A BVAR model for regional integration in Latin American Countries

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Abstract:

This paper analyses the monetary consequences of the Latin-American trade integration process. We consider a sample of five countries –Argentina, Brazil, Chile, Mexico and Uruguay- panning the period 1991-2007. The main question raised refers to the feasibility of a monetary union between L.A. economies. To this end, we study whether this set of countries is characterized by business cycles synchronization with the occurrence of common shocks, a strong similarity in the adjustment process and the convergence of policy responses. We focus especially our attention on two points. First, we try to determine to what extent international disturbances influence the domestic business cycles through trade and/or financial channels. Second, we analyze the impact of the adoption of different exchange rate regimes on the countries' responses to shocks. All these features are the main issues in the literature relative to regional integration and OCA process.

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0. Introduction

The 1990s were characterized by an intensification of Regional Trade Agreement in the Americas. The main agreements are the Southern Common Market (MERCOSUR) –signed in 1991 between Argentina, Brazil, Paraguay, Uruguay and Venezuela, with Bolivia, Chili, Peru, Colombia, and Equator as associates- and the North American Free Trade Area (NAFTA) –signed in 1994 between Canada, Mexico and the United States with more and more agreements with other L.A. (Chili, Peru, Equator…)[1]. Since 1994, a Free Trade Area Agreement for the Americas has been discussed, as an extension of the NAFTA. In the spirit of Eichengreen and Taylor (2004), this paper analyses the monetary consequences of this trade integration process. We consider a sample of five countries –Argentina, Brazil, Chile, Mexico and Uruguay- that account for some 70 per cent of the region's GDP spanning the period 1991-2007.

The main question raised in this paper refers to the feasibility of a monetary union between these countries. To this end, we study whether this set of countries is characterized by business cycles synchronization with the occurrence of common shocks, a strong similarity in the adjustment process and the convergence of policy responses. We focus especially our attention on two points. First, we try to determine to what extent international disturbances influence the domestic business cycles through trade and/or financial channels. Second, we analyze the impact of the adoption of different exchange rate regimes on the countries' responses to shocks. All these features are the main issues in the literature relative to regional integration and OCA process.

The present paper is linked to two separate strands of literature. The first strand of literature, dedicated to the debate monetary union versus dollarization, includes numerous papers dedicated to the situation of Central and Latin American countries (LAC) relative to the United States[2]. Whatever the criteria –real output fluctuations, prices co-movements, trade integration, and exchange rate variability, empirical studies suggest that dollarization is not an obvious solution, even for Mexico. Karas (2003) finds that Mexican output fluctuations have been negatively correlated with the American fluctuations. Alesina et al. (2003) show that if Mexico is more linked to the United States from the co-movements of prices standpoint, co-movements of outputs with Euro zone and the United States no exhibit significant difference.

[1]. We can mention also the CARICOM (Caribbean Community and Common Market, 1973), the CACM (Centre America Common Market, 1960), CAN (Andean Community, 1969)

[2]. See for instance Alesina et al. (2003), Karas (2003), Larrain and Tavares (2003), Hallwood et al. (2006), and Allegret and Sand-Zantman (2007 and 2008).

Hallwood et al (2006) find that none of the South American countries has prices and/or output disturbances significantly correlated with the United States. Their results exhibit some correlation of Brazilian, Chilean and Uruguayan permanent shocks with Argentina suggesting that monetary union could be a better solution than dollarization. Allegret and Sand-Zantman (2008) propose a semi-structural VAR approach and a state-space model and show the weak convergence of the economic policies between the Mercosur countries. They stress that the main impediments to the convergence of economic policy are the divergence of the exchange rate regimes inside the area, and the lack of financial structure convergence. The second strand of literature analyses the sources of business cycles fluctuations in emerging countries. Two lessons from this literature are especially interesting for our purpose. On the one hand, a large body of studies suggests that the main source of fluctuations originated from external factors. Aiolfi et al (2006) –considering a sample of four LAC[3]- identify the presence of a common regional factor. Taking into account the weak intra-regional trade integration, this result suggests that the regional business cycle (major turning points are common to the four countries) is driven by external variables and common external shocks. Maćkowiak (2007) builds structural VAR models with block exogeneity ensuring that domestic shocks do not affect external variables. His main result is that external shocks account for a major source of macroeconomic fluctuations in emerging countries[4]. More precisely, if US monetary policy shocks affect significantly domestic variables in emerging countries, the magnitude of fluctuations explained by these shocks is lower relative to shocks driven by other external shocks (such as world commodity prices shocks). All these results suggest the presence of a "continental business cycle" (Canova, 2005:243) driven by US shocks and/or by international shocks. On the other hand, Ahmed (2003) and Canova (2005) conclude that financial channel is especially significant to understand the influence of external shocks on domestic business cycle fluctuations in LAC. Using a dynamic panel setting with annual data over the period 1983-1999, Ahmed (2003) finds that US three months real interest rate shocks explain a significant share of output fluctuations in these countries. Canova (2005) shows, over the period 1990-2002, that US real shocks (demand and supply disturbances) exert a weak influence while US monetary policy shocks generates stronger output fluctuations in LAC. As a result, financial channel is more significant than trade channel[5].

[3]. Argentina, Brazil, Chile, and Mexico over the period 1870-2004.
[4]. Maćkowiak (2007) studies eight emerging countries (whose two South American countries: Chile and Mexico) with monthly data spanning the period from January 1986 to December 2000.
[5]. See also Ősterholm and Zettelmeyer (2007).

The remainder of this paper is organized as follows. Section 1 explains the methodology adopted in this paper and founded on VAR models. Section 2 presents the macroeconomic variables included in the VAR. Section 3 proposes a method to consider non-stationarity and structural breaks of the selected variables. Section 4 analyses our main results. Section 5 concludes.

1. A Justification of the VAR Methodology

In the context of strong links of macroeconomic variables with complex feedback linkages, the Vector autoregression (VAR) and the Vector Error Correction Model (VECM) approaches constitute useful tools to catch the trends and interdependences between multiple time series. Contrary to the structural method based on the choice of a particular model, this procedure embodies alternative theories nested in the empirical model[6]. All the variables are treated symmetrically, including for each variable an equation that explains its evolution based on its own lags and the lags of all the other variables in the model. Sims (1980) advocates the use of unrestricted VAR models as a theory-free method to estimate economic relationships. The VMA (vector moving average) representation of the reduced form allows us to express the current and past values of the shocks, to trace out their time path on the variables contained in the VAR system, and to compute the impact multipliers (deduced from the impulse response functions). The forecast error variance decomposition indicates the proportion of the movement in a sequence due to its own shocks versus shocks to the other variables. Thus, the convergence of evidence revealed by the tests, the impulse response functions, the forecast error variance decomposition and other forecasting properties give us some guidelines to choose between alternative theories. More frequently than in the case of monetary policy literature, the "regional unification" literature one use relative large scale models with more than three of four variables. And contrary to the monetary case (Sims, 1996, Bernanke, 1996, Christiano, Eichenbaum and Evans, 1999), no common wisdom can ease the interpretation of impulse responses and forecast variance analysis.

One of the main issues of these experiments comes from the identification of shocks. If the error terms of the VAR reduced form are correlated, there is no simple way to unambiguously identify shocks with specific variables. The errors (and by the way the estimate residuals) of the reduced VAR will have common components that affect more than one variable. The practitioner will have to attribute the effects of common components to one specific variable

[6] As indicated in Canova (1995), the analyst's prior knowledge is used only to decide what variables should enter the reduced form and, in some cases, the time series transformations to be used (log or ratios of variables).

biasing the interpretation of the impulse responses or of the forecast error variance decomposition: in short, the choice of procedure of identification, i.e. the procedure of shocks orthogonalization, must be based on some a priori knowledge.

The Cholesky ordering is the usual and least theoretical method to orthogonalize shocks (this kind of "informal" structural VAR is usually called either recursive VAR or RVAR, or, as in Doan (2007), semi-structural VAR or SSVAR). The ordering is based on theoretical intuition and more formally on the results of impulse responses and forecast error variance decomposition. Another way is to introduce theory in these VAR models by the inclusion of formal restrictions in the structural VARs (SVARs). Contrary to numerous similar works, we do not apply the "BQ" decomposition identification procedure (Blanchard, and Quah, 1989). Assuming a long term neutrality of nominal shock would seem widely arbitrary for a work covering about twelve or so years[7]. Concerning the short-run issues, carry contemporaneous identification restrictions on the error terms orthogonalization for impulse response analysis seemed fairly arbitrary for such a number of variables and so much structural breaks. So, we used the Generalized Impulse method (as described by Pesaran and Shin, 1998) built-in the software "Eviews6" and allowing constructing an orthogonal set of innovations independent of the VAR ordering

2. Variables Selection and Sample Period

Our choice of variables (see Appendix 1 for data sources) is in part based on the traditional one for VARs analyzing external shocks and macroeconomic packages in open economies, but also on the literature dedicated to the sudden stop problem (Calvo et al., 2004).

Each domestic VAR includes three external variables. As real external shocks, we consider (i) the Gross Domestic Product for Group of Seven countries (noted *LGDPG7*) and (ii) the world commodities prices excluding oil (noted *WCPNO*). Our choice to exclude oil from our commodities prices index is due to the fact that some LAC (for instance Brazil and Mexico) are both producers and consumers of oil. As a result, responses to shocks are difficult to interpret in such situation. Beyond, taking into account only food or agricultural products seemed too restrictive[8].

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[7]. Leeper and Faust (1997) criticize the widespread use of long run restrictions to study the sources of business cycles because of the weak reliability of structural inference for finite samples. In particular, "unless strong restrictions are applied, conventional inferences regarding impulse responses will be badly biased in all sample sizes".

[8]. We perform alternative specifications using all commodities prices and food and agricultural products prices. Results do not change significantly.

The Emerging Economy spread index of J.P. Morgan (*EMBI*)[9] accounts for the international financial shock. Many studies chose US interest rates or international interest rates –such as LIBOR- to estimate the impact of external financial shocks on emerging markets. We prefer to use *EMBI* in order to disentangle monetary policy shocks and financial shocks. Further, over our sample period, *EMBI* does not seem significantly influenced by *LIBOR*, confirming the González-Rozada and Levy-Yeyati (2005)'results which show that spreads are determined by global factors[10]. Uribe and Yue (2006) analyze the respective influence of US interest rates and EMBI shocks on the macroeconomic fluctuations in a sample of seven emerging countries covering the period 1994-2001. An important finding is that EMBI shocks exacerbate the US interest rate shocks, implying a strong macroeconomic volatility in the studied emerging countries.

For the domestic variables (noted for each country "*i*", *i* = *A* for Argentina, *B* for Brazil, *C* for Chile, *M* for Mexico, and *U* for Uruguay), we took the foreign reserves noted *i_FOREX* (as proxy for the balance of payments, and in particular for financial account), Gross Domestic Product (*i_GDP*), Consumption Prices Index (*i_CPI*), the nominal money market interest rate (*i_R*) and the real effective exchange rate[11] (*i_ER*).

Calvo et al. (2004) stress that sudden stop episodes are characterized by both international reserves losses and sharp current account reversals. The former increases the country vulnerability to shocks while the latter leads to output and employment contractions. Balance of payments quarterly data are not reliable and subject to sizable revisions. As a result, our VARs does not include current account data. As a proxy of sudden stop problems, we chose to include central bank's foreign exchange reserves. In order to test the robustness of the results, we substitute *i_TCT* -the deseasonalized exports-imports ratio- to *i_FOREX*. The *TCT* ratio represents a proxy for the intertemporal constraint of the current account: a decrease in capital inflows imposes to reduce absorption in order to increase exports and decrease imports. Interestingly, results do not significantly change. As a result, we prefer to consider

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[9] We merged two time series: the EMBI for the period 1991Q1-1997Q4 and the EMBI+ from 1998Q1. As indicated in Cunningham (1999), the main differences between these indices are (i) the number of financial instruments embodied (the EMBI tracks returns and spreads on Brady Bonds and some other restructured sovereign debts, the EMBI+ tracks returns on a wider range of instruments), (ii) the number of countries (11 for the EMBI, 16 for the EMBI+). However, in both the indices the weight of the LAC (Latin American countries) is very important (respectively 83.8% and 70.2%). Amongst the LAC, both Argentina and Brazil account for 47.6% of the EMBI+. In 1999, J.P.Morgan released a new index, the EMBIG (for "global") embodying more countries (27) and more titles. In this last index, LAC decreased to 61.5%.

