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## **Responses of Monetary Authorities in Emerging Economies to International Financial Crises: What Do We Really Know?\***

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Jean Pierre Allegret<sup>1</sup>

**Abstract:**

*This paper analyses policy options available for emerging economies to cope with the financial crises. A seminal paper on this question has been published by Kaminsky et al. (2005). Their main conclusion was that developing countries exhibit pro-cyclical fiscal and monetary policies, amplifying the destabilizing effects of capital inflows. The global financial crisis of 2008-09 had led to a renewed interest of the analysis concerning economic policies responses in emerging countries to financial crises. A growing number of studies have provided new empirical evidences according to which emerging economies tend to adopt more frequently counter-cyclical policies to face crises. The main purpose of this paper is to survey the literature on policy responses in emerging countries to financial crises. More precisely, we identify what are the main factors explaining the behavior of monetary policy during financial crises. Two main lessons can be drawn. On the one hand, initial conditions matter. In other words, the ability to face financial crises depends on pre-crisis vulnerabilities. On the other hand, the currency mismatch appears as one of the main impediments to conduct countercyclical monetary policies.*

**Key Words:** Monetary Policy, Monetary Authorities, Emerging Economies, International Financial Crises

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**JEL Classification:** E52, F41, F62

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## 1. Introduction

The empirical literature on business cycles and crises in emerging markets (see, for instance, Kose and Prasad, 2010; Claessens et al., 2011) exhibits two main features. First, the volatility of macroeconomic variables tends to be higher in developing and emerging economies relative to advanced countries<sup>2</sup>. Interestingly, the effects of globalization have accentuated this volatility gap, mainly between advanced economies and emerging countries. Second, if, over the period 1978-2007 Kose and Prasad (2010) find no noticeable difference between emerging and advanced countries in terms of recessions duration, they show that their amplitude is three times larger in emerging markets relative to advanced economies. In addition, emerging economies suffer from larger cumulative output losses while recessions associated with financial crises exert stronger negative influences on macroeconomic variables. Such stylized facts must be joined with the fact that severe financial crises exert long-lasting negative effects on growth (Cerra and Saxena, 2008; Balakrishnan et al., 2011).

From this perspective, an important question is to determine what are the policy options available for emerging economies to cope with the financial crises. In other words, how do emerging markets respond to financial crises? A seminal paper on this question has been published by Kaminsky et al. (2005). Considering a large sample of 104 advanced and developing countries for the period 1960-2003, they show that if net capital inflows are pro-cyclical in the two groups of countries, their economic policy differ. Developing countries exhibit pro-cyclical fiscal and monetary policies, amplifying the destabilizing effects of capital inflows. At the opposite, in OECD countries, authorities conduct counter-cyclical policies that mitigate the negative effects on output of capital flows. Kaminsky et al. (2005) identify several factors that can explain the adoption of pro-cyclical policies in emerging countries: political distortions, weak institutions, and capital markets imperfections.

The global financial crisis of 2008-09 had led to a renewed interest of the analysis concerning economic policies responses in emerging countries to financial crises (See, for instance, Ghosh et al., 2009; IMF, 2010a). It is important to keep in mind that two main features distinguish the current episode from the crises of the late 1990s and early 2000s. On the one hand, the main trigger of the crisis is a shock originated in the financial sector of advanced countries. After an initial period of resilience, the financial turmoil in advanced economies hit emerging markets in late 2008. On the other hand, this crisis is characterized by an exceptional synchronization at a worldwide level. Interestingly, a growing number of studies

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<sup>2</sup> For instance, over the period 1960-2008, Kose and Prasad (2010: 68) find that the standard deviation of the annual growth rate of output has been the lowest for advanced countries (3.10) and the highest for developing countries (5.76) while the median volatility for emerging economies has been between these two extremes (4.87).

have provided new empirical evidences according to which emerging economies tend to adopt more frequently counter-cyclical policies to face crises<sup>3</sup>. Vegh and Vuletin (2012) study the cyclical components of short-term interest rates and real GDP for 68 countries over the period 1960-2009<sup>4</sup>. 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. Takáts (2012) studies a subset of 14 emerging markets having adopted inflation targeting over the period 2000-2011. He uses Taylor rule function augmented with an exchange rate term to estimate the correlation between the business cycle and the real policy interest rate. He finds that the probability to adopt a counter-cyclical monetary policy is close to unity for 7 out of 14 emerging markets and is below 0.50 only in two cases (Indonesia and Thailand).

The main purpose of this paper is to survey the literature on policy responses in emerging countries to financial crises. More precisely, we identify what are the main factors explaining the behavior of monetary policy during financial crises. The rest of this paper is organized as following. Section 1 shows that the ability of emerging countries to mitigate the impact of the crises rests on their initial situation. In other words, initial conditions matter. Section 2 analyzes the influence of the monetary regimes. We try to disentangle the respective influences of the exchange rate regimes and the inflation targeting. Section 3 reconsiders the fear of floating hypothesis. Section 4 analyzes to what extent the accumulation of foreign exchange reserves can protect emerging markets against financial crises. Section 5 concludes.

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<sup>3</sup> The analysis of fiscal policy is beyond the scope of this paper. Note, however, that Frankel et al. (2011) and Takáts (2012) find that emerging countries have evolved toward counter-cyclical fiscal policies over the recent decade.

<sup>4</sup> To estimate the cyclical components, Vegh and Vuletin (2012) use the Hodrick-Prescott filter.

## 2. Initial Conditions Matter

A first strand of literature suggests that the responses of emerging countries to the crisis rest on their pre-crisis macroeconomic fundamentals and vulnerabilities. Indeed, an important lesson drawn from the global financial crisis of 2008-2009 is that countries that entered the crisis with better fundamentals were able to respond with more counter-cyclical policy easing<sup>5</sup>. In other words, countries with sizeable domestic and external imbalances have been constrained in their ability to face the crisis.

A first sub-group identifies macroeconomic variables and vulnerabilities indicators explaining the considerable variation in the crisis impact on emerging economies. In this paper, we focus on variables exerting an influence on policy responses<sup>6</sup>.

Berkmen et al. (2012) uses cross-country regressions to identify the factors driving the growth performance in 2009. Crisis impact is measured by the revisions in GDP growth forecasts before and after the crisis. The baseline analysis uses the Consensus Forecast applied to a sample of 43 emerging markets. They find that countries with more leveraged domestic financial system and more rapid growth in credit to the private sector suffer from larger downward revisions of GDP forecasts<sup>7</sup>. In a similar perspective, the IMF (2010a) stresses that countries experienced a pre-crisis credit boom undergo a dramatic output busts during the crisis.

Figure 1 exhibits the credit growth by emerging region. We see that Emerging Europe, and, to a lesser extent, Latin America, experienced rapid growth in their credit to the economy.

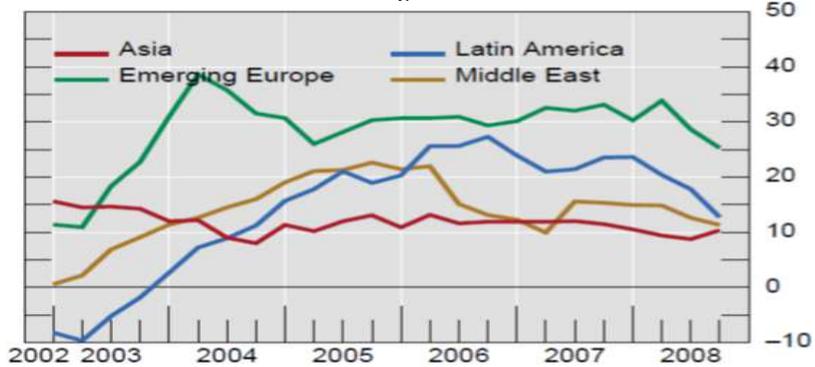
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<sup>5</sup> See, for instance, IMF (2010a) and Gallego et al. (2010). Pre-crisis conditions refer to both financial (ratio of international reserves to short-term external debts, credit booms), fiscal (ratio of primary balances to public debt levels), external (current account deficits and composition of capital inflows) and monetary (exchange rate regimes, initial level of inflation) vulnerabilities.

