

International Interdependence and Macroeconomic Transmission: Europe and Latin America

Maria Helena Ambrosio Dias^{*}

Joilson Dias^{**}

Lionello Punzo^{***}

Abstract

Recent World's economic crisis has indicated a high degree of macroeconomic interdependence among nations. Therefore, macroeconomic policy practice in Europe may affect not just the European countries, but other economies as well. According to the New Open Economy Macroeconomics the transmission mechanism can have short and long run effects. In this research we investigate the long run transmission mechanism of European macro policies, especially fiscal policies, to the Latin American economies. We found that European fiscal policies are "Beggart-hy-Neighbor" for Argentineans and "Prosper-thy-Neighbor" for Brazilians. This means that such policies should be accounted by Latin American economies when formulating their macro policies.

Key Words: *New Open Macroeconomics, Fiscal Policy, SVAR Models*

Resumo

As crises econômicas recentes indicaram um alto grau de interdependência entre as nações. Dessa forma, a prática de política macroeconômica na Europa pode afetar não apenas os países europeus, como também outras economias. De acordo com a nova macroeconomia aberta, o mecanismo de transmissão pode ter efeitos de curto e de longo prazo. Neste trabalho, nós investigamos o mecanismo de transmissão das políticas macroeconômicas Européias no longo prazo, em especial, políticas fiscais, para as economias da América Latina. Os resultados indicam que as políticas fiscais Européias apresentam efeitos "Beggart-hy-Neighbor" para a Argentina e "Prosper-thy-Neighbor" para o Brasil. Assim, tais políticas devem ser consideradas pelas economias latino-americanas ao formularem suas políticas macroeconômicas.

Palavras-Chave: *Nova Macroeconomia Aberta, Política Fiscal, Modelos SVAR*

JEL: F41, F42

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^{*} Full Professor at the Maringa State University, Department of Economics, Graduate Program in Economics, Brazil. The author acknowledge the financial support from BNDES, Brazil.

^{**} Full Professor at the Maringa State University, Department of Economics, Graduate Program in Economics, Brazil. The author acknowledge the financial support from CNPq, Brazil.

^{***} Full Professor at the University of Siena, Department of Economics, Graduate Program in Economics, Italy.

1. Introduction

Macroeconomic policy transmissions among nations have brought many concerns. How much of a macroeconomic policy practice abroad can be internalized? Which are the channels these policies being transmitted? How broad is the extension, or spillover effects, of national macroeconomic policies to world market economies? These worries increase during economic crises.

Accordingly, studies on international interdependence have grown recently to become a literature known as NOEM – New Open Economy Macroeconomics.¹ The main point of this literature was its departure from the models proposed by Mundell-Fleming in earlier 1960s. The result of the Mundell-Fleming model was straight forward and did not take into consideration many potential transmission mechanisms existent among the economies.

One early work showing macroeconomic interdependence among economies was Dornbusch (1976). The exchange rate of a country could overshoot by a monetary expansion if the output was fixed in the short run. This also would affect the terms of trade of the economy and by extension its relationship with other economies.

This interdependence was emphasized by Cooper (1985, p. 1205). In accordance, strong integration calls for more economic policy coordination, because higher interdependence reduces the effectiveness of fiscal policy on domestic output and increases the impact on income abroad.

Devereux and Wilson (1989) showed that a domestic fiscal expansion would raise the level of income at home, but would worsen current account balance. This would improve foreign income and current account, allowing foreign government to increase income and employment abroad. Since home country wishes to reach a high income level and a zero account balance, ignores the benefits of the foreign economy. However, if the expansionary fiscal policy would practice with coordination, both economies would reach higher employment without current account imbalances. Yet, home monetary policy expansion could have different outcomes depending where the rigidity of wages occurs, home or foreign country, and which one acts as a leader in the strategic policy game.

In 1995, Obstfeld and Rogoff developed a sophisticated model of international economic policy transmission. Their model taught us the fact that intertemporal decisions by consumers had effects on the exchange of goods among economies. Moreover, the model analyzes welfare implications of trading partners. As a result, monetary shocks may have real effects beyond the expected period if the economy has any nominal rigidity on prices or wages. The most important feature was the effect of government expenditure. Government spending may increase long run output above its short run, lowering international real interest rate. Hence, they call the attention to the existence of a transmission mechanism among economies created by fiscal policies.

