Original Sin:
The Pain, the Mystery, and the Road to Redemption

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1. Introduction

Most countries cannot borrow abroad in their own currencies, a fact that we refer to as "original sin." This problem affects almost all countries aside from the issuers of the 5 major currencies – the US dollar, the euro, the yen, the pound sterling and the Swiss franc – along with a few telling exceptions that we analyze below. It has important implications for financial stability and macroeconomic policy.

If a country suffers from original sin, by definition its external debt will be overwhelmingly denominated in foreign currency. Under these conditions, if a country accumulates a net debt (as a developing country is expected to do) there will be an aggregate currency mismatch on its balance sheet. This mismatch is associated with greater output and capital flow volatility, lower credit ratings, and more rigid monetary policies, as we show below (hence, the pain). We provide evidence that this state of affairs is not easily ascribed to weaknesses in national policies and institutions; standard measures of these explanatory variables in fact do a relatively poor job of explaining the phenomenon (hence, the mystery). We find instead that explanations based on factors limiting the incentives for currency diversification by global investors – transaction costs in a world of heterogeneous countries or network externalities – provide a better explanation for observed patterns. The solution to this problem (redemption from original sin) lies therefore not just in strengthening domestic policies and institutions but also in overcoming the difficulties created for emerging-market borrowers by the structure and operation of international financial markets.

We quantify original sin and describe its incidence in Section 2 of the paper. In Sections 3 and 4 we analyze its causes and consequences. In Section 5 we then propose

an initiative designed to address the problem, before closing with some concluding remarks in Section 6.

2. Facts About Original Sin

Of the nearly $5.8 trillion in outstanding securities placed in international markets in the period 1999-2001, $5.6 trillion was issued in 5 major currencies: the US dollar, the euro, the yen, the pound sterling and Swiss franc. To be sure, the residents of the countries issuing these currencies (in the case of Euroland, of the group of countries) constitute a significant portion of the world economy and hence form a significant part of global debt issuance. But while residents of these countries issued $4.5 trillion dollars of debt over this period, the remaining $1.1 trillion of debt denominated in their currencies was issued by residents of other countries and by international organizations. Since these other countries and international organizations issued a total of $1.3 trillion dollars of debt, it follows that they issued the vast majority of it in foreign currency. The causes and consequences of this concentration of debt denomination in few currencies is the focus of this paper.

Table 1 presents data on the currency composition of bonded debt issued cross-border between 1993 in 2001. ("Cross-border" means that Table 1 excludes local issues.) We split the sample into two periods, demarcated by the introduction of the euro. The figures are the average stock of debt outstanding during in each sub-period. The information is organized by country groups and currencies of denomination. The first country group, financial centers, is composed of the US, the UK, Japan, and Switzerland; the second is composed of the Euroland countries; the third contains the remaining

developed countries; and the fourth is made up of the developing countries; we also report data on bond issues by the international financial institutions (since these turn out to be important below). Column 1 presents the amount of average total stock of debt outstanding issued by residents of these country groups. Column 2 shows the corresponding percentage composition by country group. Columns 3 and 4 do the same for debt issued by residents in their own currency, while columns 5 and 6 look at the total debt issued by currency, independent of the residence of the issuer. Column 7 is the proportion of the debt that the residents of each country group issued in their own currency (the ratio of column 3 to column 1), while column 8 is the proportion of total debt issued in a currency relative to the debt issued by residents of those countries (the ratio of column 5 to column 1).

Notice that while the major financial centers issued only 34 percent of the total debt outstanding in 1993-1998, debt denominated in their currencies amounted to 68 percent of that total. In contrast, while other developed countries ex-Euroland issued fully 14 percent of total world debt, less than 5 percent of debt issued in the world was denominated in their own currencies. Interestingly, in the period 1999-2001 – following the introduction of the euro – the share of debt denominated in the currencies of other developed countries declined to 1.6 percent. Developing countries accounted for 10 percent of the debt but less than one per cent of the currency denomination in the 1993-1998 period. This, in a nutshell, is the problem of original sin.

When we look at the currency denomination of the debt issued by residents, we see that residents of the major financial centers chose to denominate 68.3 percent of it in their own currency in 1999-2001, while the residents of Euroland used the euro in 56.8

percent of their cross-border bond placements. This figure is substantially higher than the 23.2 percent which they chose to denominate in their own currency in 1993-1998, before the introduction of the euro. In that earlier period, the other developed countries issued 17.6 percent of their debt in their own currencies, a number not too different from that for the Euroland countries; in the recent period, however, this number has declined to 9.6 percent. The number for developing countries is an even lower 2.7 percent.

Column 8 reveals that in 1999-2001 the ratio of debt in the currencies of the major financial centers to debt issued by their residents was more than 150 per cent.[1] This ratio drops to 91.3 percent for the Euroland countries, to 18.8 percent in the other developed countries (down from 32.9 percent in the previous period), and to 10.9 percent for the developing nations. Notice that after the introduction of the euro, Euroland countries narrow their gap with the major financial centers while other developed countries converge towards the ratios exhibited by developing nations.

It is sometimes possible for countries to borrow in one currency and swap their obligations into another. Doing so requires, however, that someone actually issue debt in the domestic currency (otherwise there is nothing to swap). Column 8 takes this point on board and is therefore a better measure of the currency mismatch than column 7, in the sense that when the ratio in column 8 is less than 1, it indicates that there are not enough bonds to do the swaps needed to hedge the currency mismatch of residents.

Figure 1 plots the cumulative share of total debt instruments issued in the main currencies (the solid line) and the cumulative share of debt instruments issued by the largest issuers (the dotted line). The gap between the two lines is striking. While 87

[1] This, in a sense, is what qualifies them as financial centers.

percent of debt instruments are issued in the 3 main currencies (the US dollar, the euro and the yen), residents of these three countries issue only 71 percent of total debt instruments. The corresponding figures for the top five currencies, 97 and 83 percent, respectively, tell the same story.

Table 2 presents similar information for cross-border claims by international banks reporting to the Bank for International Settlements. These data only distinguish the five major 5 currencies and an "other currency" category. The table shows that of $7.8 trillion in cross-border bank claims, 81 percent are denominated in the 5 major currencies. While we cannot know how much is actually issued in each borrower's currency, we can safely say that the bulk of the debt in the developing world and in the developed countries outside the issuers of the major currencies is also in foreign currency.

All this points to the fact that currency mismatches are a global phenomenon. They are not limited to a small number of problem countries. In a sense, the phenomenon seems to be associated with the fact that the vast majority of the world's financial claims are denominated in a small set of currencies.[2] In turn this suggests that the problem may have something to do with observed patterns of portfolio diversification – or its absence. We develop this point below.

Measuring Original Sin

To measure currency mismatches and build indices of original sin, we use the data on securities and bank claims used to construct Tables 1 and 2. We start with the securities data set, which provides a full currency breakdown.

Our first indicator of original sin (*OSIN*1) 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,[3]

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

Thus, a country that issues all its securities in 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).

This indicator has two drawbacks. First, it only covers securities and not other debts. Second, it does not take account of opportunities for hedging currency exposures through swaps. We deal with these issues next. Consider the following ratio:

$$INDEXA_i = \frac{\text{Securities + Loans issued by country } i \text{ in major currencies}}{\text{Securities + Loans issued by country } i}$$

*INDEX*A has the advantage of increased coverage. (It also has the disadvantage of not accounting for the debt denominated in foreign currencies other than the majors; we address this problem momentarily). To capture the scope for hedging currency exposures via swaps, we also consider a measure of the form:

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

*INDEX*B accounts for the fact, discussed above, that debt issued by other countries in one's currency creates an opportunity for countries to hedge currency exposures via the swap market. Notice that this measure can take on negative values, as it

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[2] The sense in which this is true – and important – is made explicit below.

in fact does for countries such as the US and Switzerland, since there is more debt issued in their currency than debt issued by nationals. However, these countries cannot hedge more than the debt they have. Hence, they derive scant additional benefits from having excess opportunities to hedge. We therefore substitute zeros for all negative numbers, producing our third index of original sin:

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

We are now in a position to refine *INDEX*A. Recall that *INDEX*A understates original sin by assuming that all debt that is not in the 5 major currencies is denominated in local currency. This may be the case for countries with some capacity to issue debt in their own currencies. However, if this is so, it should be reflected in *OSIN*3 because it means that someone – either a resident or a foreign entity – might have been able to float a bond denominated in that currency. If this is not the case, this provides information about the likelihood that the bank loans not issued in the 5 major currencies, were denominated in some other foreign currency. We therefore replace the value of *INDEX*A by that of *OSIN*3 in those cases where the latter is greater than the former.[4] Hence we propose to measure *OSIN*2 as:

$$OSIN2_i = \max(INDEXA_i, OSIN3_i)$$

Notice that *OSIN*2 ≥ *OSIN*3 by construction and that, in most cases, *OSIN*1 ≥ *OSIN*2.

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[3] We follow Hausmann et al. (2001) but extend their sample from 30 to 90 countries and update it to the end of 2001.

[4] If the composition of the bank debt was the same as that of securities then OSIN3 should be smaller than *INDEX*A, since it includes not only debt issued by residents but also that issued by foreigners. When OSIN3 is greater than *INDEX*A, it is informative of a potential underestimate of original sin.

Table 3 presents the average of these three indexes for the different country groupings and different parts of the developing world. Data for individual countries can be found in the Appendix. As before, we observe the lowest numbers for the major financial centers, followed by Euroland countries (which exhibit a major reduction in original sin after the introduction of the euro). Other developed countries exhibit higher values, while the highest values are for the developing world. The lowest values in the developing world are in Eastern Europe, while the highest are in Latin America.

Table 4 lists countries with measures of *OSIN*3 below 0.8 in 1999-2001, excluding the financial centers. Among the countries with the least original sin are several future Eastern European accession countries and overseas regions of European settlement (Canada, Australia, New Zealand and South Africa). Notice further that both fixed-rate Hong Kong and floating-rate Singapore and Taiwan appear on this list (raising questions about whether any particular exchange rate regime poses a barrier to redemption).[5]

Original sin is also persistent, to a surprising extent. Flandreau and Sussman (2002) present a three-way classification of original sin circa 1850, based on whether countries placed bonds in local currency, indexed their debt to gold (included gold clauses in their debts), or did some of both. Table 5 shows the mean value of *OSIN*3 in the 1993-1998 period for each of the three groups distinguished by Flandreau and Sussman. *OSIN*3 is highest today in the same countries that had gold clauses in their debt in the 19th century (average 0.86) and lowest for countries that issued domestic debt (average 0.34) and intermediate in countries that issued both gold-indexed and domestic-

[5] We return to this issue below.

currency debt (average 0.53); hence, there is a high correlation between original sin then and now. The standard t test suggests that countries that exclusively issued debt with gold clauses in the 1850s suffer from significantly higher levels of original sin today than either countries that issued both gold-indexed and domestic-currency debt (p-value = 0.016) or those that issued exclusively in local currency (p-value = 0.000).

3. The Pain of Original Sin

This state of affairs is not without consequence. Countries with original sin that have net foreign debt – as developing countries are expected to have – will have a currency mismatch on their national balance sheets. Movements in exchange rates then have wealth effects that limit the effectiveness of monetary policy (Aghion, Bacchetta and Banerjee 2001, Céspedes, Chang and Velasco 2002). This renders central banks less willing to let the exchange rate move, and they respond by holding more reserves and aggressively intervening or adjusting short-term interest rates (Hausmann, Panizza and Stein, 2001, Calvo and Reinhart, 2002). The existence of dollar liabilities also limits the ability of central banks to avert liquidity crises in their role as lenders of last resort (Chang and Velasco, 2000). And, dollar-denominated debts and the associated volatility of domestic interest rates heighten the uncertainty associated with public debt service, thus lowering credit ratings.

Given these facts, it is no surprise that countries afflicted by original sin have a hard time achieving domestic economic stability. Their incomes are more variable and their capital flows are more volatile than those of countries free of the phenomenon. Since financial markets know that mismatches are a source of financial fragility,

developing countries burdened with them are charged an additional risk premium when they borrow, forcing them to skate closer to the edge of solvency. A shock to the exchange rate can then cause asset prices to move adversely, tipping them over the precipice. But if countries attempt instead to minimize these risks by limiting their recourse to foreign sources of funding, they may then be starved of the finance needed to underwrite their growth. The process of economic and financial development will be slowed. Countries in this situation thus face a Hobson's choice.

Currency mismatches and exchange rate volatility

There being is no widely accepted indicator of exchange rate flexibility, we employ three measures. First, we use the de facto classification of Levy-Yeyati and Sturzenegger (2000) (*LYS*). This is a discrete variable that equals one for countries with a flexible exchange rate regime, 2 for countries with intermediate regimes, and 3 for countries with a fixed exchange rate regime; we therefore expect original sin to be positively correlated with *LYS*. Our second measure of exchange rate flexibility (following Hausmann, Panizza and Stein, 2001) is international reserves over M2 (*RESM2*), the motivation being that countries that float without regard to the level of the exchange rate should require relatively low levels of reserves, while countries that want to intervene in the exchange rate market need large war chests. Again, we expect a positive correlation. Finally, following Bayoumi and Eichengreen (1998) we examine the extent to which countries actually use their reserves to intervene in the foreign exchange

market, comparing the relative volatility of exchange rate and reserves (*RVER*).[6] *RVER* will be high in countries that let their currencies float and low in countries with fixed exchange rates; thus, we anticipate negative correlation with original sin.

Table 6 reports regressions using *OSIN*3 to measure original sin. (The appendix shows that the results are robust to using *OSIN*2.[7]) All regressions control for the level of development (*LGD_PC*, which denotes the log of GDP per capita), the degree of openness (*OPEN*), and the level of foreign debt (*SHARE2*, which denotes total debt instruments plus total loans divided by GDP).[8] Because *OSIN*3 captures only one part of possible mismatches (it does not include information on bank loans), its precision depends on how representative bonded debt is in total external liabilities. To take account of this fact, we weigh all observations by the share of securities in total foreign debt.[9]

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[6] *RVER* is equal to the standard deviation of exchange rate depreciation divided by the standard deviation of the reserves over M2 ratio. See Hausmann, Panizza and Stein (2001) for details on the construction of this index.

[7] In all regressions original sin is measured as the average value for 1993-1998 average, while all other dependent and explanatory variables are measured as 1992-1999 averages. We focus on this period because most of our dependent variables are not available after 1999.

[8] We do not have much guidance regarding the expected signs of these controls. Although the theory of optimum currency areas suggests that there should be a negative association between exchange rate volatility and openness, previous empirical studies (e.g. Honkapohja and Pikkareinen 1992, Bayoumi and Eichengreen 1997, Eichengreen and Taylor 2002) have not found much support for this hypothesis. They tend to find that any effect of openness is dominated by the effect of country size; in other words, the empirically relevant corollary of the theory of optimum currency areas is that small countries prefer to peg. We return to the importance of country size below. The recent literature on fear of floating (Calvo and Reinhart 2002) suggests that there should be a negative correlation between level of development and desired levels of exchange rate volatility – although it also suggests that less developed countries may sometimes be less successful at limiting volatility in practice. We of course expect a negative correlation between exchange rate flexibility and share of foreign debt, on the grounds that exchange rate variability will then wreak havoc with debt service costs. This is because the share of foreign debt should amplify the negative effect of currency mismatches. In fact, we do find some evidence that the interaction between original sin and share of foreign debt amplifies the effect of original sin on exchange rate flexibility (the results, however, are not very robust).

[9] Formally, the weight is equal to (total debt instruments)/(total bank loans + total debt instruments). In the appendix, we show that the results are robust to dropping the weights.

