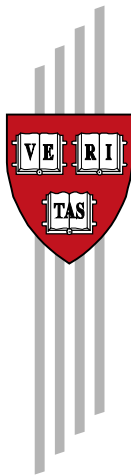


Redemption or Abstinence? Original Sin, Currency Mismatches and Counter-Cyclical Policies in the New Millenium

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Redemption or Abstinence? Original Sin, Currency Mismatches and Counter Cyclical Policies in the New Millenium

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Abstract: This paper updates our previous work on the level and evolution of original sin. It shows that while the number of countries that issue local-currency debt in international markets has increased in the past decade, this improvement has been quite modest. Although we find that countries have been borrowing at home, thanks to deepening domestic markets, we document that foreign participation in these markets is more limited than what is usually assumed. The paper shows that the recent decline of currency mismatches and the consequent ability to conduct countercyclical macroeconomic policies is due to lower net debt (abstinence) and not to redemption from original sin. We conclude that original sin continues to make financial globalization unattractive and developing countries have opted for abstinence because foreign currency debt is too risky. The promised paradise of financial globalization will need to wait for redemption from original sin.

Keywords: original sin, local-currency debt, financial globalization, currency mismatch

JEL Codes: F33; F34; F41; G15

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1. Introduction

The emerging market crises of the 1990s focused the attention of economists on issues of debt composition and particularly currency denomination (see, among others, Krugman, 1999). Since in bad times the real value of the domestic currency tends to weaken, servicing foreign currency debt becomes more difficult exactly when the capacity to pay is diminished. This makes for riskier debt, less room for counter-cyclical fiscal policies and a monetary policy geared towards currency not output stability.

A debate emerged in the late 1990s and early years of the past decade regarding the causes of the prevalence of foreign currency foreign debt in emerging markets. Some saw it as a consequence of moral hazard. We worked at the time on the *original sin* hypothesis which was originally introduced by Hausmann (1999) and Eichengreen and Hausmann (1999) to describe a situation in which “the domestic currency is not used to borrow abroad or to borrow long-term even domestically” (p. 330). In our work on original sin, we made the following four points: (i) original sin is a widespread phenomenon in both developing and developed countries; (ii) original sin is quite persistent over periods as long as 150 years; (iii) original sin is not a mere consequence of bad policies or institutions; and (iv) original sin has negative effects on economic stability and on policy options (Eichengreen, Hausmann, and Panizza, 2005a, b).

These findings led to a heated debate in policy and academic circles centered on whether original sin was one of the many consequences of bad domestic policies and institutions, or whether instead, as we argued at the time --and as evidenced by the fact that too many countries with good policies and institutions suffered from the problem-- it was more related to structural features of global financial markets. (Reinhart, Rogoff, and Savastano, 2003, Goldstein and Turner, 2004, and Eichengreen Hausmann and Panizza, 2007, Reinhart and Rogoff, 2009).

More recently, several observers argued that the debate is now mute because things have changed since we first proposed the concept. In particular, it is often claimed that many emerging market countries can now issue external debt in their own currency. According to this view, these countries are also making greater use of the domestic debt market, where original sin is not as pervasive as in the external debt market and where

foreigners are playing an increasingly active role. In other words, original sin is no longer a problem --if ever it was-- because many developing countries expiated their sins and achieved redemption. ¹ And so, we find anecdotal statements to the effect that "governments and corporations increasingly are borrowing in their own currencies" (David Wessel, *The Wall Street Journal*, May 3, 2007). Or that: "The principal emerging markets sales desk pitch of recent years has been the expiation of the "original sin" of governments' borrowing in foreign currencies." (John Dizard, *Financial Times*, October 21 2008). Summing it all up, we find Martin Wolf's (2006, p.37) statement: "I don't believe in original sin."

In fact, redemption from original sin was argued as one of the reasons for the impressive performance of emerging markets since the 2008 crisis and for their ability to conduct counter-cyclical macroeconomic policies for the first time.

As partial observers, we have always been a bit skeptical of the "redemption" view, and the recent experience of Iceland and several East and Central European countries appears to vindicate our skepticism. However, it would be wrong to use a few isolated cases as evidence against the redemption view, just as the positive experience of a few countries should not be used as evidence in favor of the redemption view.

In this paper, we update our measures of original sin to 2008 and look at the redemption hypothesis by using data on the international and domestic bond markets for a large sample of developing, transition, and emerging market countries (henceforth, developing countries). Our main findings can be summarized as follows. First, we do find a reduction in original sin, but this reduction is small and concerns a limited number of countries, which we identify. Second, we find that several countries are making greater use of the domestic bond market and that this market is becoming less "sinful" in the sense that the proportion of long-term, fixed-rate debt is increasing relative to currency-, CPI- or interest-indexed debt. Third, we find that there is no evidence that foreign investors are now more willing to take currency risk by increasing their exposure to domestic currency bonds traded in local markets. Fourth, we document that there has been an important retreat from reliance on foreign debt as expressed in major declines in gross and net foreign debt to GDP ratios. Therefore, while we find that original sin is still

¹ The various papers by Eichengreen, Hausmann, and Panizza covered the 1993-2001 period.

with us, meaning that the great majority of countries that need external funds would have to borrow in foreign currency, we show that fewer countries are willing to put themselves in a position of having to borrow abroad. Finally, we show that emerging market countries are now able to conduct countercyclical policies because they have lower gross and net levels of external debt and not because they have been redeemed from original sin.

Therefore, the picture is not as rosy as many claim. This is especially true if one considers that our findings are heavily influenced by the stock of debt issued during the period 2003-2007. These were years characterized by extremely low risk aversion and by the presence of investors desperate for yield and willing to buy almost anything that promised a decent return. It remains to be seen how the current crisis will affect the incipient domestic bond markets of several emerging market countries and the appetite for domestic currency debt in global markets.

2. International original sin

We measure original sin by using BIS data on international bonds. This dataset does not fully capture international original sin because it does not include non-bonded debt (essentially bank loans and official lending) and it does not track the activities of international investors in the domestic market. However, this is the only dataset for which we have detailed information on currency composition.

Trends in the international bond market

Using BIS data for the period 1999-2001, Eichengreen, Hausmann, and Panizza (2005a) found that the international bond markets were dominated by 5 major currencies (the US dollar, the euro, the yen, the pound sterling, and the Swiss franc). They showed that 85 percent of the bonds issued by countries that do not issue one of these currencies were denominated in one of these five currencies. **Figure 1** updates this information and tracks the evolution of the international bond market over the period 1999-2008. It shows that this market grew by a factor of five during the period under consideration, going from approximately USD5.5 trillion to about USD23.8 trillion. In 1999, 97 percent of

outstanding bonds (USD5.3 trillion) were denominated in one of the top five currencies but only USD3.9 trillion was issued by residents of the countries that issued these currencies (71 percent of total outstanding bonds). Therefore, 90 percent of the outstanding bonds issued by countries outside this 5-currency area were denominated in one of these five main currencies. By 2008 the share of top five currencies was still 96 percent (corresponding to USD23 trillion), while the amount issued by residents of this 5-currency area had reached USD20.4 trillion (85 percent of total outstanding bonds). Therefore, the share of outstanding bonds issued by countries outside this 5-currency area that was denominated in one of these five main currencies decreased from 90 to 75 percent.

Table 1 focuses on 6 subgroups of countries (major financial centers; countries in the euro area; advanced economies that do not belong to the first two groups; international organizations; offshore centers; and developing countries).² It shows that between 2001 and 2008 the international bond market grew by a factor of three. The stock of outstanding bonds issued by the major financial centers went from USD3.5 trillion to USD9.8 trillion and the stock of bonds issued by the countries in the euro area grew by a factor of four (going from USD2.5 trillion to USD10.6 trillion). With respect to currency composition, the market for euro-denominated bonds is now as large as that for dollar-denominated instruments (it was about half that of the dollar in 2001).

Developing countries “only” doubled their stock of outstanding bonds (from USD0.6 trillion to USD1 trillion). Therefore, the share of developing countries in the international bond market decreased from 7.8 percent to 4.2 percent.³ In 2001, only 0.8 percent of the debt instruments issued by developing countries were denominated in the currency of the issuing country. By 2008, the share of debt issued by developing countries and denominated in the currency of the issuer had increased to 4.1 percent (column 7).

² The major financial centers group includes USA, Japan, UK and Switzerland; the other developed countries group includes 9 economies (Australia, Canada, Cyprus, Denmark, Iceland, Malta, New Zealand, Norway, and Sweden); the offshore centers group includes 10 economies (Aruba, Bahamas, Barbados, Bermuda, Cayman Islands, Gibraltar, Hong Kong, Liechtenstein, Singapore, and British West Indies); the developing countries group includes the remaining 65 economies included in our sample.

³ When measured as a share of the groups' GDP, the stock of outstanding external bonds issued by developing countries peaked at 9 percent in the late 1990s, and it is now around 5 percent.

While 96 percent of bonds issued by developing countries are still denominated in a currency different from the issuer's currency, there has been an increase in the share of bonds denominated in the currencies of developing countries that are not issued by residents of these countries.⁴ The total value of bonds issued in the currency of developing countries went from 3.7 percent of the total value of bonds issued by these countries to 18.5 percent of the total (column 8). This is relevant because debt issued by other countries in one's currency creates an opportunity to hedge currency exposures via the swap market.

In short, Table 1 shows that developing countries are currently issuing 4 percent of their debt in their own currency and that they could potentially use swaps to hedge up to 18.5 percent of their debt. The remaining 81.5 is in foreign currency and remains difficult to hedge. Moreover, the 18.5 percent figure is an overestimation of the ability to hedge because some countries may have a level of outstanding debt (the debt that needs to be hedged), which is lower than the amount of debt denominated in their own currency (more on this below).

Original sin in developing countries

To track the evolution of original sin we use two of the three indexes originally developed by Eichengreen, Hausmann, and Panizza (2005a).

Our first indicator of original sin (*OSIN1*) is one minus the ratio of the stock of international securities issued by a country in its own currency to the total stock of international securities issued by the country. That is:

$$OSIN1_i = 1 - \frac{\text{Securities issued by country } i \text{ in currency } i}{\text{Securities issued by country } i}$$

⁴ Eichengreen, Hausmann and Panizza (2005b) show that most international bonds issued in the currencies of developing countries are issued by AAA institutions located in the advanced economies. The international financial institutions are large players in this market. They started by issuing bonds in exotic currencies with the objective of reducing funding costs but now they sometimes do it with the explicit objective of creating new markets (Eichengreen, Hausmann, 2005, Borensztein, Levy Yeyati and Panizza, 2006).