As a matter of fact, Betts and Devereux (2000) reminded us that Obstfeld and Rogoff (1995) showed that monetary policy may not be a “Beggary-thy-Neighbor” under flexible exchange rate. This is true especially when using a model of monopolistic competition and sticky prices. Hence, there would be no incentive to engage in a competitive depreciation as proposed by Mundell’s (1968) model.

An evolution of these models is present in Corsetti and Pesenti (2001). Their interdependence model showed that a domestic monetary policy can be “Beggary-thy-Self”

¹ A very extensive literature review can be found in Lane (2001).

in the short run. In other words, the monetary expansion may hurt domestic economy. By depreciating the terms of trade, this policy generates negative externalities that surpass the positive externalities of lowering interest rates. By making the strong hypothesis that fiscal expansions are expended on domestic goods, their model predicts that such policy is “Beggar-thy-Neighbor”.

In this paper we test this hypothesis by estimating the impact of a fiscal policy in Europe over the Latin American countries: Brazil and Argentina. If the impact is “Prosper-thy-Neighbor”, it means that fiscal expansion in Europe cause an increase in the demand of Latin American goods, otherwise means that such expenditure are more on domestic goods and does not reach the demand for goods abroad.

Considering Corsetti and Pesenti (2001)’s model, we call attention to the relations that enable us to verify the effect of economic policy transmission on long-run consumption and output. The theoretical results imply that domestic consumption is related to the world fiscal position in the long run, such that: $\bar{C} = C(\bar{g}_w)$. Also, the steady state domestic product would be affected by domestic government expenditure and world fiscal position in the long run, as follows: $\bar{Y} = Y(\bar{g}, \bar{g}_w)$. The world fiscal position means the combination of domestic and foreign government expenditure. Both consumption and output depend upon domestic (\bar{g}) and world fiscal policy (\bar{g}_w). The function C and Y represents, in general, the parameters of the authors’ model.

By making the world government expenditure to be represented by the European economy and the domestic consumption and output to be the Latin American countries as Argentina and Brazil, we search for macroeconomic interdependence among Latin American countries and European ones.

Europe in our empirical tests comprises of the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and United Kingdom.

This paper is organized as follow. In Section 2, we present a short review of empirical models that used SVAR – Structural Vector Autoregressive Model.² The literature review will show that this model is more appropriate for understanding long run international transmission effects. In Section 3, we concentrate on describing the data and presenting the econometric results of our model. Section 4 has some conclusions and policy guidelines.

2. Applications on Macroeconomic Transmission

In this section our aim is to review briefly the applied literature on macroeconomics interdependence. The applied papers on this field follow the initial empirical estimates proposed by Blanchard and Quahl (1989). In their paper, the authors decomposed the shocks into two categories – transitory and permanent. The transitory shocks represent the short run impact arriving from the exogenous variables in the model while permanent represent the long run impact from the same variables. They proposed to

² For details on SVAR models see Hamilton (1994).

analyze these short and long run effects through a SVAR – Structural Vector Autoregressive Model.³

The advantage of the SVAR models are that they allow to identify the restriction to be imposed in the estimates according to the proposed theory. In another words, the theory can be easily tested empirically. To fully complete the theory tests, the SVAR models are combined with exogeneity or causality tests. Therefore, the results can be interpreted as economic policy shock from one country to the other, in our case.

The early papers to use the SVAR models in the NOEM – New Open Economy Macroeconomics did so to test the underlying price hypothesis. The price hypotheses tested in these models were PCP – Producer Currency Price, PTM – Price to Market behavior and LCP – Local Currency Pricing. When testing the effects of monetary shocks on terms of trade, Clarida and Galí (1994) and Eichenbaum and Evans (1995) found that the underlying price hypothesis was PTM. Betts and Devereux (1997) extended the previous empirical model to consider the trade balance surplus. They reached the conclusion that PTM better explain product and terms of trade movements when compared to the PCP hypothesis.

