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Government spending shocks in European Union: A structural VAR approach

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Abstract

Countercyclical fiscal policy represents an instrument used by governments to stabilize economies especially during downturns. Therefore, the transmission mechanism for fiscal policy shocks has been studied to identify the effect of a rise in government spending on boosting private consumption. We have used in this paper a structural vector autoregressive model with data for European Union countries to investigate the impact of a fiscal spending shock on the main budgetary aggregates. Our results confirm that an increase in government expenditure produces a rise in private spending. Massive fiscal stimulus during contractionary periods can contribute to attenuate negative output shocks.

Keywords: government spending shock, private consumption, fiscal stimulus, structural vector autoregressive model
Jel codes: D10, E63, H10

1. Introduction

The analysis of transmission of fiscal expenditure shocks in European Union countries has become increasingly important, especially considering the necessity of governmental intervention during crisis, economic downturns requiring an unprecedented response to mitigate the negative output effects. Fiscal policy represents a countercyclical tool to achieve stabilization, by increasing public expenditure during recessions or by reducing taxation to support economic recovery.

Increasing public spending represents the response of governments during contractions, to attenuate business cycle fluctuations. Private consumption reaction to the rise in governmental expenses consists in similar increases. Fiscal stimulus deployed by governments results in smoothing private consumption shocks, increase household spending and stimulating demand. There have been established several limits in the literature for public spending multipliers.

Standard Real Business Cycle models analyzing the relation between government spending and private consumption find that economic agents decrease consumption and increase savings in case of negative GDP shocks. Forward-looking representative agents postpone spending decisions in case of rises in public expenses, due to a negative wealth effect (Prescott, 1986; Rebelo, 2005; Wagner and Elder, 2005; Linnemann and Schabert, 2006; Battaglini and Coate, 2008; Konstantinou and Partheniou, 2021).

Neo Keynesian models show that in response to an expansion in public spending private consumption will rise as labor demand and real wages increase. Household consumption will increase following a rise in wages, offsetting the negative wealth effect due to anticipation of higher taxation (Coenen and Straub, 2005; Chari et al., 2009; Cwik and Wieland, 2011; Cogan et al., 2010; Woodford, 2011; Palley, 2013).

The impact produced by government spending shocks on household consumption and the propagation of these shocks in the economy is also studied using structural vector autoregressive models, resorting to different identification methods, using short-run, long-run or sign restrictions to identify structural shocks (Kamps, 2005; Giordano et al., 2007; Dungey and Fry, 2009; Corsetti et al., 2012; Forni and Gambetti, 2016; Atems, 2019).

There are diverging results in the literature regarding the relation between a rise in government purchases and household consumption. Several authors identify a positive relation between governmental expenditure and private consumption (Fatas and Mihov, 2001; Galí et al., 2007; Ravn et al., 2007; Mountford & Uhlig, 2009; Christiano et al., 2011), while other studies find a contractionary effect on consumer behavior (Burnside et al., 2004; Ramey, 2011).

We analyze in this paper the effect of an increase in government expenses on private consumption using a structural vector autoregressive model for European Union countries, with the following variables: public expenses, household consumption and output. We choose for our analysis the group of European Union countries. We estimate impulse-response functions to investigate the reaction of output and private consumption in case of a one-percent deviation shock produced to government spending. Our results confirm the existence of a negative effect from a decrease of public expenditure on private consumption.

Fiscal stimulus policies applied in European Union during crisis required an unprecedented intervention to stabilize economic growth and to promote a more resilient economy and increase adaptation to climate change and digitalization challenges.

The remainder of this article is organized as follows. The first part introduces the main papers which analyze the relation between fiscal spending shocks and private consumption. The second part presents the methodology used for investigating the effect of a fiscal shock on household spending, a structural vector autoregressive model with data for EU countries, while in the third part we present the main results obtained. The final part contains the conclusions.

2. Literature Review

The relation between government spending and household incomes has been analyzed by using either Real Business Cycle models, DSGE models or structural vector autoregressive models. In standard Real Business Cycle models, with Ricardian households, a rise in government spending increases taxation and reduces incomes of households due to a negative wealth effect. Fatas and Mihov (2001) show that the expansionary effects of government purchases are determined by rises in private consumption. Burnside et al. (2004) investigate the relation between government expenditure shocks, hours worked and real wages using data for U.S. during post-WWII period. The shocks are identified with changes in military purchases and the effects produced by these shocks on private consumption are small.

Galí et al. (2007) utilize a general equilibrium model with sticky prices and rule-of-thumb consumers. The model postulates the possibility of an interaction between rule-of-thumb consumers and sticky prices, allowing thus a boost in private consumption as a reaction to a government spending shock. Christiano et al. (2011) implement a DSGE model for an economy with price and wage frictions and a monetary policy based on a Taylor rule. A rise in public spending at ZLB increases output and inflation, which contributes to a decline in the real interest rate and a rise in private spending.

