

# Foreign Currency Debt, Financial Crises *and* Economic Growth: A Long Run Exploration\*

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## Abstract:

What are the costs of hard currency liabilities? After the global financial instability of the late 1990s, the costs are widely believed to be large, and many emerging markets have recently pushed to diminish such borrowing. We study these costs in a unique data set spanning two periods of international financial integration (1880-1913 and 1972-2002) covering the experience of over 45 countries. The data show that hard currency debt is likely to raise the probability of currency crises and also debt crises but the impact is largest when poor fundamentals are a factor. Similarly, when such liabilities are paired with bad fundamentals they are most likely associated with lower growth because they contribute to crises. Nevertheless, strong financial development and policy credibility are likely sufficient to eliminate the large negative association between high exposure to hard currency debt and income reducing financial crises.

## 1. Introduction

Both the contemporary and historical record demonstrate that borrowing in foreign currency is associated with financial fragility and costly financial crises. Some authors have focused on the fact that most countries exclusively and excessively rely on hard currency debt in international markets calling this ‘original sin’ (cf. Eichengreen and

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Hausman 1999). While there may be a case for international capital market failure, our analysis suggests that other mitigating factors determine exactly how costly external foreign currency debt can be.<sup>1</sup> Moreover, we highlight that over the long run many countries have had large domestic debt markets where they issue significant amounts of local currency debt. This has frequently been one important route to reducing the costs of foreign currency exposure for financially fragile emerging markets. Nevertheless it is important to emphasize that a process of partial “de-dollarization” of liabilities is not sufficient to fully eliminate the risks of financial crisis.

In this paper we investigate the costs of foreign currency debt by assessing the losses to economic growth and income per capita arising from foreign currency debt. We demonstrate that foreign currency borrowing may have a negative indirect impact on living standards because it is associated with financial crises. This negative impact is largest when unsustainable foreign borrowing catalyzes crisis events and when countries fail to bolster their financial systems in the midst of financial booms. We find empirical support for this logic using data from over 1200 country years spanning two periods of open international financial integration--1880 to 1913 and 1972 to 2002.

Our results suggest that minimizing foreign currency financing is *not a sufficient condition* for financial security and the avoidance of growth reducing financial crises. Oppositely, hope is not lost when most borrowing consists of hard currency debt. Such debt can be managed successfully; historically, many countries with solid financial systems and good reputations in capital markets have avoided crises and maintained living standards *despite* net hard currency exposure. Lasting financial stability and good economic outcomes depend partially on rationally managing foreign currency exposure on the balance sheet, but also on strengthening financial development and limiting other sources of vulnerability in the macro economy.

The headline implication of our historical research is that breaking free from the alleged burden of hard currency debt *will not guarantee* that countries avoid financial crises in the future. Although it may be a step in the right direction, further strengthening

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<sup>1</sup> Goldstein and Turner (2004) call attention to the mismatch issue. A currency mismatch is measured as the value of foreign currency obligations relative to foreign currency assets and streams of revenues. Financial development and prudent borrowing are other routes to avoiding these costs as we will illustrate.

of the financial system, the institutional framework and prudent external borrowing may also be key components of financial stability.

## **2. Foreign Currency Debt, Financial Integration and Crises: A Long Run Overview and Comparison**

Similar to the last 40 years, the period between 1880 and 1913 witnessed a strong surge in the integration of international capital markets.<sup>2</sup> Capital moved across borders in increasingly large amounts, and for the most part it was free of government controls. Arbitrage did a fair job of eliminating risk-comparable interest rate differentials (Obstfeld and Taylor, 2004). Cross border, market-based financing for projects in both the developed and the less-developed regions played an important role in shaping the flow of capital out of London. Today market based financial centers, multilateral lenders and bilateral agreements direct capital to the developing world. By and large however since the 1970s, market-based cross-border flows have been the area of primary interest since this is where the bulk of capital flows originate.

### **2.1 The Size and Direction of International Capital Flows**

In the first period of globalization, average current account deficits in countries such as Australia, Canada, New Zealand and the US (although in the latter this was mainly prior to 1860), were on the order of three percent and much higher in many years. In the periphery, the levels were somewhat lower in absolute value but still significant in certain years. Foreign investment accounted for up to 20 percent of total capital formation in many of the emerging markets of the time. This value was 50 percent in Australia, Canada, Argentina and Brazil (cf. Fishlow, 1986 and Williamson, 1964 on the USA).