As shown by Devereux, Engel, and Tille (2003), in the case of LCP, producers set prices in their own currency, and importing intermediaries set consumer prices in local currencies. Then, a nominal appreciation improves terms of trade, consistent with observed by Obstfeld and Rogoff (2000).

Comparing both strategies of price setting, with PCP, the exchange rate is affected by both money and velocity shocks. According to Devereux and Engels (2003), under PCP, as in Obstfeld and Rogoff (1995), an unexpected home monetary expansion increases domestic consumption directly, but part of this increase is offset by exchange rate depreciation, while leads to a foreign exchange rate appreciation, a reduction of their price level, and an expansion of foreign real balances, increasing consumption abroad.

Further development in theory testing was met by Dhrymes and Dimitrios (1997). They specify SVAR models that are more compatible with prevalent economic theory hypotheses. For instance they tested if the model is better specified when the variables enter as forward looking or backward looking. Their main results were that international interest rate and real exchange rate are determinants of real output. Moreover, they also found that there is no money illusion.

More recently, the SVAR models were used to test the wage rigidity hypothesis. For instance, Bergin (2003, 2004) besides testing if prices were PCP or PTM also included the hypotheses of flexible price and wage rigidity. The hypothesis of wage rigidity was rejected in all empirical tests. The PTM did explain most of the movements in the output, however did not perform well in explaining exchange rate movements. This result on exchange rate was obtained by using a standard structural model as benchmarking.

Another application of SVAR models was made by Cavallari (2000). The author measured the long run impact of a monetary policy. In the paper the productivity movements were defined to be the first difference of the ratio of domestic to world output. Another variable considered was the domestic and international interest rates. The main conclusion reached by the author was that monetary shocks do not cause any impact on real variables. According to Lee and Chinn (2002), the missing variable in this model was

³ See Sims (1980).

de exchange rate. Therefore, they extended the previous model to incorporate this variable. By estimating the long run impact of an international monetary policy they found evidence of its effect on exchange rate movements. The effects are transitory and compatible with the theory of price being PTM.

A more elaborated model of international transmission was done by Giuliadori (2004). The author proposed a three equation system. The first equation was formed by the ratio of the domestic and the world output. The second equation was the changes in the exchange rate. The third equation was the ratio of the balance of payments to output. The shocks on these variables are of the following nature: *i*) supply; *ii*) demand; *iii*) structural monetary. The permanent shocks are defined as being originated from supply shocks or technology shocks. By estimating the system for the OECD countries the author found that permanent shocks do permanently affect exchange rate, but not symmetrically. For instance in countries as Austria, Belgium, Denmark, Holland, Japan, Swedish, and United Kingdom the exchange rate depreciates. However, in the remaining countries there is an appreciation. In another words, world supply shocks may cause different impacts depending on countries own characteristics and linkage to the world economy.

The Corsetti and Pesenti (2001) model were estimated using the SVAR technique for American economies. This application to the American economies was done by Dias and Dias (2010). The authors search for the impact of US fiscal policy on Brazilian and Argentinean economies after 1980. The result was that any long run expansionary US fiscal policy is “Beggart-hy-Neighbor” for the two economies.

In the coming section, we estimate a SVAR model for Brazil and Argentina. The estimated model is then used to verify the impact of a European fiscal policy over these countries. The impact of this fiscal policy is observed over the behavior of two important variables - consumption and output. We consider fiscal policy in different timing. The first one is a transitory shock or a unique shock. The second one is a permanent fiscal policy shock. The transitory fiscal policy is equivalent to a European government expenditure superior to the expenditure of domestic country, Brazil and Argentina, considering each amount of government expenditure as proportion of their respective output. Thus, Europe is the foreign economy and Brazil or Argentina is the domestic economy. The permanent fiscal shock proposes that Europe raises permanently its government expenditure above of the two domestic countries, with respect to their own output.

3. The Impact of European Fiscal Policy on Latin American Countries

The objective of this section is to estimate the impact of European fiscal policy on consumption of Argentineans and Brazilians using a SVAR model, considering long run changes in European government expenditure. It is important clarifying what we mean by long run fiscal policy. It is the differences between the government expenditure in Europe and Latin American countries as proportion to their GDP (Gross Domestic Product). Hence, any European fiscal policy shock means that European governments were expending proportionally more than Latin American governments regarding their GDP.

