Acta Oeconomica, Vol. 64 (S1) pp. 133–152 (2014)
DOI: 10.1556/AOecon.64.2014.S1.5

THE EFFECTS OF FISCAL POLICY IN A SMALL OPEN TRANSITION ECONOMY: THE CASE OF CROATIA*

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In this paper, we use the structural VAR model to analyse the dynamic effects of (discretionary) fiscal shocks on the economic activity of the private sector in Croatia between 2000 and 2012. Due to the fact that Croatia is a small open transition economy, we assume that shocks of foreign origin can have notable effects on its performance. Therefore, the original Blanchard-Perotti identification method is extended by introducing variables that represent external (foreign) demand shocks. The results show that government spending has a positive and statistically significant effect on private aggregate demand and private consumption, and that net indirect taxes have a negative and statistically significant effect on private consumption and private investment.

Keywords: fiscal policy, small open economy, Croatia, SVAR

JEL classification indices: C32, E62, H20, H30, H50

* This work has been supported in part by the Croatian Science Foundation under the project number IP-2013-11-8174.

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1. INTRODUCTION

The current economic crisis has awoken interest in researching the possibilities and limitations of the stabilisation function of fiscal policy. This function is of very great importance in countries in which monetary policy is limited by some structural characteristics, as in Croatia, which is a small open economy with a managed exchange rate.

This paper analyses the possibilities of the short-term effects of the fiscal policy on economic activity (business cycle), through its effect on aggregate demand. Since Croatia is one of the European countries with the longest recession period (recession in Croatia still lasts), it can be concluded that fiscal policy between 2008 and 2012 has not been adequate and that its stabilisation potentials have not been fully used, although there were many discretionary changes in fiscal system.

Discretionary measures are in the focus of this paper, whose possibilities are theoretically and empirically usually observed through the theory of fiscal multipliers. Thus, the indirect goal of the paper is to estimate the size of government spending and tax multipliers. This is the first attempt in the literature. The multiplier size is determined by various structural characteristics of the economy, and one of the main and most important characteristics is a country's openness in terms of foreign trade.

After an overview of the literature, the third section briefly explains our econometric model. It is a structural VAR model (SVAR) with the Blanchard-Perotti method of identification. The model is extended with variables that represent foreign shocks using Ravn – Spange (2012) methodology. The fourth part analyses the used data, while the fifth part shows the effects of fiscal shocks on private consumption and private sector demand, as well as the results of the calculation of the government spending multiplier and tax multiplier. This part also gives a brief review of the methodological limitations of the results.

2. LITERATURE REVIEW

The number of empirical studies on fiscal policy is extensive, but they can be structured in several directions. First, in VAR literature, four main identification approaches can be found to identify fiscal policy shocks: 1) narrative approach (Ramey – Shapiro 1999); 2) calibrated elasticises (Blanchard – Perotti 1999, 2002); 3) sign restrictions (Mountford – Uhlig 2002); and 4) recursive structure (Kamps – Caldara 2006). Second, the analyses of empirical results include dynamic responses to different fiscal shocks and/or fiscal (tax and spending) multipliers, and frequently an interpretation of historical facts. Third, VAR as a

standard methodology has developed into DSGE (dynamic stochastic general equilibrium) models. DSGE literature is growing, as are different DSGE models such as real business cycle (RBC) models and New Keynesian (NK) models. For the DSGE literature review and methodology development, see Leeper at al. (2012).

The seminal paper using the structural VAR model for estimating the effects of fiscal policy is Blanchard – Perotti (1999, 2002) and it is still used as a benchmark in analyses. The structural VAR approach predicts that a positive spending shock (deficit financed, i.e. leaving taxes unchanged) has a positive effect on output, while a positive tax shock (leaving government spending unaffected) has a negative effect on output. The original model of Blanchard – Perotti (1999) takes only three variables: government spending, net taxes and real GDP, and the analysis was conducted for the USA. Later, Perotti (2002) extended the model by adding short-term interest rate and price levels, and the expanded analyses included larger OECD countries (Germany, Great Britain, Australia, Canada). Since these seminal papers, a large variety of papers have been published that use the Blanchard–Perroti identification method as benchmark methodology in the research of the effects of fiscal policy. The model has been further elaborated and has been adjusted according to the particularities of different economies. *Table 1* gives a brief overview of research using the SVAR methodology for estimating the effects of fiscal policy based on the Blanchard–Perroti identification method.

Table 1

A brief overview of research on the effects of fiscal policy on economic growth using SVAR methodology based on Blanchard–Perotti identification scheme

Authors	Model and identification scheme	Period, frequency of data and country	Variables	Fiscal policy effects
Perotti (2002)	SVAR BP 2002	Quarterly 1960–2001 USA, Germany, Australia, Great Britain, Canada	Net tax revenue, government spending, GDP, interest rate, inflation rate	Weak effect of fiscal shocks on GDP; multiplier less than 1 for all countries except the USA in the 1980s; after the 1980s, government consumption effects are considerably weakened (multipliers are smaller, and the government spending multiplier changes its algebraic sign)

Table 1 (cont.)