<sup>6</sup> For an overview of the variables explaining the different impacts of the global crisis, see, among others, Lane and Milesi-Ferretti (2010), Frankel and Saravelos (2012), and Aizenman and Pasricha (2012).

<sup>7</sup> Growth revision is measured as changes in the average forecast for 2009 made in January-June 2008 and January-June 2009.

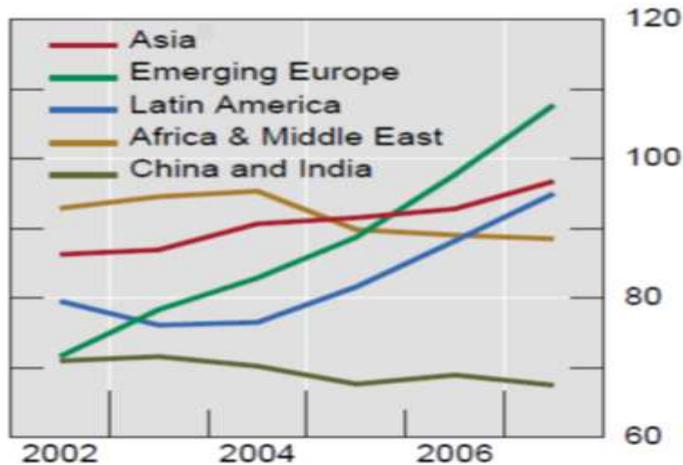
Figure 1. Growth in Emerging Economies by Region, in percent, regional averages, GDP weighted



Source: CGFS (2009): 88.

Credit boom in Emerging Europe suggests the presence domestic vulnerabilities. Interestingly, Figure 2 shows that, in Emerging Europe, and, once again to a lesser extent in Latin America, the growth in deposits has been insufficient to fund such credit growth. Indeed, the figure exhibits a striking increase in the loan-to-deposit ratio in these two emerging regions meaning that banks had to rely massively to other refinancing sources.

Figure 2. Loan-to-Deposit Ratio in Emerging Economies, in percent



Source: CGFS (2009): 91.

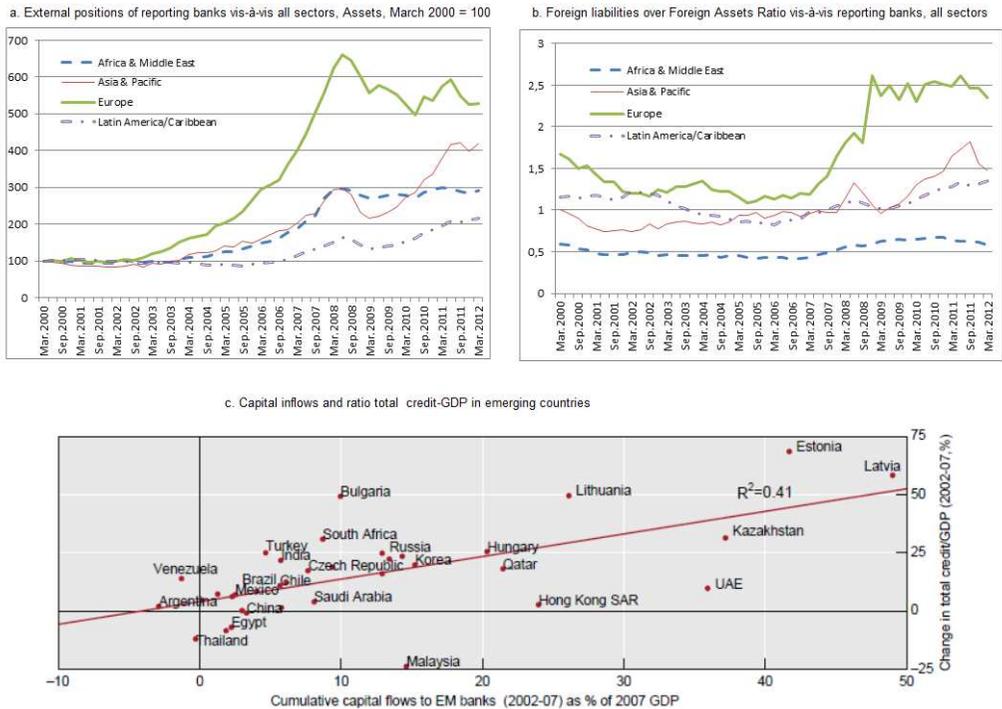
These financial vulnerabilities mirror, in part, the bad performances of these emerging regions relative to other ones in terms of growth in 2008-2009 (Table 1)

**Table 1. Growth Performances in Emerging Countries, Gross domestic product, constant prices, Percent change**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Central and Eastern Europe	5.15	0.22	4.33	4.79	7.31	5.92	6.42	5.41	3.17	-3.60	4.55	5.26
Developing Asia	6.71	5.77	6.83	8.14	8.52	9.49	10.32	11.44	7.76	7.14	9.65	7.83
Latin America and the Caribbean	4.00	0.45	0.34	2.06	6.03	4.70	5.65	5.81	4.24	-1.61	6.16	4.52
Middle East and North Africa	5.03	2.92	3.79	7.50	6.17	5.59	6.15	5.57	4.65	2.74	4.89	3.50
Sub-Saharan Africa	3.56	4.89	7.17	4.83	7.09	6.17	6.44	7.09	5.60	2.82	5.29	5.13

Source: IMF (2012), *World Economic Outlook DataBase*, April.

However, the financial vulnerability in Emerging Europe was considerably stronger relative to other emerging regions. More precisely, as exhibited by different indicators (see Figures 3a, 3b and 3b), a significant part of the credit boom in Emerging Europe has been funded from abroad. As a result, banks' balance sheets are vulnerable to any shock hitting the economy.

**Figure 3. Banking Vulnerability Indicators in Emerging Economies**

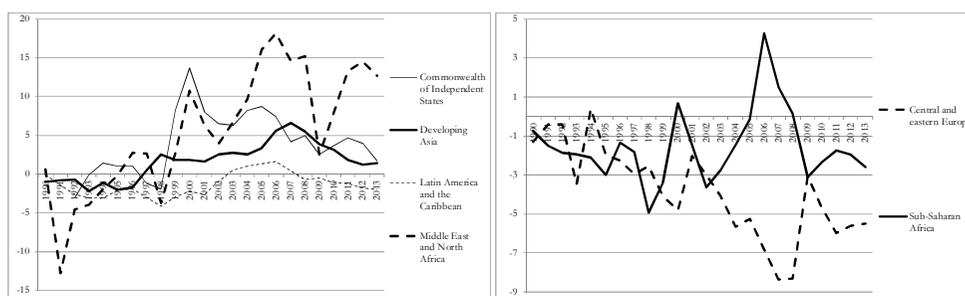
Sources: from BIS, *International Banking Statistics*, and CGFS (2009): 91.

In addition, such funding of domestic credit by foreign capital increases the currency mismatch of the domestic banks, accentuating their vulnerability to external shocks, and more especially to sudden reversal in capital inflows (Kaminsky and Reinhart, 1999; Rodrik and Velasco, 2001).

An important implication is that authorities' rooms of maneuver to respond to shocks are impaired in such environment. More precisely, domestic authorities must face two mutually incompatible objectives. On the one hand, banking fragilities involve an expansionary monetary policy. But lowering interest rates may intensify capital flights and then precipitate the collapse of the exchange rate. In addition, private agents may use additional domestic currencies injected by the central bank to convert them in dollars, accelerating the losses of international reserves. On the other hand, the defense of the exchange rate regime implies a restrictive monetary policy. Indeed, higher domestic interest rates may discourage speculation against the local currency. But the reaction may lead to the collapse of the banking system. The probable outcome of this dilemma is twin crises, i.e. a financial crisis and a balance of payments crisis (Chang and Velasco, 1998). In 1997-1998, some Asian countries experienced such dilemma as Emerging Europe in 2008-2009.

