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A GLOBAL VAR MODEL FOR THE EUROZONE: IMPACTS OF FISCAL POLICY TO MONETARY POLICY AT THE ZERO LOWER BOUND

DAVI FERRUCIO FERREIRA (31719)

A Project carried out on the Master in Economics Program, under the supervision of:

Professor João B. Duarte

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ABSTRACT

The global VAR models were first developed to become a consistent and more compact tool to forecast macroeconomic variables taking into account economic inter-linkages between national economies in a highly integrated economic environment. The present work intends to measure the impact of fiscal variables shocks from core and peripheral economies in the euro area, determined by the average share of total real GDP in the Eurozone, comprising here 12 countries, in order to assess the consequences of fiscal impacts for monetary policy conducted by the European Central Bank (ECB).

INTRODUCTION

A particular feature of a monetary union where the central bank is constrained by the zero lower bound and the country members have autonomy to decide their own national fiscal policies is that coordination between those policies is not an inevitable outcome, although it is essential to stabilize the economies after hit by adverse shocks, while smoothing the costs of policy adjustments (Corsetti et al, 2016). Especially when the size of spillover effects can be large as it can be in an environment of lower bound, it is important to observe how the effect of fiscal policy shocks at national level might influence other economies inter-linked by trade, through spillover effects in three different channels as it is appointed in a multi-country Mundell-Fleming model with fixed exchange rate and perfect mobility of capital: positive effects through trade, *negative effect through increases in the union interest rate* and, finally, through the exchange rate (Hebous & Zimmerman, 2012, p.3). The focus of this study is on the overall effects of fiscal policy shocks on the short-term interest rate set by the European Central Bank, accounting for spillovers between Eurozone economies.

A GVAR model is estimated with 12 countries from the Eurozone, accounting for trade inter-linkages between economies, and the ECB's Taylor Rule is built separately but constrained by the lower bound. A special focus is given to compare the impact from shocks coming from the core and periphery economies in the Eurozone, the different impacts from specific policy choices and the importance of coordination of national fiscal policies in order to offset adverse negative effects.

LITERATURE REVIEW

Global VAR Models - GVAR

The GVAR models offer a consistent alternative to forecasting national macroeconomic variables, while accounting for inter-linkages between different national economies (Pesaran et al., 2001). The original work of Pesaran, Schuermann and Weiner (2001) had as one of its main motivations the construction of a global macroeconometric model for risk management of commercial and central banks which was able to considerably reduce the large scale of traditional global econometric models, where the addition of new countries often quickly increased the number of endogenous variables and, consequently, the amount of coefficients to be estimated in an unrestricted VAR model.

Moreover, the GVAR models account for spillover effects of shocks in national macroeconomic variables on foreign variables which is a particularly important feature if one wants to better understand the effects of national macroeconomic policies in a highly integrated economic environment (Dees et al., 2007, p.3). In the context of a monetary union, where there is a common currency and a fixed exchange rate between national economies, macroeconomic policies can have an even more significant impact through cross-border externalities, especially due to changes in fiscal policy (Hebous and Zimmerman, 2012, p.2), taking into account that monetary policy is determined by a central supranational authority, the European Central Bank (ECB).

In the work of Pesaran, Schuermann and Weiner (2001), an empirical GVAR is estimated using quarterly data from 1979 until 1999 for a total of 29 countries, from which 4 are modeled separately (US, Germany, China and Japan) and the others are stacked in 5 regions (Western Europe, Central Europe, South East Asia, Middle East and Latin America). The variables included are real GDP, inflation (CPI), nominal

equity price index, nominal money supply, exchange rate and nominal interest rates per annum. The high complexity of the model allows the authors to analyze the impact of idiosyncratic country-specific shocks, but also the effect of regional-specific shocks, from any of the endogenous variables on any other national variable of the system through Generalized Impulse Response Functions (GIRF).

The GIRF are different from the traditional impulse response functions developed by Sims (1980), or OIR (orthogonalized impulse response functions), in two main aspects: the GIRF do not depend on the order neither of the countries nor of the variables in the model and they do not provide causal relationship between variables of the system since they do not require orthogonalization of the residuals in the global model. (Ricci-Risquette & Ramajo-Hernández, 2014, p.1602) In that sense, structural interpretations of the shocks are not possible using only this method. (Ricci-Risquette & Ramajo-Hernández, 2014, p.1602)

Some studies have been carried out since then following the initial work of Pesaran, Schuermann and Weiner (2001). A remarkable extension was done by Dees, Di Mauro, Pesaran and Smith (2007) extending the number of countries to 33, where 8 of them comprises one single area (euro area economy). Besides, it includes new variables such as short-term and long-term interest rates and develops *bootstrap* procedures for simulating the GVAR and testing the structural stability of the system. Finally, Dees, Di Mauro, Pesaran and Smith (2007) demonstrate how the GVAR might also be used if one intends to develop a 'structural' analysis of the impulse response functions by ordering a few variables and countries in the system. In this work, they focus on the structural identification of shocks in the US economy and their spillover effects in the euro area.

Another important extension of the GVAR models studies was conducted by Hebous and Zimmerman (2012) where they focus their analysis on fiscal policy shocks in the Eurozone area. One of the main goals of their work is to analyze the spillover effects of domestic budget balance shocks in a monetary union comprising 12 countries (the ones that adopted the euro in 1999 with the exception of Greece in 2001). The analysis is done comparing the effects of a domestic budget balance shock and an area-wide fiscal shock (computed as a weighted-average budget balance shock across the countries). The conclusion is that, when one compares the effect on national outputs from the above mentioned shocks, the area-wide fiscal shock has a larger impact on the economies, reinforcing the importance of coordination of fiscal policies in a monetary union.