The estimated SVAR models investigate long run effects coming from European fiscal policies by considering changes in the moving average of fiscal policy over consumption and output. The long run consumption and output series are computed by the filter of Hodrick and Prescott (1997). We search for changes around the trends and how the changes are related to the European fiscal policy.

For the proposed models to be considered econometrically acceptable, besides the coefficients being statistically significant, they must attend other statistical conditions. Although we will not discuss in details the applied tests in this research, they are presented as requirements of analysis: *i*) the unit root tests proposed by Dickey and Fuller (1979) - (DFGLS), Phillips and Perron (1988) - (PP), and Andrews and Zivot (1992) - (AZ). These test are used to ensure that the series are stationary and at the same order; *ii*) LM – Lagrange Multiplier Test and the Wald Lag Exclusion Test, both intended to certify the number of lags to be used according to Hamilton (1994); and *iii*) the Jarque-Bera test or the error normality test described in Hamilton (1994).

A quite important aspect is related to the errors distribution resulting from the estimated SVAR equations. Not every specification produced errors that are distributed normally under the statistical test. However, we applied all three unit root tests to certify that their distributions were stable. Also all eigenvalues of the SVAR models laid inside the unit circle, indicating the models itself are stable. In sum, all the estimated SVAR models presented statistical tests that validate their results.

The long run consumption and output series for the Latin American countries are obtained by log differentiating the actual consumption and output around its long run trend. Moreover, long run trends are attained by Hodrick and Prescott (1997) filtering. Therefore, we are looking for fiscal policies shocks that affect consumption and output around their long run trend. If such shock is permanent, then we expect that consumption as well as output changes around their own trends to be also permanent.

3.1 The Impact of the European Fiscal Policy on Argentina

We start by presenting the estimated SVAR models for Argentina. Equations (1) and (2) are modeling consumption and output, respectively. Both equations presented significant coefficients with the causality running from European fiscal policy (Egg) to Argentinean long run consumption (Acc) and output (Ayy).

$$(1) \mathbf{y}_t(\text{Acc}) = \begin{bmatrix} \text{Egg} \\ \text{Acc} \end{bmatrix} \mathbf{C}(\text{Acc}) = \begin{bmatrix} 0.0028 & 0 \\ (0.00019)^* & \end{bmatrix} \mathbf{e}_t(\text{Acc}) = \begin{bmatrix} p_t \\ t_t \end{bmatrix}$$

$$(2) \mathbf{y}_t(\text{Ayy}) = \begin{bmatrix} \text{Egg} \\ \text{Ayy} \end{bmatrix} \mathbf{C}(\text{Ayy}) = \begin{bmatrix} 0.0026 & 0 \\ (0.00018)^* & \end{bmatrix} \mathbf{e}_t(\text{Ayy}) = \begin{bmatrix} p_t \\ t_t \end{bmatrix}$$

$$\begin{bmatrix} -0.0261 & 0.0754 \\ (0.0075)^* & (0.0051)^* \end{bmatrix}$$

$$\begin{bmatrix} -0.0226 & 0.0702 \\ (0.0069)^* & (0.0048)^* \end{bmatrix}$$

Considering equations above, the first line of coefficients means that the European fiscal policy is influenced only by itself ($C(\text{Acc})=0.0028$, $C(\text{yy})=0.0026$) and do not suffer any influence coming from Argentinean consumption changes, since ($C(\text{Acc})=0$ and $C(\text{yy})=0$). The second line shows the influence on Argentinean consumption and output. The coefficients $C(\text{Acc})=-0.0261$ and $C(\text{yy})=-0.0226$ represent the transmission mechanism from changes in European fiscal policies over Argentinean long run consumption and output. The remaining coefficients $C(\text{Acc})=0.0754$ and $C(\text{yy})=-0.0702$ represent the impact on future consumption and output due to any deviation in actual consumption and output to their respective trends. This is known as the self-transmission-mechanism of consumption and output.

In addition, the coefficients in the bracketed numbers in equation (1) and (2) are the standard deviation of the coefficients. The star means they are significant at 1 per cent. The variables p_t stands for permanent shocks or accumulated shocks and t_t transitory shock or a unique shock.