A country that issues all of its securities in its own currency would get a zero, while a country that issues all of them in foreign currency would get a 1 (the higher the value, the greater the sin). OSIN1 has two drawbacks. First, it only covers securities and not other types of debt. Second, it does not take into account opportunities for hedging currency exposures through swaps. There is no easy solution for the first problem (see Eichengreen, Hausmann and Panizza, 2005a, for an attempt at building a more comprehensive index, which they label OSIN2). However, it is possible to build an index that captures the scope for hedging currency exposures via swaps. Consider a measure of the form:

$$INDEXA_i = 1 - \frac{\text{Securities issued in currency } i}{\text{Securities issued by country } i}$$

INDEXA accounts for the fact that debt issued by other countries in a country's currency creates an opportunity for countries to hedge currency exposures via the swap market. However, this measure can take on negative values (as it does for countries such as the US and Switzerland, which have more debt issued in their currency than debt issued by residents). But a negative value would be meaningless for our purposes as countries cannot hedge more than the debt they have. As a consequence, Eichengreen, Hausmann and Panizza (2005a) suggest imposing a lower bound to *INDEXA* and building an index of original sin defined as:

$$OSIN3_i = \max\left(1 - \frac{\text{Securities issued in currency } i}{\text{Securities issued by country } i}, 0\right)$$

Note that $OSIN1 \geq OSIN3$ by construction. **Figure 2** plots the evolution of the outstanding stock of international bonds issued by developing countries. The columns show that this market grew from approximately USD200 billion in 1993 to just above USD1 trillion in 2007 (the market shrunk by approximately 2 percent in 2008). The value of international bonds denominated in the developing countries' currencies went from nil in 1993 to a peak of USD193 billion in 2007 (it was USD185 billion at the end of 2008).

The solid and dotted lines plot the evolution of the weighted averages of the two indexes of original sin described above. OSIN1 barely moved and went from 1 in 1993 to 0.96 in 2008. OSIN3, instead, went from 1 to 0.815 (this corresponds to the 18.5 percent of column 8 in Table 1).

Table 2 shows the evolution of original sin (this time computed as a simple average) for all developing countries and different developing regions (Latin America and the Caribbean, Emerging Europe, and Asia). The top panel focuses on OSIN1; the first column includes all developing countries and shows that the simple average is basically identical to the weighted average depicted in Figure 2. The remaining columns show that the median country has always an index of 1 and that there are no large differences among the three developing regions considered in the Table. The bottom panel focuses on OSIN3. It shows that the simple average of the index is slightly higher than the weighed average (0.88 versus 0.815 in 2008) and that the median developing country has always an index close to 1. With respect to regional composition, Emerging Europe is the region with the lowest level of average original sin. Latin America and Asia have instead similar average levels of original sin (always above 0.9).

Table 3 lists the developing countries that achieved redemption of some sort. The first column includes the countries that issue at least 15 percent of their international securities in own currency ($OSIN1 < 0.85$) and the second column shows the countries that could potentially hedge at least 25 percent of their international securities ($OSIN3 < 0.75$).⁵ Out of a sample of 65 developing countries, for which we have data, only 9 ever managed to issue at least 15 percent of their debt in own currency (and only 7 countries had an index of OSIN1 lower than 0.85 in 2008) and only 18 would have ever been able to swap at least 25 percent of their international debt securities (11 countries in 2008).

3. The domestic bond market

The previous section showed that there have been some improvements in the international component of original sin, but that we are still far from significant

⁵ The table also reports the value of the indexes for the countries included in the list.

redemption. The question we address now is whether redemption is being achieved in the domestic bond markets.

Figure 3 uses BIS data on international and domestic bonds for 25 developing and emerging economies and shows that indeed domestic bond markets are becoming more and more important.⁶ In 1997, these 25 countries had a stock of outstanding bonds of approximately USD1.7 trillion. About one quarter of these bonds had been issued in the international market and the remaining 75 percent in the domestic market. When, in 2007, the stock of outstanding bonds peaked at USD7.22 trillion (USD7.18 trillion in 2008), the share of international bonds had dropped to 12 percent. **Figure 4** looks at outstanding bonds as a share of the group's GDP and shows that the external bonds peaked at 9 percent in 2002 and have been decreasing since then. The domestic bond market, instead, kept growing faster than GDP until 2007 and then collapsed in 2008.

Table 4 describes the evolution of the domestic debt share in the 25 countries included in our sample. It shows that there are large cross country and regional differences, but every developing region shows a pattern of increasing reliance on the domestic bond market.

The fact that developing countries are relying more on the domestic bond market does not necessarily mean that they can issue long-term, fixed-rate debt (this was our 2001 definition of *domestic original sin*). Detailed data on the structure of the domestic debt market are hard to find, but the BIS recently conducted surveys in 24 developing and emerging market countries.⁷ **Table 5** summarizes the results of these surveys and shows that most countries are making substantial progress towards issuing more fixed rate debt and less exchange rate and interest rate indexed securities. About 70 percent of domestic bonds are now issued with a fixed rate, 20 percent with a floating rate, 7 percent are indexed to inflation and 3 percent are indexed to the exchange rate. About 95 percent of domestic debt issued by Asian developing and emerging market countries is fixed rate and about 5 percent of this debt is floating rate. In Emerging Europe, about 73 percent of

⁶ These are the developing and emerging economies for which BIS collects data on the size and composition (by type of issuer) of the domestic bond markets. The countries are: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, South Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Africa, Taiwan (China), China, Thailand, Turkey, Venezuela.

⁷ Early attempts at measuring domestic original sin include Hausmann and Panizza (2003), Mehl and Reynaud (2005), Cowan et al. (2006), and Jeanne and Guscina (2006).

domestic bonds are fixed rate, 17 percent are floating rate and the remaining 10 percent is almost equally split between inflation and exchange rate indexed bonds. In Africa and the Middle East, about 80 percent of domestic bonds are fixed rate and the remaining 20 percent is almost equally split between floating rate and inflation indexed bonds. Only in Latin America fixed rate bonds are still a minority of total outstanding domestic debt. In this region, floating rate bonds represent 45 percent of the total, inflation indexed and fixed rate bonds a little more than 20 percent each, and exchange rate indexed bonds the remaining 7 percent (down from more than 17 percent in the early years of this decade). Bonds issued on the domestic market are also becoming long-dated.⁸ A BIS survey of government bonds in the same 25 emerging and developing countries discussed above shows that average original maturity of these bonds is now 9 years (it was 7 years in the recent past, **Table 6**). Average original maturity reaches 10 years in Asia and 17 years in the Middle East and Africa. At 6 years, original maturity remains, instead, short in Emerging Europe.

4. Domestic borrowing and original sin

The previous section showed that it is indeed true that emerging and developing countries are relying more on the domestic bond market and that, in this market, domestic original sin (i.e. the inability to issue long-term, fixed-rate debt) is not as prevalent as in the international market.⁹ There are two possible reasons why developing countries are making greater use of the domestic market, but only one of these two reasons would be consistent with the redemption hypothesis.

The first reason is that developing countries realized that borrowing abroad is too dangerous and therefore they decided to target their domestic investors (the fact that developing countries as a group have been running current account surpluses reduced the need to borrow abroad). Whether this is a good thing or a bad thing depends on one's

⁸ However, it is not clear what this maturity means. Consider the case of India where the average maturity of government debt is well above 15 years, but where domestic banks hold more than 50 percent of the stock of government bonds (Gopinath, 2007). These large bank-holdings of public debt alter the effective maturity of government debt because, during banking crises, long-term government debt held by banks becomes *de facto* overnight debt.

⁹ For a set of studies of the evolution of the domestic bonds markets in Latin America and Asia see Borensztein et al. (2007) and Eichengreen, Borensztein and Panizza (2006).

view on the cost and benefits of financial globalization. However, if developing countries addressed original sin by simply borrowing domestically, they did not really achieve redemption. They simply forego the potential (but always elusive) benefits of financial globalization. In other words, they just did what we said that they could do in the presence of original sin:

If a country is unable to borrow abroad in its own currency -if it suffers from the problem that we refer to as original sin- then when it accumulates a net debt, as developing countries are expected to do, it will have an aggregate currency mismatch on its balance sheet. Of course, such a country can take various steps to eliminate that mismatch or prevent it from arising in the first place. Most obviously, it can decide not to borrow. A financially autarchic country will have no currency mismatch because it has no external debt, even though it still suffers from original sin as we define it. ... Alternatively, the government can accumulate foreign reserves to match its foreign obligations. In this case, the country eliminates its currency mismatch by eliminating its net debt (matching its foreign currency borrowing with foreign currency reserves).

Eichengreen, Hausmann, Panizza (2005a) p. 13.

The second possible reason why countries are making greater use of the domestic bond market is that they managed to convince foreign investors to participate in this market. This is technically external debt, as it constitutes a liability vis a vis a non-resident, but it is often recorded as domestic debt because it is difficult to track down the ultimate holders of bonded debt (Panizza, 2008).¹⁰ If countries managed to do this they have indeed achieved redemption.

¹⁰ The official definition of external debt focuses on the residence of the creditor (external debt is debt owed to non-residents) and not on the place of issuance. The *External Debt Statistics: Guide for Compilers and Users* (jointly published by the BIS, Eurostat, IMF, OECD, Paris Club, UNCTAD, and the World Bank) states that: "Gross external debt, at any given time, is the outstanding amount of those actual current, and not contingent, liabilities that require payment(s) of principal and/or interest by the debtor at some point(s) in the future and that are owed to non-residents by residents of an economy."

4.1 External borrowing and currency mismatches in developing countries

In Section 3, we used a subsample of 28 emerging market countries for which we have information on domestic and international bonds to show that the share of international securities has been decreasing both in relation to total securities (Figure 3) and in relation to the issuing countries' GDP (Figure 4). We now show that we find the same pattern if we look at all the developing countries for which we have information on international securities or total external debt.

Panel A of **Table 7** focuses on the BIS security data used to compute our indexes of original sin and shows that these securities went from a peak of about 9 percent of developing countries' GDP in 2002 to 5 percent of developing countries' GDP in 2008 (these are weighted averages, the simple averages are 15 and 12 percent, respectively). For any given level of external debt, countries can reduce vulnerabilities by accumulating international reserves. Therefore, it is interesting to look at the evolution of external borrowing net of reserve accumulation. This is what we do in the last two columns of Panel A. We find that until 2001 developing countries held reserves which were slightly higher than their outstanding international debt securities (the difference was about 2 percent of GDP if we focus on the simple average and 3-4 percent of GDP if we focus on the weighted average). However, by the end of 2008, international reserves held by developing countries had become much larger than outstanding international debt securities of these countries (7.5 percent of GDP if we focus on the simple average and 21.5 percent of GDP if we look at the weighted average).