On the external side, the global financial crisis in developed countries has led to a sharp reversal in capital flows. Many indicators suggest that Emerging Europe is particularly vulnerable to the financial channel. Indeed, emerging Europe has accumulated large and sustained external deficits, while other emerging countries reduced their deficit or increased their surplus (Figure 4). Current account deficits led Emerging Europe to be dependent from capital inflows to cover them. As a result, these countries are vulnerable to a sudden stop in capital flows.

**Figure 4. Current Account Balances, in percent of GDP**

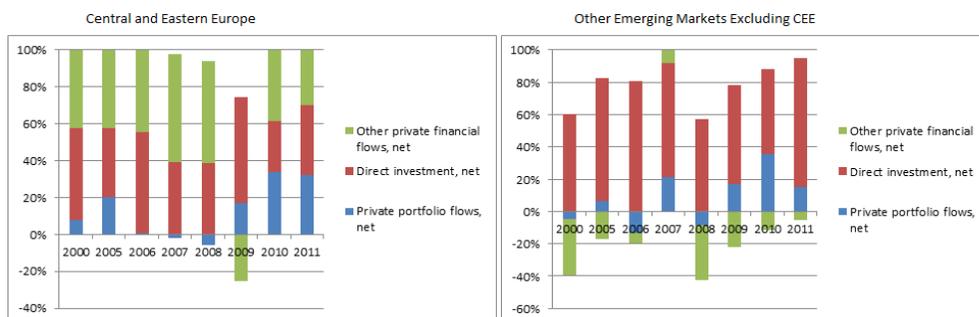


**Source:** IMF (2012), *World Economic Outlook Database*, April.

This vulnerability may be accentuated by the composition of net capital inflows. Figure 5 compares the composition of these inflows in Emerging Europe with other emerging countries. The main lesson of this figure is the high weight of other private financial flows (including banking flows) in Emerging Europe while in

other emerging economies foreign direct investments represent the main share of net capital inflows. An extensive literature shows that foreign direct investments are more resilient during crises.

**Figure 5. Composition of Net Capital Inflows, in % of Total Net Capital Inflows**



**Source:** from IMF (2012), *World Economic Outlook Database*, April.

Liabilities to advanced economy banks and portfolio exposures to advanced economies show that emerging Europe are more vulnerable to external bank crises, while emerging Asia is more sensitive to external securities-market disturbances (Balakrishnan et al, 2011). At the same time, Western European banks have increasingly dominated banking flows, whereas North America has been the main source for portfolio investments in emerging and developing economies. As a result, Western Europe has become the most likely source of common-lender effects, and the United States and Canada have become more important sources of securities-market disturbances.

Llaudes et al. (2010) analyze the influence of external vulnerabilities on the impact of the global financial crisis for a sample of 50 emerging markets. They find that pre-crisis current account deficits and the global deleveraging on credit growth have played a critical role. These variables explain the fact that Emerging Europe has experienced the greatest peak-to-through decline in quarterly real GDP. Gallego et al. (2010) focus on the evolution of six sets of vulnerability indicators<sup>8</sup> for Central Eastern and South-Eastern Europe at three different reference points in times

<sup>8</sup> (i) Sentiments indicators include sovereign spreads, sovereign rating, and domestic stock exchange index. (ii) Real and nominal indicators refer to industrial output, interest rates, inflation rate, and exports. (iii) Budget balance in percentage of GDP, public debt in percentage of GDP, and interest payments represent fiscal indicators. (iv) Monetary indicators contain money supply (M2), deposits, and credits. (v) External indicators include current account balance, foreign direct investment, basic balance, external debt, net portfolio investment inflows, and net foreign assets all expressed in terms of GDP, and short-term external debt in percentage of foreign exchange reserves. (vi) Banking indicators encompass domestic banks' foreign liabilities in percentage of banks' foreign assets, long-term foreign exchange deposit ratings, stock price index for domestic banks in percentage of domestic stock exchange index, loan-to-deposit ratio, foreign exchange loans in percentage of total loans, non-performing loans in percentage of total loans, capital adequacy ratio, and return on equity.

(August 1998 for the Russian crisis; December 2001 for the Argentine crisis; and September 2008 for the Lehman Brothers collapse). Their results suggest that the weaker resilience of Emerging Europe is due to the strong deterioration of their external indicators while these indicators improved for Latin America.

The second sub-group dedicated to the initial conditions tests directly their influence on the conduct of counter-cyclical monetary policy. Coulibaly (2012) uses a logit regression model to identify what variables favor the adoption of such a policy. Recall that he defines a counter-cyclical monetary policy as following: if the cumulative change in the monetary policy rate between 2008Q3 and 2009Q1 is negative. Coulibaly considers a set of macroeconomic variables measured in 2007 including, for instance, the foreign exchange reserves in percentage of GDP, the current account balance in percentage of GDP, the inflation rate, the short-term external debt as a percent of total external debt, trade and financial openness measures, an inflation targeter dummy, the exchange rate regimes and indexes of financial development and financial reforms. First, Coulibaly finds that the probability to conduct a counter-cyclical monetary policy increases in countries with stronger fundamentals (lower inflation, current account surplus...). Second, trade and financial integration exerts a positive influence on the ability to reduce interest rates during the crisis. Finally, and it's the main Coulibaly's result, the financial reforms index and the inflation targeter dummy are the most important determinants. In other words, countries with more liberalized financial system and having adopted the inflation targeting before the crisis can lower their policy rates more significantly than other economies.

### **3. The Influence of the Monetary Regime**

In the aftermath of the waves of exchange rate crises in emerging markets during the 1990s', the world economy has moved towards more flexible exchange rate regimes. Advocates of floating regime tell that in a world with prices and wages stickiness, exchange rate flexibility is able to insulate the economy more effectively against real or external shocks. Indeed, flexibility allows for large variations in relative prices that smooth adjustment of output to real domestic and external shocks. Costly and protracted adjustments are avoided. Floating regime means that the exchange rate is no longer a nominal anchor disciplining or strengthening the credibility of monetary authorities. In order to stabilize –to anchor- the inflation expectations of private agents, an alternative anchor must be implemented by these authorities. Until the mid-1980s, monetary aggregates were the main conventional anchor. But given the instability of money demand –explained among others by financial innovations, international capital flows volatility, and dollarization in several developing countries- controlling the quantity of money does not guaranty the control of inflation. From the end-1980s, a growing number of industrial countries –for instance, Sweden, the United Kingdom, and Canada- have

experienced a new monetary strategy based on the direct targeting of inflation. This strategy has been more and more adopted in emerging countries. For most of them, inflation targeting constitutes the new monetary policy regime in the aftermath of currency crises. As stressed by Bernanke (2003), relative to previous monetary regimes, an important advantage of inflation targeting is to allow a “constrained discretion” in the conduct of monetary policy. More precisely, in such regime, monetary authorities have a strong commitment to maintaining inflation low and stable at medium-term. As a result, if inflation expectations are well-anchored, monetary authorities can use policy rates in order to stabilize output. An expected result is that output must be more stable under this regime relative to other monetary regimes (mainly monetary aggregates targets or exchange rate rule).

Drawing lessons from the currency crises over the period 1970-1999, Calvo and Reinhart (2001 and 2002) have challenged the advantages of flexible exchange rate regime. They examine the behavior of several macroeconomic variables in the aftermath of currency crises for a sample of 25 emerging markets and developed countries. Their major result is the following: if depreciation induces traditional expansionary effects in developed countries, it results in contractionary output in emerging markets. Calvo and Reinhart (2001) point up two main explanations. First, exchange rate crises in emerging markets are followed by a sudden stop to capital inflows. These countries suffer from reserve losses and a more severe reversal in the current account deficit. The reversal in the current account results from a major decline in aggregate demand. Second, in the aftermath of currency crises, emerging countries lost access to international capital markets. More precisely, the behavior around episodes of currency crises of sovereign credit ratings show that, for all time horizons, the probability of downgrades is higher in emerging markets than in developed countries. Calvo and Reinhart’s view is disputed by other studies that focus on longer time horizon. For instance, Edwards and Levy-Yeyati (2003), and Broda (2004) show clearly that larger movements in relative prices –allowed by floating regimes- bring to smoother adjustment of output to real shocks under floating regimes.