Monetary Policy Rules

The work of Nakamura and Steinsson (2011) studies the effect of military spending shocks in different regions in the US, which are subject to the same monetary authority, and their effects on national output. One of the features for concern in their analysis is the characteristic behavior of the central bank which can be more or less inclined to "lean against the wind". In this sense, they established three different Taylor Rule settings to represent different degrees of commitment of the central bank to accommodate inflationary pressures in the monetary union economy (Nakamura & Steinsson, 2011, p.22-23). Those monetary policy rules are called: Volcker-Greenspan, fixed-real rate and fixed-nominal rate policies and they decrease, respectively, from the most sensitive monetary policy to the less sensitive one, regarding responses to inflationary pressures. The standard model is given by:

$$\hat{r}_t^n = \rho_r \hat{r}_{t-1}^n + (1 - \rho_r)(\phi_\pi \hat{\pi}_t^{ag} + \phi_y \hat{y}_t^{ag} + \phi_g \hat{g}_t^{ag}) \quad (1)$$

In this model, the nominal interest rate set by the central bank reacts to deviations from the aggregate weighted average inflation, output and government spending shocks (Nakamura & Steinsson, 2011, p.18).

Since the ECB more closely relates to a *fixed-nominal rate policy*, the solution to the equation for the fixed-nominal rate policy restricts itself to (Nakamura & Steinsson, 2011, p.36):

$$\hat{r}_t^n = \phi_\pi(\hat{\pi}_t - \hat{\pi}_t^*) \qquad (2)$$

Where $\hat{\pi}_t$ is inflation in the region where the shock was originated, in the case of this work, the country, and $\hat{\pi}_t^*$ represents inflation in the foreign region, in this case, the other countries in the system which are weighted by their share of total real GDP of the Eurozone. The sensitivity of the nominal interest rate to deviations from the weighted average inflation in the Eurozone is measured by ϕ_π=1.5, while the other parameters were set to zero.

DATA AND METHOD

Data

The sample of countries include 12 Eurozone countries (Austria, Belgium, France, Finland, Germany, Greece, Italy, Ireland, Luxembourg, Netherlands, Portugal and Spain) and the calculated individual VARX* models are all 5-dimensional, with the exception of Greece and Luxembourg which have a 3-dimensional and a 4-dimensional VARX*, respectively.

The data for Consumer Price Index (CPI) and real GDP, measured in indexes (Index 2015 = 100), were collected from the Federal Reserve Bank of St. Louis website economic data. The long-term interest rates, in percentage format (1+ltir), were

collected from the OECD Data website and represent government bonds that will mature in 10 years. The trade shares were calculated based on how much a partner country represents in terms of a country's total trade on average during the years considered. Total trade means the sum of exports, FOB, and imports, CIF, which were collected from the Direction of Trade Statistics (DOTS) from the IMF Data website.

The government data were collected from the Government Finance Statistics (GFS) from the IMF. Government expenditure represents the sum of *intermediate consumption* and *capital investments* and Net Taxes represents the sum of *taxes, social contributions* and *sales (incl. own account capital formation)*, excluding, therefore, public transfers. The estimation, however, is done also through indexes where Index 2015=100.

With the exception of the data already in percentage terms, all the data were transformed into its natural logarithm form. The periodicity is quarterly for all variables and the times series considered are seasonally adjusted going from the first quarter of 2002 until the first quarter of 2018 because of lack of data from some countries in the period between 1999 and 2001. Since the euro was introduced as common currency in 1999, the period previous to that year was not considered.

*Country-Specific VARX**

The first step for solving a Global VAR model is the estimation of individual VARX* models for each country taking into account domestic variables and their correspondent foreign variables. Considering a system of *N* countries, *i* = 1, 2, 3…, *N* and *t* periods of time, *t* = 1, 2, 3 …, T, the following general model represents an individual VARX*(p_i, q_i), where p_i=1 and q_i=0:

$$x_{it} = \alpha_{i0} + \phi_i x_{i,t-1} + \Lambda_{i0} x_{it}^{*} + \Upsilon_i d_t + \varepsilon_{it} \quad (3)$$

x_{it} : a column vector of domestic variables

ϕ_i: a coefficient matrix for the lagged variable

$x_{i,t-1}$: a column vector of the first lag of domestic variables

Λ_{i0}: a coefficient matrix for the country-specific foreign variables

Υ_i : a column vector with the coefficients of the global variable

d_t: global variables vector, in this case comprising only the interest rate, Eonia

ε_{it}: a column vector of independent and identically distributed residuals with zero mean and variance-covariance matrix equal to Σ_i.

The country-specific foreign variables, which form the column vector x_{it}^{*} , are calculated as weighted-averages of the same variables for the other countries in the system. The weights are computed based on trade inter-linkages between economies in the Eurozone following the calculation below:

$$x_{it}^{*} = \sum_{j=1}^{N} w_{ij} \, x_{it} \quad (4)$$

The data was obtained from the Direction of Trade Statistics, in the IMF Data website. The trade weights of each partner country *j* were calculated based on the average trade share corresponding to the total quarterly trade of country *i* over the period 1999 until 2018. The trade weights for *i* = *j* are all equal to zero (See Appendix for the Trade Weights Table).

