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Macroeconomic Policy Responses to Financial Crises in Emerging European Economies

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Abstract:

This paper contributes to the literature on monetary policy responses in emerging economies to international financial crises. Such issue is especially relevant for these countries insofar as they tend to be more unstable than developed countries. In addition, they suffer from larger cumulative output losses that have long-lasting negative effects on growth. If the earlier literature has suggested that emerging countries conduct pro-cyclical policies that exacerbate the impact of shocks, recent findings drawn from the experience of the global financial crisis show that they tend to more frequently adopt counter-cyclical monetary policies. However, even in the last crisis, all countries did not conduct expansionary monetary policies. Among the factors explaining such a behavior, the literature identifies the currency mismatch. This paper is related to this literature. It analyzes monetary policy responses to common financial shocks over the period 1995-2010 for a sample of ten emerging European countries. Emerging Europe has especially suffered from the global financial crisis. Three monetary instruments are analyzed: the nominal short-term interest rate, the real exchange rate, the foreign exchange reserves. Our empirical methodology used Structural Bayesian vector autoregressive (SBVAR) models over two crises periods (1995Q1-2001Q4 and 2002Q1-2010Q4). Our main findings are the following. First, common international financial shocks lead to different monetary policy responses. Second, countries with high currency mismatch ratios suffer from both fear of floating and fear of losing international reserves.

Key words: Financial crises, External shocks, Emerging European Countries, Structural Bayesian VAR model.

JEL: G1, E5, E6.

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Abstract:

This paper contributes to the literature on monetary policy responses in emerging economies to international financial crises. Such issue is especially relevant for these countries insofar as they tend to be more unstable than developed countries. In addition, they suffer from larger cumulative output losses that have long-lasting negative effects on growth. If the earlier literature has suggested that emerging countries conduct pro-cyclical policies that exacerbate the impact of shocks, recent findings drawn from the experience of the global financial crisis show that they tend to more frequently adopt counter-cyclical monetary policies. However, even in the last crisis, all countries did not conduct expansionary monetary policies. Among the factors explaining such a behavior, the literature identifies the currency mismatch. This paper is related to this literature. It analyzes monetary policy responses to common financial shocks over the period 1995-2010 for a sample of ten emerging European countries. Emerging Europe has especially suffered from the global financial crisis. Three monetary instruments are analyzed: the nominal short-term interest rate, the real exchange rate, the foreign exchange reserves. Our empirical methodology used Structural Bayesian vector autoregressive (SBVAR) models over two crises periods (1995Q1-2001Q4 and 2002Q1-2010Q4). Our main findings are the following. First, common international financial shocks lead to different monetary policy responses. Second, countries with high currency mismatch ratios suffer from both fear of floating and fear of losing international reserves.

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1. Introduction

This paper investigates policy options available for emerging economies to cope with financial crises. Focusing on monetary policy, we provide some answers to the following question: how do emerging markets respond to financial crises? Such issue is especially relevant for emerging countries. First, as stressed by the empirical literature on business cycles (see, for instance, Kose and Prasad, 2010; Claessens et al., 2011), the volatility of macroeconomic variables tends to be higher in emerging economies relative to advanced countries. Second, Kose and Prasad (2010) show that the amplitude of recessions is three times larger in emerging markets in comparison to advanced economies. Emerging economies suffer from larger cumulative output losses while recessions associated with financial crises exert long-lasting negative effects on growth (Cerra and Saxena, 2008; Balakrishnan et al., 2011).

An extensive literature suggests that emerging countries tend to adopt pro-cyclical policies that exacerbate the impact of negative shocks. For instance, Calderón et al (2003) find, for a sample of 12 emerging economies with annual data covering the period 1996-2002 (except for Chile, 1991-2003), that countries suffering from lower credibility –proxied by the country risk spread on sovereign debt- are unable to conduct counter-cyclical macroeconomic policies. This finding is robust to different measures of fiscal and monetary policy stances. In a study based on a large sample of advanced and developing countries for the period 1960-2003, Kaminsky et al. (2005) show that developing and emerging countries exhibit pro-cyclical fiscal and monetary policies, amplifying the destabilizing effects of capital inflows. On the contrary, in OECD countries, authorities conduct counter-cyclical policies that mitigate the negative effects of capital flows on output. Several factors explain the adoption of pro-cyclical policies in developing and emerging countries: political distortions, weak institutions, and capital markets imperfections.

The global financial crisis of 2008-09 has led to a renewed interest of the analysis concerning economic policy responses to financial crises in emerging countries (See, for instance, Ghosh et al., 2009; IMF, 2010). A growing number of studies have provided new empirical evidences according to which emerging economies tend to more frequently adopt counter-cyclical monetary policies to face crises. Monetary authorities have three main instruments at their disposal to respond to crises: the interest rates, the exchange rates, and the foreign exchange reserves.

Vegh and Vuletin (2012) study the cyclical components of short-term interest rates and real GDP for 68 countries over the period 1960-2009. They find that from 1960 to 1999, 51 percent of developing countries pursued pro-cyclical monetary policy (i.e., a negative correlation between the short-term interest and the GDP cyclical components) while over the period 2000-2009, around 77 percent of these countries conducted counter-cyclical monetary policy (i.e., a positive correlation between the short-term interest and the GDP cyclical components). Coulibaly (2012) analyzes the behavior of monetary policy during financial and economic crises over a sample of 188 countries from 1970 to 2009. Monetary policy stance is measured with short-term interest rates. A decline in the interest rate in the year of the crisis relative to the previous year signals a counter-cyclical monetary policy. While in the 1990s, around 55 percent of emerging economies lowered their interest rate during crises episodes, this share increased to 70 percent during 2000s, and reached 80 percent in 2008-2009. Coulibaly (2012) finds that the adoption of inflation targeting before the crisis is one of the main determinant of counter-cyclical monetary policy during the crisis. Indeed, inflation targeting is a proxy for central bank transparency and credibility. In a similar way, De Carvalho Filho (2011) considers a sample of 52 advanced and emerging economies during the global crisis. Using a panel data setting in which the real GDP is the dependent variable and controlling for macroeconomic variables correlated to GDP contractions¹ and to variables growth acceleration², he finds that inflation targeters outperformed other countries both during the crisis and after. Relative

to not-inflation targeting economies, he finds that inflation targeters cut nominal and real interest rate more sharply.

Considering the flexibility of exchange rate as a smoother adjustment mechanism of output to real domestic and external shocks, the recent literature tends to show the advantages of floating exchange rates to respond to the financial crisis. On the one hand, emerging countries with fixed exchange rate regimes experienced weaker decreases in their interest rates relative to floaters (IMF, 2010). On the other hand, countries with more flexible exchange rates exhibited a slighter decline in output and experienced a faster recovery (IMF, 2010; Berkmen et al, 2012). These studies stress the advantages of faster adjustment in relative prices allowing with flexible exchange rates. Adler and Tovar (2012) offer a larger perspective by considering a sample of 40 emerging countries over the period 1990-2010. They focus their analysis on the “pure effect” of external financial shocks³ on output performance⁴. Using a cross-sectional econometric approach, they show that flexible exchange rate regimes smooth international financial shocks, especially for high degree of international financial integration. Tsangarides (2012) provides the most comprehensive analysis of the role of the exchange rate regimes during the global financial crisis. Considering a sample of 50 emerging countries, he addresses two main issues. First, do the exchange rate regimes explain output behavior during the crisis? Second, do the exchange rate regimes exert an influence on the speed of recovery? To investigate these questions, Tsangarides (2012) implements cross-country growth regressions identifying the conditional link⁵ between growth and the exchange rate regimes. He finds, on the one hand, that pegged regimes far no better, yet no worse, than countries with floating exchange rate regime, and, on the other hand, that peggers recover slower than floaters.

Since the Asian crisis of 1997-1998, many developing and emerging countries have considerably increased their foreign exchange holdings. Reserves accumulation responds to a self-insurance motive insofar as reserves may strengthen the ability to resist to disturbances resulting from the recurrent capital flows instability. Analyzing the experience of a sample of emerging countries over the period 1970-2010, Aizenman and Hutchison (2012) find that the positive correlation between output volatility and the degree of financial openness does not hold in countries with high levels of international reserves. Using different measures of output performances during the financial crisis and different reserves coverage ratios, Llaudes et al (2010) and Berkmen et al (2012) find that the relationship between international reserves holding and reduced vulnerability is nonlinear. More precisely, if Berkmen et al (2012) shows that countries with higher international reserves⁶ experienced smaller growth revisions, the relationship is statistically insignificant. Llaudes et al (2010) confirm that higher international reserves⁷ can help to buffer the impact of the financial crisis, but international reserves holding exhibits diminishing returns.

As stressed above, all countries do not conduct countercyclical monetary policies to respond to crises. From this perspective, an extensive literature suggests that currency mismatch may prevent the adoption of expansionary monetary policy to face international financial shocks. Focusing on the experience of Latin American countries during the financial crises of 1997-1998, Cavallo and Izquierdo (2009) show that more liability dollarization triggers a fear of floating and then constrains the ability of monetary policy to respond to external shocks. Indeed, the fear of floating implies that policy makers are reluctant to let the nominal exchange rates depreciate after negative shocks. Izquierdo and Talvi (2009) suggest that the de-dollarization process experienced since 2000 in Latin American countries explains the difference in the policy reaction during the global financial crisis with the one enacted in the aftermath of the Russian crisis of 1998. In the former Latin American currencies have depreciated and policy interest rates have decreased; in the latter, pegged exchange rates have limited the magnitude of depreciation and interest rates have been dramatically increased. Using VAR models, Josifidis et al. (2013) analyze adjustment mechanisms and exchange rate regimes during the global financial crisis by focusing their attention on transition countries that acceded to

the European Union in 2004, but remained outside the euro area. They find that currency mismatch explains the lags in the responses of the monetary policy to the financial crisis. Hausmann and Panizza (2010) use a Taylor-type monetary policy rule in a panel data setting to assess the influence of currency mismatch on the adoption of counter-cyclical monetary policy. They show that the decline in the currency mismatch favors the conduct of counter-cyclical monetary policy.