Panel A captures a relatively small part of the total external debt of developing countries because it does not include bank loans and official (multilateral and bilateral) lending. It is thus interesting to look at the evolution of a more comprehensive measure of external debt as measured by the IMF (Panel B) or the World Bank (Panel C). As expected, we now find much higher debt ratios, but the trends are similar to those of the BIS data (the correlation between BIS and IMF data ranges between 60 and 98 percent). For instance, panel B shows that average gross external debt of developing countries went from more than 35 percent of the group's GDP at the turn of the century (about 60 percent of GDP if we consider the simple average), to less than 25 percent of GDP in

2008 (51 percent of we consider the simple average).¹¹ The evolution of net external debt is even more dramatic. External debt net of international reserves went from about 25 percent of GDP in 2000 (the simple average was close to 60 percent) to minus 2 percent in 2008 (the simple average is 31 percent). In other words, developing countries, as a group, no longer have a net external debt.

Taken together, these results suggest that developing countries adopted two behaviors that limited their vulnerabilities associated with external borrowing. First, they borrowed less. Second, they self insured by accumulating large foreign exchange rate reserves. Note that while self insurance may play a positive role in limiting vulnerabilities, it can also be a costly policy because returns on international reserves tend to be much lower than the opportunity cost of funds.

What about original sin? Did the partial redemption documented in Section 2 play a role in reducing vulnerabilities? In order to address this question we need to focus on a measure of aggregate currency mismatch. Ideally, we would like to measure currency mismatches by looking at the share of net debt denominated in foreign currency scaled by GDP or exports. Therefore, a good measure of the mismatch would be:

$$MISM_i = \frac{\text{foreign currency debt} - \text{international reserves}}{GDP}$$

Although we do not have data on the currency composition of all external debt, we can build a lower bound for the aggregate currency mismatch by assuming that the share of external debt denominated in domestic currency is equal to the share of international securities that are either denominated in domestic currency or can be hedged with swaps contracts:

$$MISM3_i = \frac{\text{foreign currency debt}}{GDP} - (1 - OSIN3) \frac{\text{foreign currency debt}}{GDP} - \frac{\text{international reserves}}{GDP}$$

¹¹ There are some differences in methodology and country coverage between the IMF and the World Bank, but panel C yields the same message as Panel B.

This definition allows breaking down the total mismatch into three components. The first is total external foreign-currency borrowing, the second is the attenuation brought about by redemption from original sin, and the third is self insurance via reserve accumulation.¹²

Figure 5 plots the evolution of the cross-country simple average of MISM3 and that of its three components. The average mismatch went from about 56 percent in 2000 to 27 percent in 2008. This 29 percentage point reduction was due to a 20 percentage point reduction in external debt, a 7 percentage point increase in international reserves, and a 2 percentage point reduction in original sin. This shows that, even if we consider an upper bound of the original sin component, redemption from original sin explains less than 10 percent of the decrease in aggregate currency mismatch that took place since the turn of the century.

Figure 6 shows the evolution of the weighted average of the index of currency mismatches. The index peaked at 28 percent in 1999 and reached minus 6 percent in 2008 (indicating that, on average, developing countries are long in foreign currency debt). This 34 percentage point reduction can be attributed to a 17 percentage point reduction in external debt, a 14 percentage point increase in foreign reserves, and a 3 percentage point reduction in original sin. Again, changes in original sin explain less than 10 percent of the reduction in currency mismatches (and we are considering an upper bound).¹³

4.2 Who buys the domestic bonds?

The previous subsection argued that most of the recent reduction in mismatches is due to lower external borrowing and to reserve accumulation and not to redemption from original sin. However, our argument would not be valid if the reduction in external debt documented above had been compensated by a comparable increase in the amount of

¹² MISM3 is a lower bound for the aggregate currency mismatch because official debt and syndicated bank loans are almost always denominated in foreign currency, but we are assuming that the domestic currency share of all external debt is equal to the domestic currency share of international securities (alternatively,

$(1 - OSIN3) \frac{\text{foreign currency debt}}{GDP}$ is an upper bound for the attenuation component).

¹³ It is possible to build similar measures of mismatches by using OSIN1 instead of OSIN3. If we do this we find an even smaller role of redemption.

domestically issued debt bought by foreign investors. There is, in fact, anecdotal evidence that foreign investors have been entering the domestic markets of several emerging market countries. But how important is this phenomenon?

It is not easy to find data on the level and composition of foreign holdings of domestic bonds. However, we can rely on a series of surveys conducted by the US Treasury to have an idea of the composition of the bond portfolio of US investors. These surveys classify all the international bonds (the surveys include bonds issued in the international market and bonds issued in the market of the issuing country) held by US investors according to the residence of issuers and the type of currency. These data, which were first used by Burger and Warnock (2006), are available for 2003, 2004, 2005, 2006, and 2007. While the 2006 and 2007 surveys allow identifying six currencies (US dollar, euro, yen, British pound, currency of the issuer, and other currencies), the surveys for the previous years do not distinguish the currency of the issuer from the "other currencies" category.

Figure 7 shows that US holding of bonds issued by residents of developing countries almost doubled over the period 2003-2007, going from approximately USD900 billion to USD1.6 trillion. The share of bonds denominated in US dollars ranges between 65 percent (in 2003) and 75 percent (in 2005), and the share of bonds denominated in one of the top four currencies (US dollar, euro, yen, and British pound) ranges between 90 percent (in 2007) and 93 percent (in 2003). Therefore, out of the USD1.6 trillion dollars of debt securities issued by residents of developing countries and held by US investors, at most 10 percent are denominated in the currency of the issuer.

We can also use the data collected by the US Treasury to calculate two indexes of original sin:

$$US_SIN1_i = 1 - \frac{OWN + OTHER}{TOTAL}$$

$$US_SIN2_i = 1 - \frac{OWN}{TOTAL}$$

The first index is available for 2003, 2004, 2005, 2006 and 2007, and the second index is only available for 2006 and 2007. US_SIN1 provides a lower bound for the true value of original sin because the "other" category is likely to include assets in Swiss francs, Canadian dollar etc.¹⁴ **Table 8** shows that the simple average of US_SIN1 went from 0.94 in 2003 to 0.81 in 2007 (the weighted average plotted in Figure 5 started at 0.93 in 2003 and reached 0.91 in 2007). The median value never went below 0.95. US_SIN2, instead, remained constant at 0.9, with a median of 1.

Out of 72 developing countries included in the 2007 survey, 55 had a US_SIN2 index greater than 0.9; 49 had an index greater than 0.99; and 30 had an index equal to 1. **Figure 8** plots the 17 countries with an index lower than 0.9. Of these countries, only four (Czech Republic, Poland, Hungary, and Zimbabwe!) have an index which is lower than 0.5. Mexico is often quoted as an example of a country that has been able to place a large amount of long dated domestic currency bonds with US investors, and yet less than 17 percent of Mexican bonds held by US investors are denominated in Mexican pesos. These data suggest that US investors remain unwilling to take currency risk. If investors from other countries behave like US investors we remain far from redemption.

5 Why do we have better policies?

There is evidence that the presence of original sin leads to suboptimal macroeconomic policies (Hausmann, Panizza, and Stein, 2001, Calvo and Reinhart, 2002, and Eichengreen, Hausmann, and Panizza, 2005a). Optimistic observers now argue that the fact that several developing countries are now able to conduct countercyclical macroeconomic policies is evidence that original sin is no longer a problem, if ever it was.

Table 9 compares the monetary policy response of a group of emerging countries to the Asian and Russian Crises with the monetary policy response of these countries during the current crisis. It suggests that most emerging markets adopted procyclical policies (i.e. they increased interest rates in time of crisis) then, but are adopting

¹⁴ According to this data Swaziland has zero original sin. However, it is unlikely that US investors are holding assets denominated in lilangeni (the currency of Swaziland), these are probably assets denominated in South African rands or other important currencies (like Swiss francs) classified as "other".

countercyclical policies now. This can be also verified by estimating the following regression:

$$IR_{i,t} = \alpha IR_{i,t-1} + \beta INF_{i,t} + \gamma GR_{i,t} + \mu_i + \varepsilon_{i,t}$$

Where IR is the policy interest rate, INF is inflation, GR is real GDP growth and μ is a country fixed effect (in the presence of fixed effects all the variables should be interpreted as deviation from their country-specific averages). The above equation is similar to a Taylor rule with GDP growth in place of the output gap¹⁵. While a countercyclical monetary policy would be consistent with a positive value of γ , when we estimate the above equation for the sample of emerging market countries reported in Table 9, we find that γ is negative and statistically significant (column 1 **Table 10**).¹⁶

This is the standard result that macroeconomic policies in developing countries tend to be procyclical (Gavin and Perotti, 1997, Kaminsky et al. 2004).¹⁷ Procyclicality becomes stronger if we drop the last three years from the sample (column 2) or if we focus on the period of the Asian/Russian crisis (column 3). Column 4 interacts growth with a good time dummy taking a value of one when GDP growth is above the country average and shows that procyclicality is driven by what happens during by times (the coefficients of GROWTH and GT*GROWTH add-up to zero indicating that in good times monetary policy tends to be acyclical). If we restrict our analysis to the 2007-2009 period, we find that monetary policy was acyclical (column 5), but if we focus on 2008-2009, we find strong evidence of a countercyclical policy. Note that the point estimate of column 6 is not statistically significant because when we estimate the model with country fixed effects we are left with 22 degrees of freedom. However, the random effect estimates of column 7 are statistically significant and almost identical in magnitude to

¹⁵ Aguiar and Gopinath, 2007, show that in developing countries the concept of output gap is often meaningless.

¹⁶ To avoid outliers, we drop all the observations for which the policy rate is greater than 35 percent (including these observations would strengthen our result).

¹⁷ Jaimovich and Panizza (2006) and Rigobon (2004) discuss potential endogeneity problems with the standard procyclicality results. Levy Yeyati (2009) and Panizza, Sturzenegger, and Zettelmeyer (2009) discuss the cyclical properties of external borrowing.

those of column 6. **Figures 9** and **10** compare the cyclicity of monetary policy in the current crisis with the cyclicity of monetary policy during the Asian/Russian crisis.