Global VAR Solution

The contemporaneous variables are all put on the left-hand side of the equation and the matrix of coefficients of the lagged variables is combined with a matrix of dimensions 5x5 filled with zeros since there is no lag variables for foreign variables being used in the model:

$$(\mathrm{I}\ ,\ -\Lambda_{i,0})\begin{pmatrix} x_{it} \\ x_{it}^{*} \end{pmatrix} = \alpha_{i0} + (\phi_i,\ \Lambda_{i,1})\begin{pmatrix} x_{it-1} \\ x_{it-1}^{*} \end{pmatrix} + \Upsilon_i\, d_t + \epsilon_{it} \quad (5)$$

$(\mathrm{I}\ ,\ -\Lambda_{i,0})$ is represented as the A_i matrix, $(\phi_i,\ \Lambda_{i,1})$ is the B_i matrix, while $Z_{it}=\begin{pmatrix} x_{it} \\ x_{it}^{*} \end{pmatrix}$ and $Z_{it-1}=\begin{pmatrix} x_{it-1} \\ x_{it-1}^{*} \end{pmatrix}$. The matrix of weights, W_i, is constructed such that its dimensions are $(k_i + k_i^{*})$ x k, filled with the specific trade weights in the k_i^{*} lines and zeros and ones in the k_i lines. It is possible to rearrange the terms such that the following equality is respected:

$$Z_{it} = W_i\, x_t \quad (6)$$

Substituting (4) in equation (3), one finds:

$$A_i\, W_i\, x_t = \alpha_{i0} + B_i\, W_i\, x_{t-1} + \Upsilon_i\, d_t + \epsilon_{it} \quad (7)$$

Where G = A_iW_i and H = B_iW_i, and they represent, respectively, the coefficient matrix of contemporaneous variables of all VARX* models multiplied by the trade weights matrix and the coefficient matrix of lagged variables multiplied by the trade weights matrix:

$$\mathrm{G} = \begin{pmatrix} A_1W_1 \\ A_2W_2 \\ A_3W_3 \\ (\dots) \end{pmatrix} \qquad \mathrm{H} = \begin{pmatrix} B_1W_1 \\ B_2W_2 \\ B_3W_3 \\ (\dots) \end{pmatrix} \quad (8)$$

The solution is given by multiplying the two sides by G^{-1}, the inverse of G, and then analysis via recursive approach can be done. Iterating x_{t-1} backwards allows us to get the impulse response functions coefficients from shocks.

$$x_t = G^{-1}\alpha_{i0} + G^{-1}H\, x_{t-1} + G^{-1}\Upsilon_i\, d_t + G^{-1}\epsilon_{it} \quad (9)$$

Global VAR Conditions

There are four sufficient conditions that should hold in the model to guarantee the accuracy of the results (Ricci-Risquette & Ramajo-Hernández, 2014, p.1595):

1- *Weak Exogeneity Hypothesis:* the foreign variables must be assumed to be weakly exogenous regarding the vector of all endogenous variables;
2- *Stability of the Global Model:* the eigenvalues of the coefficients matrix in the global model must be inside or on the unit circle;
3- *Smallness of Weights:* the trade weights used for calculating the country-specific foreign variables should be relatively small;
4- *Weak Cross-Dependence of Shocks:* the idiosyncratic shocks should be weakly correlated.

TESTS AND RESULTS

Three experiments were conducted with the GVAR model estimated: a comparison between the effects of government expenditure positive shocks in Portugal and Germany (t=0); a comparison between the effects of a government expenditure positive shock and a net tax negative shock in France (t=0); and finally, a comparison between the effects of a simultaneous equally weighted average positive net tax shock in Portugal, Ireland and Spain and a simultaneous equally weighted average positive government expenditure shock in France and Germany (both in t=0). The effects are calculated on the short-term interest rate set by the Taylor Rule followed by the ECB contemporaneously (t=0). It is assumed that the PV for the primary budget does not remain constant such that increases in taxes and/or spending are not offset in the future.

Case 1 –Positive Government Expenditure Shock in Portugal and Germany

The first experiment consists in comparing the impact of a shock of 1% in government expenditure in Portugal and of a shock of 1% in government expenditure in Germany on the short-term interest rate. As the ECB in the present model follows a fixed-nominal interest rate Taylor rule - mainly because it is constrained by the zero lower bound -, it only responds to the deviations in the weighted average CPI in the Eurozone (Nakamura & Steinsson, 2011, p.36).

The total effect on the short-term interest rate of an increase in 1% in government expenditure by Portugal is **0.45%**. The overall impact on the weighted average CPI in the Eurozone was positive (0.3%) which would lead to an increase in the short-term interest rate. However, as the ECB is assumed here to follow a fixed-nominal rate rule, the rate will not to go up so that the real interest rate decreases in response to the

inflationary effect resulting from an accommodative monetary policy to stimulate growth.

The total effect on the short-term interest rate of an increase in 1% in government expenditure by Germany is **1.16%**. The overall impact on the weighted average CPI in the Eurozone was positive (0.77%) which leads to a decrease in the real interest rate as the ECB will keep its nominal rate and the inflationary effects of a government expenditure shock will increase just as in the case of Portugal.

The fact that the Eurozone economies are part of a monetary union allows for spillover effects that might lead to outcomes which are not intuitive at first sight such as negative variations in national CPI's following an increase in aggregate demand at union level through government expenditures. Also, the CPI variations at national level do not necessarily need to lead to changes in the nominal short-term interest rate since the ECB only reacts to deviations from the *weighted average CPI* in the Eurozone. In the case of Portugal, only 2 countries had positive variations in CPI and, in the case of Germany, only 4 countries had positive effects.