This paper extends the previous literature by analyzing monetary policy responses to common financial shocks over the period 1995-2010 for a sample of 10 emerging European countries. Two main motives lead us to focus on these countries. Firstly, relative to other emerging economies, emerging Europe experienced the largest output drops during the global financial crisis. Secondly, while many emerging countries have reduced their level of liability dollarization since 2000, emerging Europe as a whole has increased its level of currency mismatch. Our empirical methodology used Structural Bayesian vector autoregressive (SBVAR) models over two crises periods (1995Q1-2001Q4 and 2002Q1-2010Q4). Our main findings are the following. First, common international financial shocks lead to different monetary policy responses. Second, countries with high currency mismatch ratios suffer from both fear of floating and fear of losing international reserves.

The paper is structured as follows. Section 2 introduces the econometric model. Section 3 analyses our main findings. Section 4 concludes.

2. The specification of the empirical model

Variable selection and sample period

The main aim of this paper is to analyze responses of monetary policy in emerging European countries over the longest time period in order to cover the largest number of episodes of international financial crises. As a result, our sample period spans from 1995 to 2010 and then includes both financial crises affecting emerging countries, the collapse of the dot-com bubble in 2000-2001, and the global financial crisis following the U.S. subprime crash. For data availability motives, our time period reduces the sample of studied countries to 10 emerging European countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, and Turkey. We exclude also Emerging European economies that adhered to the Euro area during the studied period.

As we are especially interested by the impact of external financial shocks on the overall domestic activity, we choose the Gross Domestic Product instead of the Industrial Production Index as usual. The main advantage of the GDP relative to the IPI is that the former takes into account more activities (whose constructions and services that represent a significant part of the activity in some of our sample countries) than the IPI. Such choice implies that we use quarterly frequency rather than monthly one in our econometric estimations.

Each Structural Bayesian VAR model includes one external financial shock and five domestic variables⁸.

More precisely, we consider four alternative variables as proxies for external financial shocks:

- The Emerging Market Bond Index (EMBI) that measures yield spreads (over safe or risk free assets that bear minimal credit risk) on emerging market countries' debt instruments. The spread is the extra return required to compensate the investor for the additional risks faced when investing in emerging economies rather than in a safe asset (such as a U.S. government bond). Spreads increase with the deterioration –effective or expected- of fundamentals in the countries issuing bonds; they also increase in periods of international financial strain. In order to limit endogeneity problems, we chose the EMBI instead of the Global EMBI (EMBIG) because the second index includes more countries from our sample.

- The VIX measures market expectations of near term volatility conveyed by stock index option prices (S&P 500 index). Since volatility often signifies financial turmoil, VIX is often referred to as the "investor fear gauge".

- Two volatility shocks in equities markets, the first referring to advanced countries (the MSCI of G7 group, RV_G7) and the second concerning emerging countries (the MSCI of Emerging Markets, RV_EM). For these two financial shocks indicators, we used the realized volatility. Indeed, as stressed, by Racicot et al. (2008), Chan et al. (2009), and Andersen et al. (2010), among others, the realized volatility is an *ex post* nonparametric and unbiased volatility estimator allowing us to obtain an indicator of volatility very close to the true volatility.

To assess to what extent our indicators of financial shocks capture episodes of crises that affect the period 1995-2010, we followed the Bloom (2009) approach. Thus, crises episodes are identified as deviations of each indicator from its HP trend (based on Ravn and Uhlig (2002) parameters).

The initial shock causes considerable stock exchange volatility. This volatility takes place over a long period that may cover several months. The purpose is to consider this period of high volatility which was linked to the two main episodes of crisis: the emerging markets crisis and the US crisis and to test the reaction of the monetary policies to avoid real propagation of the financial shock. An episode is identified if the value of the measure exceeds 1.65 standard deviations. Results are presented in Figure A1. All indicators identify the following financial crises episodes: (i) Mexican crisis 1994-1995; (ii) Asian and Russian crises 1997-1998 and Brazilian crisis 1999 (crises cluster around 1997-1999); (iii) ICT bubble and 09 / 11 bombing attack 2000-2001; (iv) Subprime crisis.

However, in choosing the relevant windows for crises periods, we are constrained by the number of observations. Using quarterly data, we assume a "cluster" crisis approach covering the period 1995:Q1-2001:Q4 as a first cluster and 2002:Q1-2010:Q4 as a second one.

Two groups of domestic variables are included in our SBVAR models. The first one refers to macroeconomic variables that respond to external financial shocks. On the internal side of the domestic economy, we retain, as stressed above, the real GDP (GDP). The real GDP is our measure of the response of the overall activity to the external shocks. The financial account excluding FDI as a ratio to GDP (F.A. excl F.D.I.) represents the external side of the domestic economy. Capital inflows are especially sensitive to international financial shocks. At the same time, they exert a strong influence on activity in emerging countries, particularly when these latter have current accounts deficits as it's the case in many emerging European economies. The choice to exclude foreign direct investments from the financial account rests on the fact that we focus our attention on the most volatile capital inflows, *i.e.* portfolio investments and other investments. The GDP and the financial account excluding F.D.I. have been deseasonalized using the Census X12 method. The second group of domestic variables represents the traditional instruments of the monetary policy to face external shocks: the nominal short-term interest rates (R), the foreign exchange reserves (FOREX), and the real effective exchange rates (REER).

The domestic variables are chosen following the traditional transmission mechanisms of the financial crises underline by the literature. Even if the origins of the crisis are different (the 1997 Asian crisis started on the foreign exchange markets and the 2008 U.S. subprime crisis began in the housing sectors) the consequences are identical. The shock causes considerable stock exchange volatility (Corsetti et al., 2005; Allen and Gale, 2007; Reinhart and Rogoff, 2008) and portfolio reallocations. This situation creates an important outflow of capital from economies which have or not the same characteristics as the first country hit by the crisis (Masson, 1998; Ahluwalia, 2000). International reserves in the economy decrease, which generates some pressure on the exchange rate and forced the monetary authority to intervene in order to avoid a reduction in economic growth.

The Structural Bayesian VAR model

The representation of the reduced form of the vector autoregressive model VAR(q) is:

$$Y_t = \sum_{i=1}^q A_i Y_{t-i} + e_t \quad (1)$$

where q is the number of lags, e_t is a white noise.

We distinguish between two blocks of variables: y_{1t} represents the exogenous variable and y_{2t} the domestic variables. The error vector whose variance-covariance matrix has no restrictions, that is to say $E(e_t, e_t^T) = \Omega$ and $E(e_t) = 0$.

Consequently, the VAR(q) model can be written as:

$$A(L)Y_t = e_t \quad (2)$$

where L is the lag operator.

In order to estimate shock response functions and the forecast error variance decomposition, it is necessary to write the process in the Moving Average infinite structural form. An intermediate step consists in “reversing” the canonical VAR model according to the Wold Theorem in order to obtain its moving average form:

$$Y_t = \sum_{j=0}^{\infty} C_j e_{t-j} = C(L)e_t \quad (3)$$

where e_t represents the vector of canonical innovations.

Thus, the structural Moving Average representation is:

$$Y_t = \sum_{j=0}^{\infty} \Theta_j \varepsilon_{t-j} = \Theta(L)\varepsilon_t \quad (4)$$

with

$$e_t = P\varepsilon_t \quad (5)$$

where P is an invertible matrix $n \cdot n$ which has to be estimated in order to identify the structural shocks. The short-run constraints are imposed directly on P and correspond to some elements of the matrix set to zero. The Θ_j matrix represents the response functions to shocks ε_t of the elements of Y_t . The different structural shocks are supposed to be non-correlated and to have a unitary variance:

$$E(\varepsilon_t, \varepsilon_t^T) = I_n. \quad (6)$$

Ω is the variance-covariance matrix of the canonical innovations e_t , thus :

$$E(e_t, e_t^T) = PE(\varepsilon_t, \varepsilon_t^T)P^T = PP^T = \Omega. \quad (7)$$

In the representation of the reduced form of the vector autoregressive model VAR(q), $e_{i,t}$ is the vector of errors with $e_{i,t} = b_i + b_t + b_{i,t}$ with b_i the individual fixed effect, b_t the period specific fixed effect and $b_{i,t}$ the disturbance term whose variance-covariance matrix has no restrictions, that is to say $E(b_{i,t}, b_{i,t}^T) = \Omega$ and $E(b_{i,t}) = 0$. The vector of canonical innovations $b_{i,t}$ is supposed to be a linear combination of the structural impulses $d_{i,t}$ at the same time⁹. Thus, $b_{i,t} = Pd_{i,t}$.

The Sims and Zha (1998)'s priors and Bayesian inference are used to identify the P matrix. The main advantage linked to these priors, much used in the literature (Kim et al., 2000, Mackowiak, 2007, Gimet and Lagoarde-Segot, 2011, Gossé and Guillaumin, 2013) is that they are not flat. It makes it possible to incorporate economic theory into the priors. No restrictions on the conditional mean of lagged variable coefficients are imposed. Although, it does restrict beliefs about lagged variable coefficients to be Gaussian and uncorrelated across equations conditional on contemporaneous variable coefficients, though it allows them to be correlated in different ways in different equations. Consequently, this method is appropriate to large systems. Finally, the fact that Bayesian inference is not affected by the presence of a unit root and by cointegration means that macroeconomic variables can be introduced in levels rather than first differences, which is more informative concerning the significance and the sign of the results (Sims, 1988, Sims and Uhlig, 1991).