As expected, original sin is negatively correlated with exchange rate flexibility.[10] The coefficients are always statistically significant when we run regressions using the full sample of countries. In the cases of *LYS* and *RVER*, the coefficients are only marginally significant (with a p value of approximately 0.16) when we exclude financial centers from the regression.[11]

The coefficients are also economically important. Column 1, for instance, suggests that complete elimination of original sin is associated with a jump of one point in the Levy-Yeyati and Sturzenegger 3-way exchange rate classification. Countries previously inclined to peg will move to an intermediate regime (to limited flexibility), while countries previously following policies of limited flexibility will be inclined to float. Viewed in this way, original sin provides an explanation for the fear-of-floating phenomenon. In the case of reserves over M2, redemption from original sin would move a country from the 75th percentile to the 25th percentile of the distribution of this ratio.

Here it is important to worry about reverse causality. Whereas we have argued that more original sin leads to less exchange rate variability, authors like Burnside, Eichenbaum and Rebelo (2001) argue that less exchange rate instability leads to more original sin. Stabilizing the exchange rate, in their view, creates moral hazard; it conveys the impression that the government is socializing exchange risk, encouraging the private sector to accumulate unhedged exposures. In fact, many analysts have argued that original sin (or liability dollarization) is caused mainly by fixed exchange rates. The problem will go away with the recent move towards floating rates. However, our data

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[10] All regressions are by weighted least squares. We also estimated the equations using ordered probit and count regression methods; the essential results were unchanged.

should dispel this hope. Of the 25 developing countries with the most flexible exchange rate regimes during the 1993-1998 period, according to the average value of the LYS index, 22 of them had a value of OSIN3 equal to 1. The time series evidence points in the same direction: there has been movement to greater flexibility of exchange rates but scant movement out of original sin except for countries that are in line to join the euro[12].

The fact that original sin is associated with less exchange rate flexibility has the implication that interest rates have to do more of the work when the country is hit by shocks, making monetary policy less accommodating and domestic interest rates more volatile.[13] Prudent borrowers will therefore prefer dollar debts, since the alternative will be riskier (Chamon and Hausmann, 2002). Moreover, a volatile interest rate will tend to limit the development of the market in long-term debt.

Currency mismatches and output and capital-flow volatility

We now explore the correlation between original sin and the volatility of growth and capital flows. There are several reasons for anticipating that the phenomenon will be associated with relatively high levels of volatility. For one thing, original sin limits the

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[11] However, doing so involves eliminating the bulk of the contrast between low and high measures of original sin.

[12] We also experimented with some instrumental variables, using country size as an instrument for original sin and they left our results unchanged.

[13] The relationship between original sin and greater interest rate volatility, relative to exchange rate volatility is documented in Hausmann, Panizza and Stein (2001). A question remains however about the equivalence between being able to borrow abroad in the same currency you *use* at home, say like Panama or Euroland, or in the same currency that you can *issue* at home. For Greece Is being able to borrow abroad in euros (a currency which that country has no capacity to issue) equivalent to being able to being able to borrow in drachmas (the emission of which was formerly under the national central bank's control)? The answer presumably depends on the value one attaches to the exchange rate as an instrument of adjustment. If one thinks that exchange rate adjustments are valuable in principle but ruled out in practice for countries burdened with original sin, then Greece has is not necessarily better off as a result of having eliminated its currency mismatch, since while it can now borrow abroad in the same currency it uses at home, it has also given up the ability to let the exchange rate play a stabilizing role now that it has been freed from mismatch problems.

scope and effectiveness of countercyclical monetary policies. In addition (as already noted), dollar liabilities limit the ability of central banks to avert liquidity crises in their role as lenders of last resort. Finally, dollar-denominated debts and the associated volatility of domestic interest rates heighten the uncertainties associated with debt service, thus increasing the volatility of capital flows and lowering credit ratings (Hausmann, 2002).

Table 7 looks at the correlation between original sin and the volatility of output and capital flows. We measure output volatility as the standard deviation of GDP growth over the period 1992-1999 and capital flow volatility as the standard deviation of capital flows (as a share of domestic credit) over the same period. We control for the level of development, openness, foreign debt, and volatility of terms of trade (*VOL_TOT*). Again, all equations are estimated by weighted least squares.[14]

Original sin is significantly associated with relatively high levels of output and capital-account volatility. It accounts for more than a quarter of the difference in output volatility between developed and developing countries; in a horserace between original sin and terms-of-trade volatility, original sin is the only one that remains statistically significant. It is equally important in explaining capital flow volatility: original sin again explains approximately a quarter of the difference in volatility between developing and OECD countries.

Original sin and credit ratings

[14] The results are robust to dropping the weights and using alternative measures of original sin (see the appendix).

Hausmann (2002) has argued that original sin lowers evaluations of solvency because it makes debt service and hence the fiscal balance more uncertain. It heightens the dependence of debt service on the evolution of the exchange rate, which may be subject to crises and crashes, and on short-term interest rates, which will be correspondingly more volatile.

To test this hypothesis, we regress credit ratings on two standard measures of fiscal fundamentals -- public debt as a share of GDP and public debt as a share of tax revenues-- on the level of development, and on original sin. The equations are estimated by both weighted OLS and weighted double-censored Tobit.[15] The regressions in Table 8 show a large and statistically significant effect of original sin on credit ratings.[16] Redemption (the total elimination of original sin) is associated with an improvement of ratings by three notches. This may help to explain why countries with similar fiscal fundamentals often have such different credit ratings even after controlling for, inter alia, the level of economic development.

In sum, we find statistically significant and economically important effects of original sin on exchange rate and GDP volatility and on country credit ratings. Currency mismatches clearly create serious problems for the countries saddled with them and, as we showed in Section 2 above, those problems are pervasive. This brings us to the questions of what causes original sin and what can be done about it.

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[15] The two sets of results are essentially identical.
[16] The appendix shows that the results are robust to alternative definitions of original sin.

4. The mystery of original sin

Helping governments find a solution to this problem – enhancing the capacity of developing countries to eliminate currency mismatches without simply substituting maturity mismatches (by causing them to increase their reliance on short-term debt at volatile interest rates) – should thus be a priority for officials striving to make the world a safer financial place and at the same time seeking to quicken the pace, sustainability and resilience of growth. But defining and implementing appropriate solutions requires identifying the distortion that gives rise to the problem in the first place.

The economist's instinctual reaction is that the inability to borrow abroad in one's own currency reflects the weakness of policies and institutions. Thus the bulk of the literature has thus focused on the shortcomings of borrowing countries, in particular on the underdevelopment of their market-supporting and policy-making institutions.

Original sin and the level of development

In Table 9 we therefore explore the relationship between original sin and the level of economic development as measured by (the log of) per capita GDP. We control for country size and for the groupings across which Section 2 suggests the incidence of the phenomenon should differ. Three relevant dimensions of size are the log of total GDP, the log of total domestic credit (valued in US dollars) and log of total trade. Table 9 uses the principal component of the three measures, which we call SIZE.

Strikingly, the coefficient on per capita GDP is close to zero and far from significant at conventional confidence levels. We ran several robustness checks. We eliminated the country group dummies and found the relationship still insignificant and

close to zero. We dropped the financial centers; doing so leaves this result unaffected.[17] We also ran the regression without regional dummies and without weights. Only in this case do we find a significant coefficient (also in this case the coefficient is not significant when we use weights).

In contrast, the other variable included in these equations, country size, is strongly correlated with original sin. Ability to borrow abroad in one's own currency seems to be heavily concentrated among large countries. We have more to say about this below.

The insignificance of our measure of economic development sets an ominous precedent for what follows. If original sin does not have a robust relationship with the level of development, then country characteristics that are correlated with the level of development are also unlikely to explain the variance in original sin. But, to give these country characteristics their due, we examine a number of them in turn.

Monetary credibility

A first hypothesis is that original sin is a symptom of inadequate policy credibility, which tends to be a particular problem in developing countries. If the monetary and fiscal authorities are inflation prone, foreign investors will be averse to lending in a unit that the borrower can manipulate. They will lend only in foreign currency, which is protected against inflation risk, or at short maturities, so that interest rates can be adjusted quickly to any acceleration of inflation.

In this view, original sin is not a problem in itself; it is more of a symptom. It is the miner's canary, signaling the presence of weak institutions. Redemption can then be

[17] We were only able to get a significant coefficient on economic development when running the regression without weights and without country group dummies. The appendix shows our results are robust to changes

achieved by pursuing institutional changes that enhance the authorities' anti-inflationary credibility. The political and economic independence of the central bank should be strengthened. Fiscal policy making should be centralized and rendered more transparent and accountable. Political support for policies of price stability should be cultivated. The country should accumulate a track record and develop a reputation for maintaining price stability. The standard advice given by the IMF and World Bank regarding macroeconomic policies and institutional reforms is both necessary and sufficient for redemption from original sin.

Unfortunately, there are problems with this easy conclusion. If inadequate anti-inflationary credibility is the cause of original sin, then it should be possible to achieve redemption simply by issuing inflation-indexed debt (Chamon, 2002) .[18] Yet we do not see very many countries able to issue internationally inflation-indexed debt in their own currencies. In addition, while only government has the capacity to inflate away debts denominated in its own currency, corporations in many emerging markets also find themselves unable to borrow abroad in that currency, despite the fact that this moral hazard, to the extent that it even exists, is more indirect.[19]

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in the definition of original sin.

[18] Tirole (2002) argues that governments could still attempt to influence the real exchange rate. However, the ability of the government to influence this relative price in a sustained manner is questionable and the political case for doing it is less compelling.

[19] To explain this, Chamon (2002) and Aghion, Bacchetta and Banerjee (2001) argue that the existence of a positive correlation between default risk and devaluation risk means that the claim of dollar lenders on the residual value of a firm goes up relative to those that lend in domestic or CPI-indexed debt. Under these conditions, peso lenders will fear the contingent expropriation implied by future additional dollar borrowing by firms. Jeanne (2002) argues that poor monetary credibility causes a peso problem: the low probability of a large depreciation. This increases the ex post real interest rate in case there is no crisis. A prudent borrower subject to idiosyncratic shocks will prefer to borrow in dollars and default in bad times than to borrow in pesos and default in good times.

We explore the cross-country correlation between original sin and inflation in Table 10. We regress the average inflation for the 1980-1998 period on OSIN3 after controlling for country groupings and size. We find a statistically significant relationship (equation 1). But this relationship is weakened by dropping high-inflation outliers: dropping the five countries with the highest average inflation reduces the t-statistic on inflation from 2.09 to 1.71; when the equation is estimated by Tobit the t-statistic falls to 1.21. Thus, while inadequate anti-inflationary credibility may help to explain the inability of a few chronic high-inflation sufferers to borrow abroad in their own currency, it cannot explain the extremely widespread nature of the phenomenon. In any case, the economic significance of the coefficient is not large. The average difference in inflation between developed and developing countries is 19 percent. The estimated coefficient implies that lowering inflation by that amount would reduce *OSIN*3 by 0.02 (from its level of 0.93 in the developing world).

It could be argued that the estimated coefficient is attenuated by endogeneity. If the debt is in dollars, the benefits from inflation are low. This would imply that original sin causes low inflation and this reverse causation lowers the value of the estimated coefficient. To deal with this problem we run an instrumental variable regression, using as our instrument the Cukierman (1995) index of central bank independence. Equation 3 runs the same equation as (1) but for the sample for which we have the Cukierman index. Equation (4) runs the instrumental variables regression on this sample. The estimated coefficient is now negative and is not statistically significant, suggesting that endogeneity is not the cause of the weak relationship.

Fiscal solvency and original sin

Other theories put greater emphasis on fiscal stories. The argument is that a government that has weak fiscal accounts will have an incentive to debase the currency in order to erode the real value of its obligations (Lucas and Stokey, 1983, Calvo and Guidotti, 1990). The solution is to index the debt to some real price or to issue short-term debt, where the cost of eroding the debt with inflation is higher. Corsetti and Mackowiak (2002) put this argument in a dynamic context: as governments approach insolvency they have an incentive to dollarize the debt further.

We explore the relationship between original sin and fiscal fundamentals in Table 11. Equations 1, 2 and 3 use, alternatively, the debt-to-GDP ratio, the average deficit, and the debt-to-revenue ratio. Equation 4 uses the principal component of these three measures. We find a negative relationship between measures of original sin and fiscal fundamentals that is sometimes significant: countries with *more* original sin have less public indebtedness.

As argued above, there may be reason to worry about reverse causality. Original sin lowers credit ratings – for any given level of debt – by making debt service more uncertain. This limits the ability to accumulate debt. Hence, we may be finding a negative result which really is expressing the impact of original sin on the ability of governments to accumulate debt, not the impact of public indebtedness on original sin. Still, to address possibilities of reverse causality we employ again an instrumental variable approach, where we use the proportion of the population over 65 as an instrument for the fiscal fundamental. The results are presented in equation 6; the key findings are unaffected.

Hence, we find no traction for fiscal interpretations of the causes of original sin. There is little association of original sin with obvious fiscal fundamentals such as the level or persistence of public debts and deficits. Indeed, one can point to any number of emerging markets that have successfully maintained low inflation, avoided large budget deficits, and followed international guidelines for the efficient design of their monetary and fiscal institutions – Chile is a case in point for Latin America, while Korea is a good example for Asia – but are nonetheless chronically unable to borrow abroad in their own currencies.

Contract enforcement

It is sometimes argued that investors are reluctant to lend to governments and corporations where the institutions designed to enforce their claims are weak or unreliable and there is a significant danger of debt repudiation. Chamon (2002) and Aghion, Bacchetta and Banerjee (2001) present a model in which when a company defaults, its assets are distributed among the creditors in proportion to their nominal claims on it. If depreciation and default risk are correlated, then domestic currency lenders will likely see a double decline in the value of their claims when a default occurs: they will receive a portion of the residual value of the company which will be diminished by the concomitant depreciation. If all lending takes place simultaneously, domestic currency lenders will charge for this effect. However, if lending takes place sequentially firms will have an incentive to increase the proportion of foreign currency lending in order to transfer part of the residual value of the defaulted company from old domestic-currency lenders to new foreign-currency investors. In anticipation of this, the domestic currency market will disappear. This mechanism can be overcome if bankruptcy courts

can enforce complicated contracts that for example, distinguish between creditors of different seniority. But, if these contracts are infeasible, then domestic currency lending may be affected.

To test this hypothesis, we study the relationship between original sin and a measure of rule of law (*RULEOFLAW*), drawn from Kauffman et al (1999), that should proxy for the quality of contract enforcement. Table 12 shows that the relationship between institutional quality and original sin is neither statistically nor economically significant (it also has the wrong sign). Using the La Porta et al. (1997) index of creditor rights yield similar results, although the sample size is more limited in this case. These negative findings are not entirely surprising, given the fact that these indexes of institutional quality are strongly correlated with the level of development which we found (in Table 9) to have a weak relationship with original sin.

The role of trade

It can be objected that what matter are not institutions, which can always be changed, at some cost, but the fundamental incentives for respecting one's contractual obligations. In terms of respecting the claims of foreigners, it can be argued that countries that trade heavily with their creditors have an incentive to meet their contractual obligations because failing to do so will provoke commercial retaliation or at minimum interrupt the supply of trade credits. This was the insight of the early Eaton and Gersovitz (1981) model of sovereign lending in the presence of potential repudiation, where lending could be supported only in the presence of potential trade sanctions with output costs. Exponents of this view point to Argentina in the 1930s, which was one of the only Latin American countries to stay current on its debts, something that is

commonly explained by its exceptional dependence on the British export market and the threat of tariff retaliation (Diaz-Alejandro 1984). More recently, Rose (2002) has shown that borrowing countries that default on their debts in practice suffer a significant reduction in trade with their creditors. Rose and Spiegel (2002) show further that borrowers with economically consequential trade links to their creditors are significantly more likely to service their debts.