So, it is indeed true that emerging market countries moved from procyclical to countercyclical policies. But did original sin play a role in this? To answer this question, we explore the relative role of original sin and overall mismatches. We start by re-estimating the equation of column 1 table 10 for the sample for which we have data on mismatches and show that the different samples yield similar results (column 1 of **Table 11**). Next, we interact our measure of mismatch with GDP growth and estimate the following equation:

$$IR_{i,t} = \alpha IR_{i,t-1} + \beta INF_{i,t} + \gamma GR_{i,t} + \delta (MISM_{i,t} * GR_{i,t}) + \lambda MISM_{i,t} + \mu_i + \varepsilon_{i,t}$$

In this set up, γ measures the cyclicity of monetary policy in a country with no currency mismatches and $\gamma + \delta x$ measures the cyclicity of monetary policy in a country with a mismatch equal to x . Therefore, we should focus on the sum of γ and δ and not on their individual values (which are negative but not statistically significant, see Column 2). In particular, we can evaluate the role of currency mismatches in a given period by summing γ with δ times the average level of mismatches for that period. In the bottom panel of the table, we add up the coefficients of the main effect with that of the interaction multiplied with the median mismatch for the 1993-2006 period (0.28) and find that this sum is negative (-0.248) and statistically significant at the 1 percent confidence level. When we repeat this experiment using the median mismatch for the 2007-2009 period (0.09), we find that the coefficient remains negative but is no longer statistically significant. This suggests that the presence of lower currency mismatches plays a role in explaining emerging market countries newly acquired ability to conduct countercyclical monetary policies.

Column 3 splits the sample into good times and bad times and confirms that for countries with currency mismatches monetary policy is procyclical in bad times and acyclical in good. Again, we find that the change in currency mismatches between the 1993-2006 period and the 2007-2008 period helps explain the substantial reduction in procyclicality that we observe in the data. In column 4, we explore the impact of the

change of Original Sin. In particular, we split the mismatch measure in two parts: the original sin attenuation defined as:

$$OS3C = -(1 - OSIN3) \frac{\text{foreign currency debt}}{GDP}$$

and the remaining part of the mismatch, defined as:

$$OMIS3 = \frac{\text{foreign currency debt}}{GDP} - \frac{\text{international reserves}}{GDP}$$

Next, we estimate the following equation:

$$IR_{i,t} = \alpha IR_{i,t-1} + \beta INF_{i,t} + \gamma GR_{i,t} + \delta_1 (OMISM_{i,t} * GR_{i,t}) + \lambda_1 OMISM_{i,t} + \delta_2 (OS3C_{i,t} * GR_{i,t}) + \lambda_2 OS3C_{i,t} + \mu_i + \varepsilon_{i,t}$$

and we evaluate the impact of OS3C at its pre and post 2007 average values (-0.03 and -0.07, respectively) and the impact of OMIS3 at its pre and post 2003 values (0.31 and 0.15, respectively). The bottom panel of the table shows that the change in mismatches does make a difference for the cyclicity of monetary policy but that the change in original sin is too small to play any role. In column 5, we conduct a similar experiment by allowing for a "good times" effect and find that the results are unchanged.

These results support the view that it is abstinence from foreign debt rather than redemption from original sin that explains the newfound ability to adopt counter-cyclical policies.

6 Conclusions

In this paper we have updated our previous work on the level and evolution of original sin and have studied some of its implications for the conduct of economic policy. In

particular, we find that while the number of countries able and willing to issue local-currency debt in international markets has increased in the past decade, this improvement has been quite modest. We have established this fact by looking at a series of complementary sources of data. The securities data published by the BIS indicates that 96 percent of bonds issued internationally were denominated in the 5 major currencies in 2008, down from 97 percent in 1999. The share of bonds issued in one of those 5 currencies by agents that reside outside the countries that issue the 5 currencies declined from 90 percent to 75 percent. In a sample of 65 developing countries, only 9 ever managed to issue at least 15 percent of their debt in own currency (and only 7 countries had an index of OSIN1 lower than 0.85 in 2008) and only 18 would have ever been able to swap at least 25 percent of their international debt securities (11 countries in 2008).

We also find that countries have been borrowing at home, thanks to a deepening domestic market based increasingly on fixed-rates, long maturities and domestic currency denomination. In this sense, there has been more progress in domestic original sin. However, we document that foreign participation in these markets is surprisingly limited, especially given the plethora of anecdotes. Using US data on the currency denomination of foreign assets held by US residents, we only found four countries (Czech Republic, Poland, Hungary, and Zimbabwe!) in which US investors held at least 50 percent of their assets denominated in the currency of the issuing country. It is often claimed that Mexico has been very successful in selling peso-denominated bonds to US investors (Borensztein, Levy Yeyati, and Panizza, 2006), and yet we find that less than 17 percent of Mexican bonds held by US investors are denominated in Mexican pesos.

We conclude that the domestic bond market is still not a venue through which to borrow from foreigners in local currency. If a country faced the need to borrow abroad, it would still need to do so mostly in foreign currency, and hence still suffers from original sin.

However, the 2001-2008 period has seen an important decline in currency mismatches. The average mismatch went from about 56 percent in 2000 to 27 percent in 2008, while the weighted average went from 28 percent in 1999 to minus 6 percent in 2008 (indicating that, on average, developing countries are long in foreign currency debt). This 29 percentage point reduction in the average was due to a 20 percentage point

reduction in external debt, a 7 percentage point increase in international reserves, and a 2 percentage point reduction in original sin. The 34 percentage point reduction in the weighted mismatch can be attributed to a 17 percentage point reduction in external debt, a 14 percentage point increase in foreign reserves, and a 3 percentage point reduction in original sin. Said differently, the reduction in the mismatch was caused overwhelmingly by abstinence, i.e. the reduction in the net debt, not by redemption, i.e. the ability to borrow internationally in local currency.

We also document that developing countries exhibited a more anti-cyclical response of monetary policy to the crisis in 2008-2009 relative to the past. We do this by running a fixed-effects panel regression of a Taylor rule. We find that the coefficient of the response to variations in output has moved from negative to positive and it has done so in a manner that is proportional to the reduction in the mismatch. However, as noted, the change in the mismatch was driven by abstinence and not by redemption.

In synthesis, original sin has declined but only marginally and in a few selected countries. Original sin continues to make financial globalization unattractive and developing countries have opted for abstinence rather than sin. Redemption has been the exception, not the rule. One conjecture is that, given original sin, abstinence is a better strategy than indebtedness: foreign currency debt is too risky to be sensible, given the mismatches it generates and since countries are unable to borrow without creating currency mismatches they have opted to forgo net borrowing and have extracted some of the benefits, such as the ability to adopt counter-cyclical policies. The promised paradise of financial globalization will need to wait for redemption from original sin.

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Figure 1: Size and currency composition of the international bond market