The contemporaneous restrictions

$$\text{Let } Y = \begin{bmatrix} EXT \\ GDP \\ R \\ FOREX \\ REER \\ FA \end{bmatrix} \text{ the vector of endogenous variables, and } \varepsilon_t = \begin{bmatrix} \varepsilon_{ext} \\ \varepsilon_{rs} \\ \varepsilon_{ms} \\ \varepsilon_{mp} \\ \varepsilon_{rd} \\ \varepsilon_{fi} \end{bmatrix} \text{ the vector of structural}$$

shocks, where ε_{ext} represents the international shock and ε_{rs} , ε_{ms} , ε_{mp} , ε_{rd} and ε_{fi} are respectively the real supply, money supply, monetary policy, real demand and financial shocks.

The variables are used in logarithmic form, except for the interest rates. It is not necessary to test the stationarity and the cointegration of the model's variables by following the postulate of Sims (1988) and Sims and Uhlig (1991), because a Bayesian inference is used and the model is not then affected by the presence of a unit root.

We impose only contemporaneous restrictions in our model. Our objective is to identify the n^2 elements of the P matrix. The Ω matrix is symmetric; consequently $\frac{n(n+1)}{2}$ orthogonalization constraints have already been imposed. It is necessary to determine the 15 remaining constraints, in reference to the economic literature.

Following the matrix Y , the P matrix of restrictions are defined as¹⁰:

$$P = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ P_{31} & 0 & 1 & P_{34} & 0 & P_{36} \\ P_{41} & 0 & P_{43} & 1 & P_{45} & P_{46} \\ P_{51} & 0 & 0 & P_{54} & 1 & P_{56} \\ P_{61} & P_{62} & P_{63} & P_{64} & P_{65} & 1 \end{bmatrix}$$

The restrictions imposed in the model are well-established in the literature.

First, the model is based on the assumption that the economies of our sample can be considered as a small open economy. This hypothesis implies the block exogeneity restriction which means that the domestic shocks do not affect the external variables contemporaneously. This identification strategy used to assess the impact of foreign variables on domestic ones follows a procedure largely validated in the literature (Kim and Roubini, 2000, Canova, 2005, Beetsma et al., 2006, Mackowiak, 2007, Gossé and Guillaumin, 2013). Consequently, $P_{12} = P_{13} = P_{14} = P_{15} = P_{16} = 0$.

Second, the response of the interest rate to other endogenous variables takes into account the information delays defended by Sims and Zha (1995, 1999) and by Kim and Roubini (2000) since the published final data on output and price are not available within a month. This assumption can be extended to the other two instruments of monetary policy (Kim, 2005; Mackowiak, 2007). Consequently, $P_{32} = P_{42} = P_{52} = 0$.

Moreover, in order to distinguish the response of each monetary policy instrument to the external financial shock in the short run, contemporaneous interactions of interest rate and exchange rate monetary policies are not allowed by imposing zero restriction on P_{35} and P_{53} . Finally, financial variables are faster to respond to a shock than real variables. Consequently, the more volatile variables are impacted first. So the variable FA has no restriction. On the contrary, the response of output (GDP) to financial shocks is postponed for a period. The real sector is also assumed to respond to domestic monetary policies only with a lag. Due to inertia, to adjustment costs, and to planning delays, the firms cannot adjust immediately their production in response to unanticipated modifications in financial signals or changes in monetary policy (Kim, 2005). Thus, $P_{21} = P_{23} = P_{24} = P_{25} = P_{26} = 0$.

Following the Schwartz, Akaike and Hannan-Quinn tests, two lags were selected for all models¹¹. In addition, further tests have to confirm the lack of residuals autocorrelation.

3. Results

Our paper focuses on responses of monetary policy to external financial shocks. Our results underline to what extent monetary authorities raise or decrease their interest rates, use their foreign exchange reserves or allow the depreciation of their real exchange rates to smoothen the negative impact of external financial shocks? For this purpose, we proceed in three steps. We begin by estimating the domestic impact of these shocks by considering the responses of two macroeconomic variables: the GDP and the F.A. excl. F.D.I. Then we analyze the responses of monetary policy. Finally, we estimate SVAR models to analyze the influence of the currency mismatch in the conduct of the monetary policy during financial crises.

Impulse response functions and their standard errors associated with a one standard deviation shock are generated using the Bayesian Monte-Carlo integration method proposed by Sims and Zha (1999). This Bayesian Monte Carlo integration technique avoids the bias of the bootstrap method and outperforms other procedures for short horizons (Kilian and Chang, 2000).

Regarding the countries' reactions to different types of financial shocks, the significance of the results is judged from the figures illustrating the responses of domestic economic variables which follow a variation of a standard deviation of the external financial variable¹². The error bands correspond to the 16% and 84% quartiles. Results are significant if the confidence interval does not include the 0 axis. Tables A2 and A3 give related variance decompositions. They highlight the involvement of external financial shocks in the total variation in each domestic variable.

3.1 Responses of GDP and financial account excluding F.D.I. to external financial shocks

The first period of financial crises

In most countries, GDP decreases in the aftermath of a positive shock on EMBI. The results show that the Baltics are especially vulnerable to this shock. For instance, Estonia experiences a long-lasting negative response to the shock. In Latvia and Lithuania, the negative impact of the shock is short-lived (two and four quarters respectively). Russia exhibits a negative response of the GDP that lasts two quarters. In other countries, responses are not significant. Variance decompositions (See Table A2) confirm the importance of this shock for the Baltics and Russia. In Estonia, EMBI shock

accounts for 37.5 percent of the GDP variance at quarter four. At quarter 8, it raises to 61.4 percent. In Russia, the influence of the shock is very important -38.0 percent- despite its short-run effects.

In the majority of our studied countries, the responses of the F.A. excl. F.D.I. are not significant or weak and short-lived. However, the EMBI shock tends to lead to net capital outflows in Bulgaria (one quarter), Estonia (four quarters), Latvia (one quarter), and Russia (two quarters). Except for Latvia, variance decompositions show that EMBI shock represents a significant share of the F.A. excl. F.D.I. variance. For instance, the shock amounts to 31.3 percent of the variance in Bulgaria (at quarter 1), 55.3 percent in Russia (at quarter 4), and 45.8 percent in Estonia (at quarter 4).

The positive shock on VIX is followed by a decrease in GDP in Croatia, Estonia, Hungary, and Latvia, while it increases in Czech Republic and Russia. Only in Estonia, Czech Republic, and Russia the shock exhibits long-lasting effects. Considering the variance decompositions, we see the strong influence of the shock for Czech Republic (29.2 percent on average) and Russia (35.2 percent on average).

An increase in the VIX tends to induce net capital outflows. This result is expected if we consider that risk appetite of investors decreases in such circumstances. But the results show that responses of the F.A. excl. F.D.I. are short-lived since they last less than one year. Variance decompositions suggest that more financially mature countries –Czech Republic and Poland- are more sensitive to the VIX shock than other ones.

The two volatility shocks exhibit different patterns concerning the responses of GDP. While the emerging market (RV_EM thereafter) shock is significant for only two countries, the RV_G7 shock significantly affects five countries. Such a result suggests that during the first sub-period, our studied countries have few financial ties with other emerging countries. At the opposite end, the stronger influence of RV_G7 shock shows that these countries are already part of the portfolio of international investors. The RV_G7 shock accounts for more than ten percent of the GDP variance in Croatia, Estonia, Lithuania, and Russia. The RV_EM shock explains more than ten percent of the GDP variance only for Estonia.

The two volatility shocks tend to be followed by net capital outflows –except in Lithuania for the RV_EM shock and Poland for the two shocks- but responses are short-lived. In other words, over this first sub-period, volatility shocks seem to exert a weak influence on our studied countries.

Overall, our results show that the Baltics are especially vulnerable to international financial shocks. In part this finding reflects the fact that over the period 1995-2001 these countries have higher trade and financial openness ratios. The impulse responses also suggest that for the majority of our studied countries the main transmission channel of external financial shocks has been GDP. Indeed, the F.A. excl. F.D.I. appears less vulnerable to international financial shocks.

The second period of financial crises

The striking feature of the period 2002-2010 is the dramatic increase in financial openness. As a consequence, international financial shocks exert a growing influence on domestic macroeconomic variables.

The positive shock on EMBI is significant in all countries except in Poland. Interestingly, this country is one of the least financially open economies. We observe a similar picture about trade openness. In other countries, GDP decreases in the aftermath of the shock. We find that responses exhibit persistent effects except in Czech Republic and Turkey. Variance decompositions disclose an interesting finding: the Baltics are especially sensitive to the shock. More precisely, the EMBI shock accounts for 66.3 percent, 59.1 percent, and 65.4 percent at quarter eight in Estonia, Latvia, and Lithuania respectively (See Table A3). The shock explains less than 10 percent of the GDP variance in Turkey. As for Poland, this country is relatively closed in terms of trade and financial ties with the rest of the world.

Responses of the F.A. excl. F.D.I. are negative. In other words, as expected, when the EMBI increases, countries experience net capital outflows. Except in Latvia, responses are significant only in the short-term (for Estonia, Hungary, Lithuania, Russia, and Turkey). On the impact, the EMBI shock explains a high share of the F.A. excl. F.D.I. variance in Lithuania (41.9 percent), Latvia (37.9 percent), Russia (29.0 percent), and Turkey (23.1 percent).

The VIX shock affects significantly more countries. It is consistent with the expected effects of increased financial openness. In all countries –except in Poland where the response is not significant- an increase in VIX leads to net capital outflows with long-lasting effects. The shock accounts for more than 15 percent of the GDP variance on the impact in Czech Republic, Estonia, and Russia. Over the long-term, the most affected countries are Croatia, Estonia, Latvia, and Russia. Indeed, for these countries the VIX shock explains more than 35 percent of the GDP variance.