This story linking the threat of trade sanctions to the credibility of financial policies is appealing to the extent that it suggests that current account liberalization provides an automatic solution to the problems posed by capital account opening. But the evidence is not supportive. We find no correlation in Table 13 between the incidence of original sin and the standard measure of trade openness (exports as a share of GDP). The result is the same dropping financial centers and is robust to additional sensitivity tests. Moreover, while the aforementioned logic may explain the absence of opportunistic defaults and the existence of debt markets, it is hard to see how it should affect the denomination of those debts, per se. Trade sanctions can be imposed whether debt is denominated in the domestic or the foreign currency. And, if the presence or absence of the potential for such sanctions is what determines ability to borrow, then we should also see punishments meted out to countries that denominate their debt in their own currencies but then depreciate the exchange rate, thereby eroding the value of creditors' claims. But, in practice, we do not observe countries that issue in their own currency being punished when the exchange rate weakens. In the last 30 years we have seen trend or cyclical depreciations in many of the countries that suffer least from

original sin: Australia, Canada, New Zealand, the UK and South Africa, to name five. In practice, these depreciations have not triggered either trade or credit sanctions.[20]

Political economy stories

It can be argued that what is required to induce governments to respect the value of the local currency (and of financial liabilities denominated therein) is a domestic constituency of local-currency debt holders prepared to penalize a government that debases the currency. If the median voter holds sovereign bonds, a government will suffer political sanctions if it defaults opportunistically or inflates away the value of the principal. By contrast, if foreigners are the main holders of public and private debts (the argument continues), then there is likely to be a larger domestic political constituency in favor of weakening the value of their claims. Foreign creditors, no fools they, will be reluctant to lend in local currency unless protected by a large constituency of local savers.

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[20] Flandreau and Sussman (2002) propose a different connection between trade and original sin. They first observe that European countries with a large presence in international trade in the 19th century were able to avoid original sin quite independently of the quality of their institutions. Spain and Russia had more ability to place debt in local currency, for example, than did the Scandinavian countries, where the latter were arguably more institutionally advanced. The authors then go on to argue that it was possible for Spain and Russia to place debt in domestic currency because there existed spot and futures currency markets in their currencies, arising out of the demand by traders to hedge their exposures. The existence of these markets facilitates the issuance of financial claims denominated in those currencies because investors can also use those markets to hedge their exposures. Flandreau and Sussman show that there is some evidence of this mechanism at work in 19th century Europe. One can similarly see evidence of it in Mexico in the 1990s, when following the negotiation of the NAFTA agreement there developed a deep and liquid futures market in Mexican pesos on the Chicago Mercantile Exchange, in turn facilitating the Mexican government's placement of peso-denominated debt securities. In recent years, international bond issuance in local currency has increased significantly in some Eastern European accession countries (e.g. Czech Republic, Slovak Republic and Poland) as they have expanded their trade, with the European Union in particular, consistent with this hypothesis. But it can be argued that these trends do not reflect the influence of greater trade but instead are purely currency "convergence plays," given that these countries are expected to join the euro. To put the point another way, it is not the threat of trade sanctions but the commitment of these countries to join the EU and qualify for adoption of the euro (something that would be ruled out under a strict interpretation of the convergence criteria specified in the Maastricht Treaty) that gives them singular policy credibility. It is relevant in this connection that the countries of Southern Europe that joined the euro similarly saw a decline in their problem of original sin between 1993 and 1998. Note, however, that there has also been a concurrent increase in the international issuance of bonds in local currency in some East

This is the logic behind Tirole (2002): lending in the currency of the borrower is deterred by a form of sovereign risk arising from the fact that the government cannot commit to protect the rights of foreigners whose welfare it does not value. Redemption can therefore be achieved by developing domestic financial markets.

Our crude measure of these influences is the size of the domestic financial system, proxied alternatively by domestic credit normalized by GDP (DC_GDP), the ratio between foreign liability (measured as the sum of bank claims and securities from the two BIS databases described above) and domestic credit (FOR_DOM), and an index built using the principal component of the previous two variables (SIZE_FIN). The theory predicts a negative correlation between DC_GDP and Original Sin, a positive correlation between FOR_DOM and original sin and a negative correlation between SIZE_FIN and original sin.[21]

Table 14 shows that the relationship between size of the financial system and original sin is never statistically significant. In the case of *FOR_DOM*, the coefficient even has the wrong sign.

Even if there existed a relationship, there would still be the question of what governments can do to promote the development of a large constituency of domestic bondholders. Conceivably, they could create a constituency of investors in long-term domestic-currency-denominated debt at one fell swoop by using force majeure to change the currency denomination of existing claims or eliminating from existing contracts provisions indexing principal and interest to the exchange rate. Something along these

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Asian countries, notably Hong Kong, Taiwan and Thailand, where trade is important but currency union is not in the cards.

lines occurred in the United States in 1933, it is argued, when Franklin Delano Roosevelt disregarded the gold clauses in U.S. government and corporate bonds in 1933 on devaluing the dollar and his decision was upheld by the Supreme Court. Doing so did not demoralize the bond markets because the economy's improved growth prospects (with their positive implications for the debt-servicing capacity of borrowers) more than outweighed the effects of the dilution of investor rights (Kroszner 1999).

Whether a similar forced conversion would in fact reassure investors in emerging markets today is another question.[22] The problem with this argument is that it implies the traditional trade-off between the positive effects associated with a more sustainable debt achieved through force majeure and the negative reputational effects related to tampering with the sanctity of contracts. Investors may react negatively if the second effect dominates and become even more reluctant to absorb new debt issues on the margin. The policy would then be counterproductive from the point of view of "redemption."[23]

Another approach, less likely to alarm investors but also less capable of delivering immediate results, would be to require banks, pension funds, and the social security system to hold long-term, domestic-currency-denominated, fixed-rate debt. The government could require the banks to hold domestic-currency-denominated bonds as reserves. It could privatize the social security system and require pension funds to hold a specified share of the retirement portfolios in such bonds. But, to the extent that the government has the strength to promulgate such regulations – in effect, to twist the arms

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[21] Since DC_GDP and FOR_DOM are supposed to have opposite effect on Original Sin SIZE fin was built by taking the negative of FOR_DOM.

[22] To some extent the Argentine forced *pesification* of dollar claims bares some similarity with the US 1933 experiment. It involved allowing the currency to depreciate while limiting the wealth effects associated with the dollar (instead of gold-linked) assets.

of these individuals and institutions – the individuals and institutions in question will presumably lack the leverage to throw a government engaging in opportunistic debt management policies out of office. Hence other investors may lack assurance that there exists an effective class of domestic stakeholders to constrain opportunistic policy.

Not everyone will be convinced by this critique; they will argue that emerging markets should emulate the policies of financial repression used by Western European governments after World War II.[24] There, strict capital controls and tight restrictions on the currency composition of newly issued debt securities succeeded in forcing residents to hold long-term domestic-currency-denominated bonds by offering them few alternative funding or investment opportunities, accelerating the creation of a domestic investor constituency. But, even in postwar Europe, a quarter of a century and more was required before those controls could be removed and foreign investors could be enticed into absorbing significant volumes of domestic issues. Financial repression is no quick fix, in other words. And, again, this approach – encouraging the development of some markets by suppressing the operation of others – may be regarded by investors as disturbingly contradictory and inconsistent.

This approach is likely to be especially problematic in low-income countries where there exists only a limited pool of domestic savings and domestic market liquidity is limited. The smaller the market, the less likely are foreign investors to willingly hold debt securities denominated in the currency in question. (In fact, precisely the same logic

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[23] Why this contradiction was not more demoralizing in 1933 is an interesting issue that would reward further study.
[24] See for example Wyplosz (2001).

applies to residents.) This observation is key: it points to where to look for the causes – and the solution – to original sin.

Putting everything together

To this point we have tested the various theories of original sin one at a time and only found a strong correlation between original sin and country size, along with a somewhat weaker correlation between original sin and past inflation. We now jointly test the theories by running a set of multivariate regressions that include explanatory variables for all theories. Table 15 reports a set of regressions that do and do not control for country groups and financial centers. We also consider a measure of original sin that excludes debt instruments issued by international organizations (*OSIN*3*_NOI*). The results are basically unchanged: the only robust determinate of original sin is country size.

Looking abroad: international causes

What accounts for the concentration of the world's portfolio in few currencies and for the fact that it is mainly large countries that seem to be able to issue foreign debt in their own currencies? Obviously, each additional currency adds opportunities for diversification, but with decreasing marginal benefits. At the same time, however, each currency also adds costs and risks. In a world with transactions costs, the optimal portfolio will have a finite number of currencies. The fact that few currencies survive is

indicative that with each additional currency, the benefits of diversification fall faster than the costs.[25]

Imagine the following situation.[26] There are two countries: one has N trees while the other has 1 tree. All trees are identical in their expected income and its variance; the large country just has more of them. Shocks to each tree are uncorrelated. Assume that the exchange rate moves with the realization of relative output. If there were no transactions costs of investing abroad, then it would be optimal to hold a globally diversified portfolio: the large country would invest 1/(N+1) of its wealth in the small country, while the latter would invest N/(N+1) in the large country. Now introduce costs to international transactions. If all countries were of size 1, then the presence of transaction costs would not affect the composition of the world portfolio. But if country size differs, then the benefits of international diversification will be greater for the small country than for the large one. There will be less appetite in the large country to hold the currency of the small country, while there will still be a large appetite for the small country to hold the assets of the large one. This is to say, large countries offer significant diversification possibilities, while small countries do not. If the transaction costs associated with international diversification are the same for investors in both countries, then the world will choose to invest in a few large currencies. Notice that this is through no fault of the small country, but a consequence of the existence of cross-border costs and asymmetries in size and diversification.

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[25] This is especially true if the additional currency exposes the investor to concentrated risks. Note that in making this argument we are paralleling the literature on portfolio diversification with transactions costs, in which it is shown that optimizing investors, faced with transactions costs, will include only a limited number of securities in their portfolios, balancing the diversification benefits of adding an additional

An implication of this view is that even if we identify characteristics that have allowed a few small countries to issue debt in their own currencies – say, like South Africa, New Zealand or Poland – it would be a fallacy of composition to assume that, if other small countries acquired those same characteristics, then they would all make it into the world portfolio. Each successful country may limit the chances of the others, given the declining marginal benefits of diversification.[27]

A further implication of this approach is that country size matters for original sin. Large countries have an advantage in shedding original sin because the large size of their economies and currency issue makes it attractive as a component of the world portfolio. In contrast, the currencies of small countries add little diversification benefits relative to the additional costs they imply.

Tables 9 through 15 above seemed to provide evidence to this effect. We explore the hypothesis further in Table 16. There we use three entirely different measures of size: the log of total GDP, the log of total domestic credit (valued in US$), and the log of total trade, in addition to again constructing the first principal component (SIZE, as in previous tables). We also control for country groupings. Equation 1 presents the regression with just the country groupings dummy. In equations 2 to 4 we use alternatively our three different measures of size. Equation 5 uses the principal component of the three measures, as in Tables 9 through 15. In the final equation we test for robustness with respect to dropping the financial centers.

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currency, which decline on the margin, against the transactions costs of purchasing additional securities, which may not.

[26] This paragraph is based on a yet unfinished paper by Ricardo Hausmann and Roberto Rigobon.

[27] We are assuming, of course, that the only effect of the introduction of additional currencies into the global portfolio is not to crowd out the five major currencies.

The results show that all measures of size are robustly related to original sin. The relationship between original sin and size is also economically important: the effects of SIZE in Table 16 account for more than half the difference in original sin between developed and developing countries.[28]

SIZE can explain why large countries like the US and Japan do not suffer from original sin. But what about Switzerland and, for that matter, the UK? Note that the financial-center dummy in the equations in Table 16 remains large and significant even after controlling for country size. This is another way of saying that the UK and Switzerland are immune from the problem. But if becoming a financial center is evidently another way of shedding original sin, this is much easier said than done. Countries that either are or were major commercial powers (e.g. the US and Japan today, Britain in the past) clearly have a leg up; the developing countries are not major commercial powers, by definition. In addition, some countries have been able to gain the status of financial centers as a quirk of history or geography (e.g. Switzerland, a mountainous country at the center of Europe which was hard to take over and also small enough to retain its neutrality, became a convenient destination for foreign deposits). Network externalities giving rise to historical path dependence have worked to lock in their currencies' international status: once the Swiss franc was held in some international portfolios and used in some international transactions, it became advantageous for additional investors and traders to do likewise. And because Britain was the world's leading industrial, trading and lending nation once upon a time, sterling acquired its position as a prominent currency for the denomination of international claims, a luxury

[28] Using a Tobit we find that size is also significant in a sub-sample of developing countries.

that the country enjoys to this day, albeit to a lesser and declining extent. These observations are related to the literature on the determinants of key currency status (Kiyotaki, Matsuyama and Matsui 1992), which explains the dominance of a small number of currencies in international markets as a function of network externalities and transactions costs. This literature does not deny that additional countries cannot gain admission to this exclusive club, but it suggests that they face an uphill battle.

All this suggests that the global portfolio is concentrated in a very few currencies for reasons largely beyond the control of the excluded countries.

Lessons from outliers

An interesting fact about the international issuance of bonds in exotic currencies is that it is done mostly by non-residents. Table 17 presents data on the proportion of local currency debt issued by foreigners in the non-major currency countries that have original-sin OSIN3 ratings below 80 percent. As the table shows, over 80 percent of the debt issued in the currencies of a number of these countries -- Poland, New Zealand, South Africa and the Czech Republic -- was issued by foreigners. The proportion exceeds half of total issuance in the cases of Canada and Denmark.

Why would non-residents issue debt denominated in exotic currencies? Consider the following case. The Inter-American Development Bank (IDB) has issued debt in New Zealand dollars, in Greek drachmas and in Russian rubles, despite the fact that none of these countries is a member of the Bank and their well-being is not a goal of the institution. The reason is that the investment banks underwriting the IDB issue are able to swap the debt-service obligation back into U.S. dollars in such a way that the net cost of

borrowing, inclusive of the swap, is less than or equal to the opportunity cost of borrowing directly in U.S. dollars.

The investment bank is able to offer this swap because there are scarce opportunities to hedge the currency mismatch in countries with original sin; hence investors there are willing to pay a premium for the privilege. Borrowers with foreign currency liabilities are willing to pay for the swap to entice otherwise indifferent foreigners to issue internationally in local currency.

Why this structure is favored by the market is an interesting question. One possibility is that the markets value the ability to separate currency and credit risk. While the local-currency debt issued by emerging market residents has both currency and credit risk and the dollar debt issued by emerging market residents has only credit risk, the debt issued by an international financial institution has only currency risk. Markets may prefer to separate these risks in order to facilitate the development of market liquidity or to get rid of inconvenient correlations between default and devaluation risk. The IFIs are particularly well placed to meet this demand.

In fact, the international financial institutions (IFIs) have played a very significant role in the international bond issuance in exotic currencies (Table 18). The IFIs issued almost half of all internationally-placed bonds in exotic currencies in the period 1992-98. This includes countries like the Czech Republic, Portugal, Spain and South Africa. In the more recent period, the relative participation of IFIs in these currencies has declined as the market has found its footing, but it has increased in other newer entrants such as Estonia, Taiwan and Trinidad and Tobago.

5. An international solution for original sin

The preceding discussion has left us with building blocks for the design of an international initiative to overcome original sin. We have seen that the global portfolio is concentrated in the currencies of a few large economies and financial centers. We have seen how transaction costs can explain why a bias toward these particular currencies is observed. We have also seen that the market in exotic currencies tends to develop through debt issuance by non-residents who then swap their debt service obligations into their currency of choice. By doing so they allow those on the other side of the swap – i.e. emerging market borrowers with dollar liabilities – to offload their currency risk just as if they had borrowed in local currency.