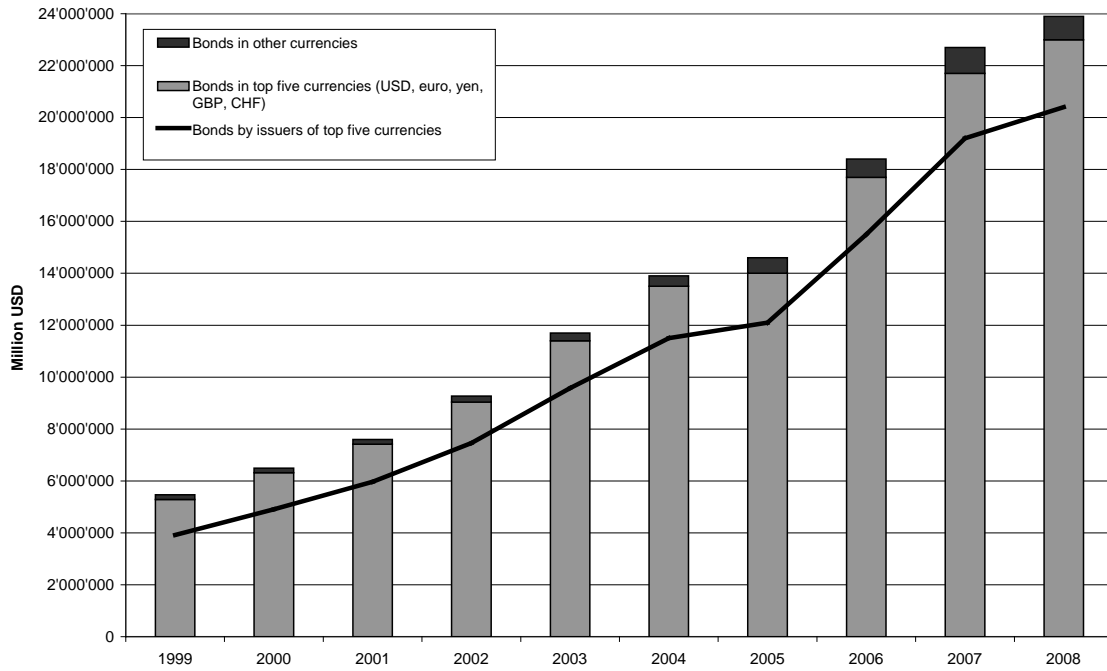


Figure 2: Bonds issued by developing countries

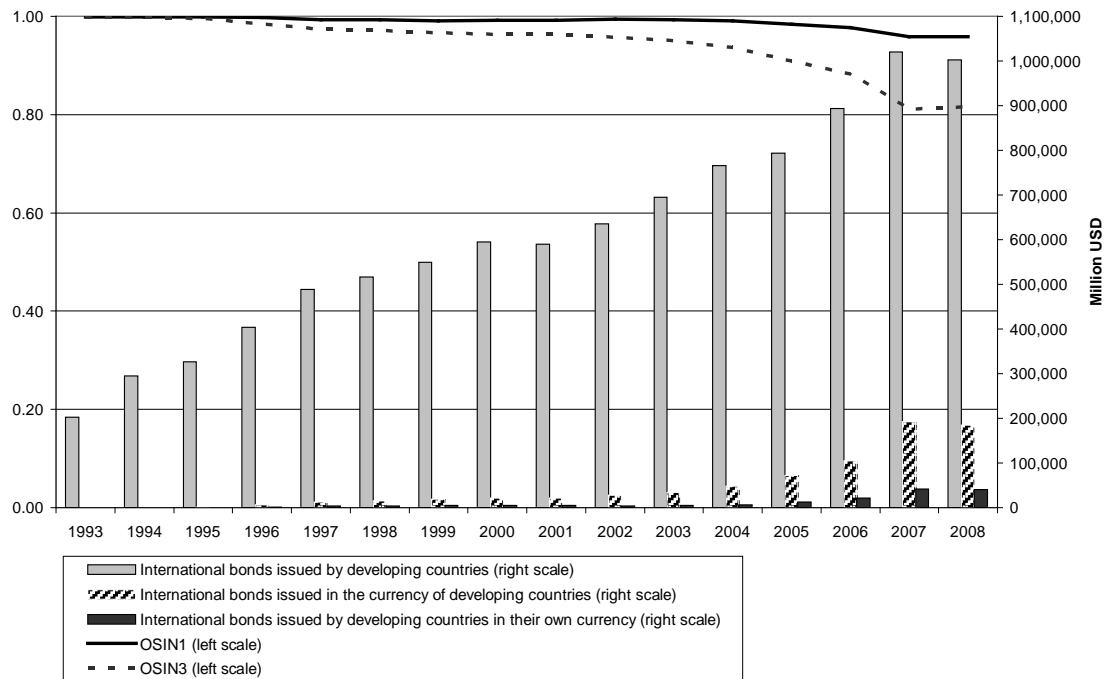
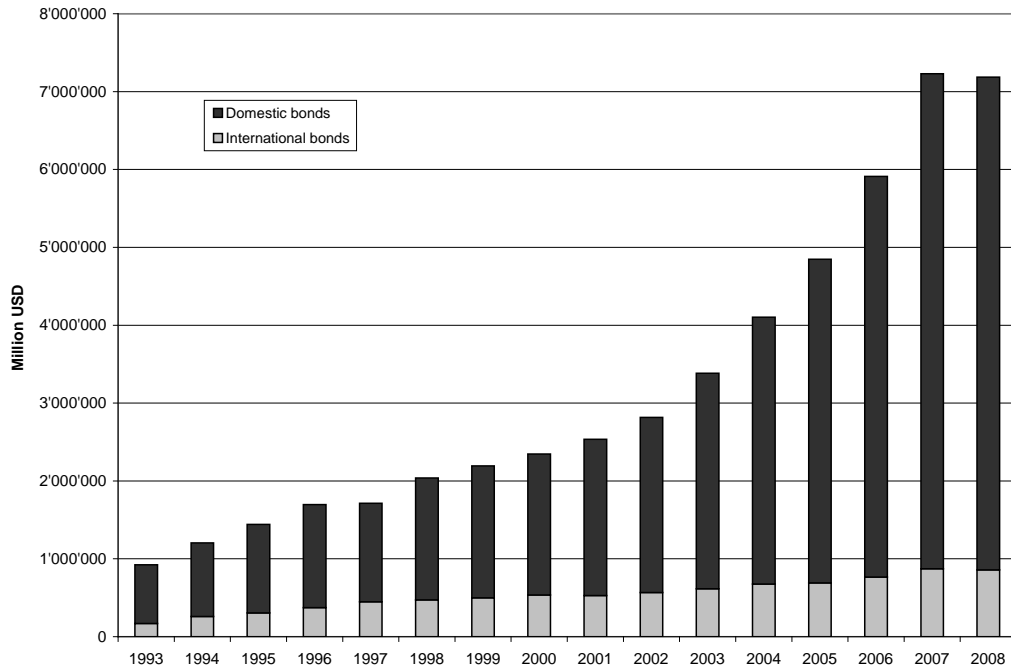
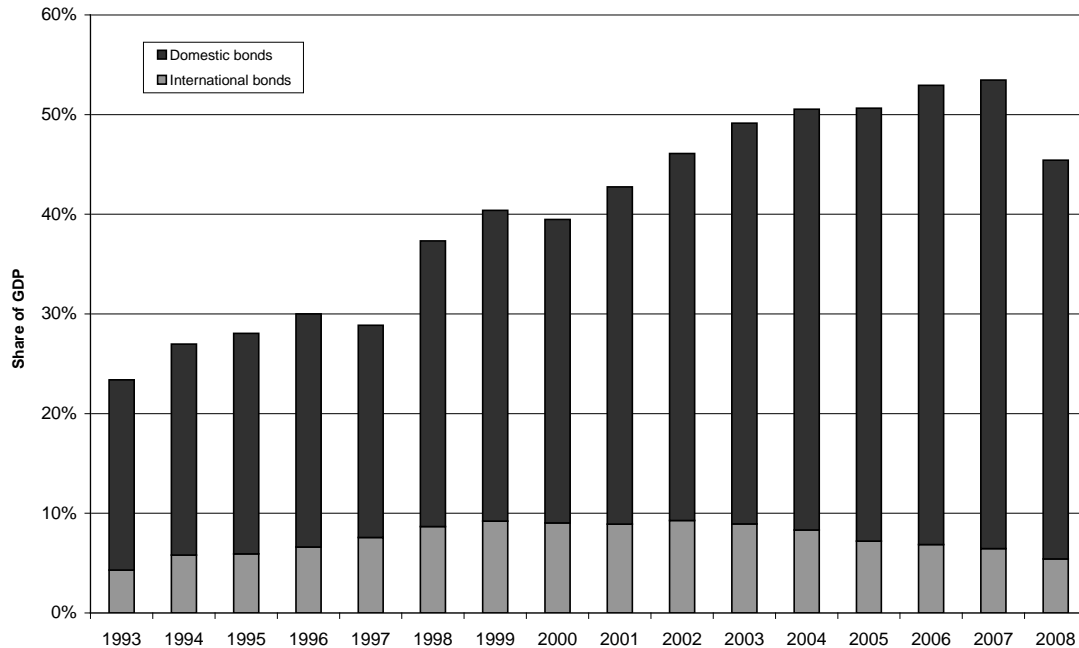


Figure 3: International and domestic bonds issued by developing countries



Countries included in the sample: Argentina, Brazil, Chile, China, Colombia, Croatia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, South Korea, Lebanon, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Singapore, Slovakia, South Africa, Taiwan (China), China, Thailand, Turkey, Venezuela.

Figure 4: International and domestic bonds as a share of GDP



Countries included in the sample: Argentina, Brazil, Chile, China, Colombia, Croatia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, South Korea, Lebanon, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Singapore, Slovakia, South Africa, Taiwan (China), China, Thailand, Turkey, Venezuela.

Figure 5: Composition of aggregated mismatches (simple average)

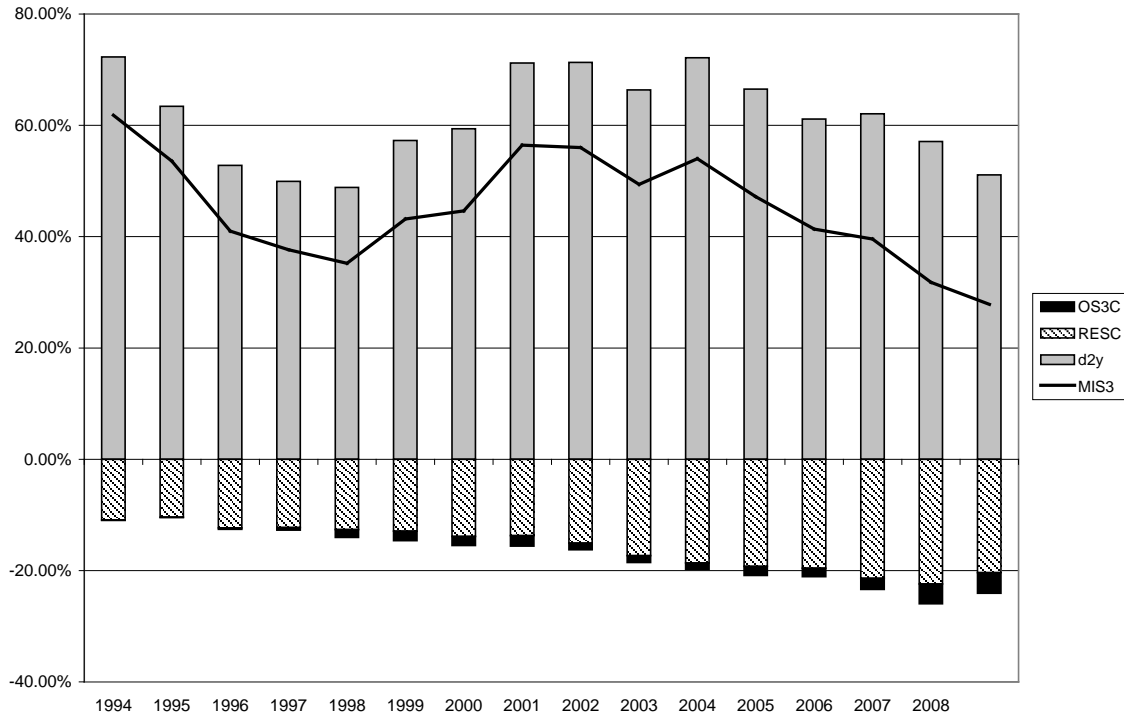


Figure 6: Composition of aggregated mismatches (weighted average)