As in the first sub-period, a positive shock on VIX exerts a short-run influence on the F.A. excl. F.D.I. In all countries significantly affected by the shock –Hungary, Latvia, Lithuania, Russia, and Turkey- we observe net capital outflows. Interestingly, in these countries, we find that the shock accounts for more than ten percent of the F.A. excl. F.D.I. variance. In particular, the shock exerts an especially strong influence on Russia and Turkey.

Both RV_EM and RV_G7 shocks lead to net capital outflows. In addition, shocks exert an impact on GDP in the long-term. These results suggest that during the second sub-period our countries have significantly increased their financial links with both emerging and advanced countries. It is important to note the dramatic increase in the influence of RV_EM shocks. Interestingly, variance decompositions show that the two shocks exert a growing influence on GDP variance over time. This finding confirms the persistence of these shocks. In the long-term, the most affected economies are the Baltics, Croatia, Hungary, and Russia.

The corollary to increased financial integration is reflected in the higher vulnerability of the F.A. excl. F.D.I. to both volatility shocks. Indeed, except Poland, all countries respond significantly to the EM shock. An increase in the RV_EM volatility leads to net capital outflows. Except Estonia and Latvia, responses last less than one year. On the impact, the shock amounts for more than 25 percent of the F.A. excl. F.D.I. variance in Czech Republic, Lithuania, Russia, and Turkey. On the impact, the G7 shock is accompanied by net capital outflows in all countries. The shock exerts a short-run (less than one year) influence except for the Baltics where it lasts from six to eight quarters. Variance decompositions confirm that the Baltics are especially sensitive to the shock in the long-term. For instance, the shock accounts for 48.5 percent of the F.A. excl. F.D.I. at quarter four in Lithuania and 30.2 percent at quarter eight in Latvia.

The response of domestic variables to external financial shocks leads to two main conclusions. On the one hand, in the two periods, GDPs decrease and countries suffer from net capital outflows in the aftermath of these shocks. On the other hand, the influence of external financial shocks increases over the second sub-period. This result is consistent with the deepening in the international financial integration. As countries tend to suffer from external financial shocks, an important question is to see to what extent authorities adopt counter-cyclical monetary policies.

3.2 Monetary Policy Responses to International Financial Shocks

The main purpose is to assess to what extent countries have conducted counter-cyclical monetary policies to smoothen the negative impact of international financial shocks. We adopt a rough measure of counter-cyclical monetary policy by focusing on the cut in interest rates, the depreciation of real effective exchange rates, and the losses in foreign exchange reserves.

Responses of interest rates to international financial shocks

In the two sub-periods, in most countries of the sample, domestic interest rates increase in the aftermath of a positive shock in EMBI. Responses are significant in the short-term. The main conclusion is that EMBI shock does not exhibit significantly different patterns of the interest rates over the two sub-periods. It is important to keep in mind that the main financial crises affecting our sample during the first sub-period originated from other emerging countries while the main epicenter of the financial crises over the second sub-period has been advanced countries. As exhibited in Figure A1, while our EMBI indicator captures financial stresses for the period spanning from 1995:Q1 to 2001:Q4 very well, it is not the case for the second sub-period.

The VIX shock exerts a stronger influence on the domestic interest rates in the second sub-period relative to the first one. More precisely, over the period 1995:Q1-2001:Q4, the responses of interest rates are significant in Czech Republic, Lithuania, and Russia. From 2002:Q1 to 2010:Q4, all impacts are significant except in Poland. During the second sub-period, the VIX accounts for more than 10 percent of the interest rates variance on the impact in Croatia, Estonia, Hungary, Latvia, Lithuania, Russia, and Turkey. In the two sub-periods, interest rates responses tend to be positive but only in the short-term. If we consider changes in monetary policy over the two sub-periods, we find that Bulgaria, Croatia, Hungary, Latvia, Lithuania, and Turkey have adopted pro-cyclical monetary policy during the sub-period 2002:Q1-2010:Q4.

The two volatility shocks have an increasing influence in the second sub-period as in the case of the VIX shock. Countries adopt more frequently pro-cyclical monetary policies in the aftermath of a positive shock on RV_EM. However, responses are significant only in the short-term (less than one year). Estonia, Latvia, and Russia experience an increase in their interest rate in the two sub-periods. We observe a change in monetary policy for Bulgaria, Croatia, and Hungary that increase their interest rates in the second sub-period. For these countries, as exhibited by the variance decompositions, the EM shock exerts a strong influence on short-term. Interest rates increase in the aftermath of the shock on RV_G7 in two countries over the first sub-period. From 2002:Q1 to 2010:Q4, responses are positive in all countries. In other words, over the two sub-periods, domestic interest rates do not increase in only two countries (Czech Republic and Poland).

Overall, when significant, interest rates increase in the aftermath of the external financial shocks. Bulgaria, Croatia, Hungary, and the Baltics have adopted pro-cyclical monetary policies over the second sub-period.

Responses of the foreign exchange reserves to international financial shocks

Except Czech Republic and Poland, the EMBI shock over the last sub-period leads to higher reserves losses. Such evolution is especially striking in the Baltics. However, the shock exerts a long-run influence on the FOREX variance only in Lithuania (32.9 percent at quarter eight). Russia is the other country significantly affected by the shock. It amounts for 20.8 percent of the variance at quarter eight.

Responses of FOREX to the shock on VIX differ between the two sub-periods. On the one hand, while in the first sub-period, the shock is followed by a slight increase in FOREX –except in Hungary- in the second sub-period FOREX experiences a consistent decrease in all countries except in Czech Republic. On the other hand, many countries exhibit more long-lasting responses in the second sub-period. Variance decompositions confirm the growing influence of the VIX shock over the period 2002:Q1-2010:Q4.

The two volatility shocks dramatically increase their influence on FOREX during the second sub-period. More specifically, while for the period spanning from 1995:Q1 to 2001:Q4, only few countries were significantly affected by these shocks, we find that all countries exhibit significant

responses over the period 2002:Q1-2010:Q4. If we focus on the RV_EM shock, it appears that the main changes in the evolution of FOREX concern the Baltics; and to a lesser extent, Russia. Thus, whereas in the first sub-period responses are not significant or significant only in the short-term, we observe that in the second one FOREX losses persist over time. FOREX variance exhibits a similar picture. Over the first sub-period, only Poland has a FOREX variance explained by the shock amounting to more than 20 percent at quarter four. In the second sub-period, six countries are in this situation, namely Croatia, Estonia, Latvia, Lithuania, Russia, and Turkey. The analysis of the responses of FOREX to the RV_G7 shock leads to similar conclusions. Indeed, the Baltics, Russia, and Turkey experience long-lasting reserves losses in the second sub-period. In the long-term, the RV_G7 shock explains an especially higher share of the FOREX variance in Croatia, Estonia, Latvia, and Russia. It is interesting to stress that Croatia exhibits long-lasting responses in the two sub-periods. But variance decompositions suggest that the influence of the shock has been considerably weaker in the first sub-period.

Responses of the real effective exchange rates to international financial shocks

The responses of the real effective exchange rates (REER) to international financial shocks are affected not only by the exchange rate regimes, but also by their changes over time. Over most of the studied period, Bulgaria, Croatia, Estonia, Latvia, and Lithuania adopted rigid exchange rate regimes. Conversely, Czech Republic, Hungary, Poland, Russia, and Turkey adopted more flexible regimes. Aside from Czech Republic –where the exchange rate regime evolves from a rigid regime in the first sub-period to a flexible regime in the second sub-period- we identify no clear change in exchange rate regimes over the whole period.

Over the first sub-period, a positive shock on EMBI leads to real depreciations in six countries out of nine. Otherwise, real depreciations occur in four countries out of eight over the period 2002:Q1-2010:Q4. In the Baltics and Croatia, the REER appreciate or does not respond to the shock. However, in the period 1995:Q1-2001:Q4, the REER depreciates (Latvia and Lithuania) or does not respond (Croatia), except for Estonia where the REER appreciates in the two sub-periods. Interestingly, we find that the response of the REER in Turkey differs between the two periods. Indeed, the REER appreciates with the impact over the period spanning from 1995:Q1 to 2001:Q4 while it depreciates in the later period.

From a qualitative point of view, the results concerning the effects of the VIX shock are not very different than those relative to EMBI shock. We see indeed that REER appreciate or does not respond in the Baltics and Croatia during the last sub-period.

The two volatility shocks exhibit a similar picture. More precisely, we find a clear reluctance in the Baltics and Croatia to allow the real exchange rates to depreciate in response to shocks. In contrast, the real exchange rates in the Czech Republic, Poland, Russia and Turkey depreciate. These results suggest that the latter group of countries allowed the exchange rate to play its role as a buffer against the negative effects of volatility shocks. As a result, the variance of the real exchange rate explained by volatility shocks increased in these countries over the two sub-periods.

3.3 Does the Currency Mismatch Matter? A Panel Structural VAR Approach

This sub-section underlines to what extent the degree of currency mismatch can explain such differences in policy responses. Two measures of currency mismatch –on the one hand, the foreign liabilities to money ratio based on Levy-Yeyati et al. (2010)'s approach¹³, and, on the other hand, the estimates by Ranciere et al. (2010)¹⁴, are used. For both estimates, we calculated the median and we classified the countries into two groups according to the median. The region is divided into two groups:

- the high currency mismatch (HCM thereafter) group that includes Bulgaria, Estonia, Lithuania, Latvia, Croatia, and Hungary;
- the low currency mismatch (LCM thereafter) group encompassing Czech Republic, Poland, Russia, and Turkey.