We are now in a position to formulate a proposal.

Step 1. Develop an appropriate currency basket index

For developing countries to be able to borrow abroad in local currency, the foreign investor – the proverbial Belgian dentist – will have to take the long position in local currency. However, it is hard to imagine a dentist managing a portfolio that includes the volatile currencies of many small, poorly-diversified economies. We therefore propose the creation of a unit of account that would include a well-diversified set of emerging-market and developing-country currencies. This unit will represent claims on a more diversified economy and hence will be more stable, since shocks – such as changes in export prices – that are positive for some economies will be negative for others.

We will discuss the choice of countries to include in the basket later. But for now assume that 20 currencies are included in the basket. We have constructed two such baskets: one with the 20 largest countries for which *International Financial Statistics* has

quarterly data on exchange rates and consumer price indexes since 1980, and another that includes the largest 22 countries with the same continuous data since 1993. (We refer to these indices as EM 1980 and EM 1993.) Tables A17 and 18 in the Appendix list the countries, the weights and the value of the indexes.

We weigh the countries by their GDPs at purchasing power parity in order to avoid setting weights in a manner that favors countries that do not behave prudently, as would happen if we weighed countries by the market dollar value of the GDP or by the value of their foreign debt. (The second criteria would favor heavily indebted countries, while the first would favor those with overvalued currencies.) To deal with the incentive to debase the currency faced by net debtors borrowing in local currency, we index the debt to the consumer price level of each country, calculating the index as the end-of-period exchange rate divided by the CPI in the same month.

Indexation to the CPI, much like indexation to the dollar, allows countries with limited credibility to lengthen the maturity of their obligations. Indexing to the CPI has better properties, however, from the point of view of macroeconomic stability: it is similar to indexing the claims to the real exchange rate, which is a relative price.[29] This gives the index some important characteristics. First, if the real exchange rate is stationary, the index should display long-run stability. (Averaging over 20 countries further increases this stability.) Second, the real exchange rate tends to appreciate in good times and depreciate in bad times. This makes debt service move in line with countries' capacity to pay, which is the opposite of what happens with dollar debts, in turn

[29] We say similar and not identical because the bilateral real exchange rate is usually calculated by dividing the nominal exchange rate (in terms of domestic currency per dollar) by the local CPI and multiplying by the CPI of the US. Here we are not doing the latter step. The implications of this are discussed below.

eliminating the destabilizing vicious circle associated with original sin. Finally, the index has a long run tendency to appreciate. To the extent that developing countries tend to grow faster than industrial countries, this generates a Balassa-Samuelson effect that causes trend real appreciation of the real exchange rate. In addition, since the index does not incorporate inflation in dollars or any other reference currency, while adjusting to the inflation of developing countries, there is a trend appreciation in line with the inflation of the reference currency.

Figure 2 shows the value of the two indexes together with the yen-dollar and Deutsche mark-dollar exchange rate.[30] The graph shows that the indexes are less volatility than the yen and the mark. Strikingly, the period of the Asian and Russian crises show a depreciation of the index vis a vis the dollar, but by less than the deutsche mark.

Table 19 calculates the volatility of the EM index vis-a-vis the U.S. dollar for various sub-periods and shows that their volatility, so normalized, is in line with that of other major currencies. Table 20 shows the average return, the volatility and the correlation with real private consumption vis-a-vis seven large developed economies for the period over which each index is defined. The indexes exhibit a trend appreciation of about 2 percent for the typical country, a volatility of 10 to 13 percent, and a mostly negative correlation with real private consumption growth in these countries. These characteristics should make such indexes an attractive form of diversification for institutional and retail investors.

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[30] The indexes are presented on a per dollar basis so that increases in the index imply depreciations.

Step 2. Have the World Bank and other international financial institutions issue debt denominated in the EM index

As noted, the experience of countries escaping original sin has been led not by residents but by foreigners issuing in exotic currencies, the international financial institutions in particular. We therefore propose that the World Bank and other international financial institutions should start issuing debt in an index such as the one described above. Their AAA rating allows them to access institutional investors. The bonds they issue would be made more attractive by their trend appreciation of the index, their relatively low volatility, and their low correlation with consumption in the countries in which they are marketed. A concerted push by the World Bank and the other IFIs could stimulate the development of a market with sufficient liquidity to make the bonds easily tradable.

This initiative should also be attractive to the IFIs like the World Bank. They will find it particularly easy to get rid of the currency mismatch caused by issuing EM-indexed bonds: they could simply convert the dollar loans they have made to the countries in the index into local currency CPI-indexed loans, something which the borrowers would surely find attractive. The IFIs would thereby eliminate the currency mismatch generated by their own lending, thus becoming a solution instead of a source of original sin. For countries that are in the index but are not members of the IFIs, (e.g. countries from other continents that are not members of a given regional development bank), entering into swaps with the World Bank or with the other countries themselves would allow them to hedge out of their currency mismatch while also contributing to the elimination of original sin.

Since the World Bank would need to calculate the index, it will have a fiduciary responsibility to its investors in assuring that there is no opportunistic manipulation of the estimates of exchange rates or the CPI by member countries. This will impart more credibility to the index.

Step 3. Have G-10 countries issue debt denominated in the index

If this effort succeeds in creating space in the global portfolio for EM-indexed debt, there will then be an opportunity for other high-grade non-residents to develop the market further. The governments of the U.S., Euroland, Japan, the UK and Switzerland, the countries that issue the five major currencies, are natural candidates to do so. They have a large stock of debt issued in their currency relative to the debt issued by their residents and hence are at the opposite end of the currency-of-denomination spectrum from emerging markets. More broadly, they are not immune from the global instability created by original sin, giving them an interest in solving the problem.

Thus, we propose that these countries should issue EM-indexed debt in order to transform the structure of the global portfolio. They would presumably want to swap out of EM-denominated debt in order not to take on an inconvenient currency mismatch. To do this, however, they would need to undertake currency swaps with each individual country in the index. This would allow the counterparties to swap out of their dollar exposures just as in the New Zealand-IDB example above. These swaps could be organized by investment banks or could be started with some participation of the World Bank.

It is important to highlight some aspects of the performance (counterparty) risks in these swaps. First, the net flows in the swaps are such that EM countries would have

to pay into the swap when their currencies are strong, while they would get money from it when their currencies are weak. If real appreciation (depreciation) tends to occur in good (bad) times, then the performance risk is concentrated in good times. At times of crisis, on the other hand, when their currencies weaken significantly, EM countries would be getting money from their swaps. This minimizes the relevance of ability to pay for performance risk, which is the opposite of what happens with dollar debts.

Second, a swap can be thought of as an exchange of bonds between the two final parties to the transaction. This means that if the EM were to default on its swap obligation, i.e. on the bond it has issued – then the industrial country would simply take back its bond. Default risk would be limited to the potential change in value of the two bonds since the time they were issued. Again, performance risk (equivalently, sovereign risk) would be minimal.

Just as in the example of the IDB and New Zealand, the net cost of borrowing to the G-7 country (after taking into account the swap) should be equal to or smaller than borrowing directly in its own currency. As we argued above, countries that suffer from original sin should be willing to pay something in order to off-load their currency mismatch. However, to allay any fears that this might not happen naturally, it can be made part of a formal contractual engagement of the members of the EM index and the issuing governments. In practice, this would mean that EM governments would agree to swap with the issuing government, at a pre-agreed price. The issuing government would exercise this de-facto put option in case it did not find a more attractive swap alternative in the market.

Creating these put options on the swap would require a political negotiation among between the member countries and the international community, as many emerging market countries are grouped together in the index. Countries unwilling to enter into these agreements would be excluded from the index.

Step 4. Further develop the EM index market

Imagine that, as a result of the preceding steps, there develops a liquid market in the EM index. It is reasonable to assume that institutional investors and mutual funds will attempt to create products that add credit risk to the index. They will be able to do so by buying local currency debt of the countries in the index. This will facilitate the development of these markets, further helping to erode original sin. It is conceivable that once the market has developed enough, the role of industrial country governments and international institutions can be scaled back, just as has happened with the issuance of individual exotic-currency debt.

6. Concluding remarks

International financial integration has not worked as promised. It was supposed to accelerate growth in the developing world by channeling much-needed capital to deserving economies and by facilitating international risk sharing. Instead, private financial markets have been a major source of risk, and since 1998 capital flows have fallen to economically insignificant levels. Original sin is central to these problems. Most graphically, the poisonous cocktail of currency depreciation and dollar liabilities

played a key role in the Asian, Russian and Latin American crises that so soured international investors on emerging markets.

The evidence is strong that original sin is not going to go away anytime soon as a result of the application the standard recipe of macroeconomic prudence and institution building. Neither cross-country nor time-series evidence supports the view that efforts to strength policies and institutions at the national level will suffice to ameliorate the problem over the horizon relevant for practical policy decisions. And even if some countries do succeed in escaping the problem through initiatives taken at the domestic level, it is hard to conceive that the others will, for the same reasons that it is hard to imagine a world in which dozens of new currencies make it into the global portfolio. Each successful country raises the bar to others, insofar as the addition of its securities to the global portfolio will reduce the diversification benefits of adding yet another currency. The only practical way for a large group of countries representing over 90 percent of the population and the GDP of the developing world to escape original sin is an international initiative to develop an EM index and a market in claims denominated in it.

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TABLES AND FIGURE

Table 1: International bonded debt, by country groups and currencies

	Total Debt Instruments Issued by residents		Total Debt Instruments Issued by residents in own currency		Total debt instrument issued in groups' currency		Share of own currency	Share of groups' currency
1993-1998								
Major financial centers	939.1	34%	493.6	64%	1868.4	68.1%	52.6%	199.0%
Euroland	855.9	31%	198.4	26%	647.5	23.6%	23.2%	75.7%
Other Developed Countries	390.1	14%	68.6	9%	128.2	4.7%	17.6%	32.9%
Developing Countries	269.0	10%	6.3	1%	16.8	0.6%	2.3%	6.3%
International Organizations	289.7	11%	0.0	0%	0.0	0.0%	0.0%	0.0%
ECU	0.0	0%	0.0	0%	82.8	3.0%	0.0%	0.0%
Total	2743.7	100%	766.8	100%	2743.7	100.0%	27.9%	100.0%
1999-2001								
Major financial centers	2597.7	45%	1773.6	61%	3913.8	67.8%	68.3%	150.7%
Euroland	1885.6	33%	1071.5	37%	1722.2	29.8%	56.8%	91.3%
Other Developed Countries	477.6	8%	45.9	2%	89.9	1.6%	9.6%	18.8%
Developing Countries	434.0	8%	11.6	0%	47.4	0.8%	2.7%	10.9%
International Organizations	378.4	7%	0.0	0%	0.0	0.0%	0.0%	0.0%
ECU	0.0	0%	0.0	0%	0.0	0.0%	0.0%	0.0%
Total	5773.3	100%	2902.5	100%	5773.3	100.0%	50.3%	100.0%

Major financial centers: The US, Japan, the UK, and Switzerland
Source: Bank for International Settlements

Figure 1: Distribution of debt by issuers and currencies (1999-2001)

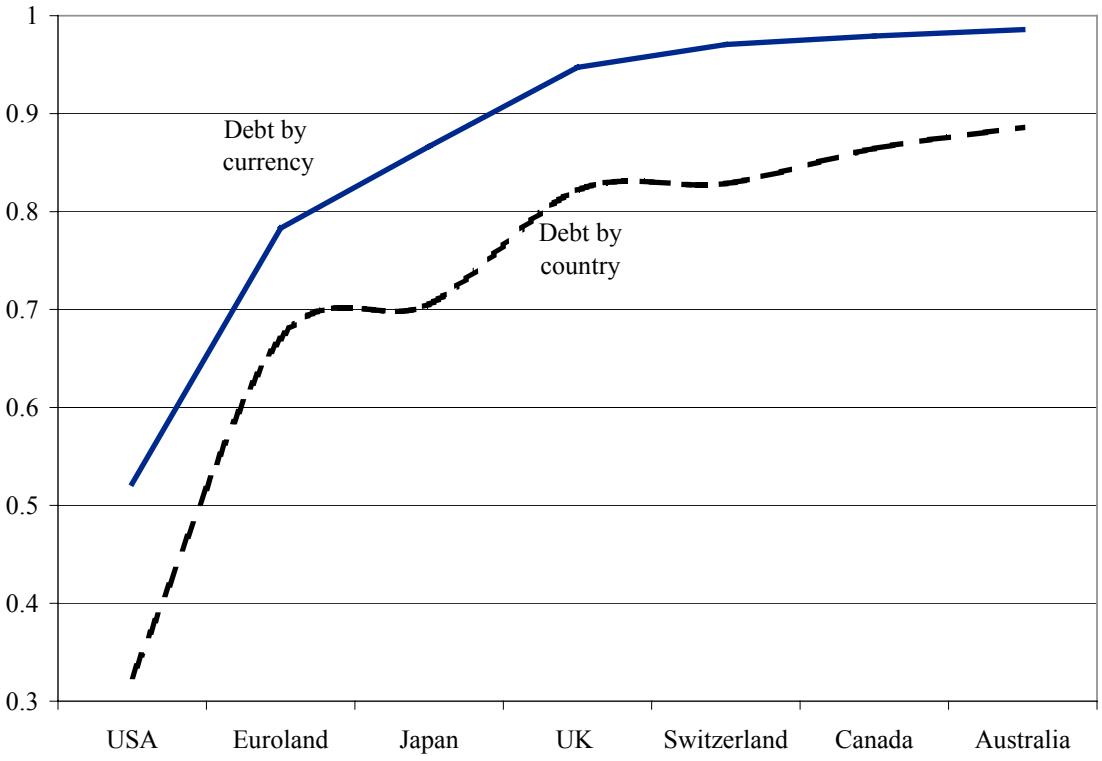

Table 2: Cross-border Bank Claims

	Total Bank Debt of residents (BIL USD)		1995-1998 Total debt in major five currencies		Share in Major Five Currencies
Major Financial Centers	3,141	44.9%	2,448	44.02%	77.9%
Euroland	1,637	23.4%	1,479	26.60%	90.3%
Other Developed Countries	263	3.8%	167	3.00%	63.5%
Offshore	502	7.2%	434	7.80%	86.4%
Developing Countries	1,305	18.7%	995	17.89%	76.2%
International Organizations	23	0.3%	17	0.31%	71.4%
Unallocated	127	1.8%	22	0.40%	17.7%
Total	6,998	100.0%	5,561	100.00%	79.5%
	Total Bank Debt by residents (BIL USD)		**1999-2001 Total debt in major five currencies**		**Share in Major Five Currencies**
Major Financial Centers	3,691	47.3%	3,146	49.59%	85.2%
Euroland	2,263	29.0%	2,080	32.79%	91.9%
Other Developed Countries	356	4.6%	223	3.52%	62.8%
Offshore	458	5.9%	381	6.01%	83.1%
Developing Countries	887	11.4%	673	10.61%	75.8%
International Organizations	18	0.2%	17	0.27%	93.7%
Unallocated	134	1.7%	19	0.30%	14.5%
Total	7,808	100.0%	6,344	100.00%	81.3%

Major financial centers: The US, Japan, the UK, and Switzerland
Source: Bank for International Settlements

Table 3: Measures of original sin by country groupings (simple average)

Group	OSIN1 1993-1998	OSIN1 1999-2001	OSIN2 1993-1998	OSIN2 1999-2001	OSIN3 1993-1998	OSIN3 1999-2001
Financial centers	0.58	0.53	0.34	0.37	0.07	0.08
Euroland	0.86	0.52	0.55	0.72	0.53	0.09*
Other Developed	0.90	0.94	0.80	0.82	0.78	0.72
Offshore	0.98	0.97	0.95	0.98	0.96	0.87
Developing	1.00	0.99	0.98	0.99	0.96	0.93
LAC	1.00	1.00	1.00	1.00	0.98	1.00
Middle East & Africa	1.00	0.99	0.97	0.99	0.95	0.90
Asia & Pacific	1.00	0.99	0.95	0.99	0.99	0.94
Eastern Europe	0.99	1.00	0.97	0.98	0.91	0.84

* In the 1999-2001 period it is impossible to allocate the debt issued by non-residents in Euros to any of the individual member countries of the currency union. Hence, the number here is not the simple average, but is calculated taking Euroland as a whole.