Authors	Model and identification scheme	Period, frequency of data and country	Variables	Fiscal policy effects
Krušec (2003)	SVEC BP 2002	Quarterly (different for each country) USA, Great Britain, Canada, Australia, Germany, Italy, Finland	Government spending, net primary tax, real output, inflation rate, interest rate	Positive government spending shock increases GDP, while a positive tax shock has a rather insignificant effect on GDP
Giordano et al. (2005)	SVAR BP 2002	Quarterly 1982–2003 Italy	Net tax revenue, various components of public expenditure, private GDP, inflation, interest rates	A shock to government purchases of goods and services has a sizeable and robust effect on economic activity; effects of fiscal policy shocks on private consumption and investment are positive; shocks to net revenue have negligible effects on all the macroeconomic variables.
De Castro – De Cos (2006)	SVAR BP 2002	Quarterly 1980–2004 Spain	Net tax revenue, government spending, GDP, interest rate, inflation rate	Government spending multiplier greater than 1 in the short run and negative in the long run; positive (insignificant) tax effect in the short run, negative in the long run; significant short-term effects of fiscal variables on prices and interest rates
Hur (2007)	Cholesky; SVAR BP 2002	Quarterly 1979–2001 South Korea	Government spending, tax revenue, GDP, foreign GDP and real effective exchange rate (exogenous variables)	Weak and short-term effect of government spending and taxes on GDP; size of (cumulative) multipliers between –2 and –1.5 for taxes and 1.2–1.6 for government spending; weaker effect of fiscal shocks in the model with exogenous variables; author emphasises problems with the significance of results

Table 1 (cont.)

Authors	Model and identification scheme	Period, frequency of data and country	Variables	Fiscal policy effects
Baxa (2010)	SVAR BP 2002	Quarterly 1998–2009 Czech Republic	Government revenue, government spending, GDP, interest rate, inflation rate	Government spending has a considerable and significant effect (multiplier close to 2); tax revenue has a negative and insignificant effect on GDP
Auerbach – Gorodnichenko (2012)	SVAR BP 2002; Switching model	Quarterly 1947–2009 USA	Government spending, net tax revenue, GDP, different components of government spending, forecast errors	Fiscal multipliers' size varies depending on whether discretionary policies are introduced during recession or expansion; government spending multiplier (different components) is between 1 and 3.56, and tax multiplier between –0.99 and –0.08
Ravn – Spange (2012)	SVAR(X) BP 2002	Quarterly 1971–2011 Denmark	Government spending, personal consumption, net taxes, GDP, foreign GDP (exogenous)	Significant and positive effect of government spending on GDP in the short run (multiplier's size is 1.3); increasing taxes decreases GDP (multiplier is smaller than government spending multiplier); crowding out effect is present; multiplier's size varies in different periods (effects of fiscal shocks are greater in the second period when Denmark introduced fixed exchange rate system)

Note: Fiscal policy effects show the effects of fiscal shocks on GDP and its components. Detailed results can be found in original papers.

A broader literature review of the assessments of the effects of fiscal policy using the SVAR methodology can be found for several transition countries (Czech Republic, Hungary, Poland, the Slovak Republic, Bulgaria, and Romania) in Mirdala (2009). Further, see Baxa (2010) for Czech Republic, Jemec et al. (2011) for Slovenia, and Mancellari (2011) for Albania.

When it comes to estimating the fiscal policy effects in Croatia, the literature is rather modest regarding the SVAR methodology. Only two papers can be found. Ravnik – Žilić (2011) use a multivariate Blanchard–Perotti SVAR methodology to analyse disaggregated short-term effects of fiscal policy on economic activity, inflation, and short-term interest rates in Croatia. Šimović – Deskar-Škrbić (2013) analyse the dynamic effects of fiscal policy and estimate the size of fiscal multipliers at different levels of government, using a closed economy model.

3. ECONOMIC POLICY LIMITATIONS AND THE ROLE OF FISCAL POLICY IN CROATIA: A BRIEF OVERVIEW

The recent economic crisis has fully exposed the illogicality of the economic model in Croatia. The problems with liquidity followed by the economic downturn in the European Union very quickly turned into a multi-year recession, with which Croatia is still faced. Since there is no more "cheap" money from abroad, the banks have to rely on domestic sources of funds. However, this is not causing a liquidity problem, because the domestic non-monetary sector is drained by the crisis, so the demand on the credit market is very low.

Unfortunately, the contribution of the central bank to prevent negative trends is more than limited because it is almost impossible to significantly change the existing conditions in the monetary sphere of the economy. If the Croatian National Bank decides to abandon the exchange rate anchor or tries to implement strong monetary expansion using some unconventional measures, it would inevitably lead to strong depreciation and would directly affect most of the debtors who are bound by the foreign currency clause.[1] In addition, there would be an immediate increase in the external debt whose repayment already causes problems due to a decrease of the credit ratings and more expensive refinancing conditions.

Monetary policy has a narrowed space to manoeuvre as its contribution in Croatia is limited to price stability. The positive side of the maintenance of a stable exchange rate as an indirect goal of the monetary policy will be perceived when entering the exchange rate mechanism ERM 2. The ineffectiveness of the basic channels of the transmission mechanism and the high-risk premium of the country are disabling more important contribution to economic growth and development. The reason for that lies in the fact that the channels of the transmission mechanisms usually do not react to the monetary impulses of the central bank.

[1] Currency clause is used to hedge exchange rate risk in loan agreements.