As we focus on changes in monetary policy responses over time, Turkey is classified in the second group because the Turkish currency mismatch significantly decreased after 2001 (see, also Alp and Elekdag, 2011).

Do interest rates responses differ according the degree of currency mismatch?

Over the period spanning from 1995:Q1 to 2001:Q4, the results show that countries with HCM react more strongly to a positive shock on EMBI (See Fig. A2). More precisely, while the positive response of the interest rates is significant during five quarters in this group, the response is not significant for countries with LCM. Variance decompositions show that EMBI shock accounts for 15.2 percent of the interest rates variance in the HCM group (See Table A4). During the second sub-period (See Fig. A3), the interest rates increase in the aftermath of the shock in both groups. However, if the length of the response is slightly higher in countries with HCM, we find that its size is significantly greater in the LCM group. As a result, the shock accounts for a higher weight in the interest rates variance in the second group relative to the first (29.6 percent and 10.0 percent at quarter two respectively).

The results suggest that the VIX shock does not lead to pro-cyclical monetary policy in the two groups. Indeed, we find that interest rates decrease in the HCM group and do not respond in the LCM group. The shock exerts a long-lasting influence in countries with HCM (33.8 percent of the variance at quarter twelve). From 2002:Q1 to 2010:Q4, where the VIX shock has been especially strong (See Fig. A1), we get similar results than those concerning the EMBI shock. According to the variance decompositions, the shock accounts for 11.9 percent of the interest rates variance in the HCM group and 7.9 percent in the LCM group.

The two volatility shocks exhibit different results. The RV_EM shock seems more relevant for countries with HCM while we find the opposite for the RV_G7 shock. Interest rates responses to the RV_EM shock are not significant in both sub-periods for the LCM group. For countries with HCM, we observe an increase in the interest rates on the impact of the shock. It extends over three quarters. The shock explains 13.7 percent of the interest rates variance at quarter two. The RV_G7 shock exerts a short-lived influence on both groups of countries during the first sub-period. Over the second one, interest rates increase in both groups. However, the size of the response is higher in LCM countries, as for the EMBI and VIX shocks. Nevertheless, variance decompositions suggest that the shock amounts to less than 2 percent of the interest rates variance in this group. Similarly, the shock represents less than 10 percent of the variance in the HCM group.

Overall, our results suggest that the two groups of countries do not significantly differ in terms of interest rate responses to international financial shocks.

Does the currency mismatch matter in the foreign exchange rate responses?

In the aftermath of a positive shock on EMBI, LCM countries use their FOREX more actively to face international financial shocks. In the two sub-periods, FOREX decreases (See Fig. A2 and A3). but the impact of the shock on FOREX is more persistent during the period 2002:Q1-2010:Q4. The EMBI shock amounts to 42.4 percent of the FOREX variance at quarter two in the first sub-period (48.6 percent for the second one). For countries with HCM, the shock explains less than 10 percent of the FOREX variance during the second sub-period (See Table A4).

The VIX shock exhibits different responses of the FOREX between the two groups of countries. While the responses are not significant for the LCM group in the two sub-periods, we find a positive

response over the period 1995:Q1-2001:Q4 and a negative one over the period 2002:Q1-2010:Q4 in the HCM group. Such a result may suggest that HCM countries use their reserves more actively. However, variance decompositions qualify this point of view. Indeed, we find a rapid decreasing influence of the shock on FOREX variance (21.0 percent at quarter one and 9.0 percent at quarter four).

In the LCM group, FOREX does not react to the RV_EM shock in both sub-periods. We find a short-lived negative response of the FOREX over the second sub-period for countries belonging to the HCM group. The shock explains a marginal share of the variance.

At the opposite end, the response of FOREX to the RV_G7 shock shows that the LCM group uses more actively their reserves than countries with HCM, especially in the second sub-period. More precisely, if FOREX decreases in both groups, the response is short-lived in the HCM group. Variance decompositions confirm the weak influence of the shock on FOREX variance for this group (3.6 percent at quarter two).

Countries with a high currency mismatch ratio are reluctant to loss reserves in order to smoothen the effects of the crisis.

The influence of currency mismatch on the real exchange rate response to external financial shocks

The REER does not react in different ways over the first sub-period for both groups of countries. Indeed, if REER depreciates in the aftermath of the EMBI shock, the latter explains less than 10 percent of the REER variance. Interestingly, over the period 2002:Q1-2010:Q4, we find an increasing influence of the shock in the LCM group (See Fig. A3). The REER depreciates, with a long-lasting effect. The shock accounts for 36.9 percent of the REER variance at quarter four and it accounts for 24.1 percent at quarter eight (See Table A4). Countries with HCM seem more reluctant to use the REER. Not only does the depreciation appear only on the impact, but the shock explains less than 10 percent of the REER variance.

In both sub-periods, the REER depreciates in the aftermath of the shock on VIX in the LCM group. If the responses exhibit long-lasting effects, we find also that the shock explains a low share of the variance (less than 10 percent). In countries with HCM, we find that the responses of FOREX are not significant over the last sub-period, confirming the reluctance to use the REER as an adjustment variable to the shock.

The RV_EM shock does not exert a strong influence on the REER in countries with HCM. Indeed, the shock leads to a long-lasting response of the REER over the first sub-period, but it explains less than 10 percent of its variance. The response is not significant during the last sub-period. In the LCM group, the REER does not react significantly over the period 1995:Q1-2001:Q4. During the last sub-period, after a positive response to the impact, the REER depreciates until quarter four. The shock accounts for 13.6 percent of its variance at quarter four. The RV_G7 shock explains less than 10 percent of the REER variance in both sub-periods for the HCM group. In addition, the REER appreciates in the aftermath of the shock despite its negative impact on economic activity. In the LCM group, the response of the REER is very short-lived in the first sub-period. From 2002:Q1 to 2010:Q4, we find a real depreciation that lasts around six quarters. The shock explains 17.1 percent of the REER variance at quarter four.

These results suggest that the level of the currency mismatch exerts an influence on the willingness and the ability to allow their exchange rate to depreciate during financial crises. More globally, our findings suggest that countries with high currency mismatch suffer from both fear of losing reserves and fear of floating.

4. Concluding Remarks

The main aim of this paper was to analyze the responses of monetary policy to main external financial shocks in a sample of ten European emerging economies. Using a Structural Bayesian VAR over two sub-periods (1995:Q1-2001:Q4 and 2002:Q1-2010:Q4), we implement two sets of estimates. In the first step, the results show that external financial shocks exert a negative influence on domestic macroeconomic variables as proxied by the gross domestic product and the financial account excluding foreign direct investments. Growing international financial integration has increased the vulnerability of the countries to these shocks. In addition, monetary policy responses across countries differ in terms of short-term interest rates, foreign exchange reserves, and real exchange rates. In a second step, the finding suggests that the level of currency mismatch explains why monetary policy responses have been different whereas countries suffered from common financial shocks. From this perspective, our results converge with the literature. On the one hand, emerging European markets with high currency ratios have prevented depreciations of their real exchange rates in the aftermath of the external financial shocks (Cavallo and Izquierdo, 2009). Such a result is especially interesting for Croatia and Hungary having adopted intermediate exchange rate regimes over the whole period. On the other hand, with Aizenman and Sun (2012) and Aizenman and Hutchison (2012), we find that a high currency mismatch ratio tends to be accompanied by a “fear of losing international reserves” in the aftermath of external financial shocks. In other words, financial vulnerability reduces the maneuvering room to adopt counter-cyclical policies. However, the results show that emerging European countries with high currency mismatch ratios suffer from both fear of floating and fear of losing reserves.

In terms of policy implications, as currency mismatch represents a major obstacle to conduct counter-cyclical monetary policy, our results suggest that emerging European countries should adopt macroprudential measures to contain foreign exchange risks. For instance, since June 2009, Turkey bans consumers from borrowing in foreign currency. In addition, Turkish authorities limit the foreign exchange loan amount provided by local banks for non-foreign exchange earnings companies. In a similar way, authorities in Hungary and Poland ask for banks to disclose the risks of foreign currency borrowing to potential clients. As long as macroprudential measures are not residency-based, they are compatible with the European Union's rules. The alternative to macroprudential measures is the adoption of the Euro as in the dollarization scheme suggested by Calvo (2002).

This paper could be extended in two directions. On the one hand, adopting a larger comparative perspective, by including emerging markets from different regions, to assess the role played by the currency mismatch in the monetary policies responses to financial crises over time. On the other hand, implementing non-linear econometric approaches to see to what extent threshold effects relative to the currency mismatch ratio can explain different monetary policies responses to common international shocks.

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End-Notes

¹ Pre-crisis determinants include growth in private credit, short-term debt to GDP, reserves to short-term debt, reserves to GDP, total capital inflows, trade openness, current account balance, exchange rate flexibility, and current account restrictions.

² Post-crisis drivers refer to growth performance of trading partners and changes in terms of trade.

³ The international financial shock is represented by deviations of the VIX from its trend. The effects of the shock on output are estimated after controlling for trade shocks (such as deterioration in terms of trade and a drop in external demand).

⁴ Output performance captures the depth and duration of each crisis episode.

⁵ Conditional link means that the relationship is controlled by taking into account the potential determinants of growth performance.

⁶ The result is robust to different coverage ratios: (i) reserves as a share of GDP; (ii) reserves as a share of exports; (iii) and reserves as a share of short-term external debt.

⁷ Llaudes et al (2010) considers the ratio reserves over external requirements (sum of the short-term external debt (at residual maturity) and the current account deficit).

⁸ See Table A1 for the details concerning sources of data.

⁹ For more details, see Gimet and Lagoarde (2010).

¹⁰ We performed a robustness check with a different order for the endogenous variables. The models are estimated with the following order: EXT, GDP, R, FA, REER, FOREX. The results are similar from the case reported in the paper that is to say, the sign and the significance of the results were unchanged by this substitution.