[10]. We perform different experiments in our VARs: first, we include both *LIBOR* and *EMBI*; second, we include only *LIBOR*. Results do not significantly change. Granger causality tests do not exhibit relations between *EMBI* and *LIBOR*.

[11]. An increase (decrease) in the real exchange rate means real depreciation (appreciation).

only the *FOREX* variables in order to avoid some difficulties of interpretation owing to the fact that the *TCT* ratio obeys in part to competitive factors, and not exclusively to financial factors.

Exchange rate regimes and real bilateral exchange rate variability constitute significant concerns for trade and financial integration process. In Mercosur countries, these concerns became significant after 1998, when the region has been hit by a wave of international shocks (Machinea, 2004). From this perspective, Silva et al. (2004), using a conventional Mundell-Fleming framework, provide suggestive conclusions concerning the impact of different exchange rate regimes on the synchronization of business cycles fluctuations. They compare the situation of Argentina and Brazil after different shocks (domestic or external). Their VECM suggests that Argentina followed strictly "currency board" rules (with a very quick adjustment between the foreign reserves and the monetary base in the error correction expression) while Brazilian monetary policy had a discretionary character based on the sterilization policy of the central bank (i.e. a sluggish adjustment of the E.C.M.). Briefly, the two countries experienced dissimilar mechanisms of adjustments to similar negative external shocks, the problem turning exacerbated after the Brazilian exchange rate regime collapse in 1999.

Appendix 2 shows the exchange rate regimes adopted by each country over the same period. At the beginning period (1991), the set of countries ranges from hard peg (Argentine currency board) to intermediate regimes, while the end of the period exhibits a clear switching toward floating regimes. We try to determine to what extent different exchange rate regimes can explain different adjustments to similar shocks. Canova find "little evidence supporting the idea that the exchange rate regime matters for both the magnitude of output responses and the mechanics of transmission of US shocks" (Canova, 2005: 246). Similarly, Maćkowiak (2007) concludes that the contribution of external disturbances to domestic fluctuations is irrespective of the exchange rate regime. At the opposite, Allegret and Sand-Zantman (2008) find that exchange rate regimes matter to explain the different responses of Argentina, Brazil and Uruguay to similar shocks. To this end, the VAR models take into account the question of exchange rate through the real effective exchange rate for each of the five countries of the sample.

Our analysis focuses on the period following the recovery (due to the international capital flows come back). The sample is relatively short: indeed, not only the quality of data for long periods is low in emerging countries but also during the 80s, the five economies were very instable mainly due to the debt crisis and the bouts of hyperinflation: such disturbances make data processing very complex and unstable. Therefore, our study begins in 1991 by taking into account more stabilized economies. In addition, as our approach of monetary integration is based on business cycle dynamics, we use quarterly data. Such data are only available and comparable since 1990 for the five countries. Thus, the paper uses quarterly frequency for the period 1991-Q1-2007-Q1.

3. Non-Stationarity and Structural Breaks: the Special Case of Emerging Economies

As noted above, the emerging economies case is not the simplest one to use times series methodology. Since the seminal works of Nelson and Plosser (1982), most macroeconomic time series in level are considered unit root process (i.e. generally I(1), and in some cases I(2)); and for the industrialized economies, availability of long run times series and economic stability allowed to stress on unit root and cointegration common tests.

On the same sample than Nelson and Plosser, Perron (1989) challenged this interpretation, indicating that most macroeconomic variables are trend stationary, coupled with structural breaks. Looking at the Latin-American macroeconomic time series, we assert the same hypothesis: indeed, in the case of Latin America, as for other Emerging countries, the econometrists had to take into account structural breaks due to non random external and internal shocks and change of policy regimes. The right way to deal with this question consists (in the Perron procedure) to test for unit roots in the presence of structural change at known date. If the date of the break is uncertain, other tests are available (Vogelsang and Perron, 1998, or Zivot and Andrews, 2002) on common softwares. However, as shown in Le Bihan (2004) all this procedures are powerless when the number and the date of the break are unknown. Overall, the combination of short sample and multiple breaks weaken heavily as the break diagnosis than the following unit root test.

We choose a rougher but probably more securing method. First we identified the noticeable breaks of the figures[12] as being the well-known historical ones (due for instance to balance of payments crisis, or switches of policy regime): the results are displayed in the Appendix 3. As particular (and generally determinist) events, these breaks can hardly be considered as the N.I.D. stochastic innovations of a random walk. Then, in order to stationarize the macroeconomic series, we clean them from the various determinist trends and intercept leaps, using simply time trends and dummies variables. At last, we end by a common A.D.F. test, finding all series as stationary.

[12]. To this end, we use Chow tests.

Thus, we can exclude any cointegration relationship but a VAR in level is an available alternative to the VECM one; so we choose a recursive semi-structural approach for a VAR in level of the detrended series.

4. A Bayesian Structural VAR?

Undeniably, the sample is short and the number of variables fairly high. In this case, Litterman (1979, 1984) suggests specifying blurred restrictions on the mean and variance of coefficients in place of brutal “ad hoc” exclusions. As Doan (2007) concludes, “in a vector autoregression, we must concern ourselves not only with lags of the dependent variables, but also with the lags of the other endogenous variables. Because of stability conditions, we have some pretty good information about the size of lag coefficients in a simple autoregression. However, it’s not as clear what the sizes of coefficients on other variables should be, and these depend, in part, on the relative scales of the variables involved”. As indicated by Canova (2007), priors on mean and variance of the variable allow dealing with over parametrization.

The choice of priors is the simplest one: overweighting the first lags of endogenous variables of each equation. Although fine tuning prior is unrealistic, a deeper investigation must allow a better assessment of the consequences of innovations but it could be time-wasting.

In the same way, this version use a semi structural BVAR. Using a Bayesian is more a reason to avoid a structural orthogonalization: Canova (2007) shows that the combination of Bayesian methods and structural hypothesis is not the simplest one, particularly for economies characterised by a succession of policies regimes.

The model

The number of lags –two in each model- has been selected using the common set of criteria and tests. As the inverse roots of the AR polynomial lie in the unit circle, VARs satisfy the stability condition. For each economy we test the following VAR:

$$
\begin{pmatrix} CYC\_LGDPG7(t) \\ CYC\_LWCPNO(t) \\ CYC\_EMBI(t) \\ CYC\_Li\_GDP(t) \\ CYC\_Li\_CPI(t) \\ CYC\_Li\_FOREX(t) \\ CYC\_i\_R(t) \\ CYC\_Li\_ER(t) \end{pmatrix}
+
\begin{pmatrix} C_{1(1,1)} & & C_{1(1,8)} \\ & & \\ & & \\ & C_{1(i,j)} & \\ & & \\ & & \\ & & \\ C_{1(8,1)} & & C_{1(8,8)} \end{pmatrix}
\begin{pmatrix} CYC\_GDPG7(t-1) \\ CYC\_LWCPNO(t-1) \\ CYC\_EMBI(t-1) \\ CYC\_Li\_GDP(t-1) \\ CYC\_Li\_CPI(t-1) \\ CYC\_Li\_FOREX(t-1) \\ CYC\_i\_R(t-1) \\ CYC\_Li\_ER(t-1) \end{pmatrix}
+
$$

$$
\begin{pmatrix} C_{2(1,1)} & & C_{2(1,8)} \\ & & \\ & & \\ & C_{2(i,j)} & \\ & & \\ & & \\ & & \\ C_{2(8,1)} & & C_{2(8,8)} \end{pmatrix}
\begin{pmatrix} CYC\_GDPG7(t-2) \\ CYC\_LWCPNO(t-2) \\ CYC\_EMBI(t-2) \\ CYC\_Li\_GDP(t-2) \\ CYC\_Li\_CPI(t-2) \\ CYC\_Li\_FOREX(t-2) \\ CYC\_i\_R(t-2) \\ CYC\_Li\_ER(t-2) \end{pmatrix}
+
\begin{pmatrix} e_{CYC\_LGDPG7} \\ e_{CYC\_LWCPNO} \\ e_{CYC\_EMBI} \\ e_{CYC\_Li\_GDP} \\ e_{CTC\_Li\_CPI} \\ e_{CYC\_Li\_FOREX} \\ e_{CYC\_i\_R} \\ e_{CYC\_Li\_ER} \end{pmatrix}
$$

Results

Using this framework, we combine the impulse response functions (tracing out the time paths of the effects of pure shocks on the set of variables), the accumulated effects of shocks (the summation of the coefficients of the impulse response functions), and the forecast error variance decomposition (indicating the proportion of the movements in a sequence due to its own shocks versus to the other variables). These experiments aim at identifying what kind of shocks, real or nominal, drive economic fluctuations in the three countries. For forecast error variance decomposition, to determine if shocks of a variable exert a significant influence on other variable, we chose 10% as a threshold. External and domestic variables are indicated in bold and italic numbers respectively when significant.

It allows us to assess the similarities in the reactions of macroeconomic variables to these shocks. At the same time, we will get a first outline of the specific -versus common- economic consequences of shocks in terms of spontaneous adjustments, as well as in terms of policy responses. The results are presented in Appendix 4, 5 and 6.

Responses of domestic variables to external shocks: is transmission real or financial?

In this paragraph, we try to identify to what extent international shocks are transmitted to domestic variables through real or financial disturbances. To this end, we consider the responses to shocks and variance decompositions of all domestic variables –except *FOREX*- in the five studied countries.

Broadly speaking, variance decompositions show that all studied countries are strongly influenced by foreign variables. For instance, in Argentina, Brazil, Chile and Mexico, foreign variables explain more than 30% of the *GDP* variance decompositions after 16 quarters. In addition, no domestic variables –except *i_GDP* themselves- exert a higher influence than foreign innovations in all countries. If we consider real foreign variables, i.e. *GDPG7* and *WCPNO*, we see that *WCPNO* innovations explain a significant part of the *GDP* variance in Brazil (more than 27.4% after 2 quarters), Chile (from 17.5 in quarter 4 to 38.7% in quarter 16), and Mexico (about 14-16% over the whole period). Argentine *GDP* is more influenced by innovations on *GDPG7* but to a lesser extent than the influence exerted by commodities prices in Brazil and Chile. If the variance decomposition of Uruguayan *GDP* does not seem impacted by real foreign variables, it does not mean that Uruguay is a closed economy. Indeed, economic activity in this country depends mainly on Argentine and Brazilian business cycles. VAR models built in this paper do not take into account such interdependencies between LAC.

A large body of empirical literature dedicated to business cycle in LAC stresses that growth in LAC follows international capital flows. More precisely, these studies suggest that the behavior of capital inflows is pro-cyclical: they tend to increase when growth in LAC improves. As a result, we can expect a significant influence of *EMBI* shocks on *GDP* during the period on our sample of countries. On this point, our results are mixed since neither Brazilian *GDP* nor Chilean *GDP* seem significantly influenced by the international financial shock. In the three other countries *EMBI* innovations matter especially in Argentina and Uruguay: for Argentina, *EMBI* innovations explain 10.4% of the *A_GDP* variance after 4 quarters and 15.8% after 16 quarters. For Uruguay, *U_GDP* variance decompositions suggest that 23.2% of its variance is explained by the international financial shocks after 4 quarters and around 20.5% after 16 quarters.