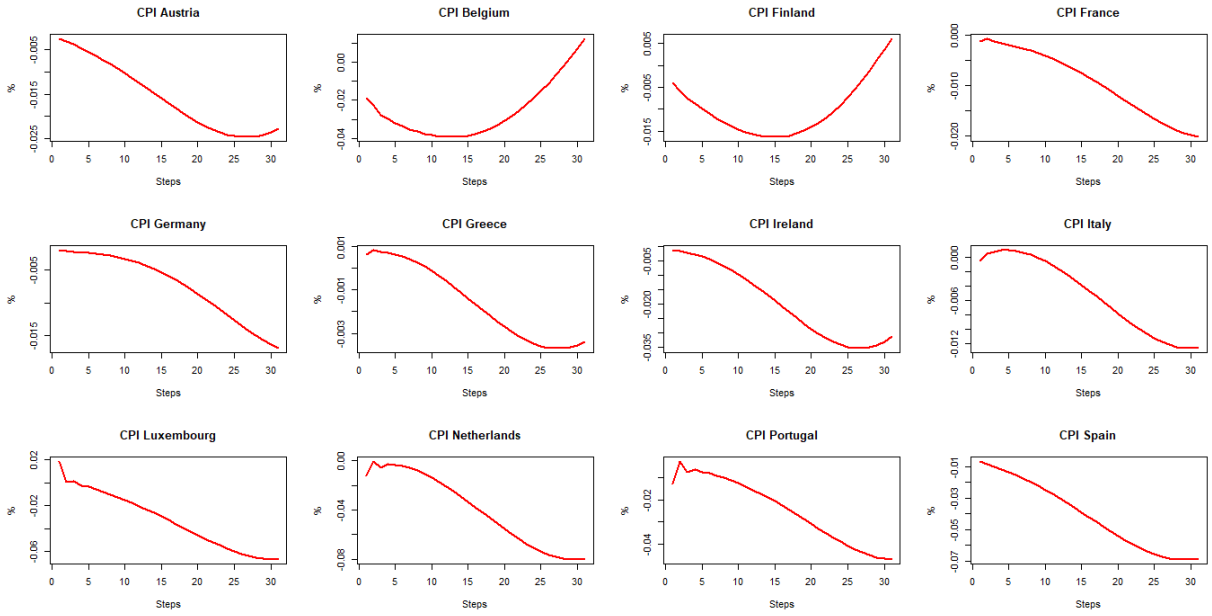
The impulse response functions for the expenditure shock in Portugal show that expansive fiscal policy alone is not able to drive economies to grow as the effects on real GDP in most countries do not show an upward trend. At the same time, CPI is falling in most countries as time passes by. That was expected since the share of the Portuguese economy in the GDP of the Eurozone is low to disturb the weighted average variables in the union level.

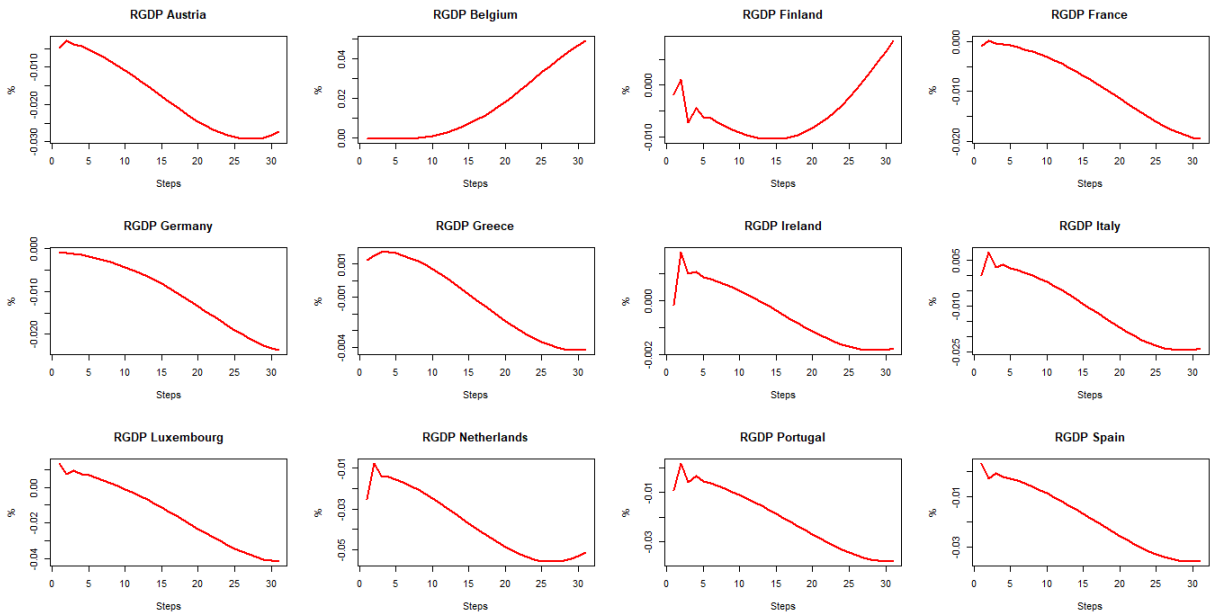
The impulse response functions for the expenditure shock in Germany show that expansive fiscal policy from a core country might lead to a temporary increase in real GDP for most countries and inflationary effects. However, as the monetary policy is

constrained, the ECB does not respond directly and real interest rates decrease in response to the inflationary effect fostering economic growth in the short-term.

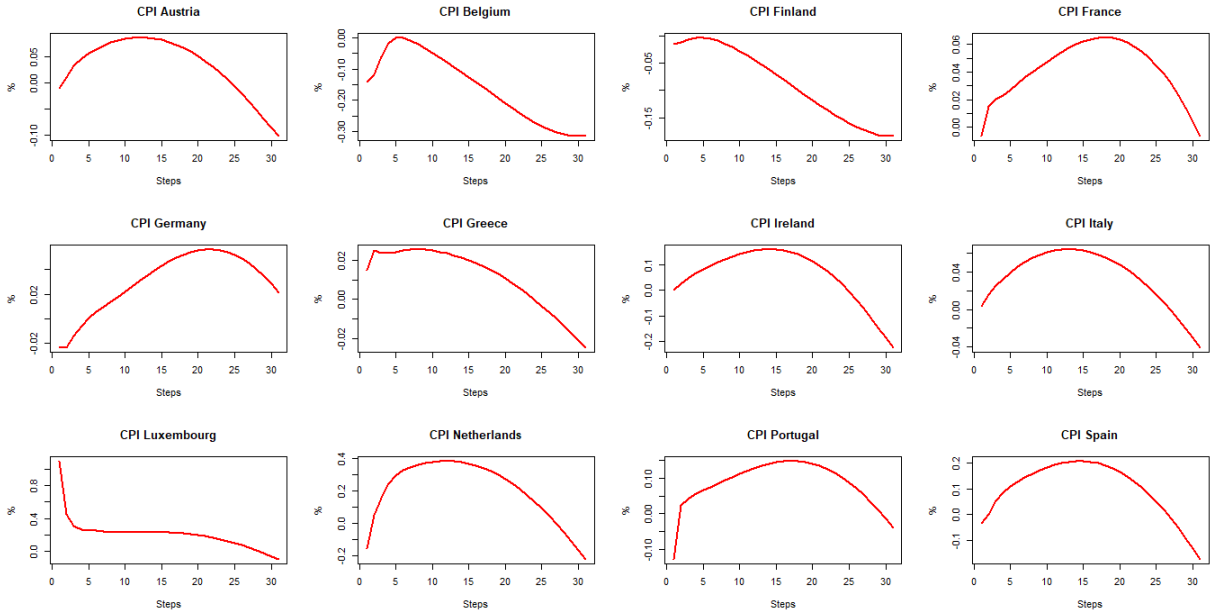
In fact, empirical research on fiscal spillovers, despite some controversy on the magnitude and signs of its effects, seems to confirm their economic significance and show evidence that the relative size of countries is a relevant factor to define the size of the fiscal spillover (Dabla-Norris et al., 2017, p.6). The main finding here also reinforces the results in Beetsma and Giuliodori (2004) that fiscal impulses in Germany are economically significant for spillover effects via trade.