¹¹ Excluding the models by country with the variables RV_G7 and RV_EM which required only one lag. As a robustness check for our choice of two lags, we performed the tests with one lag. The sign and the significance of the results, available upon request, were unchanged by this substitution.

¹² The impulse response functions of the countries for the two periods of analysis are presented in Josifidis K., Allegret, J.P., Gimet, C., Beker Pucar, E., 2013. *Macroeconomic Policy Responses to Financial Crises in Emerging European Economies*, CHERPA Working Paper 2013.

¹³ The FLM Ratio (Foreign Liabilities to Money) is based on the IMF International Financial Statistics Database using line 26C/ (line 14 + line 24).

¹⁴ Ranci re et al. (2011) use the following ratio: foreign currency denominated net liabilities = {foreign currency foreign liabilities + foreign currency domestic liabilities – foreign currency foreign assets – foreign currency domestic assets + foreign currency lending to unhedged households + foreign currency lending to unhedged nonfinancial firms} / {total bank assets}.

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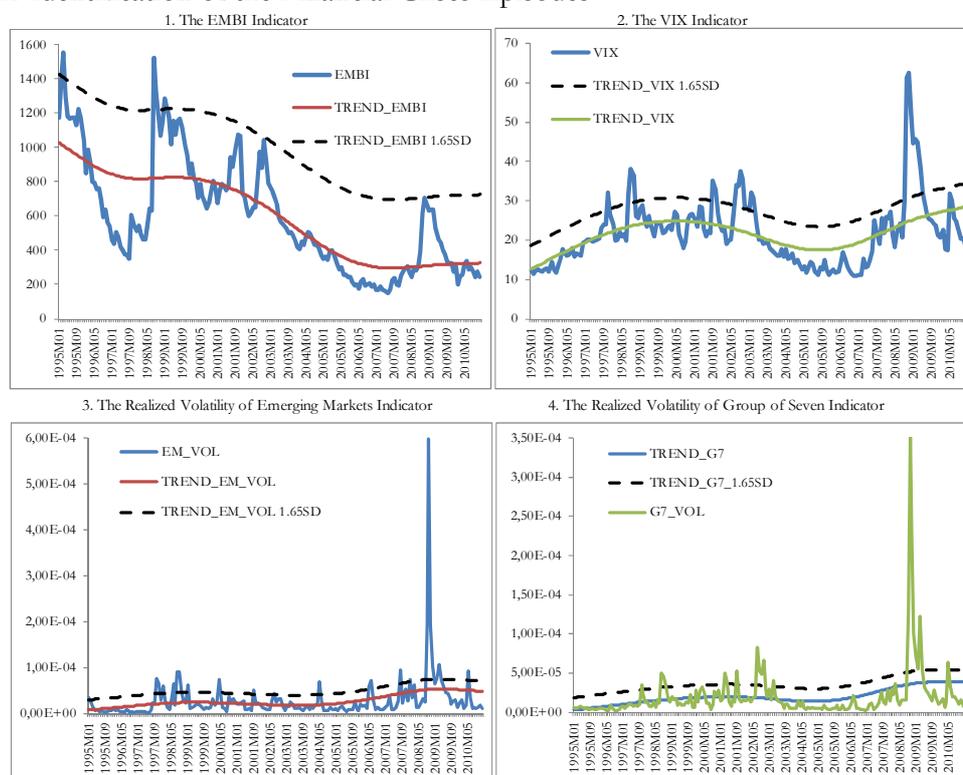
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6. Appendix

Table A1 Sources of the Data

Data	Name	Countries	Frequency	Source
Emerging Bond Index	EMBI	All	Daily	Argentinean Ministry of Economy and Public Finance
VIX Index	VIX	All	Daily	Macrobond
MSCI of Group of Seven Countries	RV_G7	All	Daily	Macrobond
MSCI of Emerging Markets	RV_EM	All	Daily	Macrobond
Gross Domestic Product	GDP	All	Quarterly	IMF IFS
Nominal Rates	Interest R	Money Market Rates: Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland, Russia, and Turkey	Quarterly	IMF IFS
		Discount Rate: Hungary		
Real Exchange Rates	REER	All	Monthly	Bank for International Settlements
Foreign Exchange Reserves	FOREX	All	Quarterly	IMF IFS
Foreign Account Excluding FDI	FA excl. FDI	All	Quarterly	IMF IFS

Figure A1 Identification of the Financial Crises Episodes



Sources: Macrobond and Argentinean Ministry of Economy and Public Finance

Table A2 Decomposition of Variance Period 1995:Q1-2001:Q4

Bulgaria														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		0,76		0,00	5,59	35,06	1		7,77		5,49	1,57	14,20	9,81
4		3,79		17,12	34,98	31,56	4		10,66		7,28	9,31	14,46	7,52
8		20,34		33,72	39,97	39,37	8		15,72		13,96	34,50	34,49	12,05
Quarter	RV_G7 Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		0,50		0,21	4,66	0,51	1		3,48		6,10	0,63	0,21	33,81
4		10,60		16,77	18,99	11,74	4		24,22		5,66	3,48	0,55	11,49
8		15,68		7,65	6,96	7,14	8		15,29		11,59	16,01	11,38	11,15
Croatia														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		44,98		2,04	2,06	2,47	1		25,06		12,18	4,04	6,41	21,75
4		11,92		8,02	1,04	6,03	4		5,81		13,30	7,55	31,24	10,06
8		5,08		2,78	0,45	2,63	8		4,39		10,63	3,59	27,87	15,30
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		41,67		0,56	4,34	2,10	1		28,06		0,04	0,22	0,87	5,26
4		28,08		1,42	9,63	17,29	4		8,83		5,34	3,28	8,51	5,96
8		10,02		3,32	11,53	20,60	8		11,82		9,19	8,45	8,63	7,14
Czech Republic														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		24,37		2,93	55,66	45,38	1		10,44		18,08	15,71	27,83	35,49
4		18,53		46,83	39,27	61,11	4		27,60		29,36	15,53	39,70	29,17
8		18,00		48,85	47,93	47,76	8		31,82		37,97	26,81	39,81	28,47
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		18,99		6,24	5,22	8,36	1		0,97		0,00	0,01	6,59	2,36
4		18,19		11,13	11,26	11,59	4		1,32		1,94	4,23	19,40	8,48
8		25,53		13,89	11,62	11,15	8		3,78		4,12	3,96	15,00	8,37
Estonia														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		1,58		5,89	16,15	1,32	1		26,62		21,28	27,63	12,59	2,11
4		37,52		10,39	11,66	26,76	4		5,69		38,74	37,99	46,28	27,87
8		61,45		20,07	18,08	26,02	8		3,37		37,65	34,93	41,41	27,81
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		5,28		32,00	14,80	15,83	1		11,90		30,10	37,93	0,75	2,43
4		31,22		50,36	22,56	36,38	4		34,48		52,26	42,72	40,22	36,54
8		24,03		45,78	23,44	34,01	8		43,69		52,44	43,98	36,58	38,28

Hungary														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		3,46		11,75	2,51	3,67	4,51	1	0,07		1,05	15,14	1,10	25,49
4		5,35		0,80	9,34	20,04	9,85	4	31,50		27,67	22,30	12,43	28,75
8		3,25		3,07	9,64	10,50	5,22	8	34,40		24,85	22,55	17,29	35,23
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		1,29		1,32	12,30	4,38	14,59	1	2,29		0,81	5,06	6,11	13,19
4		2,02		2,38	14,96	4,97	10,11	4	4,05		1,05	7,91	2,20	8,46
8		0,96		3,57	14,33	5,43	9,78	8	2,95		1,58	8,02	1,84	9,29
Latvia														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		0,03		11,70	7,43	16,32	9,17	1	5,58		0,24	0,08	2,05	3,78
4		10,57		34,70	11,65	13,93	13,38	4	25,30		7,22	3,07	6,22	5,06
8		8,66		51,27	22,09	19,08	13,77	8	28,97		16,15	4,02	21,74	5,73
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		2,21		10,65	16,61	0,27	6,35	1	1,30		1,07	1,33	4,13	0,06
4		8,05		44,94	19,07	1,33	14,86	4	3,25		24,46	8,63	5,27	13,97
8		9,31		47,93	23,74	4,20	15,81	8	3,54		26,58	9,37	7,48	13,45
Lithuania														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		14,26		2,14	26,75	13,05	1,60	1,00	19,46		6,19	30,98	1,33	2,76
4		14,89		16,21	22,11	13,78	4,28	4,00	16,22		23,93	22,62	4,27	2,83
8		10,73		2,28	3,77	2,34	3,06	8,00	17,52		25,32	24,08	4,41	4,96
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		16,00		1,19	16,32	5,25	0,21	1,00	6,47		1,96	15,76	7,86	0,95
4		11,12		3,85	10,19	2,62	9,73	4,00	30,72		4,35	20,48	5,16	24,62
8		8,84		4,69	9,17	2,13	10,25	8,00	20,25		6,47	16,91	5,34	25,57
Poland														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		15,98		3,98	8,85	15,51	20,73	1	17,35		1,42	6,43	33,51	44,26
4		9,38		52,66	23,96	24,87	21,26	4	31,81		16,46	40,28	23,23	44,72
8		32,20		33,35	12,35	33,90	29,08	8	33,08		16,76	40,18	30,87	41,28
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		2,13		5,16	1,51	12,99	12,48	1	12,04		4,67	1,49	23,15	11,67
4		2,61		11,30	7,14	7,21	10,80	4	8,64		1,39	26,42	9,78	19,27
8		4,27		10,44	6,06	8,61	12,29	8	12,41		2,41	21,72	9,74	18,66