Because of the existing restrictions of monetary policy, the only possibility for more significant activity under crisis conditions can be seen in the fiscal policy. However, due to the hard budget constraint (high and growing public debt, constant fiscal deficits, decrease of credit rating, increase of interest rates and more expensive market sources that finance the public debt), an expansionary fiscal policy in Croatia could not be effective.

Figure 1 captures the movements of the total revenues and expenditures of the general consolidated government in the last decade. *Figure 1* indicates a rather stable increase of both revenues and expenditures until the beginning of the economic crisis. A trend is consistent with GDP growth, but after GDP growth rate declines, problems occur in fiscal consolidation, especially in cutting public expenditures (compare with *Figure 2*).

Furthermore, during the last decade, Croatia produced constant fiscal deficits, regardless of the positive and relatively large GDP growth rate before the crisis. During the same period, the structure of government spending has not changed because it is primarily directed to meet current social needs (pensions, health care, agriculture subsidies, etc.), in order to preserve social peace and stability. The main prerequisites for more significant fiscal adjustment are the reforms within the mentioned public sectors. Such reforms were not introduced. The real need for fiscal consolidation has additionally caused social resistance to the changes and

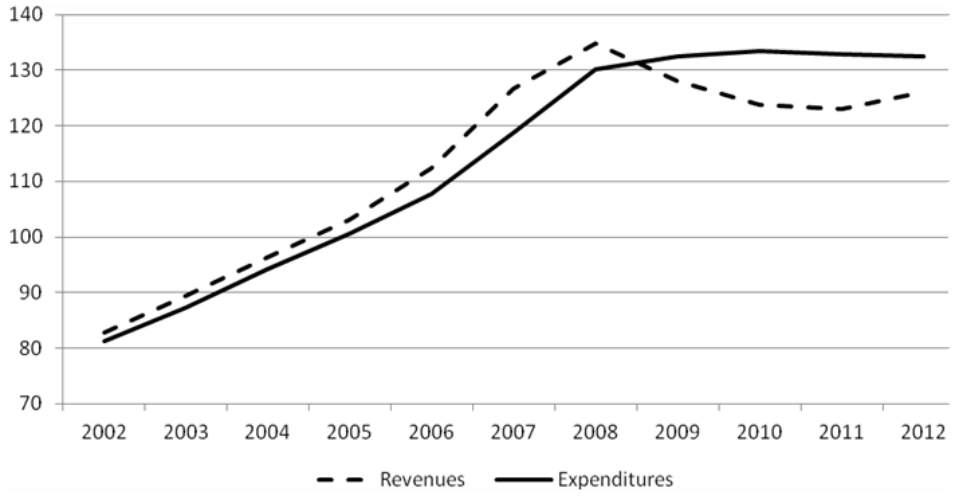

Figure 1. Revenues and expenditures, consolidated general government (billion HRK)

Note: Transactions in nonfinancial assets, financial assets and liabilities are excluded.
Source: Ministry of Finance, Croatia.

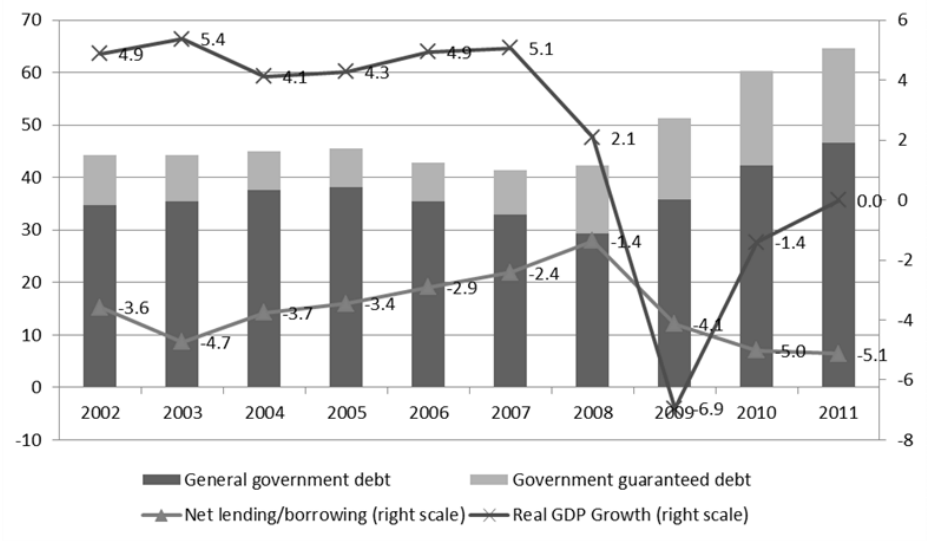

Figure 2. Public debt, fiscal deficit and real GDP growth (in % of GDP)

Source: Croatian National Bank; Ministry of Finance.

also provoked the instability of the government.[2] Without more significant reforms and fiscal consolidation, public debt significantly increased and when adding issued state guarantees it exceeds 60% of the GDP. Under such conditions, the area of operation of fiscal policy has been further narrowed.

With the assumption that the exchange rate and price stability have no alternative, Croatia has to accomplish a reliable fiscal position as soon as possible. This implies a number of reforms within the public sector and the abolition of certain social benefits. Moreover, it implies serious long-term budget planning and adequate public debt management. The aim of this paper is to determine whether fiscal policy in Croatia can achieve its stabilisation function, i.e. whether the fiscal multipliers have the expected signs.