In the past 30 years, capital flows to emerging markets have surged as a percentage of recipient GDP or of global GDP. Beginning in the 1980s, a series of

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<sup>2</sup> Cottrell (1975) provides an overview of British capital exports during the nineteenth century. Obstfeld and Taylor (2004) provide a long run view of international integration and demonstrate levels of capital market integration in the late nineteenth century comparable to those witnessed between 1972 and the present

nations liberalized their capital accounts—a trend that continues. In the past 30 years (especially prior to 2002) the persistence and size of current account deficits have been somewhat lower than in the first period of globalization but particular sets of countries have also received important net inflows of foreign capital (e.g. Latin America in the late 1980s, East Asia and other emerging markets from the early 1990s).

## **2.2 Other Stylized Facts of Global Finance over the Long Run**

Prior to 1913, capital exports from Britain (the main capital exporter), France, and Germany, took the form of bond finance, private bank loans and direct investment. Early in the period, portfolio investment dominated, but by 1913 Svedberg (1978) argued that direct investment accounted for over 60 percent of all foreign investment. The type of inflow varied by country and by period. Marketable bonds were typically placed by London investment banks and sovereign bonds were actively traded on the London Stock Exchange. Daily quotes were available in the *London Times*. Obstfeld and Taylor (2004), Mauro, Sussman and Yafeh (2006) and Flandreau and Zúmer (2004) all contain interesting discussions on the details of bond finance in this first era of globalization. Obstfeld and Taylor (2004) emphasize that covered interest parity held tightly for a number of core countries suggesting ongoing integration. They also find significant evidence that adhering to the gold standard and stabilizing exchange rates lowered the yield spread on sovereign bonds. One interpretation of this is the gold standard was a signal of policy credibility (see Bordo and Rockoff, 1999). However, another possibility is that in a world of hard currency debt, going on gold assured investors that exchange rates would be fairly stable and hence hard currency debt or debt issued in terms of gold other gold backed currencies would be less onerous for nations. Mauro, Sussman and Yafeh (2006) study the efficiency of the London bond market and pay particular attention to the reactions of bond yields to political information. They argue that markets moved on news of domestic political turmoil and that comovement amongst bond spreads was much lower than it has been in the past twenty to thirty years.

Today of course, many types and varieties of financing for emerging markets and developed countries are available. Private flows via banks in the 1980s and subsequently

private bond finance from the 1990s have been central. Equity acquisitions are also increasingly important. Multilateral, bilateral and official funding are significant sources of funding for particular countries and such financing was rare in the nineteenth century. Direct investment has also become an important feature of development finance. It is also allegedly less likely to be associated with financial crises than with foreign portfolio flows. The rise of large gross positions amongst the most developed countries is also a novel feature of the last twenty years which was not quite so evident in the first era of globalization. This phenomenon could be associated with greater risk sharing possibilities than were evident prior to 1914.

### **2.3 Foreign Currency Financing in Two Periods of Globalization**

Contemporary work on currency denomination of debt by Eichengreen and Hausman (1999) has studied mainly external borrowing. The data show that this debt is typically denominated in one of a handful of global key currencies. It was reasoned that since most emerging markets have shallow domestic pools of savings it was useful to restrict attention to the currency denomination of international obligations. A high ratio of foreign currency liabilities to total international liabilities was called ‘original sin’ because the currency denomination aspect of the contract was ostensibly unrelated to fundamentals.

Previous research on the historical record calls into question the assumption that the international market is the only one of interest (Bordo and Meissner 2006, 2007a). We have been able to track international and domestic debt and the currency denomination of both types of liabilities.

Before 1914 countries typically financed significant amounts of their projects in foreign currency debt. Like today, most debt sold in external markets (i.e., London and Western Europe) was denominated in the currency of the financial leaders which in turn was understood to represent a fixed weight of precious metal such as gold. However an interesting variation on this theme exists within this period. Many emerging markets managed to issue and place a significant amount of long term debt that was denominated and payable in local currency; and although the ‘emerging’ countries were commonly

regarded as possessing underdeveloped or weak financial systems and dubious institutional foundations they still managed to have significant domestic currency debt.<sup>3</sup> These countries included Argentina, Brazil, Chile, Italy, Russia, Spain, and Portugal. By contrast, other countries that would eventually become mature industrialized economies, and which were already leaders in terms of the quality of their institutions, the extent of their financial development and structural change maintained heavy exposure to hard currency debt. These markets included the Australasian colonies, Canada, the United States, and Scandinavia. We have high quality data for over 18 countries on the size of government obligations denominated and payable in local and foreign currency. These include bonds issued both domestically and externally, and in some respects these data have better coverage than current data which has been used to explore the question.<sup>4</sup>

That said, new evidence from the recent decade shows that developing country governments are quite able to market substantial proportions of their total debt in local currency (Burger and Warnock, 2006 and Reinhart and Rogoff, 2008). It appears also that foreign investors may be increasingly willing to hold developing country local currency debt. So are countries that reduce exchange rate exposure the most guaranteed financial stability? Or do additional factors need to accompany a break away from foreign currency debt?