As expected, *GDP* increases after a shock on *GDPG7* in all countries except Uruguay. The influence is stronger at medium-term than at short-term in Argentina and Chile, while Brazilian *GDP* responds at short-term only. The positive influence of *GDPG7* means that improvement (vs degradation) of the business cycle in G7 countries can result in increasing (vs slowdown) of growth in LAC. Uruguay does not react significantly to *GDPG7* shocks. In fact, this economy tends to respond more to the Argentinean and Brazilian shocks than to industrial countries ones. In Argentina, Brazil and Uruguay, consumption prices increase after the *GDPG7* shock. But responses of consumption prices are weakly significant (in the case of Argentina and Uruguay) or very short-lived (for Brazil). Interest rates responses allow us to distinguish two groups of countries. The first group comprises economies beneficing from better performances in terms of inflation over the main part of the studied period (Argentina, Chile and Mexico). In these countries, the short-run response to *GDPG7* shocks is a decrease in the domestic interest rates. In the second group, including Brazil and Uruguay, recurrent debates on monetary policy credibility lead central banks to stay particularly vigilant on inflationary pressures. As a result, the short-run response to *GDPG7* shocks is higher interest rates. The distinction between these groups of countries must not be overestimate since in all countries, except Argentina, interest rates responses are short-lived. Interestingly, Argentine interest rates increase at medium-run (after 8 quarters), probably as a consequence of strong economic policy constraints implied by the currency board arrangement. A positive shock – such as an increase in the *GDP* of the G7 countries- may produce an incompatible inflationary pressure with the Argentine monetary system. Real exchange rates do not react to *GDPG7* shocks. Not only, real exchange rates respond at very short term but also in all countries, variance decompositions of real exchange rates are not explained by *GDPG7* except for Chile (11.7% of the *C_GDP* after 2 quarters and 12.3% after 16 quarters) and Uruguay (after 12 quarters, but at a low level (10%)).

In all countries except Uruguay, *GDP* increases after a shock on commodities prices (*WCPNO*) confirming the importance of commodities in LACs' business cycles. Not only contemporaneous responses are significant and positive (except Argentina) but we observe significant persistent effects (see accumulated responses in Appendix 5). Interestingly, *CPI* strongly increases in Uruguay after a shock on *WCPNO* and this increase prevails over time. As Uruguay is both exporter and importer of primary commodities, it is difficult to disentangle between a demand effect (exports) and a supply effect (imports). The response of *U_GDP* to a shock on *WCPNO* suggests that the second effect is probably the most relevant: over the considered period, Uruguay suffers from increases in commodities prices. In countries where *WCPNO* innovations affect *GDP*, real exchange rates appreciate after the shock. But responses are short-lived and/or weakly significant.

In all countries, *GDP* decreases after a shock on *EMBI*. The magnitude of the *GDP* response is important in Argentina and Uruguay, and to a lesser extent in Mexico. Our findings confirm Allegret and Sand-Zantman (2008) about the specific sensitivity of Argentina to *EMBI* shock. During the first half of the 90s, Argentina was one of the main borrowers in international capital markets beneficing from very favorable financing conditions, while on the second half of the decade the economy suffered from a sudden-stop of capital inflows. In addition, the monetary policy constraints due to the currency board limited the ability of authorities to react in the face of *EMBI* shocks, inducing strong and ample macroeconomic variability. The Chilean case is particularly interesting. While Chilean spread stayed substantially below EMBI+ or Latin American spread over the period, *C_GDP* responds negatively to *EMBI* shock confirming the idea that this type of shock is global, i.e. affects all countries, even economies beneficing from low idiosyncratic risk premium. Recall that the macroeconomic situation of this country and the monetary framework introduced in 1991 significantly decreases its risk premium. Consumptions prices and real exchange rates do not significantly respond to *EMBI* shocks in all countries. At the same time, we see that domestic interest rates increase –as expected- in the five countries suggesting a financial transmission of *EMBI* shocks to domestic variables. Such transmission must be nuanced for Argentina, Brazil, Mexico and Uruguay owing to the fact that interest rates responses are short-lived and/or weakly significant. Again, we see that Chile cannot avoid a financial transmission of *EMBI* shock through its interest rate –which increases significantly- even if the effect is short (due to the credibility effect of its monetary policy framework).

The behavior and the role of FOREX (foreign reserves) variable: the relevance of the sudden stop

Two main points characterize the sudden stop literature. First, external factors exert a decisive influence on capital inflows into emerging markets. Second, depreciation results in contractionary output in emerging markets while it produces the traditional expansionist effects in industrialized countries (Calvo and Reinhart, 2001). Indeed, exchange rate crises in emerging markets are followed by a sudden stop to capital inflows. These countries suffer from reserve losses and severe reversal in the current account deficit. Such reversal is based on a major decline in aggregate.

In order to assess the relevance of the sudden stop literature, we determine what variables – foreign or domestic, real or financial- exert the main influence on *FOREX* included in our VARs as a proxy of international capital flows. The theoretical prediction is that international financial shocks, here the *EMBI* shock- are the main variable influencing *FOREX* in our five countries. In addition, we analyze the influence of *FOREX* on other domestic variables. According to the sudden stop literature, a negative shock on *FOREX* must lead to a contraction in *GDP*.

Interestingly from the sudden stop literature standpoint, *FOREX* is influenced by international variables, and more especially by financial variables. *FOREX* responses *WCPNO* shocks are short-lived (Argentina and Mexico) or insignificant. The medium-term reaction of *FOREX* to *GDPG7* shocks exhibit an interesting feature, even if weakly significant: *FOREX* decreases in the aftermath of the shock[13]. We interpret this result as a symptom of the destabilizing influence of industrialized countries business cycles. When economic conditions improve in industrialized countries, foreign capital tends to flow out from LAC. This financial channel is strengthened by international financial shocks. Indeed, *EMBI* shocks produce expected effects when significant. Thus, an increase in the spread –meaning degradation in the financial conditions for emerging countries- lead to a decrease in *FOREX* in Argentina and Brazil, and to a lesser extent in Chile and Mexico. Accumulated responses exhibit a striking feature: the international financial shocks exert persistent effects on *FOREX* in Argentina and Brazil. Variance decomposition of *FOREX* confirms that *EMBI* matters. On the one hand, except in Brazil (but at a low level), *GDPG7* innovations do not significantly explain *FOREX* variance decomposition. On the other hand, *WCPNO* shocks explain *FOREX* variance only in Mexico. To the contrary, *FOREX* variance in Argentina and Brazil is explained by *EMBI* innovations. In the two countries, this influence is not contemporaneous: for instance, *EMBI* innovations explain between 15.4% and 17.2% of the *A_FOREX* variance after 4 quarters. When domestic variables exert a significant influence on the variance of *FOREX*, it is through the *GDP*[14]. More precisely, appendix 6 shows that *i_GDP* innovations explain between 11% and 21% of the *FOREX* variance in Argentina, Brazil and Uruguay. Thus, international capital flows do not seem completely insensitive to domestic *GDP* fluctuations in LAC.

In all countries, the major part of domestic variables does not significantly react to *FOREX* innovations. However, according to the conventional wisdom, real exchanger rate appreciates after a positive shock on *FOREX* in all countries except Brazil. Accumulated responses show that such real appreciation is especially persistent in Uruguay and Argentina, but to a lesser extent in this country. The fact that *FOREX* shock generates few domestic fluctuations does

[13]. In Uruguay, *FOREX* fluctuations are too small to be significant from an economic standpoint.

[14]. The only exception is Mexico in which the consumption prices innovations explain in average 13% of the *FOREX* variance from quarter 4 to quarter 16.

not necessarily contradict the sudden stop literature. Indeed, as stressed by Izquierdo et al. (2007), episodes of financial volatility tend to produce effects on real variables only at short-run. A plausible explanation of our deceptive results is that the more significant effects of sudden stop on domestic variables are absorbed extremely rapidly, within one or two quarters. VAR models are not well-equipped to detect these types of changes. Indeed, such models analyze the responses of macroeconomic variables to shocks of standard magnitude (usually one standard deviation), and not to unusual disturbances proper to crisis episodes. In addition, the main purpose of VAR models is not to identify crisis events. Crisis episodes are relevant only if they lead to structural breaks in the studied macroeconomic series.

Overall, our results are mixed. Foreign variables innovations do not exert a significant influence on *FOREX* variance in Chile and Uruguay. When significant, the financial channel seems more relevant to analyze the behavior of *FOREX* in Argentina and Brazil while in Mexico the trade channel –*WCPNO* innovations explain significantly *M_FOREX* variance- seems more important. From this standpoint, our results are slightly in accordance with the sudden stop literature. But our methodology does not allow us to identify effects of *FOREX* shocks on domestic variables.

Responses of domestic variables to domestic shocks

Shock on *GDP* is interpreted as real one. After a real domestic shock, we observe significant responses of *CPI* only in Argentina and Brazil. In these two countries, prices decrease after the shock. Responses are short-lived in Brazil while Argentine prices react at medium run. The decrease in prices in the aftermath of *GDP* shock suggests that such shock produces a supply effect. Variance decompositions of *CPI* exhibit persistent effects. At medium-long run, the share of the *CPI* variance explained by *GDP* innovations amounts to 14% after 12 periods in Argentina, while *GDP* innovations explain around 14.7% of the *CPI* variance in Brazil over the whole period. If interest rates responses are weakly significant or short-lived in all countries, *B_R* variance decompositions show the strong influence of *GDP*. For instance, *B_GDP* is the main explanatory variable of the *B_R* variable (23% in average over the whole period). Responses of real exchange rates to *GDP* shocks are very short-lived and weakly significant. As expected, a shock on *GDP* is followed by a real exchange rate appreciation.

We consider a shock on *CPI* as a nominal demand one. In all countries, *i_GDP* doen't not react to *i_CPI* shock. Responses of interest rates allow us to discriminate between credible and less credible countries. In Argentina and Chile, interest rates decrease or do not react after *CPI* shock. In these two countries, inflation expectations are well anchored by the monetary regime in place in each country. Recall that from 1991 to 2001, Argentina had experienced a currency board arrangement while Chile had adopted an inflation targeting framework since 1991. In countries with soft pegs and a monetary policy not based on inflation targeting framework –as Brazil, Mexico and Uruguay- inflation expectations are imperfectly anchored. So, in such countries, shocks on prices induce higher fluctuations. As expected, *CPI* shocks lead to real exchange rate appreciations. In comparison with countries beneficing from an imperfect monetary credibility, the responses of real exchange rate are short-lived in Argentina and Chile.

The innovations on nominal interest rates are monetary policy shocks. In countries where *GDP* responses to interest rates shocks are significant, as expected, *GDP* decreases. However, fluctuations are significant only at short-term. The responses of consumption prices contrast amongst countries. No price puzzle appears in Argentina and Chile: prices decrease after the interest rate shock. In Brazil, Mexico and to a lesser extent Uruguay, even if the reaction is significant at very short-run (less than 2 quarters) prices increases after the prices shocks. Prices movements can be interpreted as a Cavallo-Patman effect where higher interest rates increase production costs via the financing needs of working capital, leading to inflationary pressures (Taylor, 1981). Interest rates increases are followed by contemporaneous real exchange rate depreciation in Argentina, Chile and Mexico. If responses are short-live in Chile and Mexico –with a conventional overshooting effect in the latter country- accumulated responses show that real depreciation persist over the whole period in Argentina. Taking into account the absence of price puzzle in this economy, the result is probably based on prices decreases (due to the fact that nominal exchange rate has been unchanged over the main part of the studied period).

Finally, real exchange rates shocks do not produce significant fluctuations in other domestic variables. However, concerning the *GDP*, accumulated responses exhibit an interesting feature when significant: *GDP* decreases in the aftermath of the real depreciation (Brazil, Chile and Mexico). Thus, real depreciations are synonymous of economic activity slowdown at medium-term. This interpretation is strengthened by the behavior of *FOREX* variable. Indeed, *FOREX* tends to decrease after a real depreciation, i.e. capital flows out.