4. METHODOLOGY: OPEN ECONOMY MODEL

In contrast to the Blanchard–Perotti identification method, Ravn – Spange (2012) analyse Denmark, a small open economy with a fixed exchange rate. As Croatia is a small and open economy with a nearly fixed managed exchange rate as well, this paper represents the first paper that uses the adjusted Blanchard–Perotti method-

[2] Two governments and three Prime Ministers and three ministers of finance have changed between 2008 and 2013.

ology, after it was originally presented in Ravn – Spange (2012). Because Croatia is a small, highly dollarised, open transition economy with a managed exchange rate, this methodology can be the basis for a similar analysis for a number of developing countries with similar characteristics.

The baseline model of this analysis is the reduced form of the VAR model:

$$X_t = \Psi + \Phi D_t + \Gamma T_t + \sum_{i=1}^{p} A_i X_{t-1} + \sum_{i=1}^{p} B_j Z_{t-j} + u_t, \qquad (1.1)$$

which includes deflated and seasonally adjusted values in log form of net indirect tax revenue (T_t) total general government spending (G_t), personal or private consumption (C_t), foreign-trade weighted GDP[3] (F_t), which comprises the vector of endogenous variables $X_t = [T_t, G_t, C_t, F_t]$. The exogenous variables included in the model are the US GDP (Y_t^{US}), constant (Ψ), time trend[4] and "crisis" dummy variable (D_t), which has a value of 1 from the beginning of the crisis (Q32008) (according to Krznar (2011) and the Quandt–Andrews test of structural break. Vector ut = [t,g,y/c,f]' represents the vector of innovations of the reduced model (RF), $u_t \sim (0, \sum_u)$.

The number of time lags is set to 1, according to SIC and HQ criteria. A greater number of lags is not desirable due to the short time-series as well. Also, considering the frequency of data, the selection of one time lag has its anchor in economic intuition. One time lag applies to endogenous variables and an exogenous variable, which indicates an external shock affecting the economic activity of the main trade partners and Croatia. The model also assumes that the economic activity of the main trade partners has an effect on the Croatian economy, and that economic activity in Croatia does not affect the activity of the main trade partners.

The reduced form of the model (1.1) gives information about RF innovations. RF innovations are correlated and represent the linear combination of structural innovations, which prevents their precise economic interpretation. The linear combination of structural innovations (shocks) can be displayed as follows:[5]

3 Calculated as the weighted average of GDP of three main Croatian trading partners (Germany, Italy, and Slovenia), in accordance with the information about statistics on the nominal effective exchange rate of the Croatian National Bank.

4 The ADF test and the Zivot-Andrews stationarity tests show that all variables are trend stationary, and thus the inclusion of trend guarantees model stability in which the variables are included in logarithmic form; the results of these tests can be delivered on request.

5 In the case of estimating the effect of shocks on the aggregate demand of the private sector, variable c_t is replaced with variable y_t.

$$t_t = a_1 c_t + a_2 f_t + \beta_2 e_t^G + \beta_1 e_t^t, \tag{1.2}$$

$$g_t = b_1 c_t + b_2 f_t + \beta_4 e_t^T + \beta_3 e_t^g, \tag{1.3}$$

$$c_t = c_1 t_t + c_2 g_t + c_3 f_t + \beta_5 e_t^c, \tag{1.4}$$

$$f_t = d_1 t_t + d_2 g_t + d_3 c_t + \beta_6 e_t^f, \tag{1.5}$$

where e_t^t, e_t^g, e_t^c and e_t^f represent the uncorrelated structural shocks of taxes, government spending, personal consumption, and foreign demand.

In matrix form:

$$\begin{pmatrix} 1 & 0 & a_1 & a_2 \\ 0 & 1 & b_1 & b_2 \\ c_1 & c_2 & 1 & c_3 \\ d_1 & d_2 & d_3 & 1 \end{pmatrix} \begin{pmatrix} t_t \\ g_t \\ c_t \\ f_t \end{pmatrix} = \begin{pmatrix} \beta_1 & \beta_2 & 0 & 0 \\ \beta_4 & \beta_3 & 0 & 0 \\ 0 & 0 & \beta_5 & 0 \\ 0 & 0 & 0 & \beta_6 \end{pmatrix} \begin{pmatrix} e_t^t \\ e_t^g \\ e_t^c \\ e_t^f \end{pmatrix} \tag{1.6}$$

equation (1.2) shows that the model assumes that four factors can cause unexpected tax changes during one quarter: reactions on unexpected changes in domestic consumption, reactions on unexpected changes in foreign demand, and reactions on structural shocks in government spending, or taxes. Other equations are interpreted in a similar manner.

In order to identify this system, $2K^2 - \frac{1}{2}K(K+1)$ limitations are to be set (Lütkepohl 2005), which have to have a strong base in economic theory. As the number of endogenous variables k = 4, 22 limitations are needed. The basic model implies 16 limitations, and thus 6 more are to be added.