What are the lessons from the global financial crisis of 2008-2009? Anecdotal evidences, based on countries experiences, suggest that peggers have been more constrained to respond to the crisis than floaters. Gardó and Martin (2010) show that policy stances differed across Central Eastern and South-Eastern European countries. Indeed, floaters countries tended to reduce earlier their interest rates (2008Q4) than fixers. Minella et al (2009) study the effects of external shocks on a set of small Central American countries. External shocks refer to a fall in U.S. output gap, deterioration in terms of trade, and an increase in external financing costs. Results suggest that countries with floating exchange rate regime experienced less output reduction in the aftermath of these shocks. Real depreciations played as a stimulus of aggregate demand. Corozza et al (2011) consider the experience of South-Eastern European economies. As previous papers, their striking result is that countries with hard pegs (Bosnia-Herzegovina and Montenegro) or conventional peg

(Croatia and Macedonia) have been very constrained to use their monetary policy to face the global crisis. Thus, the National Bank of the Republic of Macedonia increased its interest rates in April 2009 (while the inflation rate decreased to zero) and the Croatian National Bank did not change its policy rates during the crisis.

Cross-country analysis displays a more mixed view on the advantages of floating exchange rates to respond to the financial crisis. IMF (2010a) shows that emerging countries with fixed exchange rate regimes experienced weaker decrease in their interest rates relative to floaters. In mean percentage points, the cut has been 2.1 and 3.4 respectively from August 2008 to October 2009. Both cross-section and panel data tests confirm this observation. For instance, cross-section analysis suggests that the main determinants of the cut in policy rates have been the levels of policy rates and inflation just before the output collapse and the evolution of inflation during the crisis. When we interact these determinants with a fixed exchange rate regime dummy variable, interest rates appear less sensitive to them. Panel tests show that policy rates are less responsive to output gap for peggers. In a similar way, IMF (2010a) finds that countries with floating exchange rate regime experienced a more faster recovery while Berkmen et al (2012) shows that countries with more flexible exchange rates exhibits smaller output declines. These two 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 shocks<sup>9</sup> on output performance<sup>10</sup>. 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 link between growth and the exchange rate regimes. Conditional link means that the relationship is controlled by taking into account the potential determinants of growth performance.

Output performance during the crisis period is measured by the average real growth rate in 2008-2009 relative to 2003-2007. The regression includes several growth determinants divided in two sub-groups: the first one is related to the trade

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<sup>9</sup> 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).

<sup>10</sup> Output performance captures the depth and duration of each crisis episode.

channel (growth rates of partner countries and commodity terms of trade) and the second sub-group refers to the financial channel (for instance, the ratio short-term external debt to GDP and foreign exchange reserves). Econometric results show that pegged regimes far no better, but also no worse, than countries with floating exchange rate regime. In other words, the study does not find the shock absorber effect of flexible exchange rates. These results are robust to alternative exchange rate classifications<sup>11</sup> and different measures of output performance. Recovery period is measured by the real growth rate in 2010-2011. In addition to previous potential determinants of growth, Tsangarides (2012) includes a 2008-2009 output drop variable representing a rebound effect. The main finding is that peggers had to recover slower than floaters. Interestingly, results suggest that the role of the exchange rate regimes differs according to the timing of the crisis-recovery path. While the exchange rate regimes do not seem to explain variations in output performances during the crisis period, floating regime seem to favor growth in the recovery period.

Some papers analyze the impact of the inflation targeting framework during the global financial crisis. 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. The multivariate analysis suggests that a country with an inflation targeting regime was from 6-to-11 times more likely to cut its policy rate than a country without such regime. Alp and Elekdag (2011) and Alp et al (2012a and b) develop a small open economy stochastic model<sup>12</sup> to perform counterfactual simulations for Malaysia, South Korea, and Turkey during the global financial crisis. In the aftermath of currency crises that hit these countries on the period 1997-2001, they moved towards flexible exchange rate regimes and adopted inflation targeting as new monetary regime to anchor inflation expectations. The authors estimate output performances during the global crisis under two counterfactual assumptions:

- the first experience measure output performance if the three studied countries had adopted a fixed exchange rate regime instead of the flexible exchange rate that goes hand in hand with the inflation targeting framework;
- the second experience estimates to what extent the decrease in the interest rate –allowing by the inflation targeting framework- had limited the fall in output relative to a situation in which the central banks did not decrease their policy rates.

These two experiments lead to a similar conclusion: flexible exchange rate and decrease in policy rates have strengthened the resilience of these countries to the global financial crisis. For instance, concerning Turkey, Alp and Elekdag (2011)

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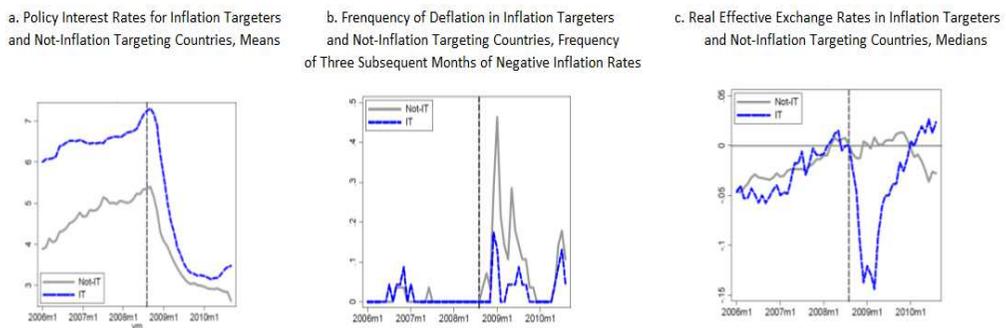
<sup>11</sup> For instance, removing countries that modified their exchange rate regime in 2008-20099 does not change the results.

<sup>12</sup> The DSGE models include nominal and real frictions, and a financial accelerator mechanism in a small open economy framework.

find that growth in 2009 would have been -8.0 percent under a fixed exchange rate while the actual growth has been -4.8 percent.

De Carvalho Filho (2011) analyzes to what extent inflation targeters have outperformed other countries during the global crisis. He considers a sample of 52 advanced and emerging economies, of which 23 are inflation targeters. The first question addressed in the paper is to know if inflation targeting countries have been more resilient during the crisis. Using a panel data setting in which the real GDP is the dependent variable and controlling for macroeconomic variables correlated to GDP contractions<sup>13</sup> and to variables growth acceleration<sup>14</sup>, he finds that inflation targeters outperformed other countries both during the crisis and after. This finding is robust to alternative measures of output performance<sup>15</sup>. In a second step, de Carvalho Filho (2011) identifies channels by which differences in monetary policy stances can exert an influence on post-crisis output performance in inflation targeting and non-inflation targeting countries. Relative to not-inflation targeting economies, he finds that inflation targeters (i) cut nominal (Figure 6a) and real interest rate more sharply; (ii) experienced weaker deflation pressures (Figure 6b); and (iii) exhibited larger real exchange rate depreciation (Figure 6c).

**Figure 6. Monetary Indicators in Inflation Targeting and No-Inflation Targeting Countries**



**Source:** de Carvalho Filho (2011).

Interestingly, these real depreciations do not lead to a relative increase in their risk premium (measured by the EMBI and the 5-year sovereign CDS spreads). Such result confirms the credibility effect associated to the inflation targeting regime.

<sup>13</sup> 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.

<sup>14</sup> Post-crisis drivers refer to growth performance of trading partners and changes in terms of trade.

<sup>15</sup> Post-crisis growth in absolute terms, post-crisis growth relative to pre-crisis growth trends, and measure of output loss since the crisis.