5. Conclusion

This work leads us to six main conclusions. First, our results converge to indicate that Latin American countries are strongly influenced by foreign variables. It is particularly the case in Argentina, in Brazil and in Chile, three countries strongly integrated on the international financial markets and into the foreign trade diversified by a geographical point of view. Second, contrary to several studies, we find that real channels seem as important as financial ones to explain the influence of foreign variables on domestic ones in the major part of the studied LACs. Third, our results confirm that *EMBI* shock is a global one, meaning that all countries are hit by such shock whatever may be their credibility. Fourth, our attempt to test the relevance of the sudden stop literature leads us to mixed conclusion. If our proxy of international capital inflows –the *FOREX* variables- is significantly explained by foreign financial variables, the analysis of domestic variables responses to *FOREX* shocks does not follow the predictions of the common knowledge. Fifth, contrary to Canova (2005), our estimates do not allow us to distinguish countries according to their exchange rate regimes. A better distinction to analyze the responses to similar shocks may be between the credibility degrees of our economies. Finally, from an OCA perspective, our study suggests that foreign variables engender a near-common business cycle in the region. Indeed, LACs tend to react similarly to same foreign shocks. An important question is to determine to what extent a monetary union may insular against such shocks. On this point, Edwards (2006) obtains a negative answer. Using probit panel regressions to investigate whether countries forming a monetary union have a lower occurrence of sudden stop episodes and of current account reversal episodes, and whether they are better able to absorb external shocks, he finds that belonging to a currency union has not lowered the probability of a sudden stop or a current account reversal, and external shocks have been amplified in currency union countries.

A next step of this paper could be the building of a VECM (Vector Error Correction Model) able to embody short and long run dynamics, allowing us to focus on respective speeds of adjustment. Indeed, very different speeds of adjustment could prejudice any project of monetary integration (except obviously for the endogenous OCA perspective).

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Appendix 1 Data and Sources

Data	Sources
GDP Group of Seven	OECD
World commodities prices excluding oil	IMF, International Financial Statistics
EMBI	Ministry of Economy and Production of the Republic of Argentina (http://www.mecon.gov.ar/peconomica/basehome/infoeco_ing.html)
GDP	IPEA (http://www.ipea.gov.br) for Argentina, Brazil, Chile, and Mexico Central Bank of the Republic of Uruguay
Consumption Prices Index	IMF, International Financial Statistics
Foreign Exchange Reserves	IMF, International Financial Statistics
Money Market Interest Rates	IMF, International Financial Statistics for Argentina, Brazil, Mexico, and Uruguay Central Bank of Chile for Chile
Real Exchange rates	IMF, International Financial Statistics for Chile and Uruguay Central Bank of Argentina for Argentina IPEA for Brazil OECD for Mexico

Appendix 2 Exchange Rate Regimes in the Selected Latin American Countries

Countries	*Year/Month*	*Exchange rate regime*	*Countries*	*Year/Month*	*Exchange rate regime*
Argentina	1990-M1	Independently floating	***Brazil (cont.)***	1998-M4	Forward-looking crawling peg
	1991-M1	Horizontal band		1999-M1	Independently floating
	1991-M3	Currency board	***Chile***	1990-M1	Backward-looking crawling peg
	2001M12	Managed floating		1998-M9	Forward-looking crawling peg
	2004M11	Other tightly managed floating		1999-M9	Independently floating
Brazil	1990-M1	Backward-looking crawling peg	***Mexico***	1990-M1	Forward-looking crawling peg
	1990-M3	Managed floating		1994-M12	Independently floating
	1991-M5	Backward-looking crawling peg	***Uruguay***	1990_M1	Backward-looking crawling peg
	1994-M7	Tightly managed		1992_M1	Forward-looking crawling peg
	1995-M3	Backward-looking crawling peg		2002-M6	Independently floating

Source: from A. Bubula and I. Ötker-Robe's Database.

Appendix 3: Structural breaks

International Variables

As the Commodity Prices than the EMBI are marked by a structural break from the last quarter of 2001, due to the simultaneity of a Commodity Prices hiking and a decrease of EMBI .

Domestic Variables

Argentina :
Except the economic mayhem at the beginning of the 90s, the only structural break (intercepts and trends) comes from the exchange rate collapse of 2002. Attacks on Foreign Reserves are perceptible since 2001, with the unhooking of both the Foreign Reserves and the Interest Rate. About one year later, it hits the Exchange Rate, the GDP and the CPI.
Let us note in particular than the Tequila contagion (after the Mexican Crisis of 1994-95) is not obviously perceptible.

Brazil:
Two well known events are worthy of note: the Real Plan in 1994 and the currency crash of 1998-99. But in 2002, the Argentinean crisis contagion and the political uncertainty of the presidential election weighted on the Exchange Rate. Except this point, we had to introduce a break for 1994 in the CPI, the Foreign Reserves, and the Interest Rate (but curiously neither for the real Exchange Rate nor the GDP). The 1998-1999 crisis hits significantly the Exchange Rate and the Foreign Reserves (but neither the CPI nor the interest rate).

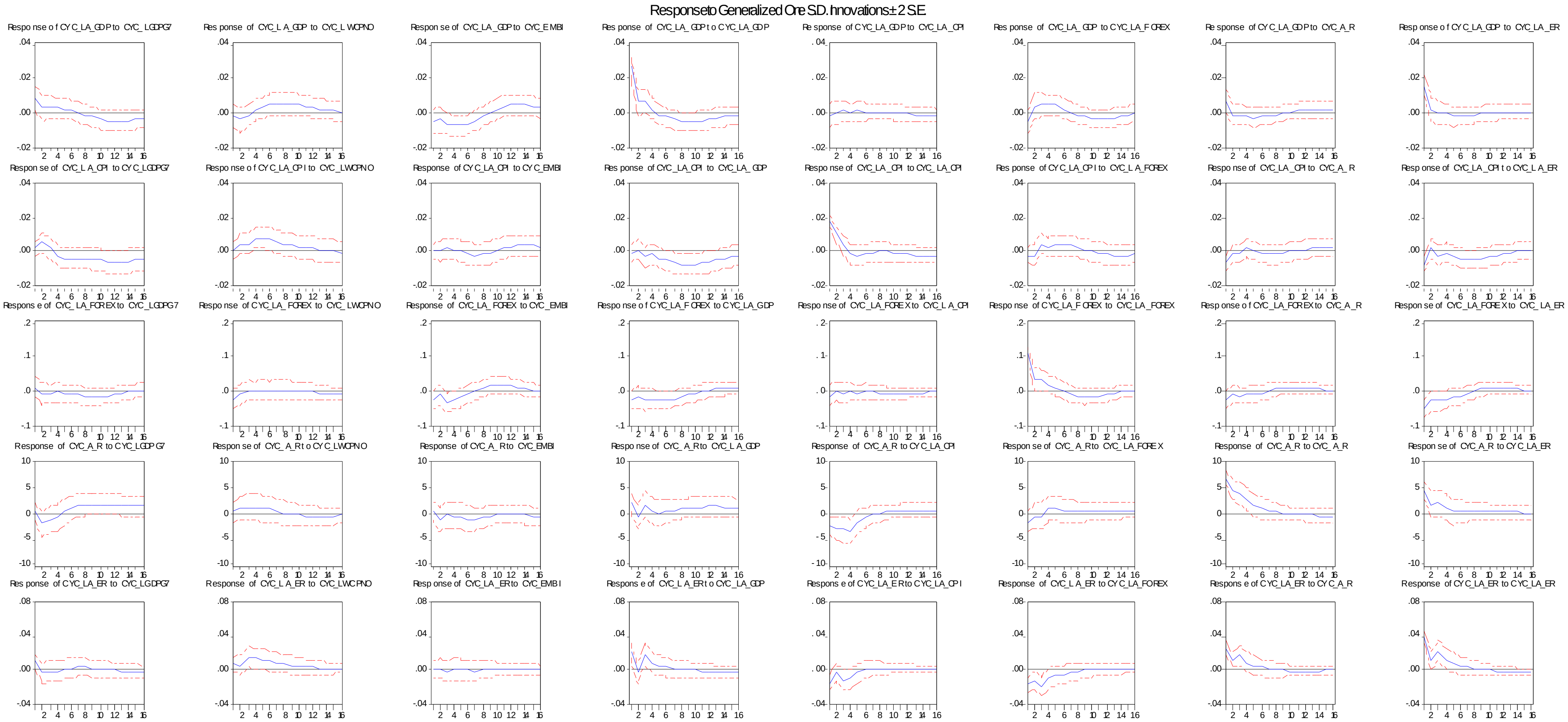
Chili:
Chilean economy is particularly sensible to the international financial mayhem: so, the main break is due to the Asian Crisis, in 1997, hitting all the variables except the GDP. But the uncertainty following the Argentinean crisis is perceptible also on the Exchange Rate as on the Interest Rate.

Mexico:
Obviously, the Currency Crash of 1994-95 hit all the variables real and nominal, beginning the last quarter of 1994 with the Foreign Reserves, the Interest Rate, and then hurting the Exchange Rate, the CPI, and the GDP in 1995.

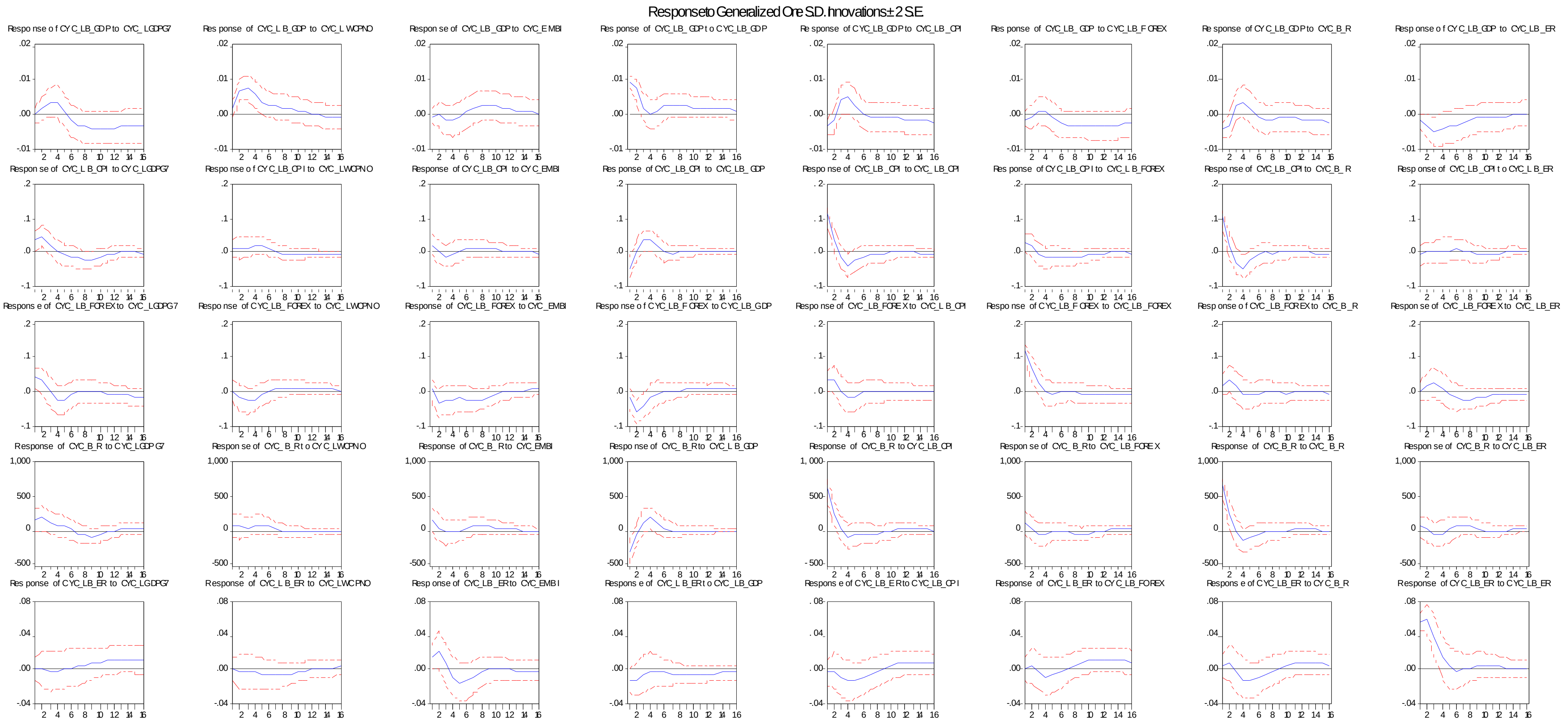
Uruguay:
The introduction of structural breaks in the case of Uruguay could be discussed. Although some shocks are obviously non-random one, the high frequency of macro-fluctuations in the Uruguayan case turns the break detection difficult. However, two shocks are clearly perceptible, with a break on the GDP (due to the Brazilian Currency Crash at the end of 1998) and a break on all the macroeconomic variables (except the CPI) after the Argentinean Crisis of 2002.