Quarterly data frequencies have the greatest significance in the process of identification. It is due to the assumption that economic policy-makers cannot react to changes in the economic environment in one quarter. There are different information, administrative and procedural barriers for reacting in such short period: e.g. most of the statistical reports are published with a couple of months' or quarters' delay; there are procedural barriers within parliament, etc. Therefore, the reaction of fiscal variables on changes in economic activity can only be automatic, i.e. the consequence of automatic stabilisers' activity. That fact allows setting the limitations in the model based on the empirical estimation of the exogenous elasticities of fiscal variables in relation to the changes of certain macroeconomic aggregates. To be more precise, parameter a_1 and b_1 can be interpreted as (automatic) elasticises of tax revenue and expenditures according to aggregate demand changes.

The total calculated elasticity equals $a_1 = 0.96$.[6] According to Blanchard – Perotti (2002), Ravnik – Žilić (2010), Hur (2007), and Ravn – Spange (2012), all coefficients related to the equation of the reduced innovation of government spending should equal zero. The reason for this is found in the assumption that government spending is completely under the control of the economic policy that cannot react within the same period on the changes in the economy. However, Caldara (2011) warns about the "automatic" reaction of government spending components (which are related to unemployment) to the business cycle. Taking into account this correlation, it is necessary to calculate the exogenous elasticities of those components to the changes in the business cycle. However, according to the Grdović Gnip (2011) estimation, this elasticity is very small in Croatia (–0.01). Therefore, in this paper we also assume that the total expenditures cannot have an influence on the changes in the aggregate demand within the same quarter, hence $b_1 = 0$.

In order to identify other parameters of the system, Blanchard – Perotti (2002) recommend the calculation of cyclically adjusted residuals, which are uncorrelated with structural shocks in GDP (and personal consumption), and thus they can be used as instruments for t_t and g_t in the IV regression of income and personal consumption on t_t and g_t, which results in parameters c_1 and c_2.

Parameters β_2 and β_4 show the reaction of taxes on changes in government spending and vice versa. In order to identify the system, it is necessary to assume that one of these parameters is equal to 0, i.e. there is no reciprocity. This paper assumes that tax revenues react to changes in government spending, and not vice versa, so $\beta_4 = 0$. Blanchard – Perotti (2002) demonstrated that the results of the model can hold this assumption (i.e. they are robust).

The last three limitations are implied in the assumption that foreign demand affects all endogenous variables, and that there is no effect the other way around, thus $d_1 = d_2 = d_3 = 0$. It is possible to estimate this model in order to get information about structural innovations which are not correlated, so that an economic interpretation can be offered of the conclusion of the analysis of the impulse response functions (IRF).

An analysis of model adequacy has been performed for model (1.1) (see the *Appendix*). The results of the analysis of residuals and the stability test show that the model is adequate and stable. After estimating the structural form of the model, the tests were repeated (they include tests for residual normality). That has not changed the conclusion on the model adequacy.

[6] The calculation of the elasticities in relation to the income is given by the calculation of the elasticity of tax components to their basis and the elasticities of each base to the income. The needed data for the calculation of tax elasticity was taken from Ravnik – Žilić (2011) and Šimović (2012). The rest of the elasticities are authors' calculations.

5. DATA

The data on Croatian GDP, on GDP of the main trade partners, on the size of general government consumption, and net indirect taxes were taken from Eurostat. All data are at constant prices and exchange rate from 2005. The US income data has been taken from the FRED database. All variables are in millions of euros. The data series applies to the 2000Q1–2012Q2 period, and all data have been seasonally adjusted using the ARIMA X12 method.

The aggregate demand of the private sector is calculated as the sum of personal consumption and investment (Giordano et al. 2005). This indicator gives information on the effect of fiscal variables on the private sector, thus eliminating possible correlation between fiscal shocks and GDP components related to government spending, high correlation between GDP and the component of GDP government spending (G), and high correlation of net exports and foreign demand variable, which could significantly violate some important econometric assumptions. Also, total GDP includes components such as inventory and import level, which domestic fiscal shocks cannot directly affect. These components are affected by the changes in the determinants of personal consumption. The mechanism of the instantaneous effect of the fiscal shocks of consumption and indirect taxes on export has not been elaborated in economic literature.

The analysis uses indirect taxes for three reasons: (i) the goal of the paper is to analyse the effects of fiscal policy on aggregate demand. In theory, income taxes mostly affect aggregate supply, modelling the behaviour of workers and companies; (ii) SVAR models are more suitable for the analysis of aggregate demand shocks; (iii) the Croatian tax system is mainly consumption-oriented and the majority of discretionary measures were related to indirect taxes, and thus we want to try to estimate the consequences of those changes.

As in all papers using the Blanchard – Perotti (2002) methodology, taxes are in net form. In this paper, we deduct subsidies from indirect taxes according to the ESA 95 methodology, whereas other papers deduct interest and social expenditures from the total tax revenue.

Total general government spending is also based on the ESA 95 methodology (European Commission 2012: 17–21). It comprises individual and collective general government spending. The paper uses this indicator of government spending for three reasons: (i) Croatian data on total general government expenditures is available from the third quarter of 2004 – a period too short to be analysed; (ii) the level of aggregation of consolidated central government's total expenditures category, which has been adjusted to changes in GFS methodology 1986–2001, is too high, and certain components cannot be compared; (iii) most papers (Blanchard – Perotti 2002 and Perotti 2002) which use the SVAR methodology for estimating

multiplier size use data on current consumption (goods and services consumption) and investment spending of the government, for which data is not available in Croatia.