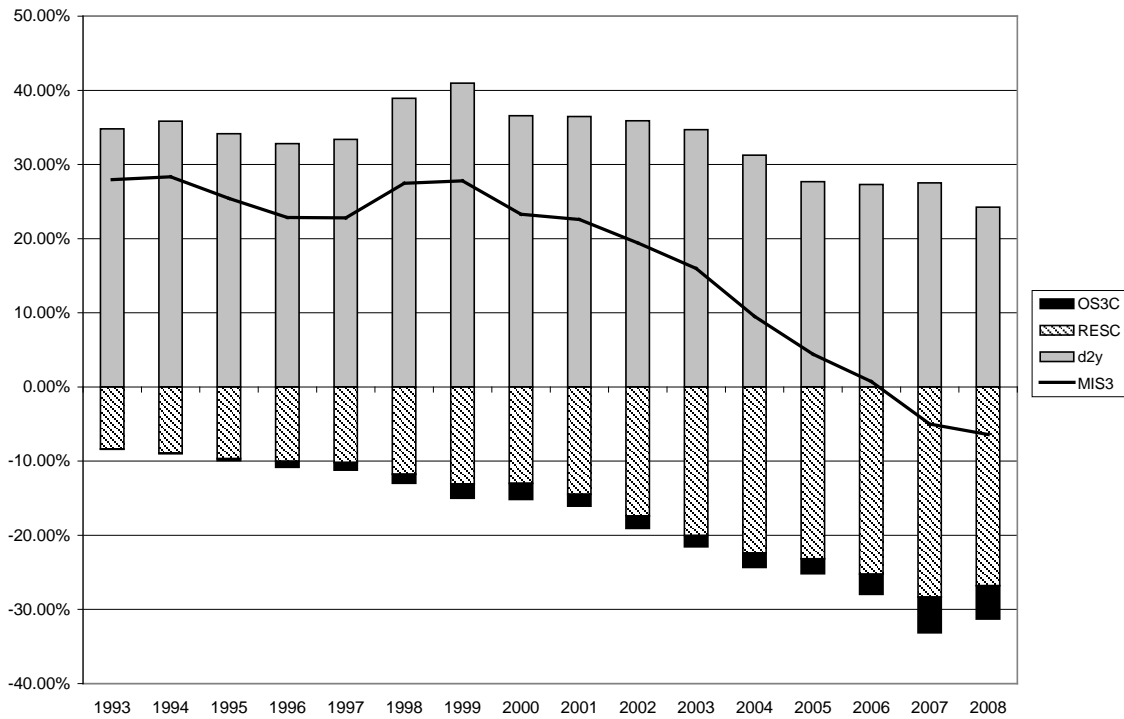


Figure 7: International bond holdings of US investors

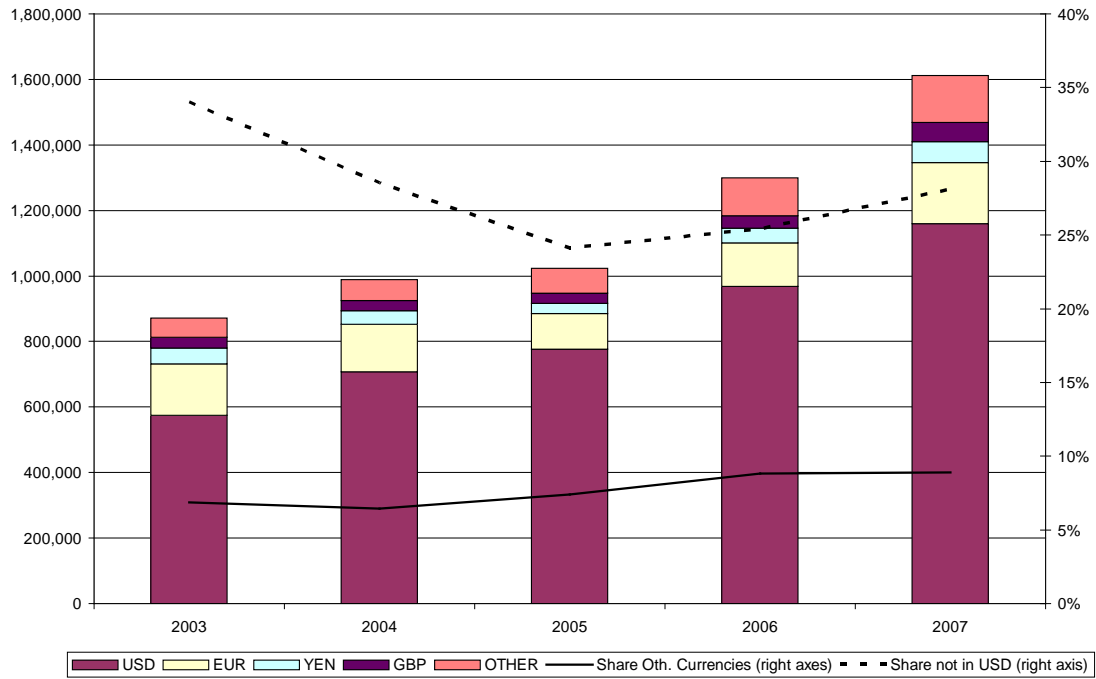


Figure 8: US_SIN2, countries with value of the index lower than 0.9 (2007 survey)

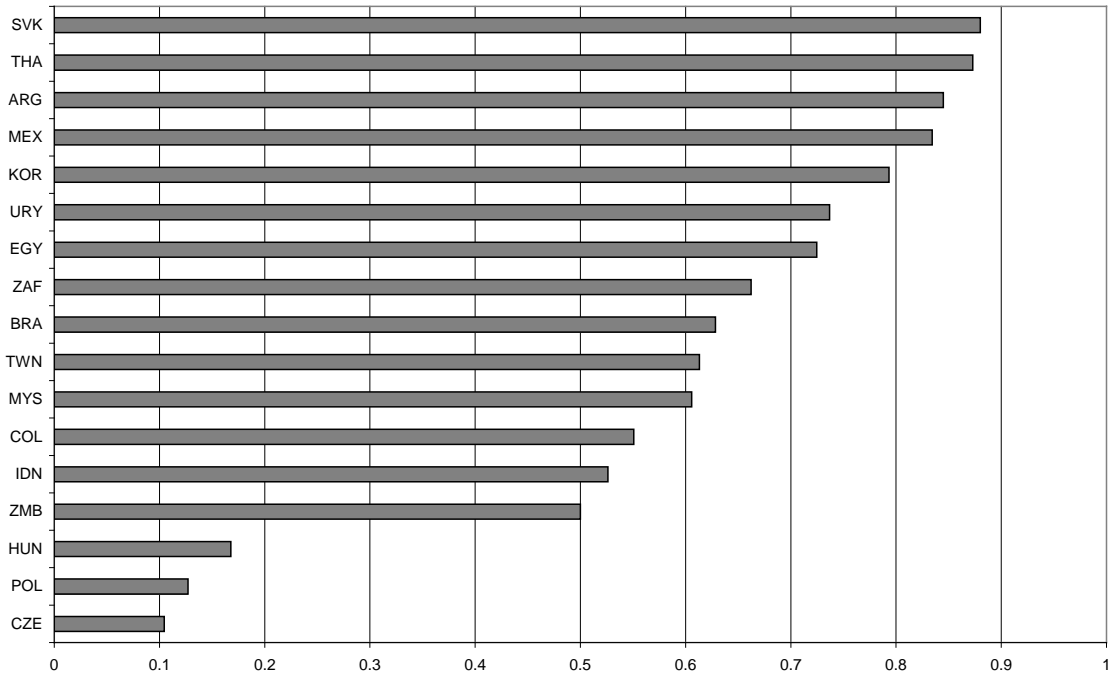


Figure 9: Cyclicity of monetary policy in 2008-09

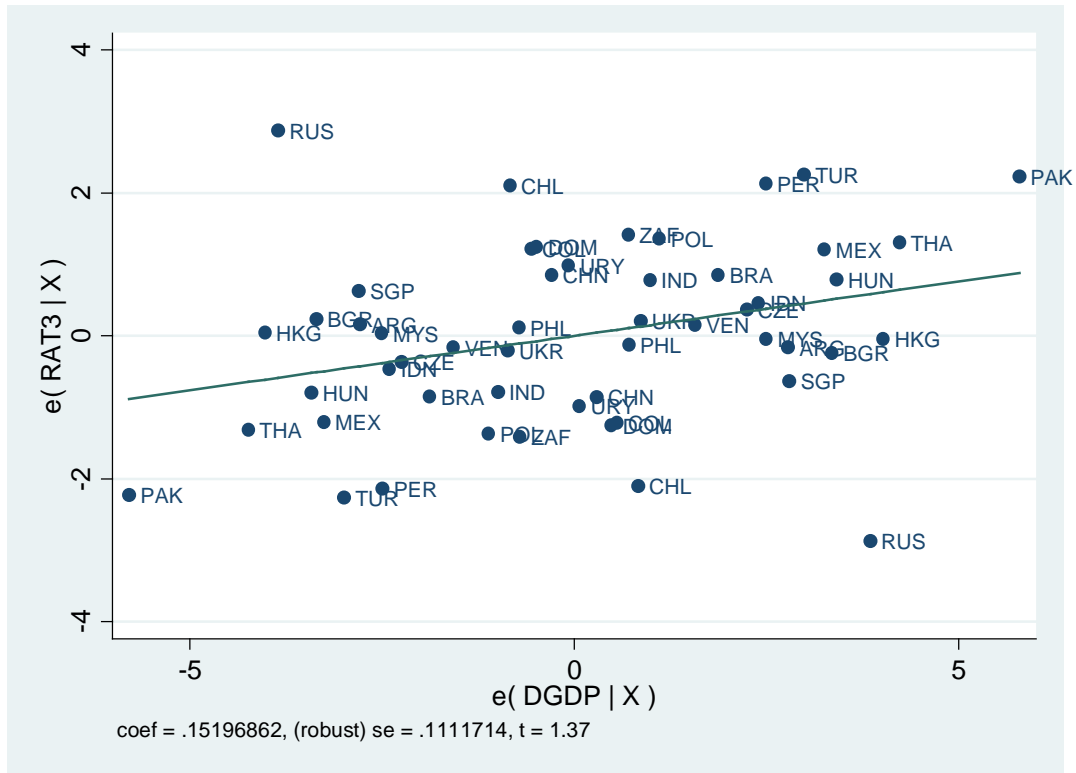


Figure 10: Cyclicity of monetary policy in 1996-98

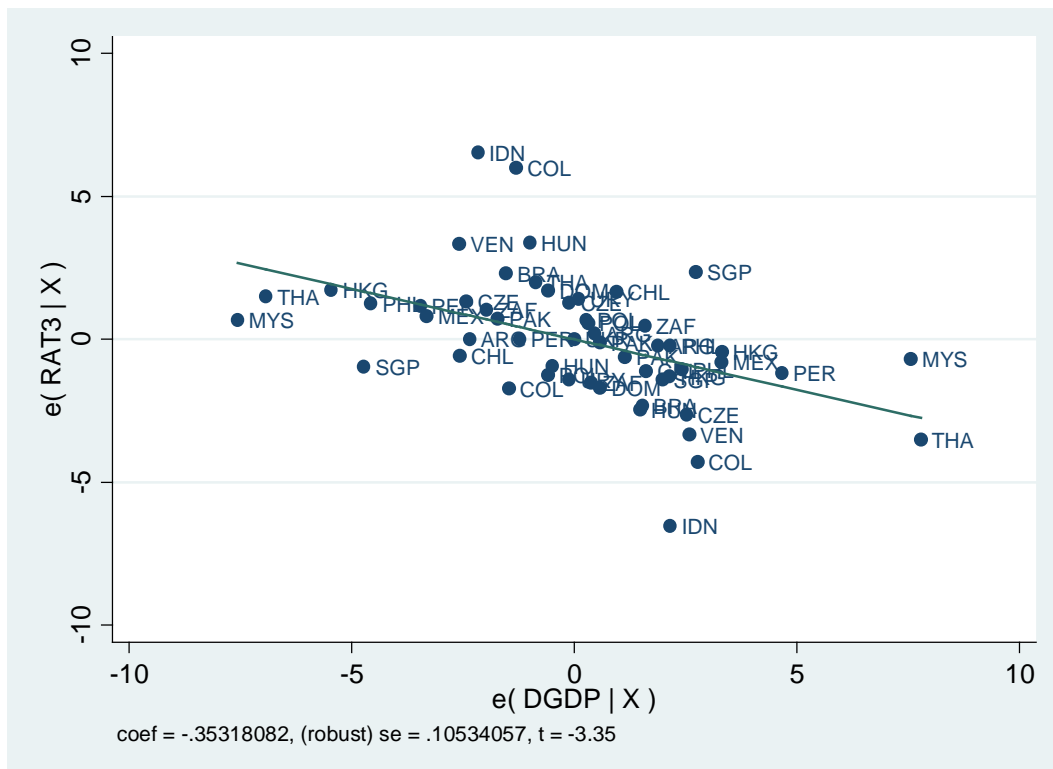


Table 1: The international bond market by country groups (million USD)