Zubairy (2010) estimates a DSGE model with deep habits, distortionary labor and capital income taxes, the results obtained consisting in a positive response of private consumption to a rise in public expenses. Bouakez and Rebei (2007) introduce habit formation by households in an RBC model for the effects of fiscal shocks. If governments increase spending, the result is a rise in the marginal utility of consumption and the amount of labor from households, increasing consumption.

Structural vector autoregressive models typically identify different responses of private consumption in case of a government spending shock using different identification schemes for fiscal shocks propagation. Mountford and Uhlig (2009) analyze government revenue and spending shocks, in a SVAR model with sign restrictions, with quarterly data for USA during 1953-2000. The financing for public spending can be: deficits, tax cuts or a balanced-budget approach. Results confirm that deficit-financed tax cuts represent the most effective fiscal policy in stimulating growth, with the multiplier being persistent for 5 years after the shock.

Ramey (2011) introduces the narrative approach to structural vector autoregressions, with a series in which fiscal spending shocks are based on Ramey-Shapiro war dates and the second series of news is constructed from prediction errors of professional forecasters. Results obtained refer to the fact that a rise in government purchases decreases output, consumption and investment. Ravn et al. (2007) analyze government spending shocks in a SVAR model, which yields the following result: fiscal shocks produce a rise in output and private consumption, a decrease in the trade balance and a depreciation of the real exchange rate. According to Kirchner et al. (2010), fiscal shocks in euro area countries have become weaker in time, with government spending multipliers having an increasing trend until the '80, when they were situated above unity. Marattin and Salotti (2009) investigate fiscal shocks in a panel VAR using data from 1970 to 2006, an increase of one percentage point of public expenditure rising private consumption by 0.24% in EU countries.

3. Data & Methodology

Structural vector autoregressive impulse-response functions analyze the response of variables to a shock, identified by restrictions imposed on the structural parameters. In a SVAR model the error terms have zero mean and no serial correlation. Identification represents a very important issue in vector autoregressive models and requires imposing several assumptions to uniquely identify the parameters. Several identification methods are used, such as recursive identification, short-run or long-run restrictions, sign restrictions or narrative identification. We will use in this paper the recursive identification based on Cholesky decomposition, respectively the causal ordering of the variables and orthogonalization. Errors are decomposed by orthogonalization into uncorrelated structural shocks.

We will use in this paper a SVAR model with the following variables: government spending, household expenditure and gross domestic product. The causal ordering of the variables is based on the following assumptions about the variables: government spending is not contemporaneously affected by shocks from the other variables, household consumption is affected contemporaneously by fiscal spending shocks, but not by output shocks and output is influenced by government spending and household consumption shocks.

The ordering of the variables is justified by the fact that fluctuations in government spending are not correlated with the business cycle (Caldara and Kamps, 2008). Impulse-response functions analyze the response of endogenous variables to a one-percent deviation shock.

We use quarterly data from Eurostat database for government expenditure, real GDP and private consumption for European Union countries. The variable gross domestic product at market prices, respectively final consumption expenditure of general government is expressed in chain linked volumes (2010), in euro per capita. Data for household final consumption expenditure is in chain linked volumes (2010), in euro per capita. All variables have quarterly frequency, from 1995 Q1 until 2022Q3 (figure 1).

The results of unit-root Dickey-Fuller tests confirm that variables should be made stationary by differencing the series. We choose the lag length of the model using AIC and HQIC tests, the results indicating four lags to estimate the model.

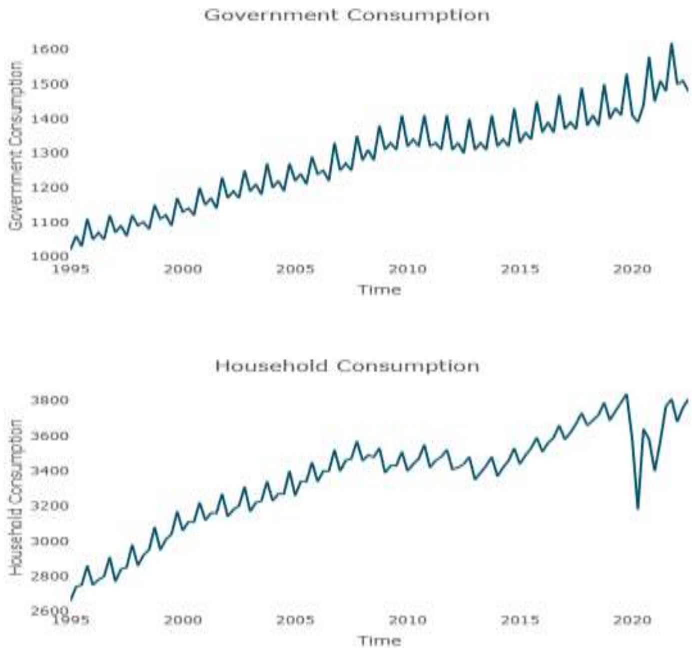

Figure 1. Evolution of gross domestic product, government consumption, household consumption, EU countries, euro per capita, 1995Q1-2022Q3

Source: Based on Eurostat data.