6. RESULTS

This part only shows the reactions of personal consumption and private aggregate demand (AD) on structural shocks in net indirect tax revenue and in total spending of central government.[7] Impulses show that the multiplier's size is consistent with similar research (Mancelarri 2011; Hur 2007; Šimović – Deskar-Škrbić 2013).

6.1. Multiplier in an open economy model

Figure 3 shows the effect of one unit shock in net indirect tax revenue on personal consumption. The effect is statistically significant in the first two quarters after the shock. Multiplier size is –0.99 in the first quarter and –0.69 in second quarter. The effect becomes slightly positive in the third quarter (average size is 0.08), and

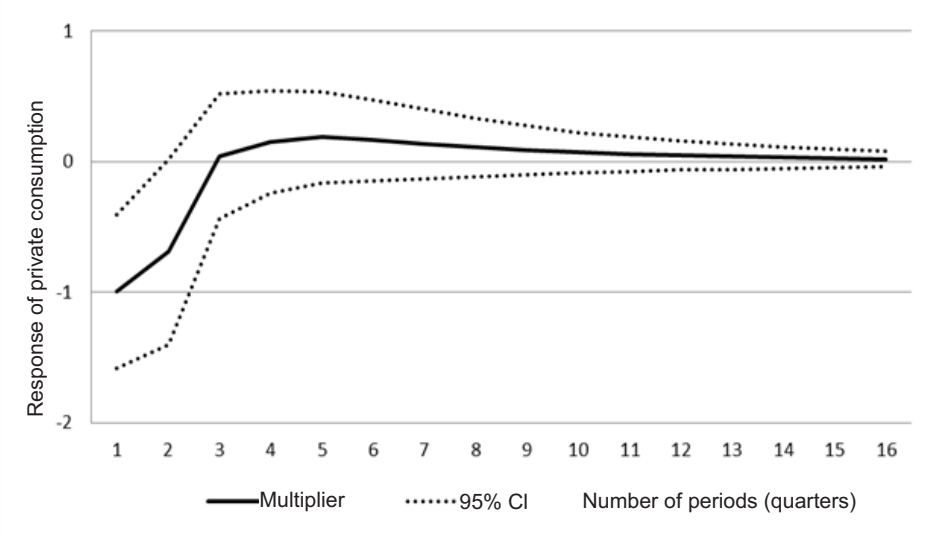

Figure 3. Indirect tax multiplier (private consumption)

Source: Authors' calculations.

[7] Due to the extensiveness of the presentation, other results can be sent upon request.

it stays on approximately that level before disappearing after the fourth quarter. However, the multiplier is statistically insignificant in that period.

Figure 4 shows the effect of one unit shock of government spending on personal consumption. The effect is statistically significant in first five quarters after the shock. Multiplier size is in the range between 0.92 in the first quarter and 0.83 in the fifth. The multiplier is the greatest in the third quarter (1.03), which is not in accordance with the theoretical assumption of a gradually decreasing effect after the first period. However, it matches the movements in other papers such as Ravn – Spange (2012).

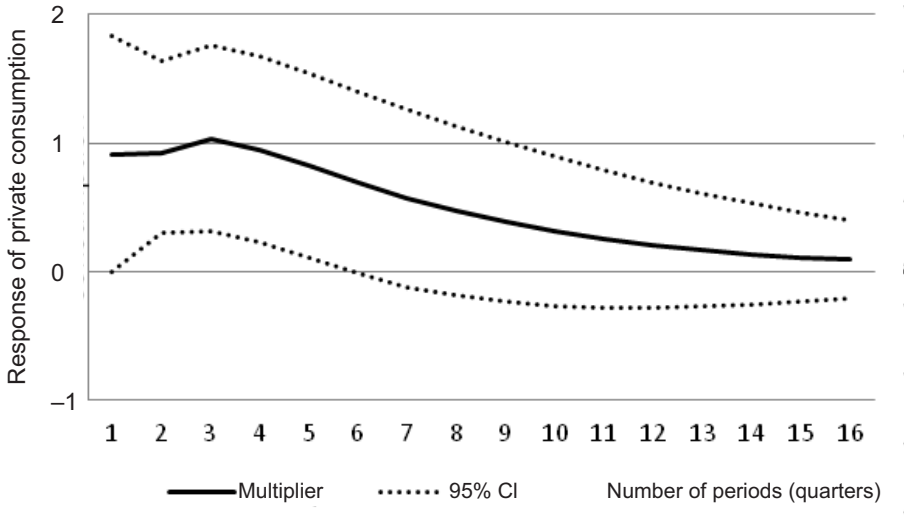

Figure 4. Government spending multiplier (private consumption)

Source: Authors' calculations.

Figures 5 and *6* show the effects of shocks in fiscal variables on private aggregate demand. The tax effect is negative and statistically significant only in the first period. Multiplier size in the first quarter is higher compared to the previous case of personal consumption. This can be explained through the consumption and investment relation (investment accelerator), as consumption is one of the key determinants of investment. The government spending effect becomes significant in the second quarter after the shock and lasts for five quarters. The multiplier is once again higher in comparison to personal consumption, which can be explained through accelerator mechanism as well. It is worth mentioning that the multiplier's size is, in accordance with theory, lower than in the closed economy model, which was explored by Šimović – Deskar-Škrbić (2013).