Appendix 4 Forecast Error Generalized Impulse Responses of One Standard Deviation (Innovations ±2 SE)

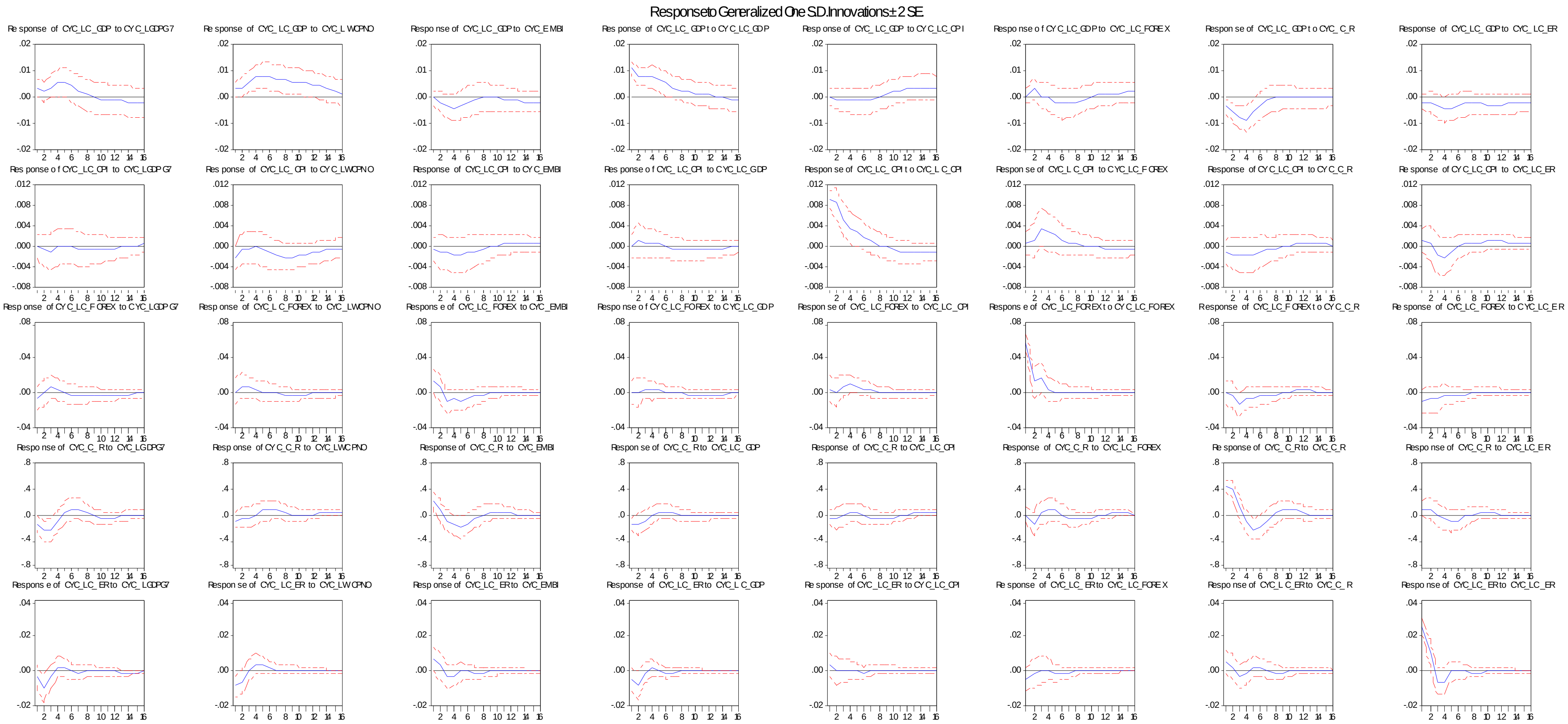
Argentina



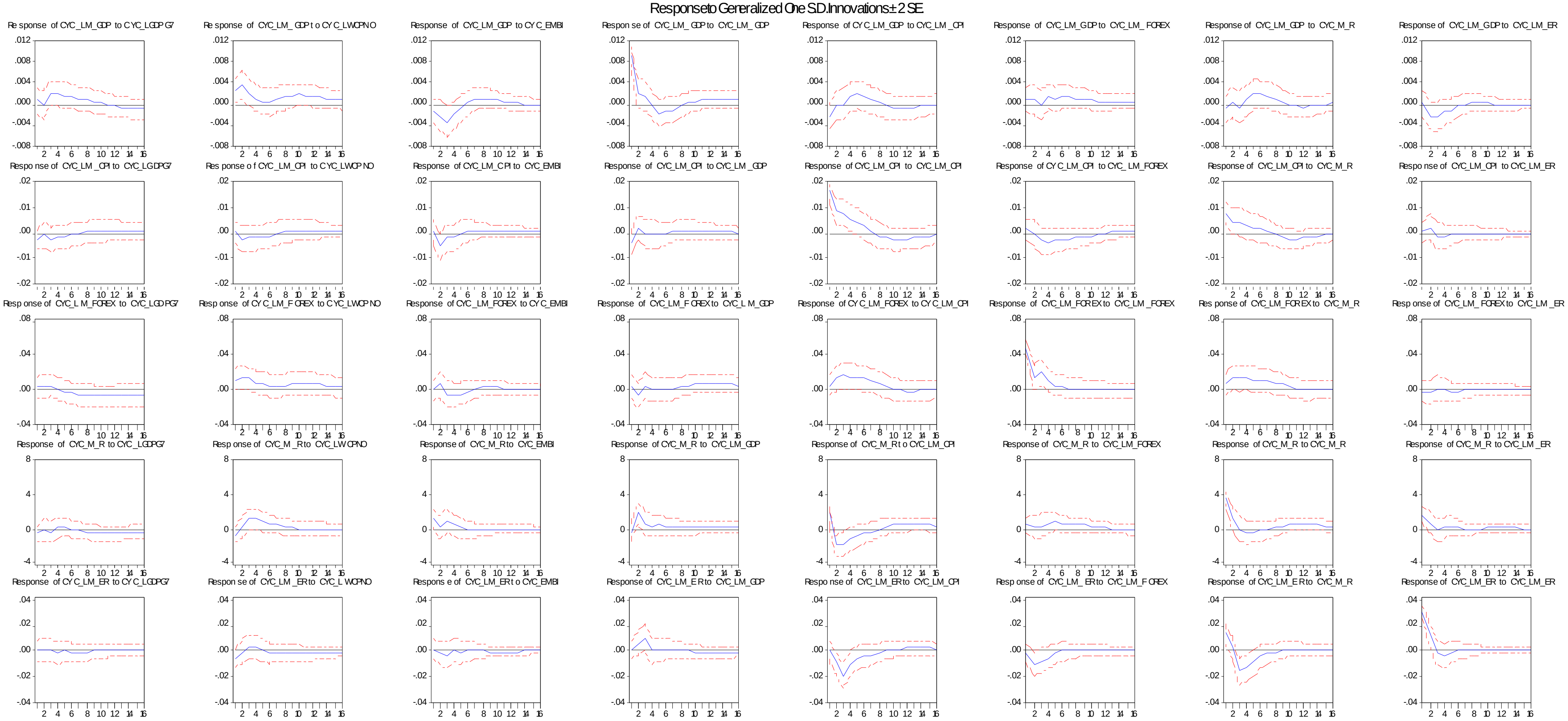
Brazil



Chile

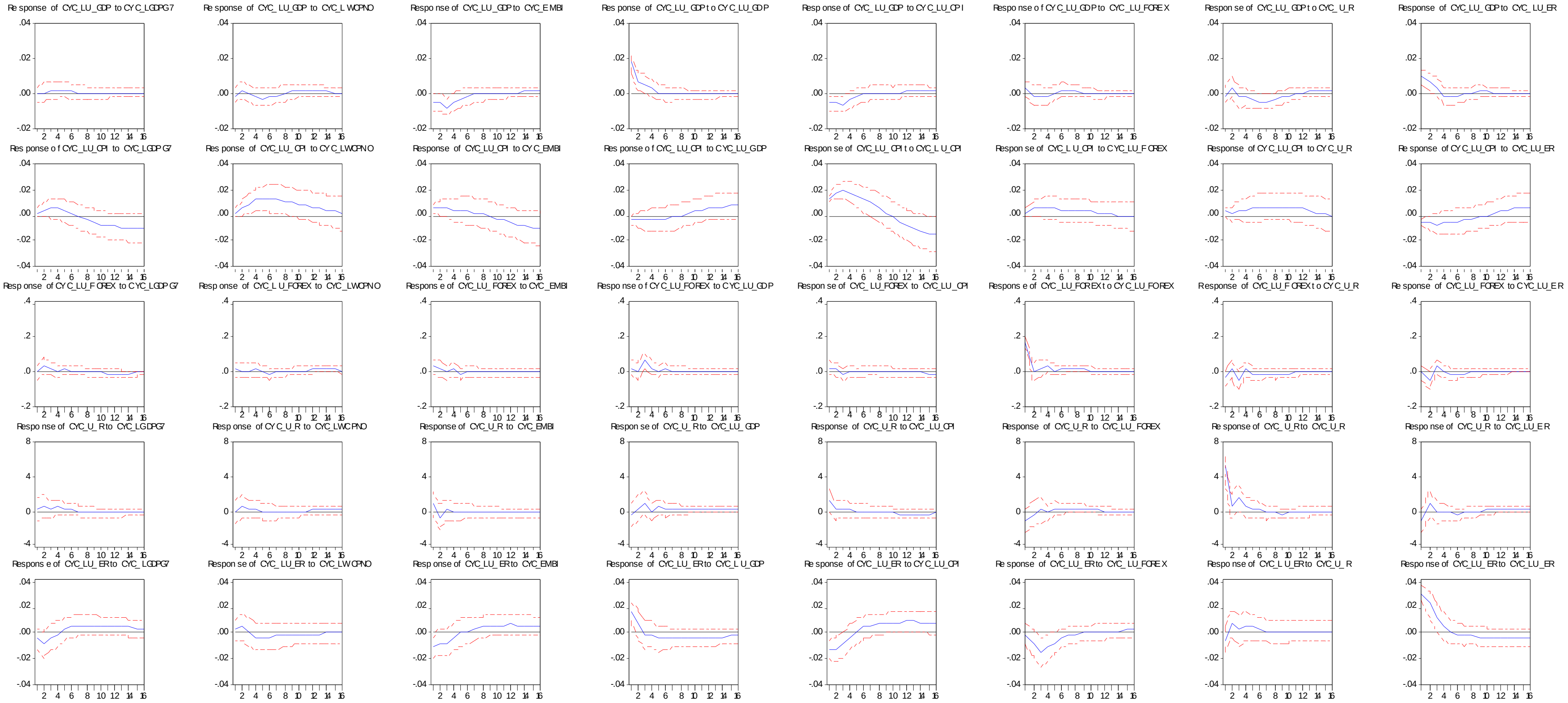