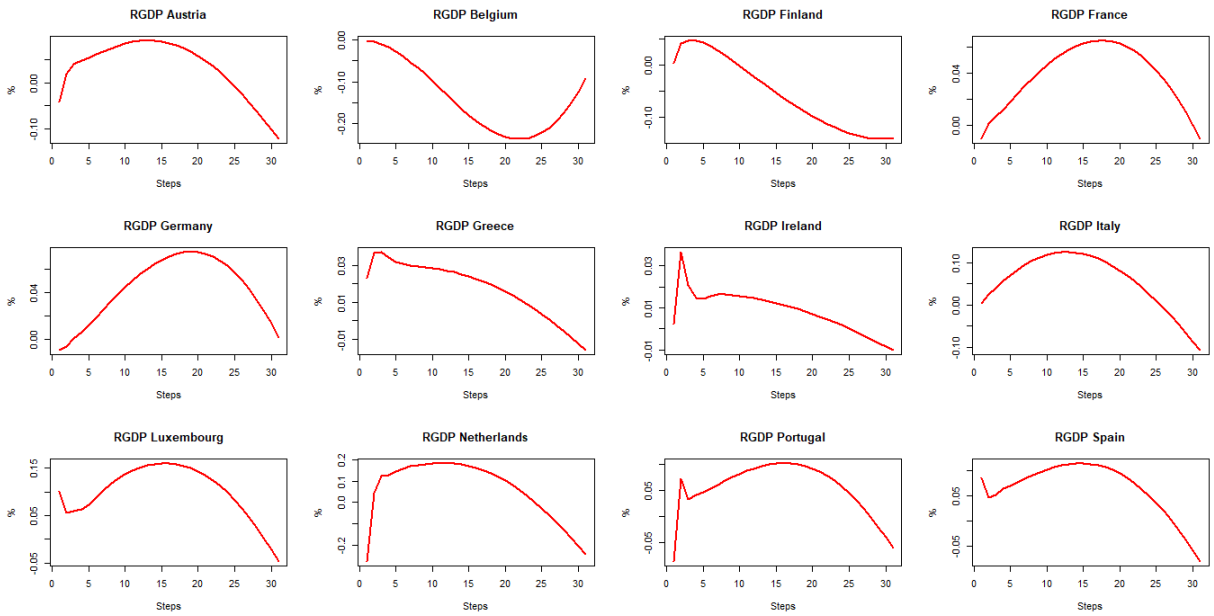
IRF Portugal Positive 1% Expenditure Shock





IRF Germany Positive 1% Expenditure Shock





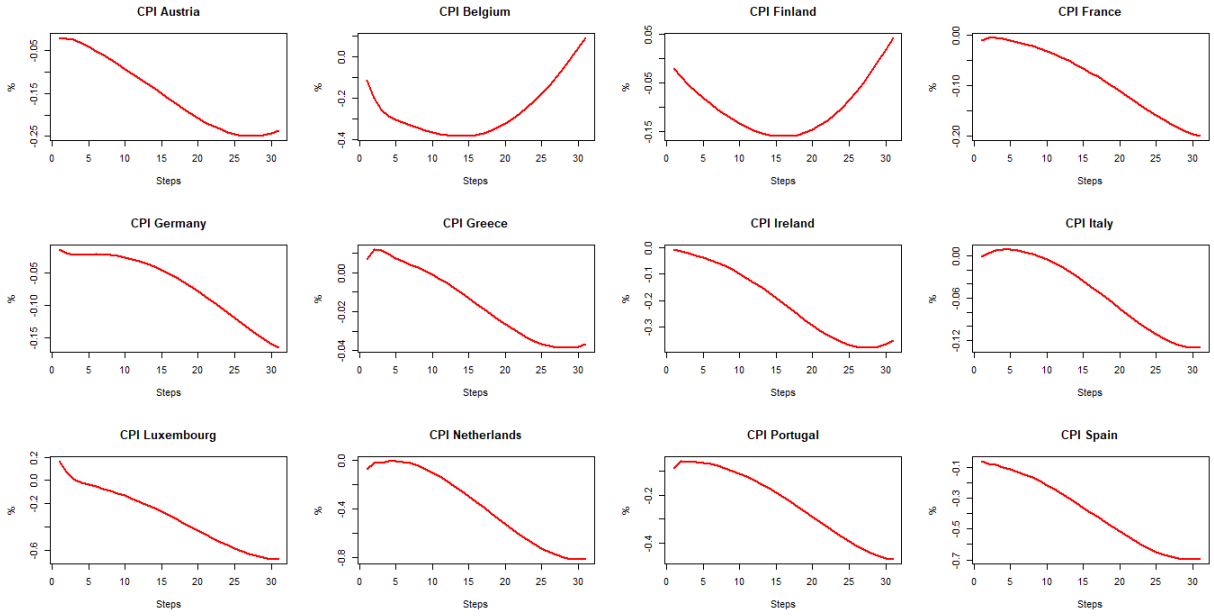
Case 2 –Positive Government Expenditure Shock and Negative Net Tax Shock in France