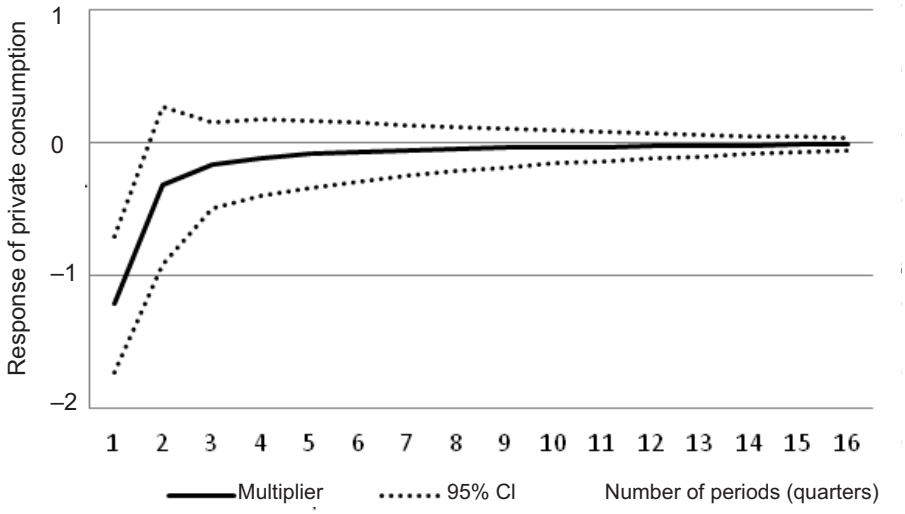

Figure 5. Indirect tax multiplier (private AD)

Source: Authors' calculations.

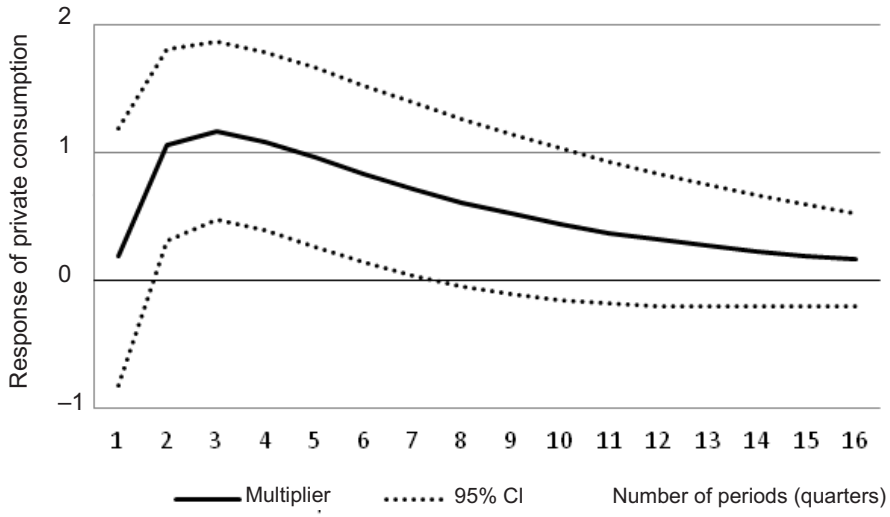

Figure 6. Government spending multiplier (private AD)

Source: Authors' calculations.

6.2. Research limitations

The above results point to several methodological limitations. First of all, these results are to be taken *cum grano salis* due to the relatively short time series and its characteristics such as the structural break from the beginning of the crisis in 2008. Furthermore, the fiscal multiplier is originally defined as the effect of unit change of fiscal variables on the total income, and this paper analyses the effects on personal consumption and private demand. A selection of other endogenous and exogenous variables could result in other conclusions. That is why the authors will continue this research and assess models with other sets of variables. Also, other research shows that the multiplier's size is largely determined by the stage in a business cycle (it is higher in recessions). As Croatia has been in recession for more than 40% of the analysed period, it can be concluded that the multiplier size is partially overestimated.

The paper uses elasticities from other research, but has shown them to be theoretically appropriate for Croatia. The literature emphasises the choice of elasticity as one of the most important determinants for differences in the multiplier's sizes in different countries. Thereby, the key assumption which affects the multiplier's size is government spending elasticity on changes in cycles. In this, as in most of the papers using the Blanchard–Perotti methodology, this elasticity is assumed to be 0.

The share of consumption defined according to ESA 95 and of indirect taxes in chosen macroeconomic variables is lower compared to other definitions. As the formula for calculating the multiplier uses the inverse share of the afore-mentioned variables, it can be concluded that lower shares increase the multiplier's size.

It is important to note that there are several already entrenched criticisms of the Blanchard–Perotti methodology: (i) Caldara – Kamps (2012) emphasise the sensitivity of results on the assumptions on the size of elasticities; (ii) in the current debate on the effects of fiscal consolidation, it is pointed out that it is of great importance to include the feedback between the level of public debt and growth in the analysis of the effects of fiscal policy on economic growth; (iii) it is very important to explicitly model the effects of monetary policy in the fiscal SVAR analysis because the effectiveness of fiscal policy depends on the monetary policy stance to a large extent; (iv) switching regime models suggests that the multiplier's size strongly depends on the stage of the business cycle (e.g. Auerbach – Gorodnichenko 2012); (v) recent research has shown that the size of fiscal multipliers strongly depends on the economic environment (e.g. Corsetti et al. 2012), and thus, for the robustness of the results, it is important to include in the analysis structural characteristics of the economies such as level of indebtedness, ex-

change rate regime, health of financial system, etc. But, despite all the criticism, the Blanchard–Perotti methodology is still the most widely used framework for fiscal policy analysis in a time-series framework.