Mexico



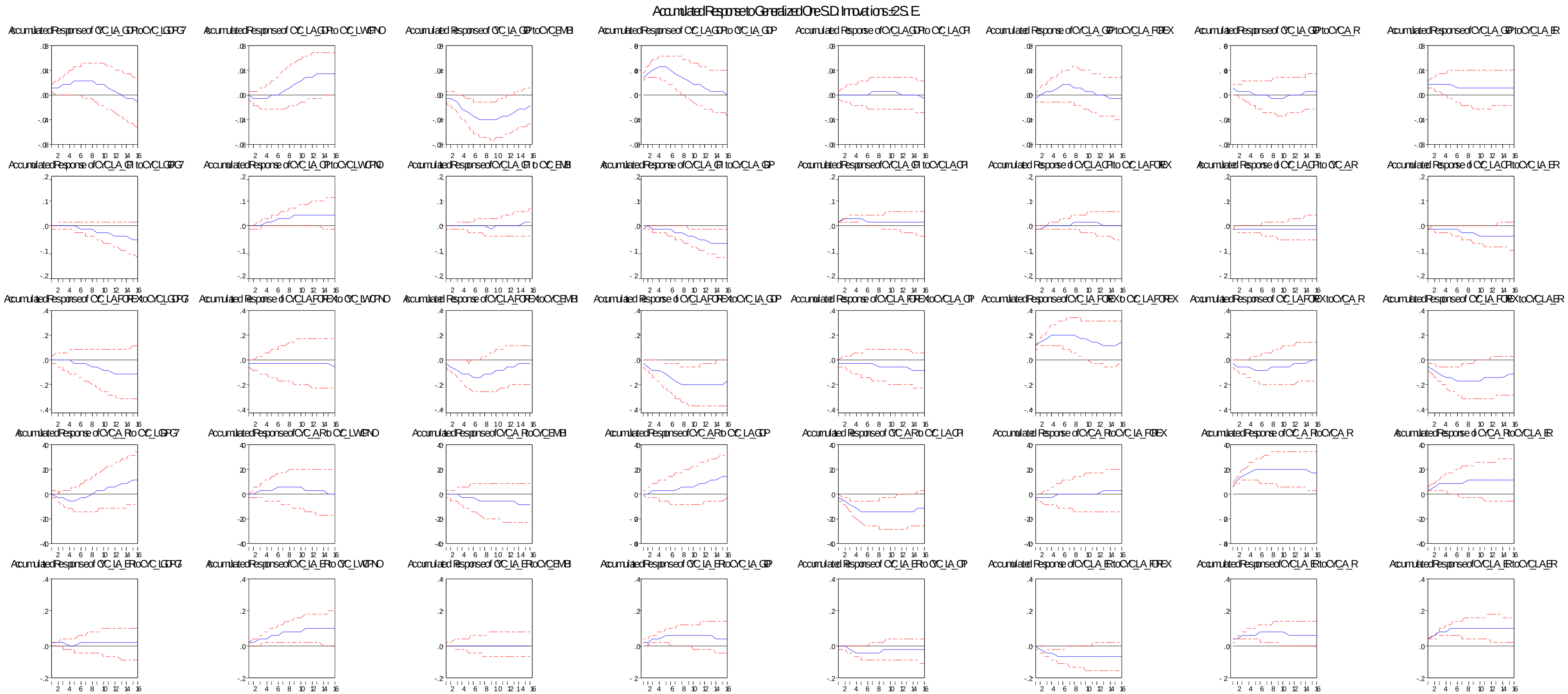
Uruguay

Response to Generalized One S.D. Innovations ± 2 S.E.

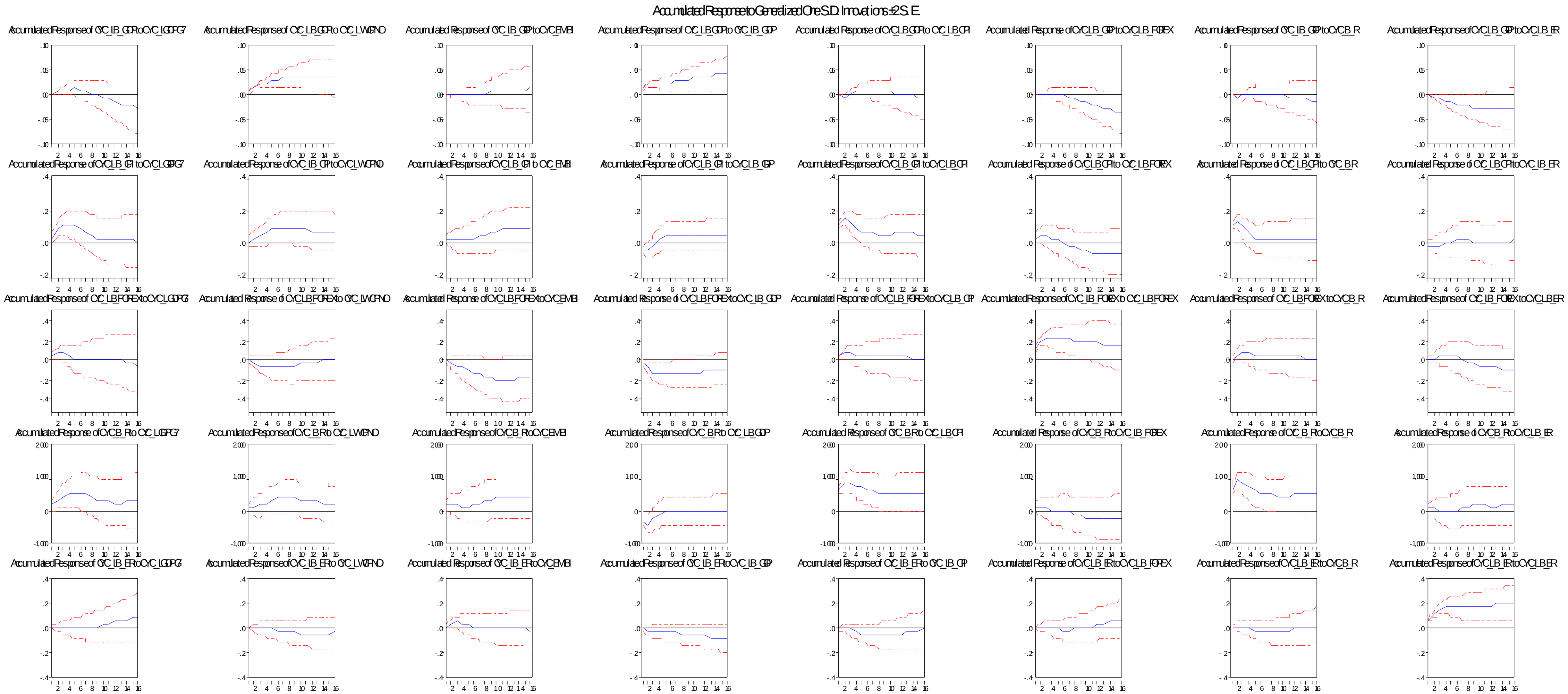


Appendix 5 Accumulated Responses to Generalized S.D. Innovations (Innovations ±2 SE))