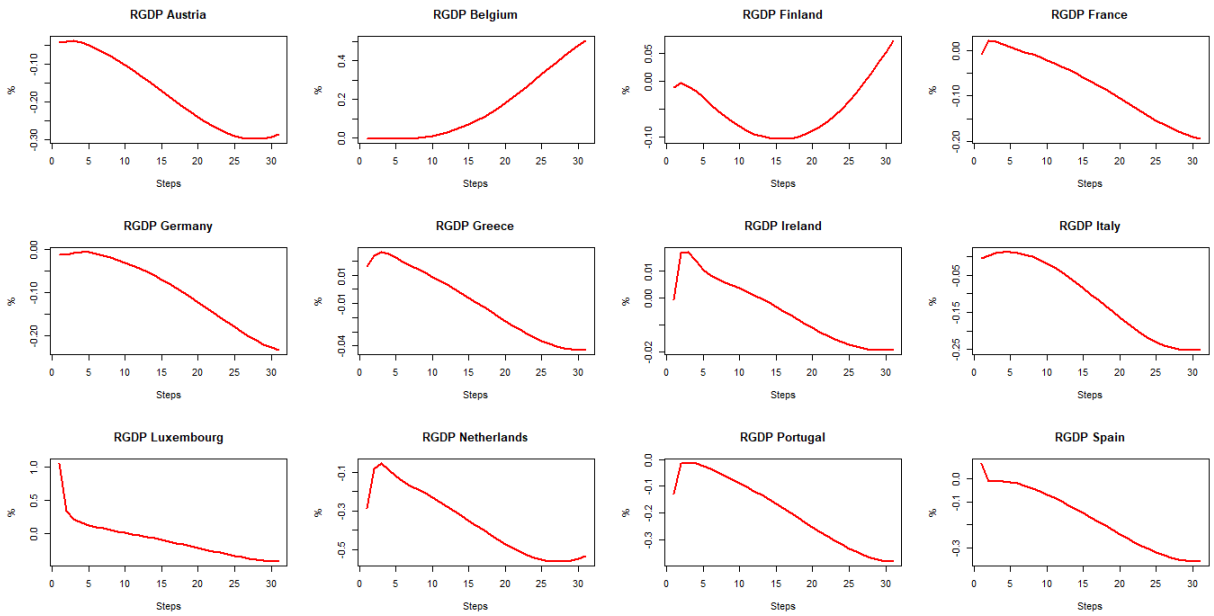
The second experiment consists in comparing the impact of a positive shock of 1% in government expenditure and a negative shock of 1% in net tax in France on the short-term interest rate. The goal is trying to determine the effects of two different strategies to foster growth in the short-term by using the same economy from the core group, which tends to have a larger impact on the union. The effects on the short-term interest rate set by the ECB might be different though in terms of costs to the monetary policy depending on the choice of the macroeconomic policy.

The total effect on the short-term interest rate of an increase in 1% in government expenditure by France is **2.92%**. The overall impact on the weighted average CPI in the Eurozone was positive (1.95%) which would lead to a decrease in the real interest rate if the ECB keeps its nominal rate constant and the inflationary effects of a government expenditure shock will increase. The total effect on the short-term interest rate of a decrease in 1% in government net taxes by France is **8.51%**. The overall impact on the

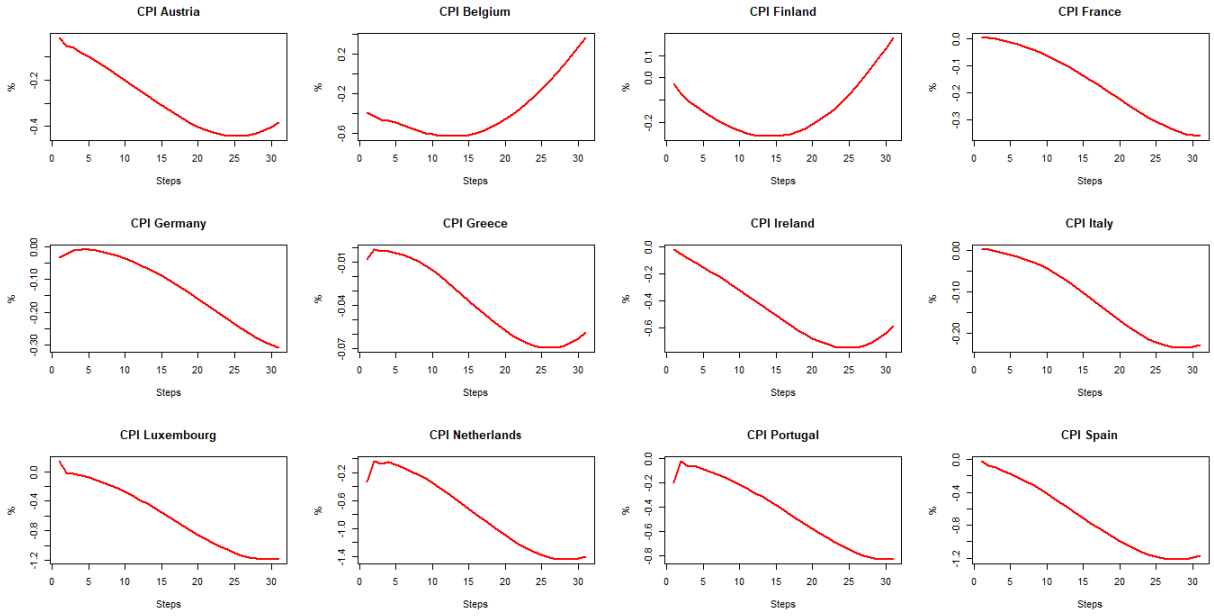
weighted average CPI in the Eurozone was positive (5.67%) and the sign of the impact, although not the size, is the same as the case of an expenditure shock. The main finding here suggests that a net tax cut shock impacts more on the short-term interest rate than a positive shock in government expenditure, which seems in line with the results of Mountford and Uhlig (2008) that show that a tax cut shock financed via déficit in the government budget seems to stimulate the economy more, *in the short-term*, than a déficit financed spending increase (Mountford and Uhlig, 2008, p.21).