Table 4: Countries with OSIN3 below 0.8, excluding financial centers

	Non Euroland			Euroland	
Country	1993-98	1991-01	Country	1993-98	1991-01
Czech Republic	0.0	0.00	Italy	0.00	0.00
Poland	0.82	0.00	France	0.23	0.12
New Zealand	0.63	0.05	Portugal	0.42	0.24
South Africa	0.44	0.10	Belgium	0.76	0.39
Hong Kong	0.72	0.29	Spain	0.59	0.42
Taiwan	1.00	0.54	Netherlands	0.64	0.47
Singapore	0.96	0.70	Ireland	0.94	0.59
Australia	0.55	0.70	Greece	0.93	0.60
Denmark	0.80	0.71	Finland	0.96	0.62
Canada	0.55	0.76	Austria	0.90	0.68

Table 5. OSIN3 in 1993-1998 and the Flandreau-Sussman classification, circa 1850

	Mean	St. Dev.	N	Difference with respect to gold clauses
Gold clauses	0.86	0.28	31	0.00
Mixed clauses	0.53	0.39	6	0.36
				(0.016)**
Domestic Currency	0.34	0.36	5	0.52
				(0.000)***
Total	0.75	0.35	42	

P values of the mean comparison test in parentheses

Table 6: Original Sin and Exchange rate flexibility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	LYS	LYS Dropping Financial Centers	RESM2	RESM2 Dropping Financial Centers	RVER	RVER Dropping Financial Centers	LYS OLS	OSIN3 OLS	LYS IV using LGDP as instrument
OSIN3	0.984	0.536	0.248	0.339	-0.801	-0.598	0.833		1.750
	(2.98)***	(1.40)	(3.74)***	(3.10)***	(2.02)**	(1.33)	(2.48)**		(2.15)**
LGDP_PC	0.268	0.247	-0.053	-0.052	0.026	0.025	0.322	-0.033	0.351
	(3.61)***	(2.96)***	(1.85)*	(1.81)*	(0.61)	(0.56)	(3.76)***	(1.18)	(3.53)***
OPEN	0.178	0.149	-0.014	-0.014	1.017	1.021	0.062	-0.083	0.137
	(1.85)*	(0.90)	(0.41)	(0.41)	(2.88)***	(2.93)***	(0.47)	(1.41)	(1.33)
SHARE2	58.719	114.118	-35.858	-29.788	-569.562	-543.739	0.036	-0.070	0.106
	(0.46)	(0.37)	(0.66)	(0.54)	(2.36)**	(2.29)**	(0.27)	(0.62)	(0.76)
LGDP							-0.078	-0.085	
							(1.09)	(3.98)***	
Constant	-1.389	-0.782	0.531	0.435	0.104	-0.084	-1.304	1.565	-2.727
	(1.79)*	(0.86)	(1.73)*	(1.35)	(0.17)	(0.13)	(1.68)*	(6.75)***	(1.95)*
Observations	75	69	65	62	65	62	75	80	75
R-squared	0.22	0.19	0.37	0.34	0.62	0.65	0.24	0.41	0.15

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Original Sin and Volatility

	(1)	(2)	(3)	(3)
	VOL_GROWTH	VOL_GROWTH Dropping Financial Centers	VOL_FLOW	VOL_FLOW Dropping Financial Centers
OSIN3	0.011	0.017	7.103	8.108
	(1.96)*	(2.52)**	(3.58)***	(2.67)**
LGDP_PC	-0.012	-0.012	-3.214	-3.378
	(2.14)**	(2.09)**	(2.56)**	(2.42)**
OPEN	-0.001	-0.001	-4.181	-4.380
	(0.12)	(0.09)	(1.20)	(0.82)
VOL_TOT	-0.000	-0.000	0.223	0.222
	(0.86)	(0.89)	(1.08)	(1.01)
SHARE2	-14.287	-14.579	147.265	1,384.972
	(1.72)*	(1.46)	(0.04)	(0.21)
Constant	0.135	0.129	32.825	33.157
	(2.25)**	(2.13)**	(2.39)**	(2.22)**
Observations	77	72	33	28
R-squared	0.40	0.40	0.64	0.61

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Original Sin and credit ratings

	(1)	(2)	(3)	(4)
	RATING1	RATING1	RATING1	RATING1
DE_GDP2	-1.553		-1.815	
	(1.91)*		(2.19)**	
DE_RE2		-0.599		-0.665
		(1.40)		(1.52)
LGDP_PC	3.189	3.051	2.884	2.764
	(8.54)***	(7.59)***	(6.47)***	(5.68)***
OSIN3	-3.429	-3.324	-4.883	-4.435
	(3.85)***	(3.49)***	(3.49)***	(3.11)***
Constant	-12.369	-11.059	-8.751	-7.889
	(3.16)***	(2.60)**	(1.89)*	(1.57)
Observations	56	49	51	44
R-squared	0.82	0.81	0.81	0.80

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Original Sin and economic development

	(1)	(2)
	OSIN3	OSIN3
LGDP_PC	-0.012	-0.007
	(0.74)	(0.42)
SIZE	-0.072	-0.083
	(2.37)**	(2.50)**
FIN_CENTER	-0.767	
	(7.37)***	
EUROLAND	-0.239	-0.236
	(1.94)*	(1.93)*
OTH_DEVELOPED	-0.066	-0.069
	(0.67)	(0.71)
Constant	1.061	1.022
	(9.17)***	(8.73)***
Observations	75	69
R-squared	0.68	0.34

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: Original sin and monetary credibility

	(1)	(2)	(3)	(4)
		Dropping Fin centers	OLS same sample as 4	Instrumental Variables
	OSIN3	OSIN3	OSIN3	OSIN3
AV_INF	0.098	0.100	0.119	-0.132
	(2.09)**	(2.10)**	(1.41)	(1.57)
SIZE	-0.104	-0.113	-0.183	-0.183
	(2.83)***	(2.88)***	(3.36)***	(3.34)***
FIN_CENTER	-0.716		-0.598	-0.595
	(7.42)***		(5.12)***	(5.34)***
EUROLAND	-0.146	-0.136	-0.225	-0.222
	(1.41)	(1.31)	(1.57)	(1.59)
OTH_DEVELOPED	-0.070	-0.062	-0.105	-0.102
	(0.91)	(0.81)	(1.31)	(0.76)
Constant	0.953	0.954	1.055	1.060
	(33.00)***	(32.47)***	(19.12)***	(22.26)***
Observations	74	68	33	33
R-squared	0.66	0.37	0.76	0.76

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 11: Original Sin and Fiscal Sustainability

	(1)	(2)	(3)	(4)	(5)	(6)
	OSIN3	OSIN3	OSIN3	OSIN3	OSIN3 Dropping Financial centers	OSIN3 Instrument is >65
DE_GDP	-0.145					
	(1.85)*					
DE_RE			-0.035			
			(1.18)			
DEFICIT		-0.313				
		(0.49)				
FISC				-0.073	-0.079	-0.061
				(1.62)	(1.77)*	(0.22)
SIZE	-0.117	-0.099	-0.126	-0.123	-0.139	-0.124
	(3.32)***	(2.75)***	(3.20)***	(3.22)***	(3.49)***	(2.17)**
Fin_Cent	-0.745	-0.759	-0.737	-0.742		-0.736
	(7.19)***	(8.70)***	(6.73)***	(6.75)***		(4.12)***
Euroland	-0.152	-0.180	-0.160	-0.154	-0.137	-0.149
	(1.71)*	(1.81)*	(1.62)	(1.63)	(1.49)	(1.21)
Oth_Dev	-0.120	-0.109	-0.121	-0.123	-0.114	-0.117
	(1.80)*	(1.39)	(1.61)	(1.74)*	(1.63)	(0.67)
Constant	1.066	0.996	1.056	0.996	1.000	0.996
	(23.28)***	(26.20)***	(18.41)***	(41.56)***	(39.36)***	(34.99)***
N.Obs	64	74	57	57	52	57
R-squared	0.67	0.66	0.65	0.66	0.43	0.66

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 12: Original Sin and institutions

	(3)	(6)
	OSIN3	OSIN3 Dropping Financial Centers
RULEOFLAW	0.038	0.038
	(0.98)	(0.97)
SIZE	-0.098	-0.107
	(2.77)***	(2.83)***
FIN_CENTER	-0.803	
	(8.81)***	
EUROLAND	-0.219	-0.210
	(2.07)**	(2.00)*
OTH_DEVELOPED	-0.152	-0.145
	(1.73)*	(1.67)
Constant	0.975	0.976
	(47.90)***	(46.69)***
Observations	75	69
R-squared	0.66	0.37

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 13: Original Sin and trade openness

	(1)	(2)
	OSIN3	OSIN3 Dropping Financial Centers
	OSIN3	OSIN3
OPEN	-0.033	-0.028
	(0.98)	(0.85)
SIZE	-0.087	-0.095
	(2.25)**	(2.34)**
FIN_CENTER	-0.780	
	(8.77)***	
EUROLAND	-0.254	-0.244
	(2.24)**	(2.16)**
OTH_DEVELOPED	-0.090	-0.083
	(1.13)	(1.05)
Constant	0.996	0.992
	(35.46)***	(35.40)***
Observations	75	69
R-squared	0.69	0.34

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14: Original Sin and Size of the Financial System

	(1)	(2)	(3)	(4)
	OSIN3	OSIN3	OSIN3	OSIN3 Dropping Financial Centers
DC_GDP	-0.084			
	(0.96)			
FOR_DOM		-0.883		
		(1.17)		
SIZE_FIN			-0.069	-0.298
			(0.33)	(1.05)
SIZE	-0.093	-0.105	-0.095	-0.098
	(2.70)***	(2.75)***	(2.69)***	(2.71)***
FIN_CENTER	-0.700	-0.725	-0.747	
	(6.23)***	(8.09)***	(7.68)***	
EUROLAND	-0.135	-0.170	-0.167	-0.123
	(1.12)	(1.68)*	(1.53)	(1.06)
OTH_DEVELOPED	-0.082	-0.091	-0.096	-0.078
	(1.09)	(1.20)	(1.28)	(1.07)
Constant	1.019	0.990	0.979	0.971
	(25.01)***	(45.71)***	(43.91)***	(38.11)***
R-squared	0.66	0.66	0.66	0.37

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15: The Determinants of Original Sin

	(1)	(2)	(3)	(4)	(5)
	OSIN3	OSIN3_NOI	OSIN3	OSIN3 Dropping Financial centers	
LGDP_PC	-0.022	0.011	-0.056	-0.009	-0.045
	(0.47)	(0.23)	(1.04)	(0.17)	(0.93)
FISC	-0.071	-0.097	-0.095	-0.062	-0.069
	(1.33)	(1.89)*	(1.52)	(1.04)	(1.21)
SIZE	-0.146	-0.157	-0.241	-0.147	-0.148
	(3.10)***	(3.21)***	(3.86)***	(2.93)***	(2.90)***
SIZE_FIN	0.062	0.020	0.270	-0.106	-0.158
	(0.25)	(0.09)	(0.53)	(0.23)	(0.41)
RULEOFLAW	0.086	0.004	0.035	0.075	0.052
	(0.98)	(0.06)	(0.38)	(0.85)	(0.60)
INF	0.040	0.013	0.054	0.037	0.043
	(1.59)	(0.70)	(1.58)	(1.45)	(1.52)
OPEN	-0.136	-0.111	-0.155	-0.095	-0.031
	(1.39)	(1.22)	(1.10)	(0.78)	(0.26)
FIN_CENTER	-0.746	-0.687			
	(7.11)***	(7.11)***			
EUROLAND	-0.168	-0.152		-0.148	
	(1.69)*	(1.60)		(1.35)	
OTH_DEVELOPED	-0.163	-0.173		-0.159	
	(1.68)*	(1.81)*		(1.65)	
Constant	1.240	1.018	1.550	1.104	1.337
	(3.50)***	(2.85)***	(3.33)***	(2.73)***	(3.40)***
R-squared	0.68	0.73	0.48	0.45	0.43

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 16: Original Sin and Country Size

	(1)	(2)	(3)	(4)	(5)	(6)
	OSIN3	OSIN3	OSIN3	OSIN3	OSIN3	OSIN3 Dropping financial centers
LGDP		-0.034 (2.55)**				
LCREDIT				-0.034 (2.73)***		
LTRADE			-0.041 (2.68)***			
SIZE					-0.099 (2.76)***	-0.107 (2.81)***
Fin_Cent	-0.915 (12.02) ***	-0.784 (9.86)***	-0.781 (10.24)***	-0.742 (8.20)***	-0.752 (8.62)***	
Euroland	-0.319 (5.26) ***	-0.186 (2.10)**	-0.177 (1.98)*	-0.165 (1.61)	-0.176 (1.78)*	-0.167 (1.69)*
Oth_Dev	-0.182 (2.57) ***	-0.138 (1.92)*	-0.135 (1.88)*	-0.093 (1.23)	-0.097 (1.31)	-0.091 (1.23)
Constant	0.959 (43.92) ***	1.079 (23.95)***	1.181 (15.24)***	1.041 (35.06)***	0.982 (50.93)***	0.983 (49.57)***
N. Obs.	90	80	88	75	75	69
R-squared	0.64	0.64	0.65	0.65	0.66	0.37

Table 17: Proportion of debt issued by foreigners and measures of original sin (Average 1999-2001)

Country	% Foreign	SIN33
Czech Republic	100.0%	0.0%
South Africa	97.6%	9.5%
New Zealand	82.0%	4.5%
Poland	81.7%	0.0%
Hong Kong, China	59.7%	29.4%
Denmark	57.1%	71.1%
Canada	51.2%	75.5%
Singapore	35.4%	69.5%
Australia	31.5%	69.8%
Taiwan	0.0%	54.0%

Note: Table includes all non-major currency countries with measures of Sin3 less than or equal to 0.8.