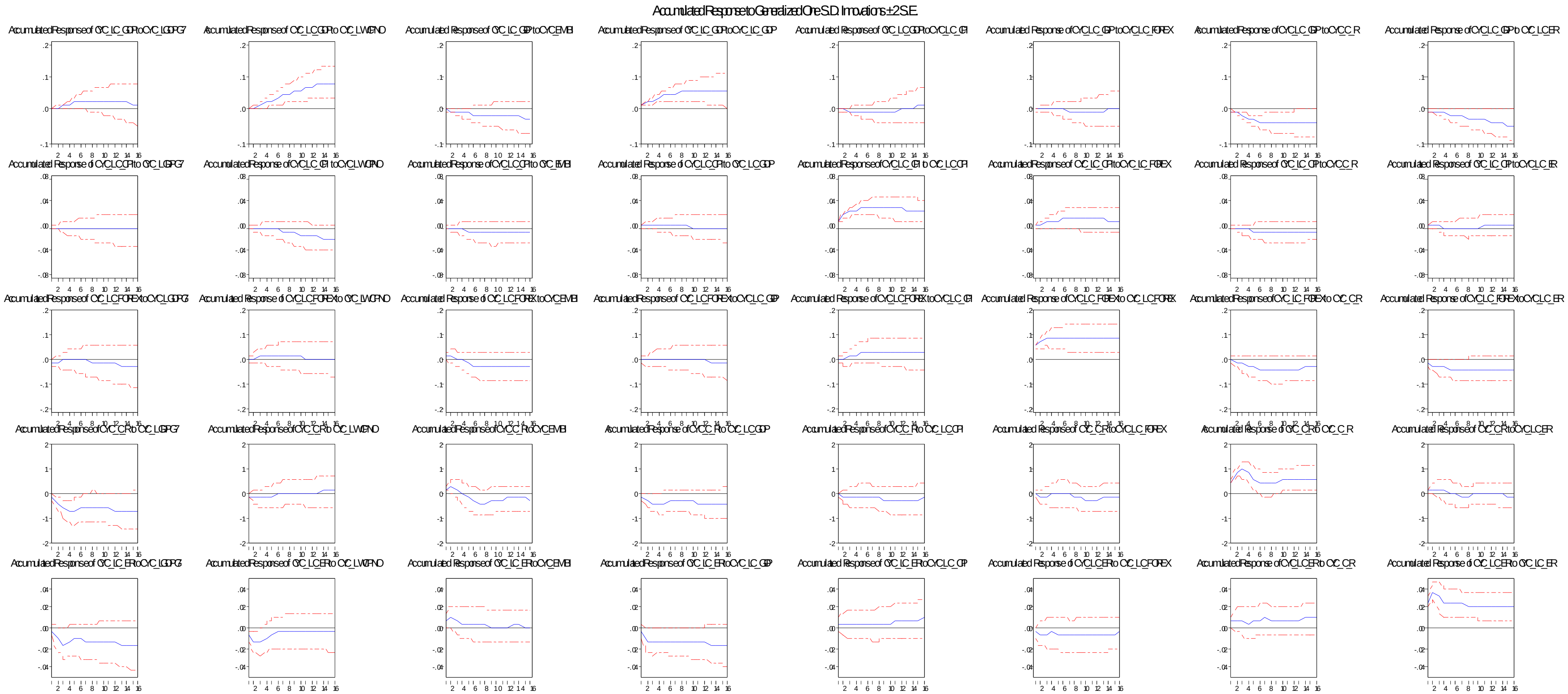
Argentina



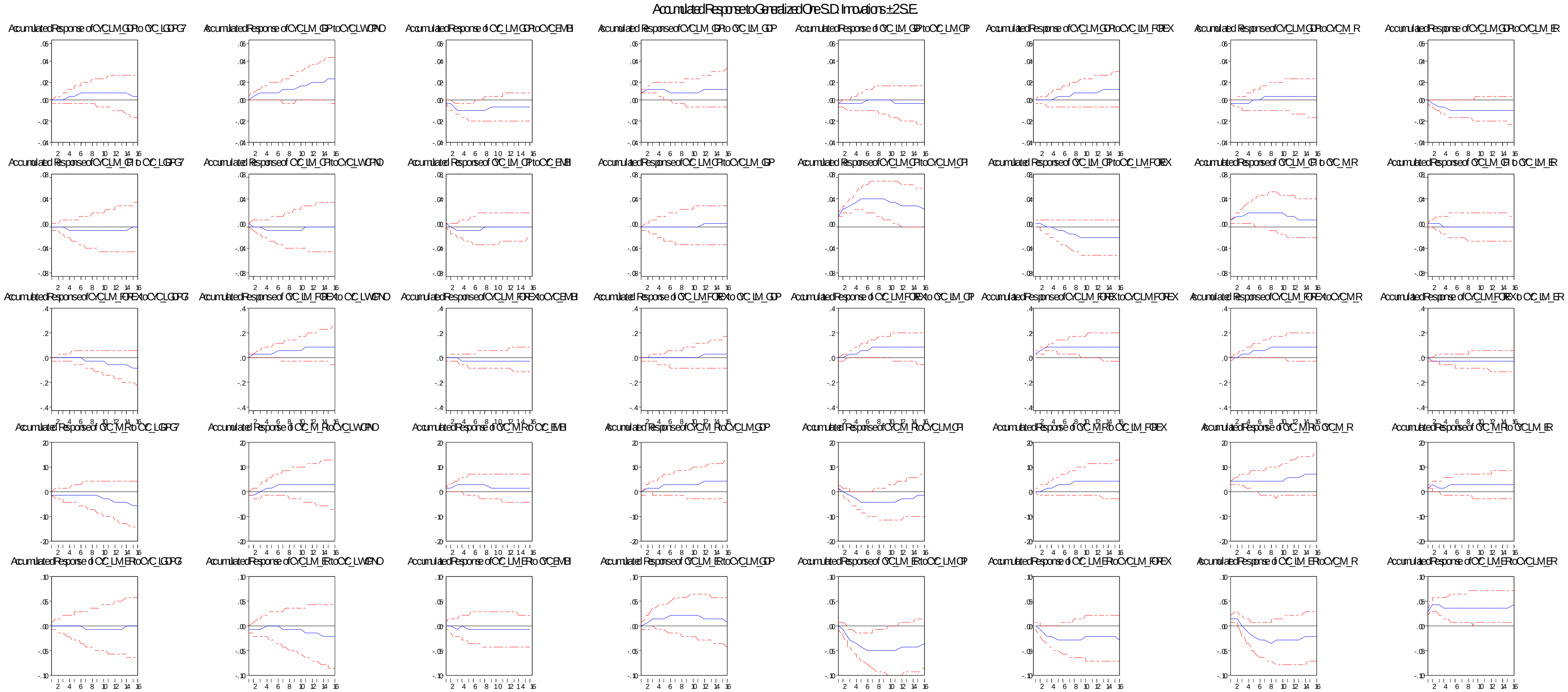
Brazil



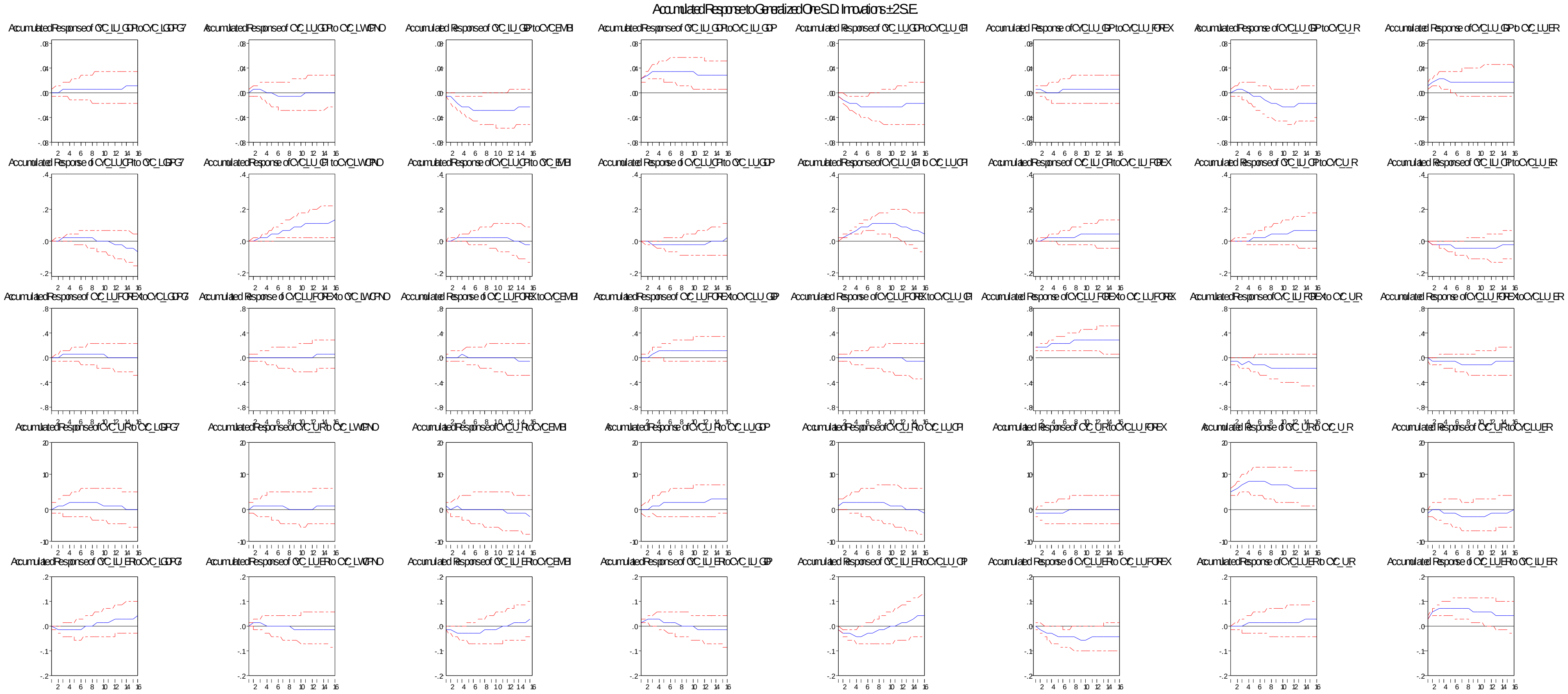
Chile


Accumulated Response to Generalized One S.D. Innovations ± 2 S.E.

Mexico


Accumulated Response to Generalized One S.D. Innovations ± 2 S.E.

Uruguay


Accumulated Response to Generalized One S.D. Innovations ± 2 S.E.

Appendix 6 Forecast Error Variance Decomposition, in percentage

Argentina

Variance Decomposition of CYC_LA_GDP:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LA_GDP	CYC_ LA_CPI	CYC_ LA_FOREX	CYC_ A_R	CYC_ LA_ER
1	8.79	1.37	0.78	89.06	0.00	0.00	0.00	0.00
2	8.73	4.14	2.55	82.82	0.03	1.24	0.31	0.17
4	9.04	4.01	**10.35**	71.03	0.18	4.53	0.54	0.33
8	7.83	9.50	**17.15**	60.03	0.21	4.45	0.50	0.34
12	**10.83**	**13.99**	**15.50**	52.71	0.21	5.46	0.76	0.55
16	**14.47**	**13.86**	**15.83**	48.42	0.49	5.21	1.18	0.54

Variance Decomposition of CYC_LA_CPI:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LA_GDP	CYC_ LA_CPI	CYC_ LA_FOREX	CYC_ A_R	CYC_ LA_ER
1	1.00	0.00	0.28	0.72	98.00	0.00	0.00	0.00
2	5.71	2.65	1.46	0.52	83.41	0.04	0.54	5.66
4	5.16	**14.27**	2.29	1.97	59.40	9.86	2.40	4.66
8	8.63	**25.74**	3.00	8.01	37.56	*11.81*	1.82	3.43
12	**14.53**	**23.64**	2.76	*14.04*	30.30	9.77	2.20	2.76
16	**19.24**	**21.48**	3.40	*13.42*	27.82	9.31	2.86	2.47

Variance Decomposition of CYC_LA_FOREX:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LA_GDP	CYC_ LA_CPI	CYC_ LA_FOREX	CYC_ A_R	CYC_ LA_ER
1	1.43	5.04	4.28	9.70	1.94	77.61	0.00	0.00
2	1.55	5.10	5.29	*11.16*	1.71	74.25	0.15	0.79
4	1.64	4.04	**15.40**	*16.04*	1.61	59.94	0.12	1.21
8	3.36	3.73	**15.95**	*22.40*	1.57	51.54	0.38	1.08
12	5.89	3.54	**17.12**	*20.77*	1.89	48.88	0.86	1.06
16	5.97	3.84	**17.21**	*21.20*	2.01	47.78	0.91	1.07

Variance Decomposition of CYC_A_R:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LA_GDP	CYC_ LA_CPI	CYC_ LA_FOREX	CYC_ A_R	CYC_ LA_ER
1	0.17	0.02	1.08	8.25	*13.47*	3.99	73.03	0.00
2	5.80	1.99	4.62	4.66	*16.86*	3.25	62.24	0.58
4	5.29	3.71	3.56	7.37	*26.08*	2.99	46.11	4.88
8	8.78	3.99	4.19	6.53	*25.50*	3.19	41.62	6.21
12	**14.30**	4.73	3.89	7.01	*23.35*	3.05	37.92	5.75
16	**17.42**	5.54	3.62	7.49	*21.92*	3.50	35.23	5.27

Variance Decomposition of CYC_LA_ER:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LA_GDP	CYC_ LA_CPI	CYC_ LA_FOREX	CYC_ A_R	CYC_ LA_ER
1	5.88	1.57	0.68	*31.30*	*13.78*	*12.42*	9.14	25.23
2	5.54	3.05	0.60	*25.11*	*11.76*	*19.90*	*12.99*	21.04
4	3.36	**14.93**	0.43	*30.93*	*12.44*	*17.53*	8.33	12.05
8	3.56	**22.58**	0.50	*28.63*	*11.35*	*15.59*	7.29	10.51
12	3.55	**23.86**	0.62	*27.92*	*11.23*	*15.49*	7.11	10.22
16	3.95	**23.86**	0.62	*27.98*	*11.09*	*15.44*	7.01	10.06

Brazil

Variance Decomposition of CYC_LB_GDP:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LB_GDP	CYC_ LB_CPI	CYC_ LB_FOREX	CYC_ B_R	CYC_ LB_ER
1	0.15	3.66	0.25	95.94	0.00	0.00	0.00	0.00
2	1.40	**27.42**	0.16	65.59	0.24	0.02	2.38	2.77
4	8.08	**34.98**	0.66	35.28	*10.16*	0.14	3.49	7.21
8	**11.89**	**32.75**	1.35	27.29	9.27	2.81	5.67	8.97
12	**20.34**	**28.53**	2.06	23.65	7.58	5.09	5.29	7.46
16	**25.24**	**25.37**	1.86	21.99	6.99	6.45	5.33	6.77

Variance Decomposition of CYC_LB_CPI:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LB_GDP	CYC_ LB_CPI	CYC_ LB_FOREX	CYC_ B_R	CYC_ LB_ER
1	9.84	0.02	8.07	*14.16*	67.91	0.00	0.00	0.00
2	**22.33**	0.07	7.07	*10.73*	54.65	0.01	4.21	0.94
4	**18.87**	2.54	5.21	*16.64*	44.25	0.85	9.12	2.51
8	**19.92**	5.45	5.50	*15.09*	40.62	1.54	9.03	2.84
12	**21.19**	5.32	5.72	*14.64*	39.30	1.88	8.70	3.26
16	**21.04**	5.39	5.70	*14.58*	39.15	1.88	8.64	3.62

Variance Decomposition of CYC_LB_FOREX:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LB_GDP	CYC_ LB_CPI	CYC_ LB_FOREX	CYC_ B_R	CYC_ LB_ER
1	**11.97**	0.58	1.20	1.32	1.09	83.84	0.00	0.00
2	**11.34**	3.75	4.27	*13.25*	1.96	63.26	1.49	0.68
4	**10.72**	6.04	8.19	*15.65*	2.01	49.48	6.69	1.23
8	**11.47**	5.67	**13.51**	*14.05*	2.37	44.09	6.33	2.51
12	**11.17**	6.86	**13.73**	*13.55*	2.48	42.22	6.67	3.33
16	**12.29**	7.55	**13.24**	*13.30*	2.47	41.03	6.64	3.49

Variance Decomposition of CYC_B_R:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LB_GDP	CYC_ LB_CPI	CYC_ LB_FOREX	CYC_ B_R	CYC_ LB_ER
1	5.07	0.08	8.91	*24.40*	*51.47*	0.72	9.35	0.00
2	**10.19**	0.10	8.67	*21.57*	*49.45*	2.15	7.83	0.03
4	**11.04**	0.78	7.08	*24.61*	*41.25*	3.41	11.72	0.12
8	**11.23**	2.12	6.99	*23.15*	*38.91*	3.23	12.84	1.52
12	**12.80**	2.22	7.12	*22.44*	*37.88*	3.36	12.60	1.58
16	**12.84**	2.46	7.08	*22.31*	*37.70*	3.36	12.52	1.73