Russia														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		38,03		52,49	27,72	52,00	6,71	1	4,81	20,29	3,03	58,18	4,20	
4		20,12		35,01	41,61	74,03	55,30	4	20,50	19,51	0,84	27,64	14,79	
8		59,04		64,70	61,45	66,44	51,83	8	51,45	20,40	24,15	24,14	16,62	
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		0,16		0,02	2,04	37,40	1,64	1	3,50	0,98	4,71	7,41	0,01	
4		32,22		32,37	3,74	77,72	34,96	4	9,87	1,76	1,29	60,15	60,56	
8		62,78		39,40	45,07	74,21	36,12	8	53,39	9,90	2,08	66,64	61,45	
Turkey														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		43,05		6,35	8,18	0,70	25,63	1	1,79	4,21	1,77	27,84	2,23	
4		44,29		17,59	24,01	17,69	29,34	4	12,25	13,86	17,61	14,26	18,07	
8		37,76		22,59	37,80	24,24	36,97	8	17,78	11,26	16,47	20,50	14,94	
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		0,01		3,29	6,19	0,00	33,43	1	2,45	0,42	0,34	0,02	12,29	
4		2,04		10,14	6,00	8,63	21,29	4	1,16	0,75	0,99	0,60	3,37	
12		1,81		13,49	15,61	16,28	13,63	12	0,28	0,70	0,27	0,11	1,01	

Table A3 Decomposition of Variance Period 2002:Q1-2010:Q4

Bulgaria														
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		2,81		14,74	2,88	0,71	1,29	1	9,58	7,33	1,95	0,00	5,53	
4		25,25		7,56	17,50	0,37	12,26	4	8,17	1,88	39,73	5,73	21,75	
8		15,90		3,79	18,60	0,82	12,15	8	31,09	21,74	49,25	7,70	28,69	
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		0,80		6,36	21,06	1,56	6,70	1	0,75	8,71	6,66	1,14	7,32	
4		9,98		22,48	17,88	7,48	13,00	4	11,43	6,98	13,18	7,25	5,82	
8		7,95		12,14	11,84	14,57	12,72	8	7,60	6,20	10,32	5,68	5,50	
Croatia														
Quarterly	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarterly	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI	
1		0,92		8,26	11,83	14,75	0,05	1	2,99	12,90	13,57	9,51	0,92	
4		38,30		20,79	23,85	18,04	14,07	4	37,79	26,51	15,02	10,87	16,42	
8		29,03		24,64	12,92	25,67	14,84	8	45,83	23,77	18,12	8,39	15,76	
Quarterly	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarterly	RV_EM	GDP	R	FOREX	REER	FA excl. FDI	
1		10,03		23,68	17,92	6,16	1,46	1	12,55	24,91	19,31	4,64	1,53	
4		51,51		43,82	43,73	23,10	13,94	4	64,63	46,74	56,67	28,62	10,59	
8		48,72		41,03	44,40	16,54	15,57	8	61,77	36,62	56,48	28,65	19,61	

Czech Republic

Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		24,41	1,24	6,49	1,21	0,01	1		19,97	5,72	0,36	0,49	6,10
4		31,46	6,06	26,32	13,97	3,69	4		19,99	1,70	10,02	5,02	4,93
8		9,80	13,07	33,52	28,72	11,34	8		16,22	6,62	7,93	9,14	6,05
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		24,09	0,30	2,59	21,32	31,38	1		19,38	0,17	3,00	11,14	28,18
4		59,77	28,91	10,66	66,42	36,81	4		31,94	7,44	11,39	34,53	37,71
8		34,23	32,93	29,46	62,08	39,33	8		13,70	5,38	18,88	29,52	33,25

Estonia

Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		33,16	34,59	5,04	0,14	6,19	1		23,44	25,62	1,35	1,23	0,18
4		66,32	23,19	10,63	15,85	3,67	4		43,39	46,30	31,07	2,15	8,92
8		53,45	16,20	21,60	11,53	4,17	8		51,00	36,84	22,82	11,49	19,07
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		37,56	31,81	0,43	0,01	1,66	1		38,24	32,38	0,20	1,01	0,99
4		74,16	24,03	32,57	7,82	14,06	4		73,14	23,75	25,53	1,77	31,83
8		68,15	17,61	56,21	24,83	15,93	8		69,19	13,60	49,69	15,70	34,23

Hungary

Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		9,48	28,53	2,93	25,98	6,64	1		14,15	12,58	0,10	28,82	15,76
4		49,59	18,04	16,02	26,81	14,57	4		22,58	14,75	4,97	27,35	12,90
8		43,95	9,27	16,43	17,79	14,33	8		19,92	10,48	3,30	18,83	11,04
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		34,03	17,16	10,56	14,17	6,44	1		29,62	16,89	12,37	19,75	7,88
4		62,70	11,94	12,86	16,07	17,47	4		62,93	48,27	7,31	46,59	28,99
8		50,94	11,45	9,09	13,73	19,94	8		62,28	50,45	5,70	41,97	25,29

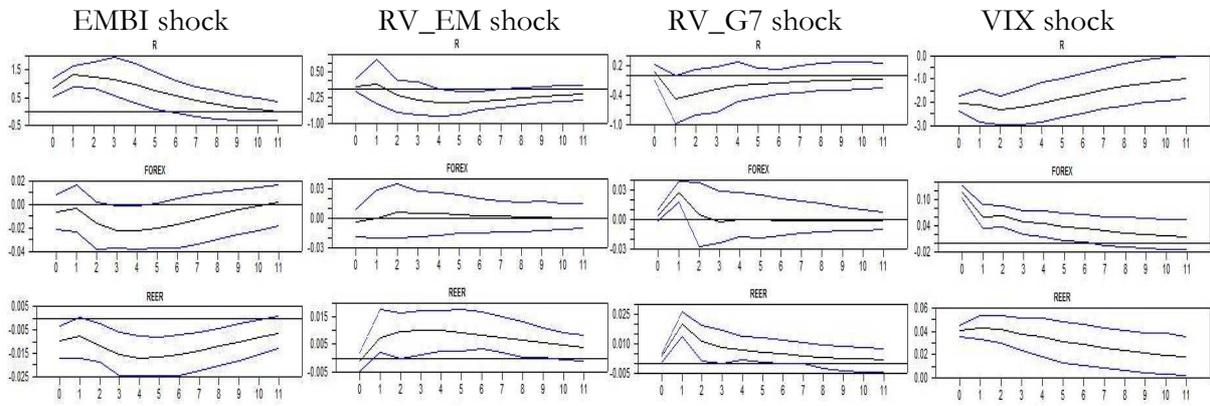
Latvia

Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		10,47	4,74	38,25	4,88	37,87	1		2,06	15,82	33,04	1,79	13,57
4		54,11	6,14	24,00	3,54	13,61	4		21,28	18,78	54,35	29,60	25,30
8		6,06	9,41	5,96	3,68	5,71	8		50,80	17,97	59,18	31,62	41,68
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		13,01	1,26	17,81	1,86	17,26	1		1,10	5,54	4,90	0,47	4,04
4		68,11	5,17	43,83	9,77	52,84	4		27,41	16,73	24,72	29,12	9,47
8		47,69	13,19	43,57	19,64	30,23	8		42,74	18,88	10,55	21,64	15,44

Lithuania													
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		18,06	0,24	44,91	0,00	41,86	1		0,13	11,84	10,03	8,55	26,91
4		65,45	27,62	44,07	3,12	7,98	4		12,71	7,39	9,95	8,47	18,85
8		25,82	21,71	32,94	12,63	12,19	8		3,46	4,36	6,86	7,54	18,32
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		3,42	1,62	10,90	0,73	37,84	1		3,98	0,44	9,56	2,53	26,42
4		74,32	57,96	5,16	23,54	48,65	4		72,14	34,30	20,41	6,28	30,37
8		61,13	66,89	3,96	24,49	47,53	8		53,33	35,65	21,08	9,94	27,71
Poland													
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		0,68	3,61	2,07	28,71	0,02	1		0,46	4,96	4,30	28,43	0,05
4		1,80	3,30	7,15	25,31	4,05	4		7,31	2,02	8,52	38,86	5,39
8		16,50	7,59	17,07	20,77	12,06	8		53,62	4,15	37,72	41,89	14,38
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		7,42	0,09	28,38	25,08	13,60	1		6,62	1,43	27,65	14,70	14,21
4		6,99	29,51	36,17	37,08	25,22	4		17,05	5,82	22,58	34,36	10,72
8		2,85	28,54	23,26	33,98	25,77	8		16,67	9,93	17,11	29,51	15,10
Russia													
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		10,66	31,97	58,25	3,10	28,99	1		30,47	27,38	76,70	5,62	30,93
4		51,22	13,00	31,00	12,82	18,15	4		73,48	51,72	82,94	31,73	21,61
8		17,94	13,91	20,77	5,01	15,37	8		62,58	42,45	79,10	22,38	28,65
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		23,79	19,17	56,59	1,36	41,66	1		28,71	22,28	52,72	3,17	50,49
4		66,09	31,94	59,41	16,44	40,24	4		65,76	50,68	54,52	4,61	52,45
8		63,49	32,12	60,45	25,33	39,68	8		55,20	53,60	46,61	27,45	52,42
Turkey													
Quarter	EMBI Shock	GDP	R	FOREX	REER	FA excl. FDI	Quarter	VIX Shock	GDP	R	FOREX	REER	FA excl. FDI
1		1,74	2,15	21,42	6,53	23,13	1		1,09	16,49	15,45	8,90	55,69
4		5,93	0,28	19,52	30,33	16,16	4		13,94	7,03	10,54	9,82	43,72
8		13,13	6,61	12,07	29,73	14,18	8		13,33	15,91	8,50	11,48	38,49
Quarter	RV_G7	GDP	R	FOREX	REER	FA excl. FDI	Quarter	RV_EM	GDP	R	FOREX	REER	FA excl. FDI
1		18,58	7,96	7,91	3,44	46,40	1		18,52	7,92	7,99	0,73	44,87
4		59,35	6,56	26,01	26,52	41,18	4		49,59	10,77	29,58	3,71	39,25
8		54,54	6,31	26,50	27,82	38,98	8		46,83	18,81	39,00	5,41	38,64