Table 18: Main Characteristics of bonds in exotic currencies

	Total Debt (Bil USD)	Share of Instruments with fixed interest rate	TOP 3 ISSUERS			TYPE OF ISSUER		
						GOV.	FIN. INST.	PRIVATE CORP.
Czech Republic			Int. Org	Germany	USA			
1992-1998	0.93	100.0%	40.0%	21.0%	10.0%	8.0%	52.0%	0.0%
			Germany	Int. Org	Nether.			
1999-2001	1.11	80.0%	24.0%	22.0%	15.0%	3.0%	71.0%	4.0%
Estonia			Int. Org	Finland				
1999-2001	0.30	100.0%	99.0%	1.0%		0.0%	1.0%	0.0%
Hong Kong			Hong Kong	Int. Org	Australia			
1992-1998	21.41	64.3%	40.0%	38.0%	8.0%	3.0%	43.0%	16.0%
			Int. Org	Hong Kong	Australia			
1999-2001	43.93	82.0%	29.0%	27.0%	17.0%	8.0%	59.0%	4.0%
Poland			Int. Org	Poland	USA			
1992-1998	0.54	56.0%	43.0%	28.0%	12.0%	12.0%	14.0%	31.0%
			Int. Org	Germany	Ireland			
1999-2001	1.79	92.0%	34.0%	26.0%	7.0%	1.0%	63.0%	2.0%
Portugal			Int. Org	UK	USA			
1992-1998	10.00	39.0%	40.0%	12.0%	11.0%	9.0%	43.0%	8.0%
Singapore			Singapore	Hong Kong	UK			
1992-1998	2.30	15.0%	52.0%	45.0%	3.0%	0.0%	45.0%	55.0%
			USA	Singapore	Int. Org.			
1999-2001	12.74	99.8%	26.0%	15.0%	11.0%	20.0%	61.0%	8.0%
Slovak Republic			Int. Org	Germany	Nether.			
1992-1998	0.46	100.0%	65.0%	20.0%	15.0%	0.0%	35.0%	0.0%
			Int. Org	Germany	Austria			
1999-2001	2.58	76.0%	44.0%	20.0%	12.0%	0.0%	44.0%	0.0%
South Africa			Int. Org	Germany	Nether.			
1992-1998	2.99	97.0%	56.0%	18.0%	11.0%	7.0%	29.0%	8.0%
			Int. Org	Germany	S. Africa			
1999-2001	6.17	99.0%	48.0%	13.0%	13.0%	3.0%	33.0%	16.0%
Spain			Int. Org	Spain	Germany			
1992-1998	36.48	87.0%	59.0%	9.0%	7.0%	11.0%	27.0%	3.0%
Taiwan			Int. Org	Taiwan				
1992-1998	3.04	0.0%	0.0%	100.0%		0.0%	0.0%	100.0%
1999-2001	7.06	94.0%	98.0%	2.0%		0.0%	0.0%	2.0%
Thailand			Hong Kong	Thailand	S. Korea			
1992-1998	7.87	77.5%	34.0%	29.0%	14.0%	5.0%	55.0%	39.0%
			Thailand	USA	Australia			
1999-2001	12.15	5.0%	95.0%	4.0%	0.8%	0.0%	85.0%	15.0%
Trinidad & Tobago			Int. Org					
1992-1998	0.40	100.0%	100.0%			0.0%	0.0%	0.0%
1999-2001	1.06	100.0%	100.0%			0.0%	0.0%	0.0%

Source: Own calculations based on data from the Bank for International Settlements.

Figure 2: Exchange rates vis a vis the dollar: the EM indexes, the yen and the mark

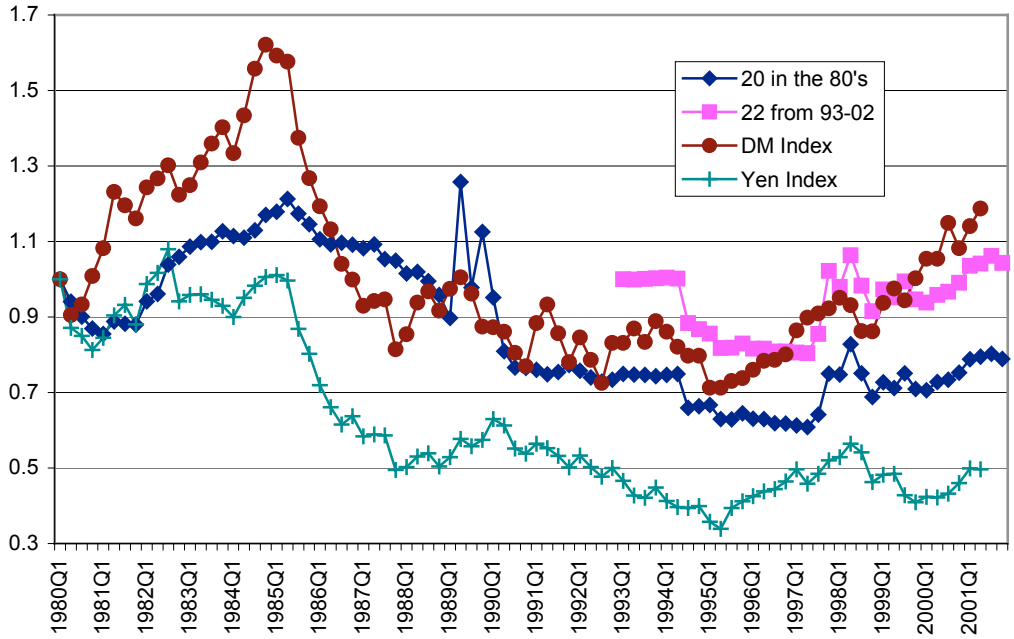

Table 19: Exchange rate changes vis a vis the US dollar

		1981-2001	1981-1993	1993-2001
EM 80	Mean	1.6	2.5	0.2
	St. Deviation	12.4	13.5	10.1
EM 93	Mean			0.5
	St. Deviation			10.6
Deutsche M	Mean	0.1	2.0	-3.3
	St. Deviation	13.8	15.5	9.8
Yen	Mean	4.1	6.4	0.0
	St. Deviation	14.4	14.6	13.5

Table 20: EM Indexes: Average return, standard deviation and correlation with real private consumption.

	EM Index 80 (1980-2001)			**EM Index 93** (1993-2001)		
	Avg. Return	St Dev	Consumption Correlation [1]	Avg. Return	St Dev	Consumption Correlation [1]
Canada	1.56	10.9	-14.5	1.49	10.5	-33.4
France	2.58	13.6	-25.9	2.92	10.2	-36.4
Germany	0.73	14.3	12.5	3.14	10.5	-14.5
Italy	4.22	14.0	-27.5	3.36	11.1	15.8
Spain	4.50	12.9	-62.0	4.30	10.5	-65.4
Japan	-3.12	13.9	4.3	0.13	11.8	34.3
United Kingdom	2.45	12.2	-35.3	-0.24	11.8	-21.4
United States	0.27	11.3	-23.4	-0.71	11.6	-25.5

[1] Note: Correlations with Real Consumption: for France, Germany, Italy and Spain it covers 1980-1998.
For Canada, UK, US and Japan it covers 1980-01. A negative number indicates that the returns tend to be high when real private consumption is low.

Appendix

Table A1: Measures of original sin by country

Country	OSIN1 1993-1998	OSIN1 1999-2001	OSIN2 1993-1998	OSIN2 1999-2001	OSIN3 1993-1998	OSIN3 1999-2001
Algeria	1.00		1.00		1.00	
Argentina	0.98	0.97	0.98	0.97	0.98	0.97
Aruba	1.00		1.00		1.00	
Australia	0.69	0.82	0.63	0.70	0.55	0.70
Austria	0.95	0.70	0.90	0.69	0.90	0.69
Bahamas, The	1.00	1.00	1.00	1.00	1.00	1.00
Bahrain	1.00	1.00	1.00	1.00	1.00	1.00
Barbados	1.00	1.00	1.00	1.00	1.00	1.00
Belgium	0.88	0.46	0.79	0.56	0.79	0.39
Bolivia	1.00		1.00		1.00	
Brazil	1.00	1.00	1.00	1.00	1.00	1.00
Bulgaria	1.00	1.00	1.00	1.00	1.00	1.00
Canada	0.78	0.85	0.76	0.83	0.55	0.76
Chile	1.00	1.00	1.00	0.98	1.00	0.98
China	1.00	1.00	1.00	1.00	1.00	1.00
Colombia	1.00	1.00	1.00	1.00	1.00	1.00
Costa Rica	1.00	1.00	1.00	1.00	1.00	1.00
Cyprus	0.95	0.96	0.95	0.96	0.95	0.96
Czech Republic	1.00	1.00	0.88	0.84	0.00	0.00
Denmark	0.92	0.95	0.80	0.74	0.80	0.71
Dominican Republic	1.00	1.00	1.00	1.00	1.00	1.00
Ecuador	1.00	1.00	1.00	1.00	1.00	1.00
Egypt, Arab Rep.		1.00		0.94		0.94
El Salvador	1.00	1.00	1.00	1.00	1.00	1.00
Estonia	1.00	1.00	1.00	0.95	1.00	0.83
Finland	0.98	0.65	0.96	0.62	0.96	0.62
France	0.59	0.35	0.52	0.42	0.23	0.12
Germany	0.69	0.37	0.67	0.48	0.00	0.00
Ghana	1.00	1.00	1.00	1.00	1.00	1.00
Greece	0.99	0.78	0.93	0.60	0.93	0.60
Guatemala	1.00	1.00	1.00	1.00	1.00	1.00
Hong Kong, China	0.89	0.81	0.89	0.82	0.72	0.29
Hungary	1.00	1.00	1.00	0.98	1.00	0.98
Iceland	1.00	1.00	1.00	0.99	0.99	0.99
India	1.00	1.00	1.00	1.00	1.00	1.00
Indonesia	0.98	0.99	0.94	0.98	0.94	0.98
Ireland	0.98	0.60	0.94	0.59	0.94	0.59
Israel	1.00	1.00	1.00	1.00	1.00	1.00
Italy	0.86	0.37	0.65	0.51	0.00	0.00
Jamaica	1.00	1.00	1.00	1.00	1.00	1.00
Japan	0.64	0.53	0.25	0.35	0.00	0.00
Jordan	1.00	1.00	1.00	1.00	1.00	1.00
Kazakhstan	1.00	1.00	1.00	1.00	1.00	1.00
Kenya	1.00		1.00		1.00	

Korea, Rep.	1.00	1.00	1.00	1.00	1.00	1.00
Latvia	1.00	1.00	1.00	0.96	1.00	0.96
Lebanon	1.00	1.00	1.00	1.00	1.00	1.00
Lithuania	1.00	1.00	1.00	1.00	1.00	1.00
Luxembourg	0.66	0.44	0.58	0.47	0.00	0.25
Malaysia	1.00	1.00	0.99	1.00	0.99	1.00
Malta	1.00	1.00	1.00	1.00	1.00	1.00
Mauritius	1.00	1.00	1.00	1.00	1.00	1.00
Mexico	1.00	1.00	1.00	1.00	1.00	1.00
Moldova	1.00	1.00	1.00	1.00	1.00	1.00
Morocco	1.00	1.00	1.00	1.00	1.00	1.00
Netherlands	0.76	0.51	0.64	0.48	0.64	0.47
Netherlands Antilles	1.00	1.00	1.00	1.00	1.00	1.00
New Zealand	0.93	0.98	0.62	0.56	0.62	0.05
Nicaragua	1.00	1.00	1.00	1.00	1.00	1.00
Norway	0.99	0.99	0.98	0.89	0.98	0.89
Oman	1.00	1.00	1.00	1.00	1.00	1.00
Pakistan	1.00	1.00	1.00	1.00	1.00	1.00
Panama	1.00	1.00	1.00	1.00	1.00	1.00
Papua New Guinea	1.00	1.00	1.00	1.00	1.00	1.00
Peru	1.00	1.00	1.00	1.00	1.00	1.00
Philippines	0.99	1.00	0.98	0.99	0.98	0.99
Poland	0.97	0.99	0.95	0.89	0.82	0.00
Portugal	0.97	0.44	0.42	0.59	0.42	0.24
Qatar	1.00	1.00	1.00	1.00	1.00	1.00
Romania	1.00	1.00	1.00	1.00	1.00	1.00
Russian Federation	1.00	1.00	1.00	0.98	1.00	0.98
Singapore	0.97	0.94	0.96	0.78	0.96	0.70
Slovak Republic	1.00	1.00	0.96	0.97	0.87	0.85
Slovenia	1.00	1.00	1.00	1.00	1.00	1.00
South Africa	0.99	0.88	0.91	0.76	0.44	0.09
Spain	0.96	0.52	0.59	0.61	0.59	0.42
Sri Lanka	1.00	1.00	1.00	1.00	1.00	1.00
Suriname	1.00	1.00	1.00	1.00	1.00	1.00
Sweden	0.98	0.98	0.95	0.91	0.95	0.91
Switzerland	0.84	0.80	0.29	0.25	0.00	0.00
Taiwan	1.00	0.99	1.00	0.62	1.00	0.54
Thailand	0.99	0.88	0.98	0.87	0.98	0.87
Trinidad and Tobago	1.00	1.00	0.99	1.00	0.66	1.00
Tunisia	1.00	1.00	1.00	1.00	1.00	1.00
Turkey	1.00	1.00	1.00	1.00	1.00	1.00
Ukraine	1.00	1.00	1.00	1.00	1.00	1.00
United Kingdom	0.56	0.64	0.26	0.31	0.26	0.31
United States	0.30	0.17	0.65	0.44	0.00	0.00
Uruguay	1.00	1.00	1.00	1.00	1.00	1.00
Venezuela	1.00	1.00	1.00	1.00	1.00	1.00
Zimbabwe	1.00		1.00		1.00	

Table A2: Original Sin and Exchanger Rate Flexibility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	LYS	LYS	LYS	LYS	RESM2	RESM2	RESM2	RESM2	RVER	RVER	RVER	RVER
OSIN2	0.727		0.571		0.415		0.733		-1.820		-1.229	
	(1.19)		(0.75)		(3.54)***		(4.26)***		(3.04)***		(1.87)*	
OSIN3		0.984		0.536		0.248		0.339		-0.801		-0.598
		(2.98)***		(1.40)		(3.74)***		(3.10)***		(2.02)**		(1.33)
LGDP_PC	0.111	0.268	0.081	0.247	-0.002	-0.053	0.005	-0.052	-0.093	0.026	-0.078	0.025
	(1.25)	(3.61)***	(0.88)	(2.96)***	(0.13)	(1.85)*	(0.27)	(1.81)*	(1.62)	(0.61)	(1.33)	(0.56)
OPEN	0.098	0.178	0.053	0.149	0.049	-0.014	0.048	-0.014	0.743	1.017	0.751	1.021
	(1.08)	(1.85)*	(0.58)	(0.90)	(1.15)	(0.41)	(1.13)	(0.41)	(1.98)*	(2.88)***	(1.99)*	(2.93)***
SHARE2	183.018	58.719	251.711	114.118	0.097	-35.858	-2.878	-29.788	-304.598	-569.562	-310.141	-543.739
	(2.01)**	(0.46)	(2.73)***	(0.37)	(0.00)	(0.66)	(0.08)	(0.54)	(1.82)*	(2.36)**	(1.89)*	(2.29)**
Constant	0.154	-1.389	1.673	-0.782	-0.132	0.531	-0.503	0.435	2.215	0.104	1.513	-0.084
	(0.13)	(1.79)*	(1.27)	(0.86)	(0.54)	(1.73)*	(1.70)*	(1.35)	(2.64)**	(0.17)	(1.71)*	(0.13)
Observations	75	75	69	69	65	65	62	62	65	65	62	62
R-squared	0.15	0.22	0.20	0.19	0.18	0.37	0.14	0.34	0.52	0.62	0.51	0.65

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A3: Original Sin and Volatility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	VOL_GROWTH	VOL_GROWTH	VOL_GROWTH	VOL_GROWTH	VOL_FLOW	VOL_FLOW	VOL_FLOW	VOL_FLOW
OSIN2	0.016		0.026		11.194		12.884	
	(1.65)		(2.11)**		(3.25)***		(2.76)**	
OSIN3		0.011		0.017		7.103		8.108
		(1.96)*		(2.52)**		(3.58)***		(2.67)**
LGDP_PC	-0.006	-0.012	-0.006	-0.012	-3.191	-3.214	-3.217	-3.378
	(2.02)**	(2.14)**	(1.83)*	(2.09)**	(2.69)**	(2.56)**	(2.30)**	(2.42)**
OPEN	0.005	-0.001	0.005	-0.001	-6.320	-4.181	-7.034	-4.380
	(1.15)	(0.12)	(1.14)	(0.09)	(2.00)*	(1.20)	(1.56)	(0.82)
VOL_TOT	-0.000	-0.000	-0.000	-0.000	0.393	0.223	0.382	0.222
	(0.39)	(0.86)	(0.46)	(0.89)	(2.32)**	(1.08)	(2.17)**	(1.01)
SHARE2	-2.723	-14.287	-2.879	-14.579	5,073.566	147.265	5,559.313	1,384.972
	(1.14)	(1.72)*	(1.11)	(1.46)	(2.32)**	(0.04)	(1.65)	(0.21)
Constant	0.070	0.135	0.058	0.129	26.478	32.825	25.605	33.157
	(1.88)*	(2.25)**	(1.44)	(2.13)**	(1.97)*	(2.39)**	(1.54)	(2.22)**
Observations	77	77	72	72	33	33	28	28
R-squared	0.21	0.40	0.19	0.40	0.65	0.64	0.60	0.61