#### 4. Back to the Fear of Floating Hypothesis

Domestic agents (financial institutions, households, firms) may borrow in foreign currencies leading to currency mismatch because their assets are often denominated in domestic currency. Different motives can explain such behavior. First, lending interest rates tend to be lower in international financial centers while exchange rate risks seem low when authorities peg their currency against the dollar (Asian countries in the 90s') or euro (Emerging Europe now) (Eichengreen and Hausmann, 1999). Second, currency mismatch may result from recurrent domestic instabilities that render uncertain the future value of the domestic currency. As a consequence, issuing debts in foreign currencies is easier (Mishkin, 1997). Finally, as stressed by Eichengreen et al (2007), emerging economies may be unable to borrow in their own currencies insofar as international investors are reluctant to diversify their portfolio i.e. to add currencies of developing countries, besides dollar, euro, yen, pound and Switzerland franc. The important point is that this so-called "original sin" is not due to economic policies or institutional failures in emerging countries. These alternative explanations of the currency mismatch lead to a similar conclusion. Emerging countries with such mismatch are vulnerable to a sudden and large devaluation of their currency against the anchor one. Any devaluation increases the charge of the debt inducing a negative balance sheet effect.

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 fear of floating (see Figure 7) and then constrains the ability of monetary policy to respond to external shocks. Indeed, fear of floating implies that policy makers are reluctant to let the nominal exchange rates to depreciate after negative shocks.

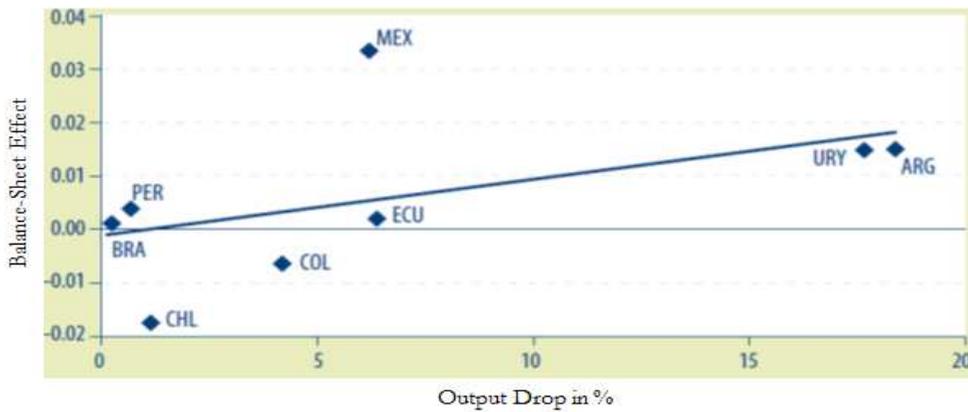
Figure 7. Liability Dollarization and Monetary Policy Responses



Source: Cavallo and A. Izquierdo (2009): 6.

There is a positive correlation between their fear of floating measure and domestic liability dollarization. Such a reaction is optimal if we consider the negative impact of depreciation on output when the liability dollarization is high (see Figure 8).

Figure 8. Balance Sheet Effect and Output Drops

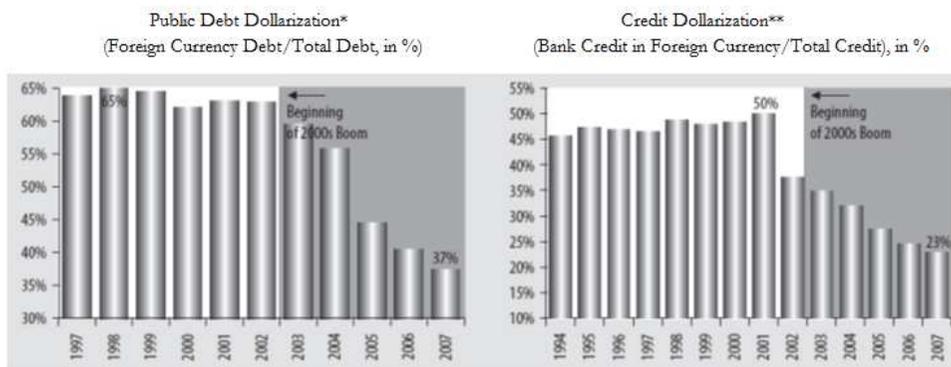


Source: Cavallo and Izquierdo (2009): 7.

The higher the domestic liability dollarization, the higher is the output loss following exchange rate depreciation.

Since these crises, the improvement in fundamentals in Latin American countries allowed them to undergo a de-dollarization process as both the share of foreign-currency denominated debt in total public debt stocks and liability dollarization in the domestic banking systems decreased after 2002 (Figure 9)<sup>16</sup>.

Figure 9. The De-Dollarization Process in Latin America



\* Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela

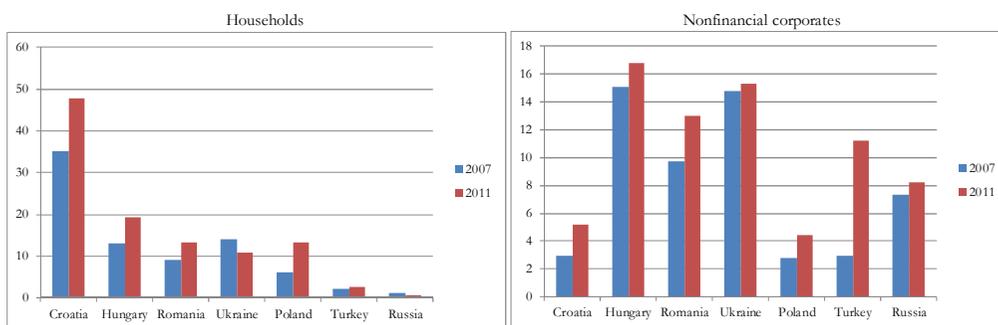
\*\* Argentina, Chile, Mexico, and Peru

Source: Izquierdo et Talvi (2009).

<sup>16</sup> See also Didier et al (2011).

At the opposite, Emerging Europe as a whole increased the currency mismatch (Figure 10).

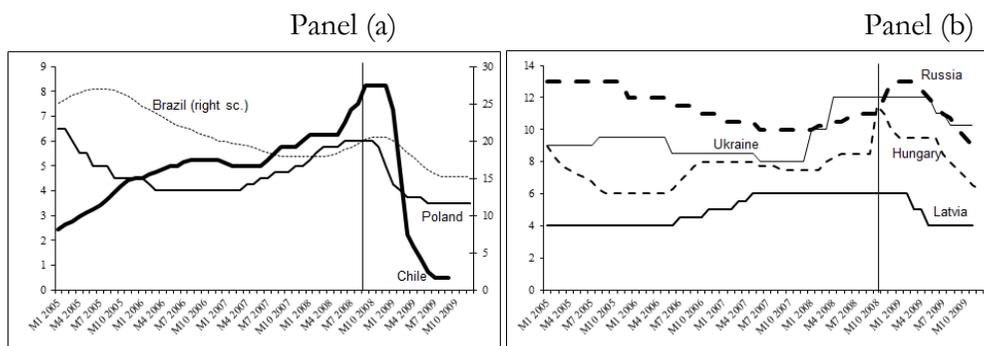
**Figure 10 Loans Denominated in Foreign Currency as a Share of GDP, Selected Countries in Emerging Europe, 2007 and 2011, in percent.**



**Source:** IMF (2012).

Figure 11 compares the evolution of policy rates in countries with low vulnerability (panel a) and high vulnerability (panel b). High vulnerability refers mainly to currency mismatch and to the dependence on capital inflows. The main lesson of this figure is that countries with high vulnerability have responded later to the financial crisis. More precisely, panel b shows that when the shock happened, monetary authorities either increased their policy rates (see for instance the sizeable interest rate hike in October 2008 in Hungary, Russia) or did not change them (Estonia, Lithuania).