Figure A2 SVAR Panel, Impulse Responses Functions, 1995:Q1-2001:Q4

Countries with High Currency Mismatch



Countries with Low Currency Mismatch

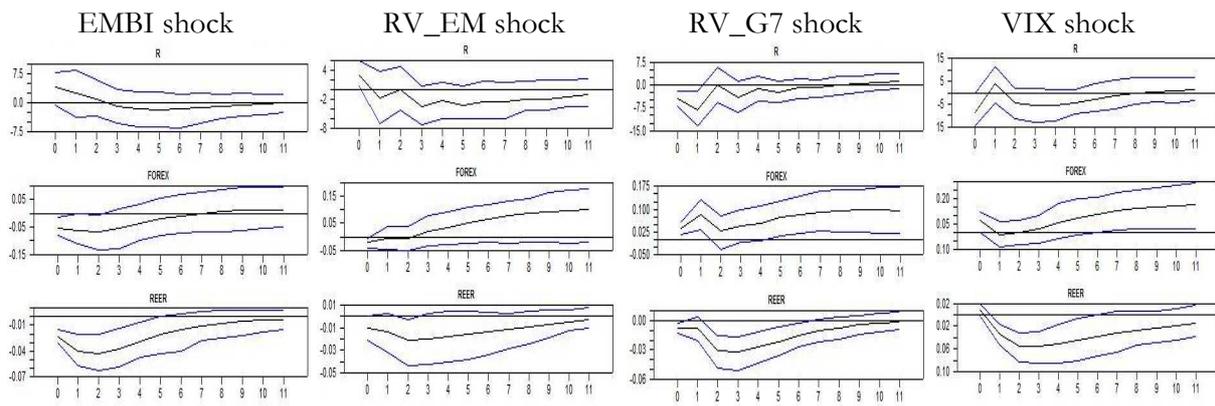
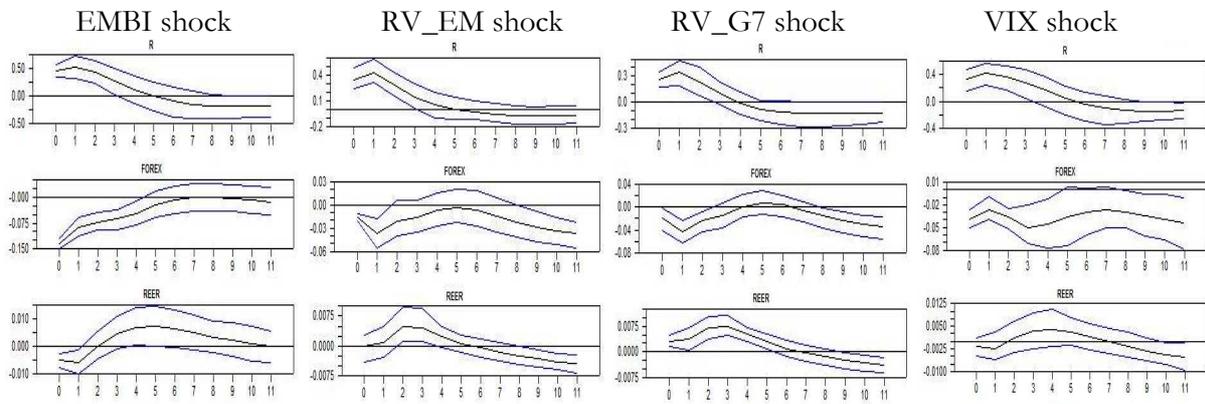


Figure A3 SVAR Panel, Impulse Responses Functions, 2001:Q1-2010:Q4

Countries with High Currency Mismatch



Countries with Low Currency Mismatch

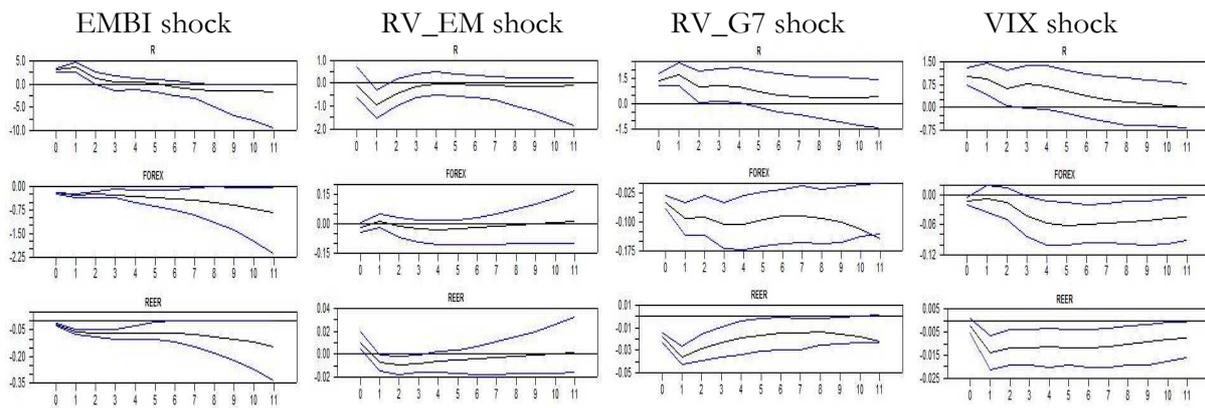


Table A4 Decomposition of Variance decompositions, Panel SVAR

Countries with High Currency Mismatch, 1995:Q1-2001:Q4					Countries with Low Currency Mismatch, 1995:Q1-2001:Q4					
Quarter	EMBI Shock	R	FOREX	REER	Quarter	EMBI Shock	R	FOREX	REER	
1			8,39	3,73	5,57	1		4,24	7,72	13,49
2			12,20	2,59	3,28	2		4,38	7,44	19,70
4			15,29	1,96	2,73	4		3,33	5,98	29,87
8			14,25	1,54	6,22	8		4,20	3,72	26,55
12			13,66	1,39	5,99	12		4,13	4,52	27,03
Quarter	VIX Shock	R	FOREX	REER	Quarter	VIX Shock	R	FOREX	REER	
1			28,19	38,68	31,05	1		18,36	21,02	19,26
2			29,36	39,84	40,01	2		16,27	14,47	16,55
4			36,57	36,50	50,57	4		14,58	9,04	11,56
8			38,45	28,71	53,74	8		12,29	5,23	12,41
12			33,78	24,11	46,19	12		11,44	4,30	11,45
Quarter	RV_G7	R	FOREX	REER	Quarter	RV_G7	R	FOREX	REER	
1			5,52	8,32	7,40	1		1,72	2,85	0,05
2			7,47	12,75	8,64	2		2,33	3,63	0,08
4			14,16	16,24	10,34	4		2,71	2,50	6,91
8			15,58	15,62	8,84	8		4,39	5,85	9,20
12			14,84	15,18	7,70	12		4,42	10,42	9,98
Quarter	RV_EM	R	FOREX	REER	Quarter	RV_EM	R	FOREX	REER	
1			0,13	0,13	0,15	1		0,06	0,29	2,08
2			0,12	0,95	1,53	2		1,89	0,26	9,77
4			1,44	1,78	3,63	4		1,82	0,42	18,27
8			5,61	1,65	6,51	8		1,77	3,91	26,84
12			7,42	1,19	7,45	12		2,33	8,27	29,42
Countries with High Currency Mismatch, 2002:Q1-2010:Q4					Countries with Low Currency Mismatch, 2002:Q1-2010:Q4					
Quarter	EMBI Shock	R	FOREX	REER	Quarter	EMBI Shock	R	FOREX	REER	
1			8,01	38,76	2,78	1		33,58	49,63	9,82
2			10,01	42,40	2,48	2		29,57	48,62	25,73
4			9,83	39,79	1,75	4		23,48	36,66	36,94
8			9,01	29,92	1,69	8		28,85	19,81	24,10
12			11,43	29,60	3,38	12		23,42	4,22	5,31
Quarter	VIX Shock	R	FOREX	REER	Quarter	VIX Shock	R	FOREX	REER	
1			6,47	3,23	0,79	1		8,70	8,21	4,66
2			11,91	3,76	0,44	2		7,90	5,05	5,82
4			10,45	5,22	2,15	4		7,09	3,05	3,47
8			9,60	3,50	1,85	8		6,95	1,82	2,52
12			11,18	4,52	2,63	12		6,72	2,03	2,91
Quarter	RV_G7	R	FOREX	REER	Quarter	RV_G7	R	FOREX	REER	
1			8,93	1,10	0,19	1		1,46	3,04	1,59
2			9,23	2,42	0,11	2		0,96	4,06	8,55
4			9,85	4,27	0,08	4		0,73	8,85	17,10
8			7,10	5,25	3,14	8		2,67	13,27	18,22
12			5,89	6,80	5,53	12		7,33	14,68	18,05
Quarter	RV_EM	R	FOREX	REER	Quarter	RV_EM	R	FOREX	REER	
1			8,60	0,41	0,02	1		0,32	1,01	0,22
2			13,74	0,29	0,02	2		0,55	1,12	7,27
4			18,41	1,57	2,97	4		0,99	5,98	13,63
8			17,19	7,48	8,88	8		1,58	10,99	14,35
12			15,65	10,37	12,08	12		1,37	11,89	14,19