	Total debt instruments issued by residents		Total debt instruments issued by residents in own currency		Total debt instruments issued in groups' currency		Share of own currency	Share of group's currency
	(1)	(2)	(3)	(4)	(5)	(6)		
2001								
Major financial centers	3,473,846	45.7%	2,500,195	58.5%	5,002,239	65.9%	72.0%	144.0%
Euroland	2,496,178	32.9%	1,702,567	39.8%	2,414,503	31.8%	68.2%	96.7%
Other developed countries	536,616	7.1%	54,760	1.3%	114,133	1.5%	10.2%	21.3%
International organizations	382,685	5.0%	0	0.0%	0	0.0%	0.0%	0.0%
Offshore centers	116,262	1.5%	12,770	0.3%	42,522	0.6%	11.0%	36.6%
Developing and transition economies	589,733	7.8%	4,976	0.1%	21,922	0.3%	0.8%	3.7%
Total	7,595,320	100%	4,275,269	100%	7,595,319	100%	56%	100%
2008								
Major financial centers	9,786,890	41.0%	6,327,389	41.8%	11,600,000	48.6%	64.7%	118.5%
Euroland	10,600,000	44.4%	8,449,554	55.8%	11,400,000	47.7%	79.7%	107.5%
Other developed countries	1,541,665	6.5%	266,899	1.8%	586,098	2.5%	17.3%	38.0%
International organizations	658,030	2.8%	0	0.0%	0	0.0%	0.0%	0.0%
Offshore centers	275,163	1.2%	46,914	0.3%	121,296	0.5%	17.0%	44.1%
Developing and transition economies	1,002,281	4.2%	40,975	0.3%	184,962	0.8%	4.1%	18.5%
Total	23,864,029	100%	15,131,731	100%	23,892,355.7	100%	63%	100%

Table 2: The evolution of Original Sin in developing countries

Year	OSIN1							
	ALL		LAC		EME		ASIA	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1993	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1994	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1995	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
1996	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
1997	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
1998	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1999	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00
2000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00
2001	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00
2002	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00
2003	0.99	1.00	1.00	1.00	0.99	1.00	0.99	1.00
2004	0.98	1.00	0.99	1.00	1.00	1.00	0.99	1.00
2005	0.99	1.00	0.99	1.00	1.00	1.00	0.98	1.00
2006	0.98	1.00	0.98	1.00	0.99	1.00	0.98	1.00
2007	0.97	1.00	0.96	1.00	0.99	1.00	0.96	1.00
2008	0.97	1.00	0.96	1.00	0.99	1.00	0.95	1.00
Year	OSIN3							
	ALL		LAC		EME		ASIA	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1993	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1994	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00
1995	0.98	1.00	1.00	1.00	0.95	1.00	0.99	1.00
1996	0.97	1.00	1.00	1.00	0.91	1.00	0.97	1.00
1997	0.95	1.00	1.00	1.00	0.87	1.00	0.99	1.00
1998	0.94	1.00	1.00	1.00	0.85	1.00	0.98	1.00
1999	0.94	1.00	1.00	1.00	0.89	1.00	0.96	1.00
2000	0.93	1.00	1.00	1.00	0.86	1.00	0.95	1.00
2001	0.95	1.00	1.00	1.00	0.87	0.99	0.94	1.00
2002	0.95	1.00	1.00	1.00	0.88	1.00	0.96	1.00
2003	0.95	1.00	1.00	1.00	0.89	1.00	0.97	1.00
2004	0.93	1.00	0.99	1.00	0.88	1.00	0.97	1.00
2005	0.92	1.00	0.98	1.00	0.88	1.00	0.97	0.99
2006	0.92	1.00	0.97	1.00	0.87	0.97	0.96	0.99
2007	0.88	0.99	0.93	0.99	0.83	0.91	0.92	0.93
2008	0.88	0.99	0.92	0.99	0.82	0.94	0.91	0.95

Table 3: Episodes of redemption

	OSIN1<=0.85	OSIN3<=0.75
1993	No country	No country
1994	No country	No country
1995	No country	Czech Republic (0.61); South Africa (0.8)
1996	No country	Czech Republic (0); South Africa (0.58)
1997	No country	Czech Republic (0); Latvia (0.15); Slovakia (0.71); South Africa (0)
1998	No country	Czech Republic (0); Latvia (0); South Africa (0)
1999	No country	Chinese Taipei (0.62); Czech Republic (0); Egypt (0.41); Estonia (0.76); Poland (0.69); South Africa (0)
2000	South Africa (0.844)	Chinese Taipei (0.53); Czech Republic (0); Egypt (0.46); Poland (0.3); South Africa (0.02)
2001	No country	Chinese Taipei (0.47); Czech Republic (0); Poland (0.29); Slovakia (0.75); South Africa (0.4)
2002	No country	Chinese Taipei (0.63); Czech Republic (0); Poland (0.34); Slovakia (0.68); South Africa (0.24)
2003	Thailand (0.831)	Czech Republic (0); Poland (0.58); Slovakia (0.52); South Africa (0.15)
2004	Thailand (0.838); Saudi Arabia (0.00)	Czech Republic (0); Hungary (0.67); Poland (0.63); Saudi Arabia (0); Slovakia (0.47); South Africa (0)
2005	South Africa (0.797)	Czech Republic (0); Slovakia (0.02); Slovenia (0.72); South Africa (0)
2006	South Africa (0.712); Thailand (0.845)	Czech Republic (0); Morocco (0.78); Slovakia (0.18); South Africa (0)
2007	South Africa (0.712); Thailand (0.800); Colombia (0.831); Uruguay (0.806); China (0.850); Egypt (0.823)	Czech Republic (0); Egypt (0.75); Ghana (0.78); Mexico (0.71); Nigeria (0); Poland (0.64); Romania (0.52); Slovakia (0.07); South Africa (0); ; Thailand (0.7); Turkey (0.64)
2008	South Africa (0.772); Thailand (0.802); Colombia (0.838); Peru (0.842); Uruguay (0.806); China (0.755); Egypt (0.809)	Bulgaria (0.66); China (0.71); Czech Republic (0); Mexico (0.72); Nigeria (0); Peru (0.49); Poland (0.65); Romania (0.47); South Africa (0); Thailand (0.65); Turkey (0.68);

Table 4: Share of domestically issued bonds over total outstanding bonds

	1994	1998	2002	2004	2005	2006	2007	2008	Average
Argentina	0.43	0.34	0.25	0.35	0.54	0.54	0.52	0.53	0.44
Brazil	0.74	0.83	0.70	0.78	0.84	0.86	0.89	0.88	0.82
Chile	0.97	0.85	0.75	0.73	0.74	0.73	0.76	0.76	0.79
Colombia	0.80	0.64	0.61	0.68	0.73	0.73	0.74	0.74	0.71
Mexico	0.36	0.41	0.70	0.77	0.80	0.82	0.83	0.82	0.69
Peru	0.90	0.37	0.60	0.63	0.58	0.57	0.64	0.63	0.62
Venezuela		0.53	0.46	0.56	0.74	0.91	0.83	0.73	0.68
Latin America	0.70	0.57	0.58	0.64	0.71	0.74	0.74	0.73	0.68
China	0.72	0.89	0.96	0.97	0.98	0.98	0.98	0.98	0.93
Chinese Taipei	0.97	0.95	0.92	0.89	0.89	0.91	0.92	0.94	0.92
India	0.95	0.94	0.98	0.98	0.97	0.95	0.94	0.93	0.95
Indonesia	0.35	0.43	0.95	0.92	0.86	0.88	0.87	0.81	0.76
Malaysia	0.92	0.85	0.80	0.81	0.83	0.84	0.87	0.87	0.85
Pakistan	0.99	0.96	0.98	0.98	0.97	0.94	0.94	0.93	0.96
Philippines	0.79	0.58	0.55	0.56	0.58	0.58	0.62	0.62	0.61
South Korea	0.93	0.86	0.91	0.91	0.91	0.91	0.90	0.89	0.90
Thailand	0.72	0.65	0.82	0.87	0.88	0.91	0.94	0.94	0.84
Asia	0.81	0.79	0.88	0.88	0.87	0.88	0.89	0.88	0.86
Croatia		0.51	0.41	0.41	0.49	0.56	0.58	0.63	0.51
Czech Republic	0.84	0.95	0.96	0.92	0.91	0.93	0.92	0.89	0.91
Hungary	0.46	0.57	0.74	0.77	0.73	0.69	0.69	0.67	0.66
Poland	0.78	0.85	0.89	0.84	0.79	0.78	0.80	0.78	0.81
Russia	0.63	0.29	0.16	0.32	0.37	0.39	0.42	0.37	0.37
Slovakia	0.86	0.63	0.75	0.81	0.84	0.83	0.83	NA	0.79
Turkey	0.57	0.73	0.80	0.85	0.84	0.80	0.81	0.78	0.77
Emerging Europe	0.69	0.65	0.67	0.70	0.71	0.71	0.72	0.69	0.69
Lebanon		0.78	0.53	0.47	0.48	0.45	0.46	0.52	0.53
South Africa	0.98	0.94	0.86	0.90	0.90	0.88	0.83	0.82	0.89
Others	0.98	0.86	0.70	0.69	0.69	0.66	0.65	0.67	0.74
Average	0.76	0.69	0.72	0.75	0.77	0.78	0.78	0.77	0.75

Table 5: Composition of the domestic bond market

	Fixed rate	Infl. Index.	Float. rate	XR Index.
ASIA (weighted average)				
1995-98	95.74	0.00	4.26	0.00
1999-03	87.09	0.28	12.64	0.00
2004-08	94.12	0.01	5.63	0.25
Average	92.31	0.09	7.51	0.08
Emerging Europe (weighted average)				
1995-98	60.05	0.00	39.95	0.00
1999-03	63.66	6.58	18.62	11.13
2004-08	72.97	4.31	17.60	5.11
Average	65.56	3.63	25.39	5.42
Latin America (weighted Average)				
1995-98	20.45	14.64	51.14	13.77
1999-03	10.64	19.31	52.48	17.56
2004-08	24.99	22.64	45.23	7.15
Average	18.69	18.86	49.62	12.83
Middle East and Africa (weighted average)				
1995-98	99.79	0.00	0.21	0.00
1999-03	94.24	3.14	2.62	0.00
2004-08	78.94	9.98	11.08	0.00
Average	90.99	4.37	4.64	0.00
All countries (weighted average)				
1995-98	64.86	5.79	23.91	5.44
1999-03	64.84	5.99	23.49	5.68
2004-08	70.02	7.71	19.33	2.94
Average	66.57	6.50	22.25	4.69

Countries include in the sample: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, South Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Africa, Taiwan (China), China, Thailand, Turkey, Venezuela.