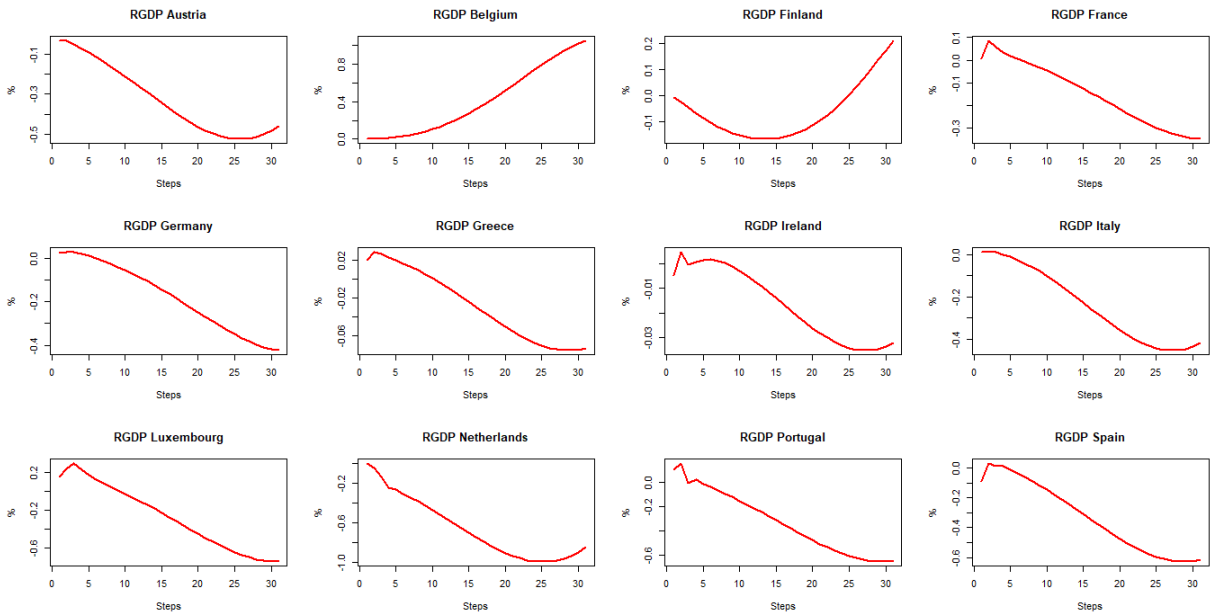
IRF France Positive 1% Expenditure Shock





IRF France Negative 1% Net Tax Shock





Case 3 – Positive 1% Net Tax Shock in Spain, Portugal and Ireland x Positive 1% Expenditure Shock in France and Germany

In the last experiment, an equally weighted average positive shock of 1% in net taxes is simulated in Portugal, Spain and Ireland (weight=0.33 for each) and it is compared to another equally weighted average positive shock of 1%, but in government expenditures, in France and Germany (weight=0.5 for each). The main goal is observing whether both effects cancel out or at least partially compensate each other.

The total impact on the short-term interest rate resulting from an equally weighted average positive shock of 1% in net taxes of Portugal, Spain and Ireland is **-1.15%**. One intuitive explanation is that an increase in taxes of member countries reduces output and inflation in the Eurozone area because it crowds out consumption and investment. However, as the ECB is constrained by the zero lower bound, it is not able to drive the interest rate target to a lower level and the union real interest rate increases even more above the natural level, keeping the vicious cycle of weak economic activity and low inflation just as the literature indicates (Corsetti et al., 2016, p.6).

The total impact on the short-term interest rate resulting from an equally weighted average positive shock of 1% in government expenditures of France and Germany is **1.62%**. An increase in aggregate demand at union level puts upward pressure in the short-term interest rate because it generates inflationary effects. When output increases, contemporaneous prices follow the same path and lead the economy to higher inflation expectations, in an environment where there is some price stickiness. If the ECB maintains the nominal interest rate unchanged, the inflationary effect from a government expenditure shock translates into a lower real interest rate which boosts consumption and investment in a virtuous cycle (Corsetti et al., 2016, p.8).

Much of the literature around the Eurozone reforms focus on the necessity of an accommodative fiscal stance to attain stabilization goals in face of adverse shocks that impact the union level and, at the same time, stress the importance of fiscal coordination between member countries (Corsetti et al., 2016, p.15). Often, the logic behind this setting is that countries more severely affected by adverse shocks should increase their primary surpluses and, in contrast, countries less affected should lower their primary surpluses, in order to stabilize the economy at the union level (Corsetti et al., 2016, p.15).

The results of the last experiment indeed seem to reinforce that argument in terms of costs to the monetary policy conducted by the ECB. If a positive net tax shock were to happen in a few economies from the periphery in order to respond to an adverse negative shock affecting their public finances, the negative effects on the union interest rate could be overcome by a contemporaneous positive expenditure shock from core countries, sharing the burden of accommodation. The difference between both results is an increase of only **0.463%** in the short-term interest rate. If the ECB wants to stimulate the economy, it would use an accommodative monetary policy in this case, and the

inflationary effect will drive the real interest rate down, strengthening the prospects for an increase in consumption and investment.