**Figure 11. Discount Rates in Some Emerging Countries**

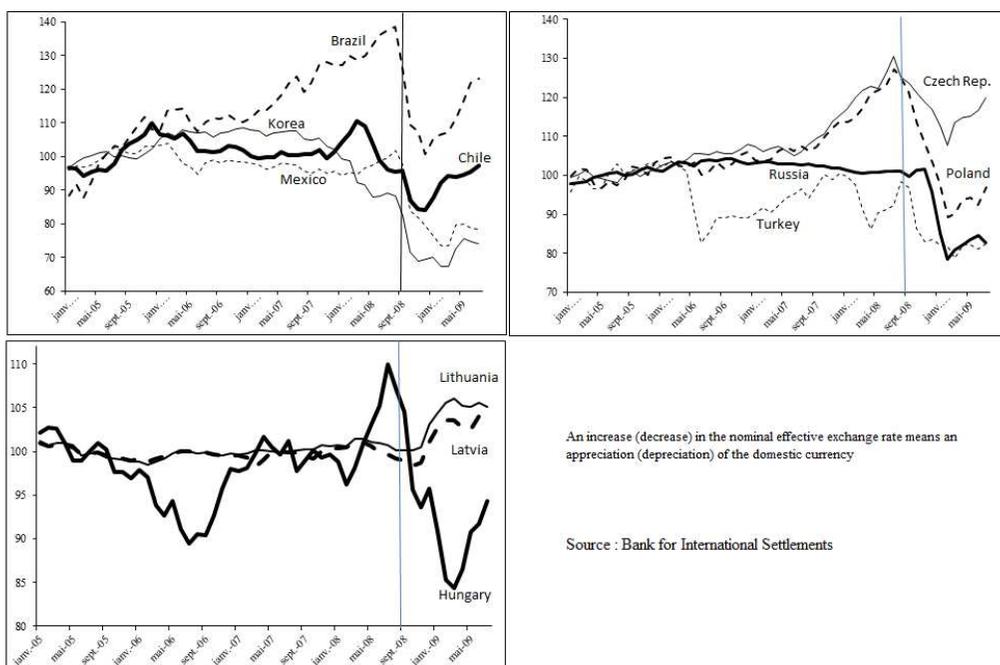


**Source:** IMF, *International Financial Statistics Database*.

Since late 2008, policy rates have fallen sharply in many emerging markets such as Brazil or Chile. It's clear that countries with pegged exchange rates have been more constrained in their ability to lower policy rates. At the same time,

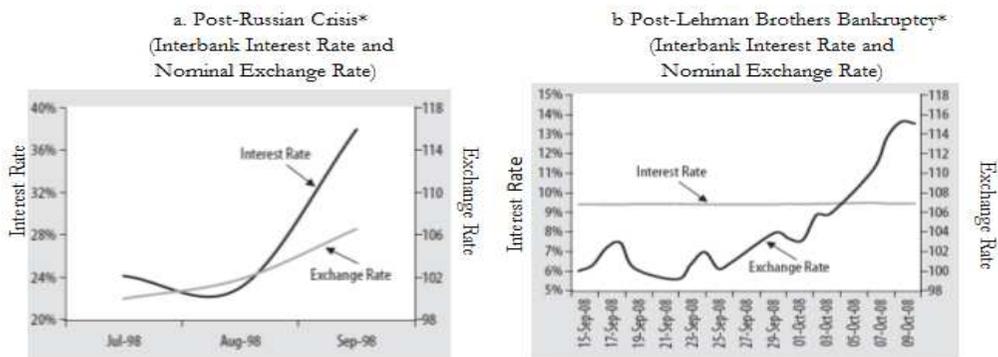
countries that had more room for lowering interest rates also allowed more exchange rate depreciations (see Figure 12).

**Figure 12. Nominal Effective Exchange Rates in Some Emerging Countries, 2005 = 100**



This policy reaction in Latin American countries is in stark contrast with the one enacted in the aftermath of the Russian crisis of 1998. While in the former Latin American currencies have depreciated and policy interest rates have decreased, in the latter pegged exchange rates have limited the size of the depreciation and interest rates have been dramatically increased (Figure 13).

**Figure 13. Policy Responses in Latin American Countries**



\* Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela

**Source:** Izquierdo et Talvi (2009).

Josifidis et al. (2013) analyze adjustment mechanisms and exchange rate regimes during this financial crisis by focusing their attention on transition countries that acceded to European Union in 2004, but stayed outside the euro area (Czech Republic, Estonia, Hungary, Latvia, Lithuania, and Poland).

Two sub-groups of emerging European countries are distinguished according to their exchange rate regimes –fixed regimes group (“fixers”) vs. flexible regimes group (“floaters”)- in order to reveal a general pattern how these countries differ concerning crisis consequences. Fixers include Estonia, Lithuania, and Latvia while floaters are Poland, Czech Republic, and Hungary. To empirically investigate the difference in adjustment mechanism to external shocks under fixed and flexible exchange rate regimes, we use the vector autoregression (VAR) or vector error correction (VEC) approach.

We use the sample of six emerging European countries in the period 2004:01-2010:12 and crisis period 2008:01-2010:12, trying to shed some light to the wide accepted argument in the favor of flexible exchange rate regimes –that under external shocks flexible exchange rates serve as a shock absorber

The trade shock is included through an indicator of economic activity in the Group of seven countries (G7): G7’s industrial production index. As a proxy of financial shock, we test three main indicators: (i) the VIX index; (ii) the EMBI+ indicator; and (iii) we restrict the financial shock to a banking shock by considering the external positions of reporting banks vis-à-vis all sectors in emerging Europe. All these indicators of financial shock had been tested separately in order to avoid endogeneity problems.

As domestic variables, we consider the foreign exchange reserves (FE), the consumer price index (CPI), the industrial production index (IPI), the nominal effective exchange rate (NEER) and the real effective exchange rate (REER).

Our results show that countries with rigid exchange rate regimes have known a weakest real exchange rate adjustment in the aftermath of the Lehman collapse relative to other economies, limiting the ability of exchange rate to smooth negative external shocks. But the main point is to consider the way in which real exchange rate adjusts according to the exchange rate regime. In fixed or rigid regimes, real exchange rate tends to adjust through movements in foreign and / or domestic price levels. If exchange rate regime is flexible, the real exchange rate adjusts mainly through nominal exchange rate movements. The main point is the economic cost of these respective adjustments. Real exchange rate adjustment is very costly under rigid exchange rate regimes when prices and wages are sticky.

Table 2 shows for the all sample period the percentage ratio of real effective exchange rate variations explained by the nominal effective exchange rate shock during 12 months. We see that nominal exchange rate shocks tend to have a higher influence on real exchange rate variance in floaters countries (Poland (98%-90%), Hungary (93%-81%), and Czech Republic (84%-78%)). Countries with fixed exchange rate regimes have relatively lower ratio of nominal exchange rate shocks to real exchange rate forecast error variance (Lithuania (52%-61%), Estonia (36%), and Latvia (0.5%-25%)). Crisis period does not change qualitatively the results.

**Table 2. Variance Decomposition of the Real Exchange Rate: Ratio of NEER Shocks to REER Variations 2004M1-2010M12, in percent**

Months	Czech R.	Estonia	Hungary	Latvia	Lithuania	Poland
I	84.32	35.59	92.95	0.56	51.92	97.65
III	79.20	35.67	83.26	5.06	61.25	92.74
VI	77.85	35.63	80.94	13.55	60.80	90.59
IX	77.90	35.62	80.92	20.08	60.79	90.40
XII	77.91	35.62	80.92	24.68	60.79	90.38

**Source:** Josifidis et al. (2013).

At the same time, considering the ratio of price shocks in explaining the real effective exchange rate variance (Table 3), it appears that countries with fixed exchange rate regimes exhibit a relatively higher influence on nominal price adjustments (CPI innovations). Thus, the share of the real exchange rate variance explained by prices shocks accounts for 39%-23% in Latvia, 32%-25% in Lithuania, and 28%-27% in Estonia. Countries with managed floating exchange rate regimes portray a relatively lower ratio of price adjustment in real exchange rate variations (in contrast to nominal exchange rate variations): Hungary (5%-16%), Czech Republic (9%-12%), and Poland (1%-5%). In other words, relatively high and increasing ratio of price shocks in explaining real effective exchange rate variations points to competitiveness improvement via deflationary mechanism.