Variance Decomposition of CYC_LB_ER:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LB_GDP	CYC_ LB_CPI	CYC_ LB_FOREX	CYC_ B_R	CYC_ LB_ER
1	0.07	0.02	5.91	5.02	8.46	0.08	9.56	70.88
2	0.03	0.18	**10.10**	3.88	6.77	0.10	10.41	68.52
4	0.06	0.27	9.17	3.29	*10.18*	0.64	9.15	67.24
8	0.34	2.32	**13.21**	3.29	*11.95*	1.13	8.37	59.39
12	3.27	3.15	**12.34**	3.76	*11.22*	2.40	8.73	55.13
16	7.54	3.02	**11.54**	3.92	*10.76*	3.19	8.48	51.54

Chile

Variance Decomposition of CYC_LC_GDP:

Period	CYC_LGDPG7	CYC_LWCPNO	CYC_EMBI	CYC_LC_GDP	CYC_LC_CPI	CYC_LC_FOREX	CYC_C_R	CYC_LC_ER
1	8.50	3.29	0.13	88.08	0.00	0.00	0.00	0.00
2	7.25	6.95	0.66	75.23	0.08	5.13	3.77	0.93
4	**13.25**	**17.48**	3.24	50.96	0.26	2.89	*11.27*	0.65
8	**14.35**	**34.06**	2.35	34.29	0.39	5.33	7.92	1.31
12	**11.57**	**40.49**	1.97	27.20	5.52	4.57	6.30	2.38
16	**11.24**	**38.69**	2.33	23.27	*11.71*	4.33	5.49	2.93

Variance Decomposition of CYC_LC_CPI:

Period	CYC_LGDPG7	CYC_LWCPNO	CYC_EMBI	CYC_LC_GDP	CYC_LC_CPI	CYC_LC_FOREX	CYC_C_R	CYC_LC_ER
1	0.04	5.17	1.18	0.31	93.30	0.00	0.00	0.00
2	0.39	2.82	1.77	1.87	92.95	0.14	0.00	0.07
4	0.74	1.95	3.52	1.94	81.76	8.75	0.03	1.31
8	1.00	5.24	6.35	1.78	72.72	*11.40*	0.16	1.34
12	1.36	8.69	6.05	1.75	69.67	*10.67*	0.25	1.57
16	1.37	9.15	5.95	1.73	69.37	*10.48*	0.24	1.71

Variance Decomposition of CYC_LC_FOREX:

Period	CYC_LGDPG7	CYC_LWCPNO	CYC_EMBI	CYC_LC_GDP	CYC_LC_CPI	CYC_LC_FOREX	CYC_C_R	CYC_LC_ER
1	1.19	0.33	5.32	0.09	1.34	91.72	0.00	0.00
2	1.11	2.50	6.22	0.16	1.54	87.47	0.44	0.56
4	2.07	2.65	8.42	0.33	5.24	80.12	0.69	0.47
8	2.35	2.57	**11.73**	0.51	6.45	75.09	0.77	0.53
12	3.15	2.66	**11.59**	0.71	6.61	73.94	0.81	0.52
16	3.46	2.65	**11.52**	0.87	6.63	73.49	0.85	0.52

Variance Decomposition of CYC_C_R:

Period	CYC_LGDPG7	CYC_LWCPNO	CYC_EMBI	CYC_LC_GDP	CYC_LC_CPI	CYC_LC_FOREX	CYC_C_R	CYC_LC_ER
1	9.09	1.44	**20.53**	6.19	0.67	1.74	60.35	0.00
2	**20.09**	0.76	**10.47**	4.55	1.13	9.24	53.54	0.22
4	**26.84**	0.74	**15.55**	3.53	0.98	8.59	43.44	0.31
8	**24.20**	1.75	**19.66**	3.19	1.36	9.87	39.61	0.35
12	**24.15**	1.76	**19.69**	3.28	1.75	*10.78*	38.24	0.34
16	**24.00**	2.01	**19.54**	3.31	2.14	*10.74*	37.88	0.38

Variance Decomposition of CYC_LC_ER:

Period	CYC_LGDPG7	CYC_LWCPNO	CYC_EMBI	CYC_LC_GDP	CYC_LC_CPI	CYC_LC_FOREX	CYC_C_R	CYC_LC_ER
1	0.80	10.38	4.60	1.44	0.92	6.54	0.02	75.30
2	**11.73**	9.75	3.59	4.04	0.75	5.58	1.72	62.86
4	**12.25**	**10.27**	4.27	3.62	0.79	5.26	2.52	61.03
8	**12.15**	**11.18**	4.26	3.81	0.87	5.56	3.86	58.31
12	**12.12**	**11.19**	4.26	3.83	1.15	5.55	3.90	57.99
16	**12.29**	**11.15**	4.26	3.86	1.25	5.57	3.92	57.69

Mexico

Variance Decomposition of CYC_LM_GDP:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LM_GDP	CYC_ LM_CPI	CYC_ LM_FOREX	CYC_ M_R	CYC_ LM_ER
1	0.46	6.07	1.98	91.49	0.00	0.00	0.00	0.00
2	0.48	**15.16**	5.26	68.90	0.07	0.00	3.15	6.99
4	4.76	**13.41**	**11.87**	50.20	1.54	1.24	3.50	*13.47*
8	6.49	**11.45**	**10.93**	43.77	2.87	2.84	7.31	*14.35*
12	6.15	**15.05**	**11.03**	40.47	4.12	2.89	7.03	*13.27*
16	7.26	**16.17**	**10.53**	39.31	4.45	2.84	6.76	*12.68*

Variance Decomposition of CYC_LM_CPI:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LM_GDP	CYC_ LM_CPI	CYC_ LM_FOREX	CYC_ M_R	CYC_ LM_ER
1	3.15	0.23	0.35	8.07	88.21	0.00	0.00	0.00
2	2.15	1.52	8.36	6.00	80.96	0.16	0.77	0.09
4	3.20	2.21	7.68	4.25	73.78	4.94	1.00	2.95
8	3.38	2.56	7.19	4.04	69.57	9.14	0.96	3.18
12	3.46	2.96	6.95	4.13	68.23	9.56	1.66	3.06
16	3.68	3.05	6.82	4.04	68.17	9.48	1.78	2.99

Variance Decomposition of CYC_LM_FOREX:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LM_GDP	CYC_ LM_CPI	CYC_ LM_FOREX	CYC_ M_R	CYC_ LM_ER
1	0.15	5.66	0.00	0.01	1.02	93.16	0.00	0.00
2	0.39	**10.82**	1.28	3.18	3.35	74.20	4.86	1.92
4	0.72	**12.11**	1.79	2.56	*14.38*	58.32	8.08	2.05
8	2.85	**12.07**	2.03	2.32	*19.26*	47.29	*10.12*	4.05
12	6.85	**14.07**	1.94	4.27	*17.32*	42.40	9.50	3.66
16	9.62	**14.47**	1.90	5.78	*16.24*	39.63	8.89	3.48

Variance Decomposition of CYC_M_R:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LM_GDP	CYC_ LM_CPI	CYC_ LM_FOREX	CYC_ M_R	CYC_ LM_ER
1	2.88	2.85	9.03	0.03	*20.93*	1.70	62.58	0.00
2	1.66	1.58	5.13	*13.57*	*20.78*	1.26	54.82	1.20
4	1.54	7.75	6.83	*10.18*	*29.28*	1.84	40.67	1.91
8	1.93	9.92	6.33	9.41	*29.25*	4.04	36.49	2.62
12	4.44	9.37	6.18	8.97	*29.02*	4.42	35.03	2.57
16	6.16	8.93	6.10	8.80	*29.40*	4.33	33.75	2.52

Variance Decomposition of CYC_LM_ER:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LM_GDP	CYC_ LM_CPI	CYC_ LM_FOREX	CYC_ M_R	CYC_ LM_ER
1	0.00	3.86	0.09	0.48	0.25	0.00	*23.13*	72.20
2	0.01	2.91	0.52	3.50	4.13	6.97	*23.57*	58.40
4	0.20	2.77	0.77	6.64	*23.77*	7.80	*21.64*	36.40
8	0.43	2.91	0.79	6.33	*24.42*	7.27	*23.72*	34.13
12	0.46	3.65	0.98	6.31	*24.45*	7.30	*23.33*	33.52
16	0.62	4.25	1.00	6.49	*24.67*	7.17	*22.91*	32.90

Uruguay

Variance Decomposition of CYC_LU_GDP:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LU_GDP	CYC_ LU_CPI	CYC_ LU_FOREX	CYC_ U_R	CYC_ LU_ER
1	0.29	0.31	8.38	91.02	0.00	0.00	0.00	0.00
2	0.30	1.04	**11.31**	76.21	2.92	0.47	6.90	0.85
4	0.95	2.36	**23.16**	57.79	4.50	0.43	5.47	5.32
8	1.39	4.30	**21.11**	47.40	3.75	2.97	*12.01*	7.07
12	1.36	4.98	**20.52**	46.21	3.65	3.07	*12.66*	7.55
16	1.43	5.20	**20.55**	45.50	3.78	3.19	*12.78*	7.58

Variance Decomposition of CYC_LU_CPI:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LU_GDP	CYC_ LU_CPI	CYC_ LU_FOREX	CYC_ U_R	CYC_ LU_ER
1	2.62	1.02	**15.81**	3.88	76.67	0.00	0.00	0.00
2	4.92	3.77	**12.90**	1.60	74.29	1.35	1.15	0.01
4	5.49	**14.86**	**11.47**	0.90	65.42	1.35	0.49	0.01
8	3.78	**32.85**	9.11	0.59	47.58	1.07	4.14	0.89
12	8.80	**34.31**	7.75	1.52	34.51	0.90	9.49	2.73
16	**13.37**	**26.91**	**12.79**	2.51	30.83	0.67	9.31	3.61

Variance Decomposition of CYC_LU_FOREX:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LU_GDP	CYC_ LU_CPI	CYC_ LU_FOREX	CYC_ U_R	CYC_ LU_ER
1	0.03	0.78	3.24	4.10	0.90	90.95	0.00	0.00
2	3.12	0.72	3.84	3.82	0.80	80.01	0.06	7.63
4	3.02	0.86	3.41	*13.81*	0.77	63.47	8.05	6.62
8	3.04	1.29	3.45	*13.11*	0.92	59.17	8.63	*10.39*
12	3.47	1.95	3.70	*12.72*	0.95	57.86	8.95	*10.39*
16	4.03	2.99	4.07	*12.36*	1.25	56.25	8.94	*10.09*

Variance Decomposition of CYC_U_R:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LU_GDP	CYC_ LU_CPI	CYC_ LU_FOREX	CYC_ U_R	CYC_ LU_ER
1	0.05	0.02	3.43	0.02	2.49	6.54	87.45	0.00
2	1.12	0.40	4.64	0.14	2.79	6.38	82.04	2.49
4	1.69	0.48	4.19	3.18	3.09	5.92	78.83	2.61
8	1.78	0.74	4.07	3.67	2.98	6.51	74.89	5.35
12	2.36	0.78	4.53	3.66	3.25	6.73	73.21	5.49
16	2.71	0.90	5.09	3.60	3.75	6.63	71.92	5.40

Variance Decomposition of CYC_LU_ER:

Period	CYC_ LGDPG7	CYC_ LWCPNO	CYC_ EMBI	CYC_ LU_GDP	CYC_ LU_CPI	CYC_ LU_FOREX	CYC_ U_R	CYC_ LU_ER
1	2.77	1.37	**14.85**	*19.45*	4.60	0.20	2.01	54.76
2	6.41	3.18	**11.41**	*12.21*	7.23	4.20	5.03	50.32
4	5.25	2.86	**11.55**	9.62	7.95	*14.87*	4.12	43.79
8	7.75	4.62	**10.88**	*10.44*	8.11	*14.65*	3.91	39.62
12	**10.34**	4.61	**14.09**	9.55	*10.28*	*12.69*	3.60	34.83
16	**10.93**	4.36	**16.57**	8.76	*12.96*	*11.53*	3.30	31.60