Meanwhile, one should be careful about jumping into conclusions since there are some factors which should be taken into consideration but are not purpose of this study. First, *timing* is important for the adoption of accommodative macroeconomic policies: for an accommodative fiscal policy, for instance, it can reach its goal well independently of the lower bound if it is used in a proper time (Corsetti et al., 2016, p.9). Second, fiscal policy changes impact on *expectations* from private agents and on *sovereign debt risk* that affect long-term interest rates and might lead even to exit from the euro area (Corsetti et al., 2016, p.11-12). Changes in expectations and in probabilities of default might lead to adverse effects that can offset the beneficial gains from an expenditure shock. Third, as discussed before, the fiscal shocks cannot be interpreted in a structural sense since that would require an ordering of the variables which would be arbitrary and include, at the same time, discretionary components as well as automatic stabilizers (Hebous & Zimmerman, 2012, p.7). The use of GIRF's however allows for informative shocks and the spillovers are independent of the motives behind a deficit in the primary budget (Hebous & Zimmerman, 2012, p.7). Fourth, the effects of net taxes shocks can differ depending on whether they represent lump-sum or distortionary taxes (Nakamura, 2011, p.23).

CONCLUSION

The present work attempted to show the different impacts of fiscal policy shocks in the contemporaneous determination of the short-term interest rate set by the European Central Bank constrained by the zero lower bound. In order to attain this goal, a GVAR

model was estimated taking into account trade linkages between 12 Eurozone economies and incorporating the models VARX* estimated for each individual country.

Three experiments were conducted. The first one compared the effects of a government expenditure shock from a core and a periphery economy, distinguished by their shares of real GDP relative to the total of the Eurozone area. The results show that a shock from expenditure in Portugal results in a much *smaller* upward pressure on the short-term interest rate, while a shock of the same magnitude in Germany's government expenditure results in a *higher* upward pressure on the nominal interest rate and also showing signs of positive spillover effects to other Eurozone economies. The second experiment compared the effects of a negative net tax shock and a positive government expenditure shock of the same size and from the same country, France. The results seem to suggest that a tax cut shock financed via deficit can yield a better outcome than an expenditure shock if the ECB follows an accommodative monetary policy in this case. Since nominal interest rates would remain constant, the higher inflationary effect launched by the net tax shock decreases *even more* the real interest rate in the union level, improving the prospects for an increase in consumption and investment in a virtuous cycle. Finally, the last experiment tried to show that government expenditure shocks in the core economies might be capable of overcoming the negative effects on the short-term interest rate originated by a positive net tax shock in the periphery. In that sense, the costs for monetary policy adjustment are smaller since the positive effects seem to slightly exceed the negatives effects. In the context of Eurozone reform, fostering fiscal coordination is essential to accommodate adverse shocks in a smoother way and if fiscal policies and monetary policy work together they might be able to better stabilize the economy at union level as well as at the national level.

APPENDIX

Country-Specific VARX Lags Table*

Country	**VARX* (p_i, q_i)**
Austria	(1,0)
Belgium	(1,0)
Finland	(1,0)
France	(1,0)
Germany	(1,0)
Greece	(1,0)
Ireland	(1,0)
Italy	(1,0)
Luxembourg	(1,0)
Netherlands	(1,0)
Portugal	(1,0)
Spain	(1,0)

Table 1 – Trade Weights

Country	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain
Austria	0.00%	3.26%	0.88%	6.61%	66.10%	0.51%	0.69%	12.78%	0.35%	5.38%	0.48%	2.97%
Belgium	1.38%	0.00%	1.01%	23.67%	28.95%	0.57%	4.36%	7.23%	2.12%	25.34%	0.94%	4.43%
Finland	2.90%	8.58%	0.00%	10.70%	40.15%	1.11%	1.88%	8.70%	0.28%	19.05%	1.26%	5.39%
France	1.84%	17.02%	0.88%	0.00%	33.34%	0.79%	1.92%	15.66%	1.07%	10.87%	2.27%	14.32%
Germany	11. %	13.21%	2.18%	21.83%	0.00%	1.11%	2.03%	14.51%	1.11%	22.24%	1.80%	8.30%
Greece	2.41%	6.77%	1.66%	12.35%	28.10%	0.00%	1.54%	26.72%	0.50%	10.94%	0.92%	8.08%
Ireland	1.15%	25.26%	1.17%	17.87%	23.87%	0.71%	0.00%	8.19%	0.28%	13.29%	1.00%	7.21%
Italy	5.37%	8.03%	1.09%	24.02%	33.95%	2.50%	1.68%	0.00%	0.52%	9.19%	1.69%	11.97%
Luxembourg	1.49%	31.14%	0.51%	18.75%	31.90%	0.32%	0.61%	5.34%	0.00%	6.48%	0.61%	2.85%
Netherlands	1.99%	21.79%	1.91%	14.21%	42.52%	0.82%	2.15%	7.57%	0.54%	0.00%	1.22%	5.29%
Portugal	0.93%	4.55%	0.72%	15.23%	20.39%	0.40%	1.03%	7.61%	0.26%	6.74%	0.00%	42.15%
Spain	1.65%	6.04%	0.88%	29.34%	24.86%	1.06%	1.92%	15.10%	0.33%	8.02%	10.81%	0.00%

Source: Own Elaboration. Data from Direction of Trade Statistics (DOTS) from IMF Data. Exports FOB and Imports CIF for Partner Countries.

Table 2 – Average Real GDP Share Eurozone (Quarterly 1999Q1 – 2017Q4)

Austria	*3.10%*
Belgium	*4.04%*
Finland	*1.94%*
France	*21.77%*
Germany	*27.61%*
Greece	*2.25%*
Ireland	*2.02%*
Italy	*17.11%*
Luxembourg	*0.41%*
Netherlands	*6.93%*
Portugal	*1.86%*
Spain	*10.96%*

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