According to figures (1) and (2), the transitory shock, a unique shock in European fiscal policy by one percent, might cause a negative impact on the Argentinean consumption and output in the first period by as much as 4 per cent. However, the impact will not persist over the long run, since the consumption will tend to return around the zero line, see the graph Uniqueshock. Nonetheless, if the changes in government expenditure in Europe are permanent or accumulated, then the negative impact in Argentina’s consumption and output is also permanent. The Accumshock Graph show that the impact lasts over 15 quarters. The impact will be between 2 per cent and 4 per cent. Therefore, such policy is “Beggar-thy-Neighbor” from Europe to Argentina.

Figure 1: Long Run – Argentinean Consumption

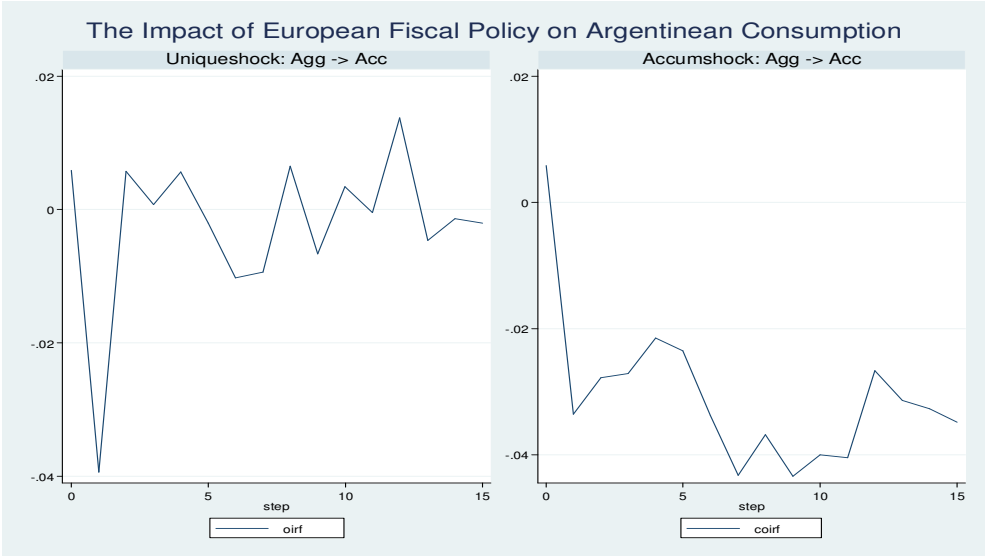
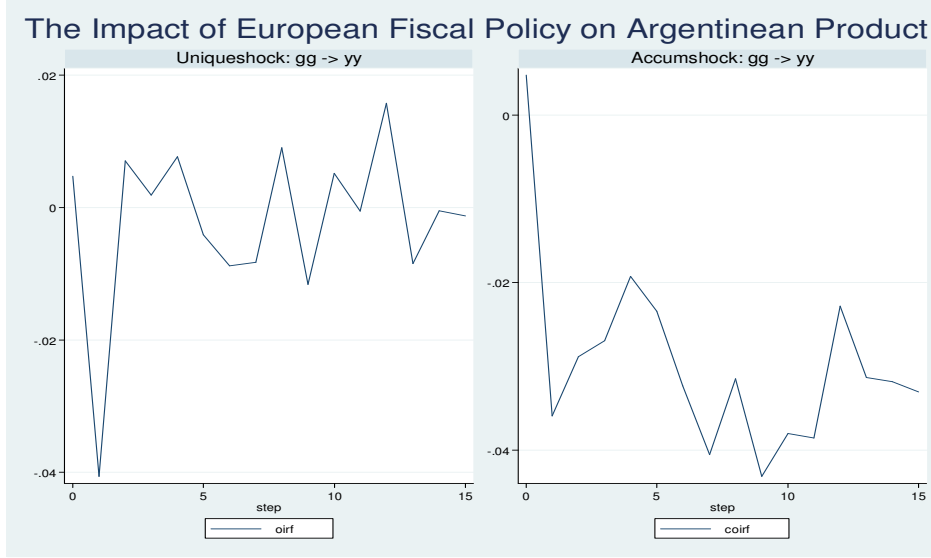