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A4: Original Sin and Credit Rating

	(1)	(2)	(3)	(4)	(5)	(6)
	RATING1	RATING1	RATING1	RATING1	RATING1	RATING1
DE_GDP2	-1.609		-1.553		17.592	
	(1.65)		(1.91)*		(2.90)***	
DE_RE2		-0.242		-0.599		-0.795
		(0.83)		(1.40)		(1.78)*
LGDP_PC	2.759	2.680	3.189	3.051	2.406	3.087
	(8.44)***	(7.59)***	(8.54)***	(7.59)***	(6.91)***	(7.46)***
OSIN2	-6.024	-5.404			1.058	
	(3.28)***	(3.21)***			(0.46)	
de_gdp_SIN2					-21.000	
					(3.10)***	
OSIN3			-3.429	-3.324		-3.890
			(3.85)***	(3.49)***		(3.35)***
de_gdp_SIN3						0.217
						(1.22)
SHARE2	579.354	545.169	-0.000	-0.000	1,098.835	-0.001
	(1.26)	(1.11)	(0.30)	(0.36)	(3.17)***	(0.60)
Constant	-6.154	-6.154	-12.369	-11.059	-9.782	-10.808
	(1.50)	(1.44)	(3.16)***	(2.60)**	(2.54)**	(2.51)**
Observations	56	49	56	49	56	49
R-squared	0.82	0.83	0.82	0.81	0.84	0.81

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A5: Original Sin and Credit Rating (dropping financial centers)

	(1)	(2)	(3)	(4)	(5)	(6)
	RATING1	RATING1	RATING1	RATING1	RATING1	RATING1
DE_GDP2	-2.738		-1.815		8.874	
	(2.93)***		(2.19)**		(1.61)	
DE_RE2		-0.579		-0.665		-0.833
		(1.87)*		(1.52)		(0.82)
LGDP_PC	2.314	2.145	2.884	2.764	2.218	2.772
	(6.52)***	(5.47)***	(6.47)***	(5.68)***	(5.94)***	(5.61)***
OSIN2	-13.869	-11.210			-7.167	
	(4.26)***	(4.47)***			(2.08)**	
de_gdp_SIN2					-12.354	
					(1.98)*	
OSIN3			-4.883	-4.435		-4.708
			(3.49)***	(3.11)***		(2.10)**
de_gdp_SIN32						0.183
						(0.16)
SHARE2	1,563.282	1,694.433	0.003	0.003	1,638.649	0.003
	(4.36)***	(3.98)***	(1.20)	(1.02)	(4.43)***	(0.99)
Constant	5.297	4.075	-8.751	-7.889	-0.281	-7.703
	(0.95)	(0.76)	(1.89)*	(1.57)	(0.06)	(1.46)
Observations	51	44	51	44	51	44
R-squared	0.81	0.82	0.81	0.80	0.82	0.80

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A6: Ratings all countries (double censored TOBIT estimations)

	(1)	(2)	(3)	(4)	(5)	(6)
	RATING1	RATING1	RATING1	RATING1	RATING1	RATING1
DE_GDP2	-2.354		-2.225		4.153	-2.287
	(2.47)**		(2.30)**		(0.52)	(0.72)
DE_RE2		-0.490		-0.894		
		(1.43)		(2.22)**		
LGDP_PC	2.805	2.754	3.172	3.039	2.753	3.172
	(8.77)***	(7.52)***	(10.62)***	(8.28)***	(8.56)***	(10.54)***
OSIN2	-12.824	-10.857			-9.394	
	(3.71)***	(3.41)***			(1.80)*	
de_gdp_SIN2					-6.951	
					(0.82)	
OSIN3			-5.610	-5.349		-5.650
			(3.94)***	(3.83)***		(2.37)**
de_gdp_SIN3						0.072
						(0.02)
Constant	0.641	-0.977	-9.916	-8.773	-2.164	-9.887
	(0.12)	(0.17)	(2.76)***	(2.04)**	(0.35)	(2.57)**
Observations	56	49	56	49	56	56

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A7: Ratings dropping financial centers (double censored TOBIT estimations)

	(1)	(2)	(3)	(4)	(5)	(6)
	RATING1	RATING1	RATING1	RATING1	RATING1	RATING1
DE_GDP2	-2.271		-2.024		7.517	-0.548
	(2.36)**		(2.05)**		(0.84)	(0.16)
DE_RE2		-0.488		-0.843		
		(1.41)		(2.07)**		
LGDP_PC	2.811	2.757	3.202	3.071	2.746	3.188
	(8.71)***	(7.40)***	(10.64)***	(8.32)***	(8.47)***	(10.55)***
OSIN2	-11.000	-8.686			-5.266	
	(2.86)***	(2.36)**			(0.82)	
De_gdp_SIN2					-10.391	
					(1.10)	
OSIN3			-4.507	-4.143		-3.472
			(2.72)***	(2.55)**		(1.21)
De_gdp_SIN3						-1.676
						(0.44)
Constant	-1.244	-3.129	-11.307	-10.245	-6.147	-12.122
	(0.22)	(0.51)	(3.01)***	(2.31)**	(0.85)	(2.90)***
Observations	51	44	51	44	51	51

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A8:Robustness Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Including Developing Dummy				Regressions without weights			
	VOL_GROWTH	VOL_GROWTH	VOL_FLOW	VOL_FLOW	VOL_GROWTH	VOL_GROWTH	VOL_FLOW	VOL_FLOW
LGDP_PC	-0.016	-0.016	-2.806	-3.157	-0.007	-0.007	-3.148	-3.301
	(1.74)*	(1.78)*	(1.72)*	(1.70)	(2.53)**	(2.54)**	(2.72)**	(2.66)**
OSIN3	0.011	0.019	6.909	8.183	0.011	0.015	6.609	8.202
	(2.05)**	(2.58)**	(3.53)***	(2.76)**	(2.31)**	(2.51)**	(2.68)**	(2.31)**
OPEN	-0.003	-0.003	-3.867	-3.475	0.003	0.003	-0.471	-0.179
	(0.53)	(0.49)	(1.23)	(0.97)	(0.91)	(0.98)	(0.32)	(0.12)
VOL_TOT	-0.000	-0.000	0.219	0.215	-0.000	-0.000	0.356	0.350
	(0.70)	(0.74)	(1.12)	(1.05)	(0.44)	(0.50)	(2.06)**	(1.95)*
DEVELOPING	-0.007	-0.009	1.079	0.321				
	(0.49)	(0.62)	(0.30)	(0.08)				
Constant	0.171	0.170	28.669	30.994	0.080	0.077	29.743	29.568
	(1.79)*	(1.79)*	(1.60)	(1.57)	(2.69)***	(2.60)**	(2.34)**	(2.17)**
Observations	77	72	33	28	77	72	33	28
R-squared	0.39	0.39	0.64	0.61	0.21	0.19	0.65	0.60

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A9: Original Sin and economic Development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
							Dropping Financial Centers		
	OSIN1	OSIN2	OSIN3	OSIN1	OSIN2	OSIN3	OSIN1	OSIN2	OSIN3
LGDP_PC	0.016	0.004	-0.012	-0.001	-0.002	-0.003	0.013	0.005	-0.007
	(1.46)	(0.60)	(0.74)	(0.13)	(0.27)	(0.15)	(1.17)	(0.80)	(0.42)
SIZE	-0.059	-0.032	-0.072				-0.053	-0.036	-0.083
	(3.25)***	(2.08)**	(2.37)**				(2.85)***	(2.68)***	(2.50)**
Fin_Cent	-0.359	-0.499	-0.767	-0.418	-0.532	-0.915			
	(5.15)***	(6.28)***	(7.37)***	(5.45)***	(6.54)***	(12.65)***			
Euroland	-0.082	-0.250	-0.239	-0.103	-0.250	-0.260	-0.080	-0.248	-0.236
	(2.10)**	(3.49)***	(1.94)**	(2.62)**	(3.82)***	(2.54)**	(2.09)**	(3.47)***	(1.93)*
Oth_Dev	-0.103	-0.122	-0.066	-0.106	-0.164	-0.190	-0.099	-0.121	-0.069
	(1.88)*	(2.13)**	(0.67)	(1.93)*	(2.66)***	(1.99)*	(1.80)*	(2.16)**	(0.71)
Constant	0.877	0.961	1.061	1.005	1.003	0.989	0.905	0.954	1.022
	(9.83)***	(17.51)***	(9.17)***	(17.38)***	(18.51)***	(7.12)***	(10.60)***	(18.71)***	(8.73)***
N. Obs.	75	75	75	80	80	80	69	69	69
R-squared	0.66	0.77	0.68	0.59	0.73	0.61	0.42	0.63	0.34

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A10: Original Sin and Monetary Credibility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dropping Financial centers			OLS same sample as 8	Instrumental Variables
	OSIN1	OSIN2	OSIN3	OSIN1	OSIN2	OSIN3	OSIN3	OSIN3
AV_INF	0.028	0.018	0.098	0.027	0.019	0.100	0.119	-0.132
	(1.89)*	(1.72)*	(2.09)**	(1.86)*	(1.68)*	(2.10)**	(1.41)	(1.57)
SIZE	-0.056	-0.032	-0.104	-0.051	-0.035	-0.113	-0.183	-0.183
	(3.02)***	(2.05)**	(2.83)***	(2.70)***	(2.56)**	(2.88)***	(3.36)***	(3.34)***
FIN_CENTER	-0.316	-0.484	-0.716				-0.598	-0.595
	(4.71)***	(6.38)***	(7.42)***				(5.12)***	(5.34)***
EUROLAND	-0.044	-0.238	-0.146	-0.050	-0.234	-0.136	-0.225	-0.222
	(1.14)	(3.39)***	(1.41)	(1.30)	(3.34)***	(1.31)	(1.57)	(1.59)
OTH_DEVELOPED	-0.061	-0.108	-0.070	-0.066	-0.105	-0.062	-0.105	-0.102
	(1.35)	(1.99)*	(0.91)	(1.44)	(1.98)*	(0.81)	(1.31)	(0.76)
Constant	0.998	0.989	0.953	0.997	0.990	0.954	1.055	1.060
	(111.52)***	(207.24)***	(33.00)***	(123.41)***	(208.19)***	(32.47)***	(19.12)***	(22.26)***
Observations	74	74	74	68	68	68	33	33
R-squared	0.66	0.77	0.66	0.42	0.63	0.37	0.76	0.76

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A11: Original Sin and Fiscal Sustainability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OSIN1	OSIN1	OSIN1	OSIN2	OSIN2	OSIN2	OSIN3	OSIN3	OSIN3
DE_GDP2	-0.057			-0.014			-0.145		
	(2.15)**			(0.44)			(1.85)*		
DE_RE2			-0.018			-0.000			-0.035
			(1.65)			(0.01)			(1.18)
SIZE	-0.060	-0.055	-0.064	-0.037	-0.031	-0.043	-0.117	-0.099	-0.126
	(3.12)***	(3.02)***	(3.05)***	(2.34)**	(2.04)**	(2.33)**	(3.32)***	(2.75)***	(3.20)***
Fin_Cent	-0.344	-0.330	-0.345	-0.448	-0.492	-0.437	-0.745	-0.759	-0.737
	(4.58)***	(4.98)***	(4.56)***	(5.38)***	(6.52)***	(5.22)***	(7.19)***	(8.70)***	(6.73)***
Euroland	-0.057	-0.054	-0.064	-0.198	-0.243	-0.192	-0.152	-0.180	-0.160
	(1.46)	(1.43)	(1.60)	(3.42)***	(3.49)***	(3.36)***	(1.71)*	(1.81)*	(1.62)
Oth_Dev	-0.078	-0.075	-0.084	-0.112	-0.117	-0.105	-0.120	-0.109	-0.121
	(1.88)*	(1.57)	(1.96)*	(2.16)**	(2.17)**	(1.98)*	(1.80)*	(1.39)	(1.61)
DEFICIT		-0.166			-0.140			-0.313	
		(0.59)			(0.75)			(0.49)	
Constant	1.037	1.014	1.042	1.004	1.000	0.998	1.066	0.996	1.056
	(68.41)***	(73.87)***	(52.81)***	(60.19)***	(124.78)**	(62.84)***	(23.28)***	(26.20)***	(18.41)***
N.Obs	64	74	57	64	74	57	64	74	57
R-squared	0.66	0.66	0.65	0.75	0.77	0.75	0.67	0.66	0.65
		Dropping Financial Centers		Dropping Financial Centers		Dropping Financial Centers	Instrumental Variables Estimates		
							Instrument is PROP	Instrument is OLD	
	OSIN1	OSIN1	OSIN2	OSIN2	OSIN3	OSIN3	OSIN3	OSIN3	
FISC	-0.030	-0.027	-0.007	-0.012	-0.073	-0.079	-1.051	-0.061	
	(1.90)*	(1.70)*	(0.39)	(0.72)	(1.62)	(1.77)*	(0.67)	(0.22)	
SIZE	-0.063	-0.058	-0.042	-0.056	-0.123	-0.139	0.148	-0.124	
	(3.04)***	(2.72)***	(2.29)**	(3.34)***	(3.22)***	(3.49)***	(0.35)	(2.17)**	
Fin_Cent	-0.343		-0.441	0.000	-0.742		-1.360	-0.736	
	(4.53)***		(5.24)***	(.)	(6.75)***		(1.43)	(4.12)***	
Euroland	-0.058	-0.063	-0.193	-0.177	-0.154	-0.137	-0.556	-0.149	
	(1.46)	(1.62)	(3.33)***	(3.18)***	(1.63)	(1.49)	(0.80)	(1.21)	
Oth_Dev	-0.081	-0.084	-0.109	-0.102	-0.123	-0.114	-0.712	-0.117	
	(1.93)*	(1.98)*	(2.10)**	(2.09)**	(1.74)*	(1.63)	(0.78)	(0.67)	
Constant	1.012	1.011	0.998	1.002	0.996	1.000	0.841	0.996	
	(89.35)***	(96.07)***	(153.94)**	(147.75)**	(41.56)***	(39.36)***	(2.92)***	(34.99)***	
N. Obs.	57	52	57	52	57	52	50	57	
R-squared	0.66	0.44	0.75	0.63	0.66	0.43	0.01	0.66	

Robust t statistics in parentheses

*** significant at 10%; ** significant at 5%; *** significant at 1%**

Table A12: Original Sin and Institutions

	(1)	(2)	(3)	(4)	(5)	(6)
	OSIN1	OSIN2	OSIN3	OSIN1	OSIN2	OSIN3
RULEOFLAW	0.008	-0.001	0.038	0.003	0.005	0.038
	(0.51)	(0.12)	(0.98)	(0.21)	(0.45)	(0.97)
SIZE	-0.054	-0.031	-0.098	-0.049	-0.035	-0.107
	(3.01)***	(2.02)**	(2.77)***	(2.68)***	(2.57)**	(2.83)***
FIN_CENTER	-0.337	-0.487	-0.803			
	(4.77)***	(6.28)***	(8.81)***			
EUROLAND	-0.061	-0.241	-0.219	-0.062	-0.243	-0.210
	(1.48)	(3.52)***	(2.07)**	(1.50)	(3.55)***	(2.00)*
OTH_DEVELOPED	-0.080	-0.110	-0.152	-0.078	-0.117	-0.145
	(1.62)	(1.97)*	(1.73)*	(1.57)	(2.11)**	(1.67)
Constant	1.004	0.995	0.975	1.004	0.994	0.976
	(124.49)***	(257.96)***	(47.90)***	(135.06)***	(252.25)***	(46.69)***
Observations	75	75	75	69	69	69
R-squared	0.66	0.77	0.66	0.42	0.63	0.37