In this paper it was impossible to include different control variables due to very limited length of all relevant time series. If the authors would have introduced a number of control variables, which are certainly very important, the OLS assumptions would have been seriously violated (CLT) and the results would further lose on quality. Thus, in the future analysis of the effectiveness of fiscal policy in Croatia, it is of great importance to use the panel or cross-section time-series framework because that is the only way to achieve a sufficient number of observations to include the control variables mentioned above.

In future research, the chosen model can be expanded with other structural characteristics of the Croatian economy, e.g. exchange-rate regime, public and external debt, capital market development, investor perception, expectations, etc. Also, in addition to the effects of government spending, the literature often analyses the effects of government investment on economic activity, which has not been done here due to the lack of data.

7. CONCLUSION

This paper provides the first fiscal multiplier estimations for Croatia in open economic framework. The estimated multiplier size in this paper corresponds to the intervals set out in the literature. In both observed open economy models, expenditure multiplier size is at its peak above 1, remaining rather strong for several quarters and then gradually decreasing. The results show a negative tax multiplier in both models, where they are rather strong in the first two quarters and then diminish rapidly. In the case of the private consumption model, the tax multiplier is –0.99 in the first quarter, –0.69 in the second quarter, then becomes slightly positive and rapidly diminishes, while in the aggregate demand model, it is above 1 in the first quarter, but then diminishes even more rapidly. Also, the multiplier's size is, in accordance with theory, lower than in a closed economy model, which presents another expected limitation for Croatian (fiscal) policy-makers.

Since the Croatian economy has been in recession from the second half of 2008, it can be concluded that fiscal policy in the past four years has not been adequate and that its stabilisation potentials have not been fully used, although there were many discretionary changes in the fiscal system. The relevance of this paper can be found in exploring the possibilities and limitations of fiscal policy measures in the macroeconomic management of the Croatian economy, which is of great importance due to the fact that Croatia is a small open economy with a man-

aged exchange rate. Furthermore, the relevance of this and potential future research is even greater in the context of the accession to the EU because monetary sovereignty and the possibilities of Croatian monetary policy will be further reduced.

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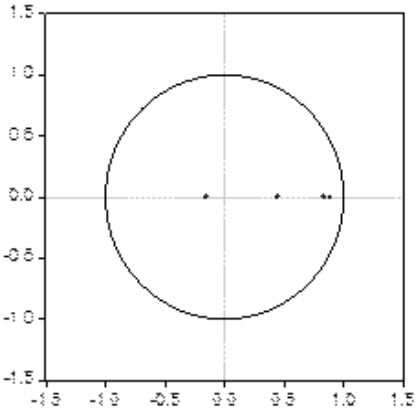
APPENDIX

MODEL ADEQUACY TESTS

Stability tests

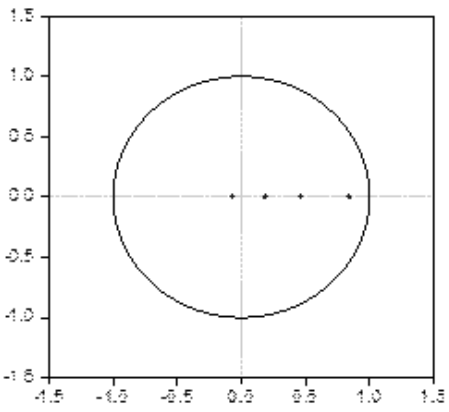
Model 1: Consumption

Inverse roots of AR characteristic polynomial



Model 2: Private AD

Inverse roots of AR characteristic polynomial



Serial correlation, normality and heteroskedasticity tests

Model 1 – Consumption

Residual serial correlation test		
Lags	LM-Stat	Prob
1	18.67130	0.2861
2	20.45608	0.2004
3	14.25282	0.5799
4	29.63618	0.0200
5	10.63893	0.8312
6	14.80011	0.5393

Residual normality test			
Component	Jarque-Bera	df	Prob.
1	3.671000	2	0.1595
2	3.251655	2	0.1967
3	2.110366	2	0.3481
4	4.272280	2	0.1181
Joint	13.30530	8	0.1018

Residual heteroskedasticity test		
Joint test:		
Chi-sq	df	Prob.
445.015	410	0.1126

Model 2 – Private AD

Residual serial correlation test		
Lags	LM-Stat	Prob
1	31.98907	0.1101
2	18.65219	0.2871
3	17.86708	0.3317
4	28.68041	0.0262
5	25.79784	0.0569
6	11.01960	0.8083

Residual normality test			
Component	Jarque-Bera	df	Prob.
1	3.732140	2	0.1547
2	1.683926	2	0.4309
3	1.569457	2	0.4562
4	3.380067	2	0.1845
Joint	10.36559	8	0.2403

Residual heteroskedasticity test		
Joint test:		
Chi-sq	df	Prob.
450.5530	410	0.0815