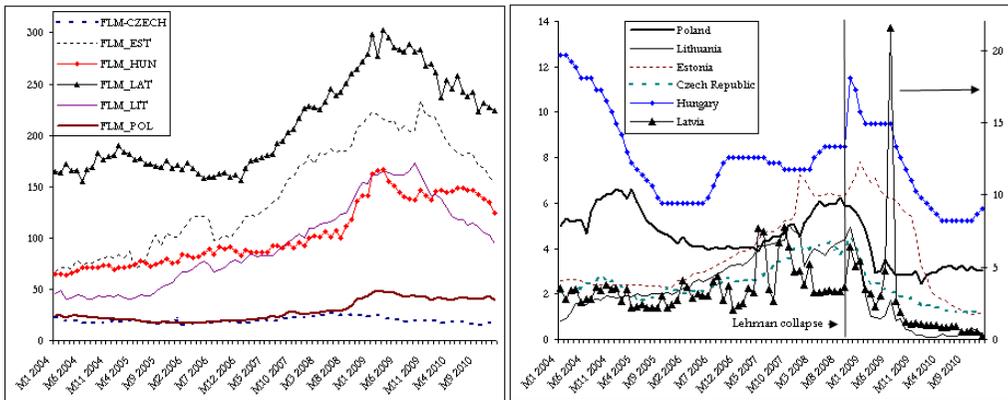
**Table 3. Variance Decomposition of the Real Exchange Rate: The ratio of price shocks to REER variations 2004M1-2010M12**

Months	Czech R.	Estonia	Hungary	Latvia	Lithuania	Poland
I	9.44	27.63	5.10	39.22	32.32	1.02
III	11.38	26.61	14.08	27.28	25.30	3.78
VI	12.26	26.69	15.51	23.58	25.32	5.22
IX	12.23	26.70	15.51	23.17	25.32	5.35
XII	12.23	26.70	15.51	22.99	25.32	5.37

**Source:** Josifidis et al. (2013).

Figure 14 estimates the extent of dollarisation-euroisation in the six studied countries. To this end, we use the same methodology as Levy Yeyati et al. (2010) by calculating the ratio of foreign liabilities to money. The left hand side of the Figure 14 exhibits these ratios while the right hand shows the money market interest rates. The main striking lesson of this figure is that the higher the foreign liabilities to money ratio (the Baltic countries here), the weaker the immediate monetary policy response to the crisis.

**Figure 14 The Ratio of Foreign Liabilities to Money and the Money Market Interest Rates, 2004M1-2010M12, in percentage**



**Source:** Josifidis et al. (2013).

Two related papers use 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. Hausmann and Panizza (2010) compare monetary policy responses to the Asian-Russian crises and the global financial crisis for a panel of 28 emerging markets. More precisely, starting from a Taylor rule to determine the policy rate, they interact a measure of currency mismatch with the GDP growth:

$$i_{j,t} = \alpha i_{j,t-1} + \beta \pi_{j,t} + \gamma \dot{y}_{j,t} + \delta (MISM_{j,t} * \dot{y}_{j,t}) + \lambda MISM_{j,t} + \mu_j + \epsilon_{j,t} \quad (1)$$

where  $i$  is the policy interest rate,  $\pi$  is the inflation rate,  $\dot{y}$  is the real GDP growth, MISM is a measure of the currency mismatch, and  $\mu$  is a country fixed effect.

The parameter of interest is the sum  $\gamma + \delta x$  where  $x$  is the currency mismatch. Thus, if  $\gamma + \delta$  is positive, then we can conclude that the monetary policy is counter-cyclical. Hausmann and Panizza (2010) estimate regression (1) over the period 1993-2000 in which the median mismatch was 0.28. They find that the sum of  $\gamma + \delta$  has been significant and negative (-0.248) suggesting the adoption of procyclical monetary policy. At the opposite, over the period 2007-2009 in which the currency mismatch has been equal to 0.03, the sum of  $\gamma + \delta$  is negative but insignificant. In other words, the decline in the currency mismatch seems to favor the conduct of counter-cyclical monetary policy. Vegh and Vuletin (2012) estimate the following expanded Taylor rule:

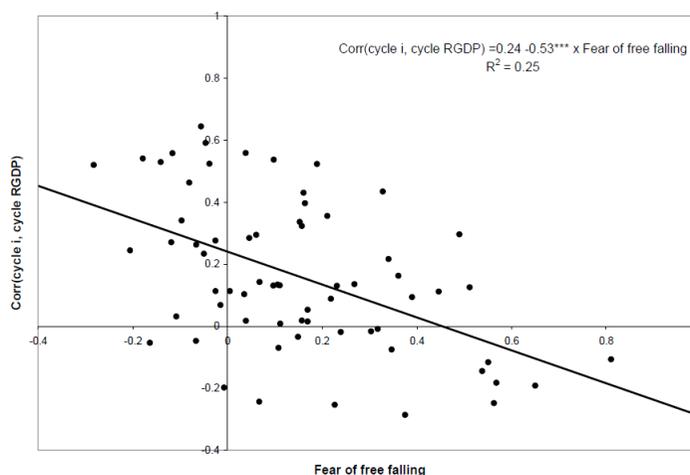
$$i_{j,t}^c = \alpha + \beta y_{j,t}^c + \delta \pi_{j,t}^c + \lambda e_{j,t}^c + \gamma (FFF_{j,t} * y_{j,t}^c) + \phi FFF_{j,t} + \eta_{j,t} + \mu_{j,t} \quad (2)$$

where  $i$ ,  $y$ ,  $\pi$ , and  $e$  are the cyclical components of the short-term interest rate, real GDP, inflation, and exchange rate depreciation, respectively. FFF is the variable representing the “fear of floating” measured as the correlation between the cyclical component of the short-term interest rate and the rate of depreciation of the exchange rate<sup>17</sup>.

Figure 15 shows that the correlation is negative since monetary policy is procyclical for high levels of FFF and becomes more countercyclical as FFF diminishes.

<sup>17</sup> More precisely, FFF uses the 10-year rolling window correlation between the cyclical component of the short-term interest rate and the rate of depreciation of the exchange rate.

**Figure 15. Country correlations between the cyclical components of short-term interest rate and real GDP vs. fear of free falling. 1960-2009**



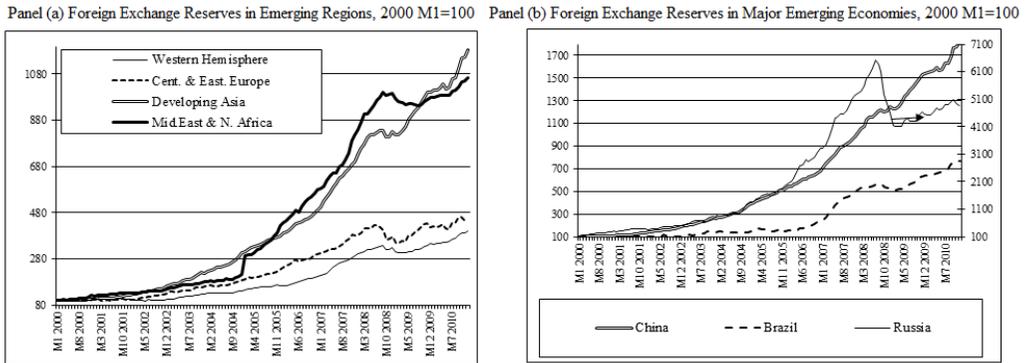
**Source:** Vegh and Vuletin (2012): 22.

In equation (2), the monetary policy the coefficient  $\gamma$  is expected to be negative. Testing different specifications based on equation (2), Vegh and Vuletin (2012) find that the coefficient  $\gamma$  is negative in all cases. Interestingly, while it is statistically insignificant for advanced countries, suggesting that the fear of floating is not relevant in such economies, the FFF is very important for developing countries. Indeed, the interaction term between FFF and real GDP cycle is negative.

## 5. How to Protect Itself against Financial Crises? Foreign Exchange Reserves Accumulation

Since the Asian crisis of 1997-1998, many developing and emerging countries have considerably increased their foreign exchange holdings (Figure 16). As a consequence, the repartition of the stock of the world reserves has changed. While in January 2000, developing and emerging countries amounted to 37.2 percent of the world reserves, this share increased to 50.5 percent in September 2005 and 66.6 percent in December 2010.

