Fiscal Multipliers in Ukraine, International Monetary Fund Working Paper

Muir Dirk and Weber Anke (2013). Fiscal Multipliers in Bulgaria: Low But Still Relevant, IMF Working Paper

Perotti Roberto (2007), Comparing alternative methodologies to estimate the effects of fiscal policy, University of Bocconi

Perotti Roberto (2007), Estimating the effects of fiscal policy in OECD countries, University of Bocconi

Petrović Pavle, Arsić Miloško and Novković Aleksandra (2014). Fiscal Multipliers in Emerging European Economies, Fiscal Council of Republic of Serbia

Ravn a,b Morten O., Schmitt-Grohe c,b,d, Stephanie, Uribe c,d Marti'n (2009) Consumption, government spending, and the real exchange rate, *Journal of Monetary Economics* 59 (2012) 215–234

Reis Ricardo. (2007). Using VARs to Identify Models of Fiscal Policy: A Comment on Perotti, Princeton University

Spilimbergo Antonio, Symansky Steve, and Schindler Martin. (2009), Fiscal Multipliers, IMF Staff Position Note

Šimović Hrvoje, Deskar-Škrbić Milan (2013), Dynamic effects of fiscal policy and fiscal multipliers in Croatia, University of Rijeka

Unevskaja Danica, Andonova Dijana, Stefanova Janevska (2015), Transmission of external shocks in assessing debt sustainability, the case of Macedonia, National Bank of Macedonia

Uribe Martin & Schmitt-Groh Stephanie (2015), Online Appendix to “Business-Cycle Facts Around the World”, Columbia University

Werning Ivan (2011), Managing a Liquidity Trap: Monetary and Fiscal Policy, National Bureau of Economic Research (NBER) Working Paper Series