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A13: Original Sin and trade openness

	(1)	(2)	(3)	(4)	(5)	(6)
				Dropping Financial centers		
	OSIN1	OSIN2	OSIN3	OSIN1	OSIN2	OSIN3
OPEN	-0.030	-0.008	-0.033	-0.031	-0.013	0.038
	(1.76)*	(0.68)	(0.98)	(1.90)*	(1.26)	(0.97)
SIZE	-0.067	-0.034	-0.087	-0.061	-0.039	-0.107
	(3.17)***	(2.06)**	(2.25)**	(2.93)***	(2.53)**	(2.83)***
FIN_CENTER	-0.313	-0.486	-0.780			
	(4.61)***	(6.29)***	(8.77)***			
EUROLAND	-0.045	-0.241	-0.254	-0.052	-0.236	-0.210
	(1.27)	(3.42)***	(2.24)**	(1.47)	(3.39)***	(2.00)*
OTH_DEVELOPED	-0.065	-0.112	-0.090	-0.070	-0.109	-0.145
	(1.42)	(2.07)**	(1.13)	(1.53)	(2.06)**	(1.67)
Constant	1.033	1.002	0.996	1.033	1.007	0.976
	(52.08)***	(89.83)***	(35.46)***	(54.57)***	(94.59)***	(46.69)***
Observations	75	75	75	69	69	69
R-squared	0.66	0.77	0.69	0.44	0.63	0.37

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A14: Original Sin and Size of the Financial System

	(1)	(2)	(3)	(4)	(5)	(6)
	OSIN1	OSIN1	OSIN2	OSIN2	OSIN3	OSIN3
DC_GDP	0.005		-0.071		-0.084	
	(0.11)		(1.78)*		(0.96)	
FOR_DOM		-0.139		0.206		-0.883
		(0.26)		(0.68)		(1.17)
SIZE	-0.055	-0.056	-0.029	-0.029	-0.093	-0.105
	(2.92)***	(2.88)***	(1.90)*	(1.90)*	(2.70)***	(2.75)***
FIN_CENTER	-0.330	-0.322	-0.439	-0.497	-0.700	-0.725
	(3.97)***	(4.04)***	(5.68)***	(6.11)***	(6.23)***	(8.09)***
EUROLAND	-0.055	-0.051	-0.205	-0.245	-0.135	-0.170
	(1.18)	(1.36)	(2.67)***	(3.50)***	(1.12)	(1.68)*
OTH_DEVELOPED	-0.070	-0.068	-0.101	-0.114	-0.082	-0.091
	(1.58)	(1.46)	(1.93)*	(2.10)**	(1.09)	(1.20)
Constant	1.003	1.007	1.028	0.992	1.019	0.990
	(42.97)***	(104.28)***	(54.66)***	(188.24)***	(25.01)***	(45.71)***
Observations	74	73	74	73	74	73
R-squared	0.66	0.65	0.77	0.76	0.66	0.66
		Dropping Financial Centers		Dropping Financial Centers		Dropping Financial Centers
	OSIN1	OSIN1	OSIN2	OSIN2	OSIN3	OSIN3
SIZE_FIN	0.021	-0.136	-0.102	-0.019	-0.069	-0.298
	(0.24)	(1.27)	(1.54)	(0.43)	(0.33)	(1.05)
SIZE	-0.056	-0.045	-0.025	-0.035	-0.095	-0.098
	(2.84)***	(2.57)**	(1.58)	(2.52)**	(2.69)***	(2.71)***
FIN_CENTER	-0.328		-0.484	0.000	-0.747	
	(4.99)***		(7.09)***	(.)	(7.68)***	
EUROLAND	-0.055	-0.038	-0.230	-0.235	-0.167	-0.123
	(1.33)	(0.87)	(3.24)***	(3.26)***	(1.53)	(1.06)
OTH_DEVELOPED	-0.069	-0.068	-0.111	-0.109	-0.096	-0.078
	(1.52)	(1.57)	(2.07)**	(2.06)**	(1.28)	(1.07)
Constant	1.007	0.999	0.989	0.995	0.979	0.971
	(110.76)***	(117.84)***	(184.73)***	(209.05)***	(43.91)***	(38.11)***
Observations	72	66	72	66	72	66
R-squared	0.65	0.43	0.77	0.62	0.66	0.37

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

TableA15: The Determinants of Original Sin (dropping financial centers)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OSIN1_20	OSIN1	OSIN2_20	OSIN2	OSIN3_20	OSIN3	OSIN3_20011	OSIN3_NOI
LGDP_PC	0.007	0.019	-0.006	-0.003	-0.018	-0.009	0.009	0.011
	(0.47)	(0.80)	(0.31)	(0.20)	(0.28)	(0.17)	(0.25)	(0.23)
FISC	-0.006	-0.025	0.005	-0.010	0.009	-0.062	-0.005	-0.112
	(0.43)	(1.04)	(0.37)	(0.50)	(0.26)	(1.04)	(0.27)	(1.99)*
SIZE	-0.025	-0.071	-0.054	-0.059	-0.063	-0.147	-0.063	-0.171
	(1.81)*	(3.01)***	(2.95)***	(2.87)***	(1.36)	(2.93)***	(1.91)*	(3.39)***
SIZE_FIN	-0.162	-0.014	-0.063	-0.030	-0.370	-0.106	-0.076	0.342
	(1.53)	(0.06)	(1.43)	(0.57)	(0.96)	(0.23)	(0.37)	(0.79)
RULEOFLAW	0.005	-0.020	0.012	0.019	0.074	0.075	-0.000	-0.002
	(0.28)	(0.69)	(0.39)	(0.76)	(0.60)	(0.85)	(0.00)	(0.03)
INF	0.002	0.000	0.007	0.007	0.028	0.037	0.008	0.016
	(0.30)	(0.02)	(0.78)	(1.18)	(0.92)	(1.45)	(0.47)	(0.82)
OPEN	0.003	-0.037	-0.051	-0.020	-0.046	-0.095	-0.037	-0.162
	(0.12)	(0.52)	(2.12)**	(0.86)	(0.56)	(0.78)	(0.83)	(1.35)
EUROLAND		-0.070		-0.179		-0.148		-0.196
		(1.42)		(2.90)***		(1.35)		(2.06)**
OTH_DEVELOPED	-0.063	-0.092	-0.093	-0.116	-0.085	-0.159	-0.076	-0.186
	(1.94)*	(1.78)*	(1.84)*	(2.03)**	(1.04)	(1.65)	(1.34)	(2.05)**
Constant	0.935	0.897	1.071	1.039	1.089	1.104	0.927	1.067
	(8.42)***	(4.23)***	(7.53)***	(8.25)***	(2.55)**	(2.73)***	(3.31)***	(2.61)**
Observations	41	51	41	51	41	51	41	51
R-squared	0.50	0.46	0.51	0.64	0.15	0.45	0.19	0.53
	OSIN1_01	OSIN1	OSIN2_01	OSIN2	OSIN3_01	OSIN3	OSIN3_NOI_01	OSIN3_NOI
LGDP_PC	-0.002	-0.001	-0.019	-0.041	-0.030	-0.045	-0.001	-0.034
	(0.16)	(0.03)	(1.02)	(2.66)**	(0.48)	(0.93)	(0.03)	(0.74)
FISC	-0.006	-0.030	0.003	-0.025	0.010	-0.069	-0.005	-0.118
	(0.32)	(1.37)	(0.21)	(1.33)	(0.26)	(1.21)	(0.19)	(2.14)**
SIZE	-0.027	-0.072	-0.056	-0.067	-0.066	-0.148	-0.066	-0.172
	(1.79)*	(3.04)***	(3.23)***	(3.01)***	(1.46)	(2.90)***	(2.04)**	(3.31)***
SIZE_FIN	-0.138	-0.002	-0.052	-0.086	-0.339	-0.158	-0.047	0.221
	(1.25)	(0.01)	(1.13)	(1.23)	(0.86)	(0.41)	(0.22)	(0.59)
RULEOFLAW	-0.010	-0.036	-0.004	0.014	0.055	0.052	-0.018	-0.025
	(0.48)	(0.97)	(0.15)	(0.61)	(0.45)	(0.60)	(0.28)	(0.33)
INF	0.002	0.003	0.010	0.012	0.029	0.043	0.009	0.024
	(0.54)	(0.33)	(1.09)	(1.28)	(0.99)	(1.52)	(0.55)	(0.91)
OPEN	0.022	-0.002	-0.020	0.025	-0.021	-0.031	-0.014	-0.083
	(0.71)	(0.03)	(0.80)	(0.94)	(0.27)	(0.26)	(0.36)	(0.72)
Constant	0.993	1.024	1.150	1.287	1.167	1.337	0.997	1.351
	(9.03)***	(5.27)***	(8.46)***	(11.18)***	(2.73)**	(3.40)***	(3.34)***	(3.48)***
Observations	41	51	41	51	41	41	41	51
R-squared	0.41	0.42	0.45	0.54	0.14	0.43	0.16	0.49

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

TABLE A16: Original Sin and Country Size

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OSIN1	OSIN1	OSIN1	OSIN2	OSIN2	OSIN2	OSIN3	OSIN3	OSIN3
LGDP	-0.020			-0.012			-0.034		
	(2.87)***			(2.03)**			(2.55)**		
LCREDIT		-0.018				-0.010			-0.034
		(2.80)***				(2.05)**			(2.73)***
LTRADE			-0.024		-0.013			-0.041	
			(3.13)***		(2.16)**			(2.68)***	
Fin_Cent	-0.338	-0.327	-0.337	-0.494	-0.495	-0.489	-0.784	-0.781	-0.742
	(5.24)***	(4.75)***	(5.07)***	(6.61)***	(6.48)***	(6.54)***	(9.86)***	(10.24)***	(8.20)***
Euroland	-0.058	-0.050	-0.053	-0.225	-0.224	-0.242	-0.186	-0.177	-0.165
	(1.61)	(1.24)	(1.57)	(3.55)***	(3.48)***	(3.54)***	(2.10)**	(1.98)*	(1.61)
Oth_Dev	-0.073	-0.069	-0.071	-0.149	-0.150	-0.113	-0.138	-0.135	-0.093
	(1.82)*	(1.53)	(1.72)*	(2.58)**	(2.57)**	(2.10)**	(1.92)*	(1.88)*	(1.23)
Constant	1.064	1.036	1.119	1.027	1.058	1.011	1.079	1.181	1.041
	(42.95)***	(66.83)***	(28.12)***	(55.53)***	(34.44)***	(92.34)***	(23.95)***	(15.24)***	(35.06)***
N. Obs.	80	75	88	80	88	75	80	88	75
R-squared	0.65	0.65	0.65	0.74	0.74	0.77	0.64	0.65	0.65

		Dropping Financial Centers		Dropping Financial Centers		Dropping Financial Centers
	OSIN1	OSIN1	OSIN2	OSIN2	OSIN3	OSIN3
SIZE	-0.055	-0.049	-0.031	-0.034	-0.099	-0.107
	(3.01)***	(2.69)***	(2.06)**	(2.57)**	(2.76)***	(2.81)***
Fin_Cent	-0.326		-0.489	0.000	-0.752	
	(4.98)***		(6.54)***	(.)	(8.62)***	
Euroland	-0.052	-0.058	-0.243	-0.239	-0.176	-0.167
	(1.38)	(1.55)	(3.52)***	(3.48)***	(1.78)*	(1.69)*
Oth_Dev	-0.069	-0.073	-0.112	-0.110	-0.097	-0.091
	(1.51)	(1.60)	(2.09)**	(2.08)**	(1.31)	(1.23)
Constant	1.006	1.005	0.995	0.995	0.982	0.983
	(134.98)**	(147.70)**	(262.01)**	(266.22)**	(50.93)***	(49.57)***
N. Obs.	75	69	75	69	75	69
R-squared	0.65	0.42	0.77	0.63	0.66	0.37

Robust t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table A17: Composition of the Emerging Market Indexes for base years 1980 and 1993

		WEIGHTS	
		1980 Index	**1993 Index**
		20 Countries	22 Countries
1	Brazil	18.95	18.09
2	Korea, Rep.	14.27	13.62
3	India	11.32	10.80
4	Mexico	8.79	8.39
5	Argentina	7.47	7.13
6	Indonesia	5.02	4.79
7	Turkey	4.81	4.59
8	South Africa	4.14	3.95
9	Thailand	4.12	3.94
10	Poland		3.29
11	Singapore	2.60	2.48
12	Malaysia	2.59	2.47
13	Israel	2.53	2.41
14	Colombia	2.37	2.26
15	Philippines	2.13	2.03
16	Chile	1.94	1.85
17	Venezuela	1.92	1.83
18	Pakistan	1.72	1.65
19	Peru	1.49	1.42
20	Czech Republic		1.27
21	Hungary	1.31	1.25
22	Uruguay	0.52	0.49
		100	**100**

Table A18: Emerging market 1980 and 1993 indexes
***(index value per US$,* Quarterly)**

Period	EM-1980	Period	EM-1980	EM-1993
1980q1	100	1990q4	76.6	
1980q2	94.1	1991q1	76.0	
1980q3	90.1	1991q2	74.8	
1980q4	87.0	1991q3	75.4	
1981q1	85.5	1991q4	77.3	
1981q2	88.8	1992q1	75.8	
1981q3	88.2	1992q2	74.0	
1981q4	87.9	1992q3	72.9	
1982q1	94.2	1992q4	73.4	
1982q2	96.1	1993q1	74.9	100.0
1982q3	103.9	1993q2	74.8	99.9
1982q4	106.0	1993q3	74.7	100.1
1983q1	108.6	1993q4	74.3	100.2
1983q2	109.8	1994q1	74.7	100.4
1983q3	109.9	1994q2	75.0	100.2
1983q4	112.7	1994q3	66.0	88.4
1984q1	111.5	1994q4	66.4	86.8
1984q2	111.0	1995q1	66.7	85.6
1984q3	113.0	1995q2	62.9	81.8
1984q4	117.0	1995q3	62.9	81.9
1985q1	117.9	1995q4	64.5	82.9
1985q2	121.3	1996q1	63.1	81.6
1985q3	117.3	1996q2	63.0	81.6
1985q4	114.6	1996q3	61.9	80.8
1986q1	110.6	1996q4	61.7	80.9
1986q2	109.2	1997q1	61.3	80.6
1986q3	109.7	1997q2	60.9	80.4
1986q4	109.2	1997q3	64.2	85.5
1987q1	108.2	1997q4	75.0	102.2
1987q2	109.2	1998q1	74.7	98.0
1987q3	105.3	1998q2	82.8	106.4
1987q4	104.9	1998q3	75.0	98.3
1988q1	101.5	1998q4	68.8	91.6
1988q2	101.9	1999q1	72.7	97.3
1988q3	99.5	1999q2	71.2	95.2
1988q4	95.8	1999q3	75.1	99.4
1989q1	89.7	1999q4	70.9	94.6
1989q2	125.8	2000q1	70.6	93.8
1989q3	97.8	2000q2	72.8	95.9
1989q4	112.6	2000q3	73.4	96.7
1990q1	95.2	2000q4	75.3	99.0
1990q2	80.9	2001q1	78.8	103.5
1990q3	76.6	2001q2	79.5	104.2
1990q4	76.6	2001q3	80.3	106.2
1991q1	76.0	2001q4	78.9	104.3
1991q2	74.8			