4. Results of structural impulse-response functions

SVAR impulse-response functions analyze the response of variables to a one standard deviation shock, identified by using contemporaneous restrictions on the parameters of the model. We estimate the effect of a government purchases shock on consumption using data for European Union countries during 1995Q1-2022Q3. The model confirms that an output shock produces on impact a decline of -0.14 percent in government consumption and a decline of -0.9 percent in household consumption. (figure 2 and 3). The coefficient for the effect of a shock to government expenditure on output is not statistically significant. A government consumption shock will produce a decrease in private consumption shock by -3.9 percent (figure 4).

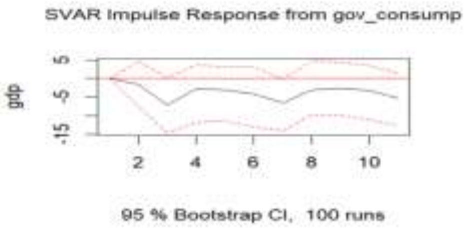

Figure 2. SVAR model results, impulse output, response of government consumption, EU countries, 1995Q1-2022Q3

Source: Based on Eurostat data.

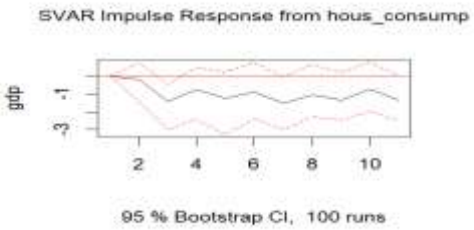

Figure 3. SVAR model results, impulse output, response of household consumption, EU countries, 1995Q1-2022Q3

Source: Based on Eurostat data.

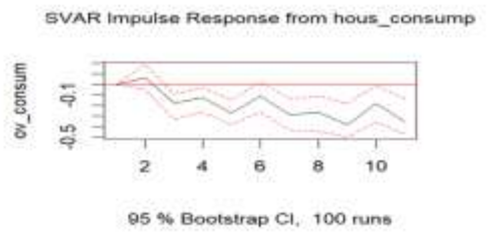

Figure 4. SVAR model results, impulse government consumption, response household consumption, 1995Q1-2022Q3

Source: Based on Eurostat data.

The results obtained show that a fiscal policy shock produces a decline in private spending. Expansionary fiscal stimulus has an important role in attenuating business cycle fluctuations and reducing adverse GDP shocks. A decline of public expenses results in a similar decrease in household consumption.

There are studies which confirm that analysis of fiscal shocks depends on the inclusion of variables, such as trade regimes or exchange rates. In the case of economies with open trade and flexible exchange rates, there is no significant output effect from a rise in government expenditure, while in economies with fixed exchange rates and closed to trade there is an important effect on output (Ilzetzki et al., 2013).

Other studies reach the conclusion that a government expenditure shock produces on consumption an effect of larger magnitude that the effect of tax shocks. The crowing-in effect of government spending on private expenditure proves to be robust when identifying restrictions are relaxed (Bouakez et al., 2014). Government spending shocks produce an increase of output and inflation, with multipliers similar in EMU and USA and with values smaller than unity (Burriel et al., 2010).

Other studies show that a public spending shock determines a decline of consumption with US data if the model incorporates the anticipation of the fiscal shock (Tenhofen and Wolff, 2007).

The results obtained by applying structural IRFs for the relation between government spending, private spending and output confirm that government spending has an important stabilizing role in protecting household consumption from decreases during downturns. Our results are thus in line with most empirical papers identifying a negative response from decreasing government spending to private consumption.

5. Conclusions

Fiscal shocks have a significant effect on household consumption in European Union countries, which confirms the importance of implementing countercyclical fiscal policies to stabilize growth during contractions. We analyzed in this paper the response of household spending in case of a government expenditure shock for EU countries, with data for the period 1995Q1 to 2022Q3. Our results confirm a negative effect from decreasing government spending on private consumption.

Fiscal interventions are motivated by the fact that the implementation of large packages of fiscal support during the pandemic crisis has contributed to boosting recovery, as monetary policy intervention was constrained at the ZLB and fiscal policy was the only instrument to intervene in an efficient manner. Thus, EU countries have been protected from deeper and long-lasting consequences of economic crisis, while, at the same time, increasing indebtedness and deficits resulted in reduced fiscal space for intervention during crisis.

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