Figure 2: Long Run – Argentinean Product



In accordance with Corsetti and Pesenti’s model, the mechanism by which the Argentinean ends up being hurt by European fiscal policy is through the changes in the terms of trade. The increase in government expenditure by Europe implies that prices in Argentina also increase, due to the increase in European demand. Consequently, the Argentina terms of trade become unfavorable to Argentina due to higher domestic prices. As a result of the change in the terms of trade, the demand for consumption goods by Argentineans falls. This demand fall induces also the output to fall, according to Figure 2.

3.2 The Impact of the European Fiscal Policy on Brazil

In this section, we present the analysis of international policy transmission from Europe to Brazil. The estimation attends all statistical requirements and follows the structural VAR procedure. The Brazilian SVAR model was estimated considering the effect of the long run European fiscal policy changes on Brazilian consumption and on output. The coefficients for Brazilian consumption were all significant at 1 per cent with the effect of the fiscal policy positive (0.014).

$$(3) \mathbf{y}_t(\text{Bcc}) = \begin{bmatrix} \text{Egg} \\ \text{Bcc} \end{bmatrix} \mathbf{C}(\text{Bcc}) = \begin{bmatrix} 0.01412 & 0 \\ (0.00094)^* & \end{bmatrix} \mathbf{e}_t(\text{Bcc}) = \begin{bmatrix} p_t \\ t_t \end{bmatrix}$$

$$\begin{bmatrix} 0.0104 & 0.0207 \\ (0.0021)^* & (0.0014)^* \end{bmatrix}$$

$$(4) \mathbf{y}_t(\text{Byy}) = \begin{bmatrix} \text{Egg} \\ \text{Byy} \end{bmatrix} \mathbf{C}(\text{Byy}) = \begin{bmatrix} 0.0155 & 0 \\ (0.00103)^* & \end{bmatrix} \mathbf{e}_t(\text{Byy}) = \begin{bmatrix} p_t \\ t_t \end{bmatrix}$$

$$\begin{bmatrix} 0.0256 & 0.0999 \\ (0.00955)^* & (0.00664)^* \end{bmatrix}$$

The transmission coefficients of the European economic policy on Brazilian output are $C(\text{Bcc})=0.0104$ and $C(\text{Byy})=0.0256$, both positives. Nonetheless, a transitory fiscal policy by Europeans does represent a cost to the Brazilian by the generated cycles. The cycles amplitude do not accommodate in the fifteen quarters of simulation.

More specifically, we have used the model from equations (3) and (4) to simulate two impacts. The first one is a unique shock or a unique change in European fiscal expenditure over the long run of 1 per cent. The impact of the European fiscal policy on Brazilian consumption can be negative in the short run, above 1 per cent. The output responds with a smaller impact, of less than 0.5 per cent. While the cycle amplitude in consumption is very high, in the interval between plus 0.5 per cent and minus 0.5 per cent, the output volatility is much lower. As we may see in the Uniqueshock in Figure (4), the output cycle do accommodate faster than the consumption during fifteen quarters.