Table 6: Average maturity of government debt issued on the domestic market

	Original	Remaining
ASIA (weighted average)		
1995-98	6.80	4.65
1999-03	8.72	5.56
2004-08	10.10	6.62
Average (simple)	8.54	5.61
Emerging Europe (weighted average)		
1995-98	2.32	2.83
1999-03	4.06	2.87
2004-08	6.25	3.68
Average (simple)	4.21	3.13
Latin America (weighted Average)		
1995-98	3.77	1.98
1999-03	4.86	2.78
2004-08	9.95	5.09
Average (simple)	6.19	3.28
Middle East and Africa (weighted average)		
1995-98	15.97	10.00
1999-03	17.05	8.88
2004-08	16.66	8.49
Average (simple)	16.56	9.13
All countries (weighted average)		
1995-98	7.01	3.38
1999-03	7.41	4.15
2004-08	9.07	5.38
Average (simple)	7.83	4.30

Countries include in the sample: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, South Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Africa, Taiwan (China), China, Thailand, Turkey, Venezuela.

Table 7: Net and Gross external debt

Year	A. BIS DATA				B. IMF DATA				C. GDF DATA			
	Gross Debt		Net Debt		Gross Debt		Net Debt		Gross Debt		Net Debt	
	Simple Average	Weighted Average	Simple Average	Weighted Average	Simple Average	Weighted Average	Simple Average	Weighted Average	Simple Average	Weighted Average	Simple Average	Weighted Average
1993	6.57%	4.81%	-4.36%	-3.55%	72.28%	34.80%	61.89%	28.02%	86.15%	35.44%	74.86%	27.55%
1994	7.17%	6.17%	-3.23%	-2.73%	63.42%	35.83%	53.69%	28.44%	67.31%	35.59%	56.43%	27.44%
1995	7.14%	5.99%	-5.21%	-3.67%	52.80%	34.15%	41.23%	25.71%	57.42%	33.88%	44.45%	24.78%
1996	7.66%	6.56%	-4.60%	-3.46%	49.92%	32.83%	38.14%	23.68%	50.46%	32.93%	37.10%	22.91%
1997	9.38%	7.50%	-3.27%	-2.68%	48.83%	33.39%	36.63%	23.85%	63.86%	32.74%	51.11%	22.40%
1998	9.88%	8.48%	-2.90%	-3.27%	57.28%	38.93%	44.91%	28.69%	70.38%	38.72%	57.44%	27.54%
1999	10.68%	8.96%	-3.16%	-4.12%	59.40%	40.97%	46.29%	29.73%	70.12%	40.78%	56.10%	28.52%
2000	11.57%	8.88%	-2.16%	-4.12%	71.22%	36.57%	58.31%	25.48%	68.22%	36.35%	54.27%	24.56%
2001	11.91%	8.79%	-3.14%	-5.66%	71.30%	36.46%	57.23%	24.19%	68.26%	36.52%	53.02%	23.49%
2002	14.27%	9.02%	-3.06%	-8.37%	66.38%	35.89%	50.61%	21.09%	66.45%	36.00%	50.20%	20.90%
2003	15.58%	8.76%	-3.03%	-11.27%	72.14%	34.68%	55.19%	17.50%	70.37%	34.36%	52.83%	16.76%
2004	14.39%	7.95%	-4.87%	-14.43%	66.50%	31.26%	48.79%	11.47%	67.64%	30.99%	49.28%	11.05%
2005	13.50%	6.97%	-6.09%	-16.18%	61.15%	27.70%	42.87%	6.45%	58.75%	26.27%	40.15%	5.23%
2006	13.53%	6.76%	-7.84%	-18.49%	62.06%	27.31%	41.59%	3.43%	58.60%	24.97%	38.87%	1.66%
2007	15.17%	6.31%	-7.23%	-22.01%	57.11%	27.52%	35.38%	-0.17%	55.28%	24.93%	34.61%	-2.48%
2008	12.71%	5.26%	-7.65%	-21.54%	51.11%	24.25%	31.53%	-1.94%				

Table 8: Original sin indexes based on US Treasury data

	Mean	Median	St Dev	Min	Max	N.Obs
US SIN1 =1-(OTH+OWN)/TOT						
2003	0.94	1	0.16	0	1	69
2004	0.90	1	0.23	0	1	70
2005	0.89	1	0.22	0	1	70
2006	0.83	0.97	0.24	0	1	70
2007	0.81	0.95	0.24	0	1	72
US SIN2 =1-OWN/TOT						
2006	0.90	1	0.22	0	1	70
2007	0.90	1	0.21	0.10	1	72

Table 9: Policy rates in emerging market countries

	Asian/Russian crisis*			Sub-prime crisis#		
	Pre-crisis	Crisis	Difference	Pre-crisis	Crisis	Difference
China				3.87	2.5	-1.37
Hong Kong	5.4	6.07	0.66	4.81	0.5	-4.31
Indonesia	13.96	27.82	13.86	8.54	7.27	-1.27
India				6.83	3.5	-3.33
Malaysia	6.92	7.78	0.86	3.5	2.05	-1.45
Pakistan	11.4	12.1	0.7	10.6	12	1.4
Philippines	12.34	12.89	0.56	4.27	4.2	-0.07
Singapore	3.13	6.75	3.62	1.69	0.7	-0.99
Thailand	9.23	15.69	6.46	3.52	1.3	-2.22
Average Asia	8.91	12.73	3.82	5.29	3.78	-1.51
Bulgaria				4.59	3.5	-1.09
Czech Republic	16	14.33	-1.67	3.3	1.6	-1.7
Hungary	20.7	18.11	-2.59	8.32	8	-0.32
Poland	22.68	21.11	-1.57	5.09	3.2	-1.89
Russian Federation	32.4	62.04	29.64	8.37	15	6.63
Turkey	68	72	4	16.62	9.3	-7.32
Ukraine	22.05	40.41	18.36	7.99	13	5.01
South Africa	15.59	17.11	1.52	10.27	8	-2.27
Average Europe and Africa	28.2	35.02	6.81	8.07	7.7	-0.37
Argentina	6.63	6.81	0.18	9.37	10.7	1.33
Brazil	25	29.5	4.5	12.17	10.1	-2.07
Chile	7.96	9.12	1.16	7.13	2.1	-5.03
Colombia	23.83	35	11.17	9.2	5.6	-3.6
Dominican Republic	13.01	16.68	3.67	10.24	10.7	0.46
Mexico	21.91	26.89	4.98	7.97	5.1	-2.87
Peru	15.94	18.72	2.78	5.3	3.65	-1.65
Uruguay	23.43	20.48	-2.95	6.96	12	5.05
Venezuela	12.47	18.58	6.11	9.9	10	0.1
Average Latin America	16.69	20.2	3.51	8.69	7.77	-0.92
Average EM	17.83	22.43	4.61	7.46	6.52	-0.94

*For Asian countries pre-crisis is 1996 and crisis is 1997, for all other countries pre-crisis is 1997 and crisis is 1998. #Pre-crisis is the average of 2007-2008, crisis is 2009

Table 10: Cyclicity of monetary policy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)#
L.IR	0.568*** (0.0447)	0.516*** (0.058)	-0.356** (0.153)	0.505*** (0.0569)	0.457** (0.181)	0.372** (0.175)	0.659*** (0.0866)
INF	0.393*** (0.0575)	0.420*** (0.0786)	0.311** (0.146)	0.420*** (0.0814)	0.304** (0.136)	0.275* (0.143)	0.280** (0.109)
GROWTH	-0.126** (0.0593)	-0.249*** (0.0861)	-0.353*** (0.108)	-0.289* (0.152)	0.0204 (0.111)	0.152 (0.11)	0.157** (0.0706)
GT				-2.001* (1.03)			
GT*GROWTH				0.287 (0.257)			
Constant	1.447** (0.662)	2.625*** (0.868)	19.32*** (2.98)	3.007*** (0.901)	1.563 (1.604)	2.426 (1.828)	0.303 (0.588)
Observations	330	252	54	252	78	52	52
R-squared	0.644	0.638	0.288	0.643	0.215	0.307	
N. of countries	26	26	21	26	26	26	26
Period	1993-09	1993-06	1996-98	1993-09	2007-09	2008-09	2008-09

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
#random effects estimations

Table 11: Cyclicity of monetary policy and aggregate mismatches

	(1)	(2)	(3)	(4)	(5)
L.IR	0.528*** (0.0521)	0.533*** (0.0541)	0.534*** (0.0503)	0.518*** (0.0564)	0.516*** (0.0546)
INF	0.398*** (0.0688)	0.406*** (0.0657)	0.407*** (0.0655)	0.410*** (0.066)	0.412*** (0.0674)
GROWTH	-0.281*** (0.0769)	-0.0457 (0.11)	0.0446 (0.18)	-0.0109 (0.12)	0.017 (0.158)
MISM3		2.679 (1.956)	2.916 (2.392)		
MIS3*GR		-0.722 (0.466)	-0.914 (0.703)		
GT			-0.0268 -1.393		0.307 -1.486
GT*MIS3*GR			0.163 (0.335)		
GT*GR			-0.0738 (0.22)		-0.0464 (0.214)
OS3C*GR				0.961 (1.117)	-0.925 (1.371)
OMIS3*GR				-0.773 (0.459)	-0.825 (0.51)
OS3C				0.5 (5.794)	3.503 (6.713)
OMIS3				2.396 (2.094)	2.849 (2.603)
GT*OS3C*GR					1.51 (1.022)
Constant	2.832*** (0.834)	1.639** (0.78)	1.485 (0.88)	1.946* (1.127)	1.738 (1.244)
Observations	270	270	270	270	270
R-squared	0.642	0.649	0.65	0.653	0.654
N. of countries	23	23	23	23	23
Period	1993-08	1993-08	1993-08	1993-08	1993-08
GROWTH+ 0.28*MIS3*GR		-0.248***	-0.211**		
p-value		0.00	0.03		
GROWTH+ 0.09*MIS3*GR		-0.111	-0.04		
p-value		0.147	0.771		
GROWTH-0.03*OS3C*GR				-0.04	0.045
p-value				0.746	0.786
GROWTH- 0.07*OS3C*GR				-0.078	0.082
p-value				0.571	0.661
GROWTH+ 0.31*OMIS3*GR				-0.251***	-0.239**
p-value				0.00	0.006
GROWTH+ 0.15*OMIS3*GR				-0.127	-0.107
p-value				0.11	0.288

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
The calculations in columns 3 and 5 are for bad times only