**Figure 16 Foreign Exchange Holdings in Developing and Emerging Countries, January 2000 = 100**



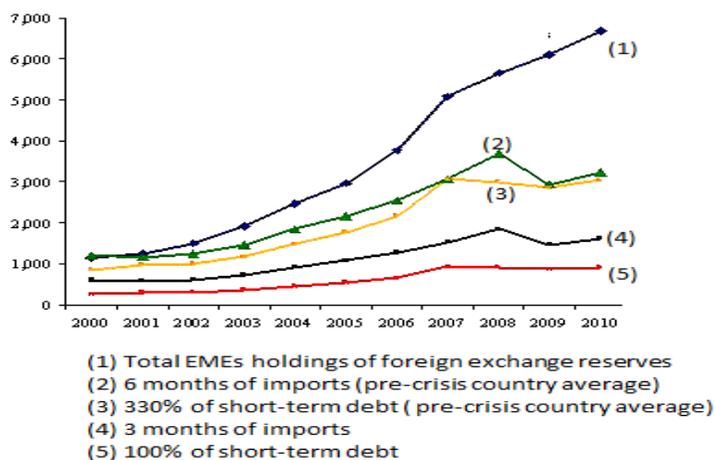
**Source:** IMF, *International Financial Statistics*.

An extensive literature analyzes the motives and consequences of this accumulation of foreign reserves in such countries<sup>18</sup>. A substantial strand of this literature stresses that reserves accumulation responds to a self-insurance motive. More precisely, drawing lessons from the past financial crises, most emerging countries accumulate foreign exchange reserves in order to face recurrent boom-bust cycles in capital inflows. From this perspective, the holding of a sizeable stock of reserves may strengthen their 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.

Empirical data suggest that emerging economies hold foreign reserves stocks considerably higher than usual prudential ratios (Smaghi, 2010; IMF 2010b; Dorrucci and McKay, 2011). Figure 17 compares the actual level of reserves with two traditional benchmarks of accumulation for self-insurance motives: on the one hand, the three-months-of-imports rule and, on the other hand, the Greenspan-Guidotti rule that requires foreign exchange reserves to cover the stock of short-term debt.

<sup>18</sup> See, for instance, Aizenman and Lee (2007).

**Figure 17 Actual Holdings of Reserves in Emerging Economies and Prudential Ratios, in USD billion**



**Source:** Smaghi (2010).

The figure shows clearly that the actual level of reserves holding is exceptionally high relative to these traditional ratios. In addition, we see that if we consider more stringent benchmarks of reserve adequacy, the effective holding stays very high. Is this holding of reserves suboptimal? Rodrik (2006), among others, considers that reserves accumulation is costly. Indeed, as such reserves are invested in safe international assets offering very low returns; this form of national saving – recall that current account surplus means an excess of domestic saving over domestic investment- is not optimally used<sup>19</sup>.

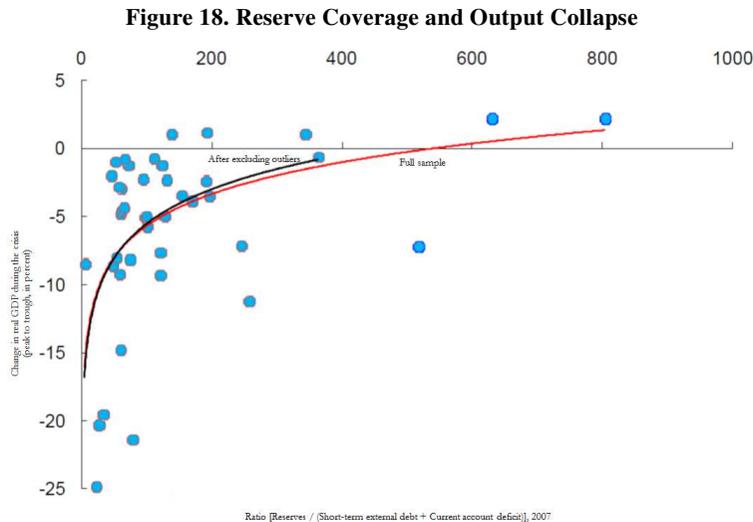
The global financial crisis has offered a good opportunity to see to what extent holding a sizeable amount of foreign exchange reserves has mitigated the negative impact of the crisis on output. Empirical literature on this topic gets mixed conclusions.

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. Such result suggests the presence of threshold effect. More precisely, if Berkmen et al (2012) shows that countries with higher international reserves<sup>20</sup> experienced smaller growth revisions, the relationship is

<sup>19</sup> An additional cost is the potential inflationary pressures due to reserves accumulation. To avoid such pressures, monetary authorities can try to sterilize the domestic effects of this accumulation, but sterilization is costly. See Calvo (1991).

<sup>20</sup> 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.

statistically insignificant. Llaudes et al (2010) confirm that higher international reserves<sup>21</sup> can help to buffer the impact of the financial crisis. But they show that international reserves holding exhibits diminishing returns. Indeed, Figure 18 shows that at very high levels of reserves holding, the moderating impact on output collapse seems disappear.



**Source:** Llaudes et al (2010): 15.

Aizenman and Sun (2012) identify factors explaining the loss of international reserves over the period July 2008-February 2009 in emerging countries. Their main result is that countries with financial vulnerabilities suffer from a “fear of losing” international reserves behavior. Indeed, these countries are reluctant to use their reserves in order to smooth the effects of the crisis insofar as they are afraid of sending a negative signal concerning their vulnerability. If reserves losses are interpreted as the syndrome of greater vulnerability, they can trigger more intensive pressures and more reserves losses. Aizenman and Hutchison (2012) obtain a similar result by considering changes in exchange market pressure from August 2008 to February 2009. They measure exchange market pressure as the sum of the percentage change in the exchange rate and the percentage loss of reserves. According to them, emerging countries with a high degree of short-term external debt exposure exhibit a negative relationship with reserves losses relative to exchange market pressure. In other words, the “fear of losing” international reserves seems more significant than the “fear of floating” due to the negative balance sheet effect resulting from a depreciation of the domestic currency.

<sup>21</sup> 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).

## 6. Conclusion

In this paper, we surveyed the literature on monetary policy responses to financial crises in emerging countries. Two main lessons can be drawn. On the one hand, initial conditions matter. In other words, the ability to face financial crises depends on pre-crisis vulnerabilities. On the other hand, the currency mismatch appears as one of the main impediments to conduct countercyclical monetary policies. Interestingly, these two lessons are not new. Indeed, they were already present in the policy debates that followed the Asian crisis of 1997-1998. As previous financial crises, the subprimes crisis shows that international capital flows can fuel domestic instabilities leading to deep recessions (Reinhart and Rogoff, 2009).

From this perspective, the analysis of policy responses to financial crises must go beyond the question of the pre-conditions allowing the adoption of countercyclical policies. More precisely, we suggest considering at the same time the role that could play capital controls to manage massive and volatile international capital flows. Ostry et al (2010) find that output collapse during the global crisis of 2008-2009 has been lower for countries using capital controls before its occurrence. Indeed, capital controls reduce financial vulnerabilities by limiting both the volume of capital inflows and the amount of bank credits in foreign currencies<sup>22</sup>. However, capital controls may trigger loss confidence for international investors. Under such circumstance, they may be destabilizing instead of stabilizing. In order to minimize such negative signal, the International Monetary Fund should integrate capital controls as a possible macroeconomic policy tool (Allegret and Dulbecco, 2000). Far from promoting a global capital market that escapes any control, an enhanced surveillance and careful Fund management of capital account convertibility would help a gradual and successful integration of each country in the global financial community. That also means that the IMF must develop its analysis of the use of different types of capital controls by member countries. Its intervention of the IMF would serve as a guarantor of the credibility of the strategy adopted by domestic authorities.

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<sup>22</sup> In a similar way, Gupta et al (2007) analyze 195 crises episodes for 91 developing countries over the period 1970-2000. They interact an index of capital restrictions with capital inflows and find that the presence of restrictions mitigates the negative impact of crises on domestic output.

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