Figure 3: Long Run - Brazilian Consumption

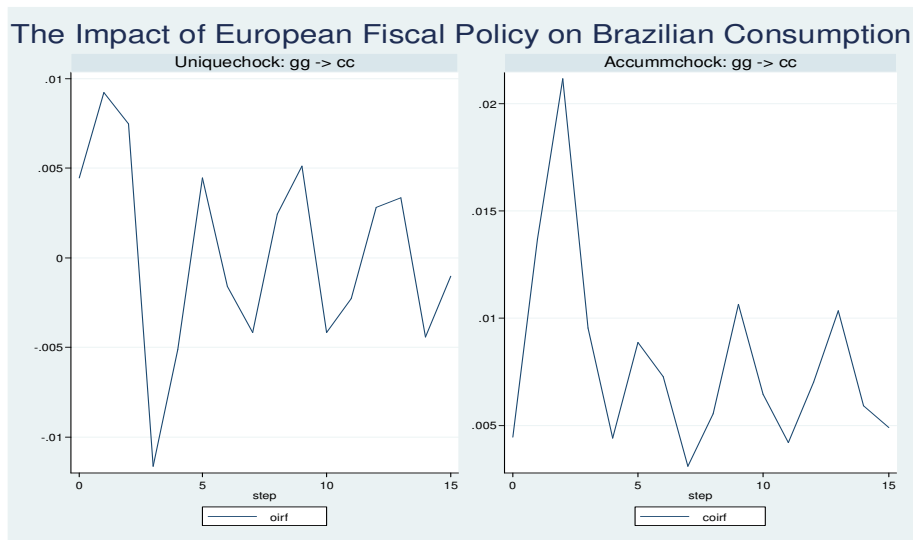
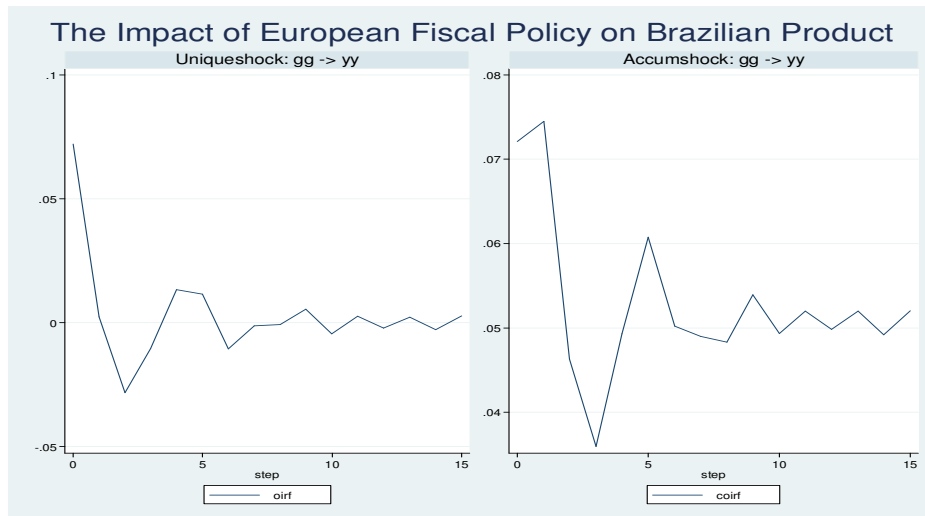


Figure 4: Long Run – Brazilian Product



In addition, the long run impact of a persistent change in the European fiscal policies appears in the Accumshock graphs of Figure (3) and (4). The impact lasts for long period in a positive behavior, more than fifteen quarters in both consumption and output. The impact on the Brazilian output oscillates around 5 per cent and is much lower than the

observed on its consumption of only 0.5 per cent. In other words, probably Europe demands more Brazilian goods with higher government expenditure than normally expected.

Thus, a persistent European fiscal shock generates a positive impact over the long run in both consumption and output. Yet, it is a huge impact on output, which classifies the European fiscal policy as “Prosper-thy-Neighbor” for the Brazilians.

Considering the theoretical models, the transmission mechanism of this economic policy occurs throughout the terms of trade. However, the demand increase for the Brazilian products due to European government expenditure changes does not affect domestic prices. Thus, fiscal policies do generate domestic output increase without the inconvenient of price staggering. As a result both Brazilian’s output and consumption increase. However, there are costs to be paid from transitory international shock transmitted which is cycle-movement in consumption and output.

4. Conclusion

The estimated SVAR model did fit quite well the data. It shows that European fiscal policies indeed affect Latin American countries. However, international policy transmission may diverge to different countries.

Argentina loses welfare in the short and long run from expansionary fiscal policy made by Europe. Therefore, Argentina must take into consideration the fiscal policy being made in Europe.

On the other hand, Brazilians do benefit by European fiscal policy expansions. Their output and consumption increases causing welfare improvement in the short and long run if such policy is permanent. However, if the fiscal expansionary policy is transitory, it generates a cycle-movement in the Brazilian consumption and output that does not cause any welfare gains.

In sum, Latin American countries must be aware of fiscal policy changes being practiced in Europe in order to have a more stable economy.

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