#### **2.4 Original Sin? A long run view of hard currency debt's origins and consequences**

Previous work in a long-run comparative vein (Bordo and Meissner 2006) finds that foreign currency debt alone does not always generate a higher likelihood of a financial crisis. A number of important countries in the nineteenth century with very heavy foreign currency exposure did not have severe financial instability or debt defaults; on the other hand, many countries with intermediate levels of hard currency exposure did have frequent and severe financial crises. In the late twentieth century again, many advanced countries exhibited significant amounts of hard currency debt outstanding relative to their total external debt liabilities, but most have avoided severe crises. On the

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<sup>3</sup> Reinhart and Rogoff (2008) reach a similar conclusion.

<sup>4</sup> Reinhart and Rogoff (2008) have also improved the twentieth century data.

other hand, emerging markets which also have a high percentage of their external debt denominated in foreign currency fell victim to debt crises and had high financial instability.

The lesson from the long-run appears to be that sound debt management, and the development of sound fiscal and financial capacity, has allowed countries to escape financial turmoil even in the face of a high percentage of debt outstanding payable in foreign currency. Minimizing currency mismatches is also important. Mismatch declines as the flows of income denominated in foreign currency rise. Countries reduce mismatches by acquiring reserves and hedging or also by obtaining export capacity to the major countries that issue key currencies. Evidence from both periods suggests that backing up hard currency debt with foreign reserves and having a larger export sector for a given level of hard currency debt helps decrease the incidence of crises. So even if countries have not yet developed the foundations of good finances, they can in the meantime minimize the risks of choppy financial waters by limiting their mismatch position.

## **2.5 The Origins of Foreign Currency Financing**

Eichengreen and Hausman (1999) argued that high percentages of total external debt denominated in hard currency debt or ‘original sin’ was not a function of policy or institutions but rather something that international capital markets imposed on emerging markets. This view was reinforced later by Eichengreen, Hausman and Panizza (2003, 2005). A supportive view from the long run was also presented by Flandreau and Sussman (2005) and Bordo, Meissner and Redish (2005). This line of research demonstrated that historically financial development and credibility were neither necessary nor sufficient to eliminate high levels of foreign currency debt relative to the total amount of international liabilities.

Despite the multitude of theoretical models which purport to link economic and financial fundamentals to hard currency borrowing, it appears that in the past the proportion of hard currency debt relative to *total external borrowing* was inversely related to economic size, initial conditions and chance historical events. Contemporary

evidence by Eichengreen Hausman and Panizza (2005) which studied the percentage of all internationally issued debt denominated in foreign currency came to a similar conclusion.

Turning to historical data on the *percentage of total debt* (domestic plus external) denominated in foreign currency shows that the United States, the Scandinavian countries, and Australasia all had higher percentages of hard currency sovereign debt outstanding than Argentina, Spain, and Russia. The latter were arguably much weaker in terms of financial development, and their institutional framework was much less capable of generating credible commitments than the former set of countries. It appears that the latter countries actively tried to avoid gold debt although they often faced higher interest charges on such loans.

The better positioned countries worked around the hard currency constraint but eventually found it optimal to diminish their reliance on such debt. In the US, reaction by the Roosevelt administration to the shock of the Great Depression generated a large market in debt payable in the local currency overnight by declaring gold clauses illegal—prior to the 1930s however nearly all borrowing domestic and foreign was meant to be repaid in a fixed amount of gold and hence in a fixed amount of the world’s leading (gold backed) currencies. In the case of Australasia, and Canada, advanced financial infrastructure such as options markets that emerged around the time of their floating exchange rates in the early 1980s allowed investors to hedge away currency risk and they became more inclined to hold such assets. Also important was these countries’ role as commodity currencies which made local currency assets a natural hedge against global inflation.

Historically we observe that high exposure to foreign or hard currency liabilities has not been a proxy for dysfunctional policies and institutions. And some countries have carried these hard currency liabilities and had good economic fortunes. They were often able to avoid the greater financial volatility hard currency liabilities can impose. These countries were largely able to maintain credibility in the face of sharp decreases in foreign capital inflows associated with losses in investor risk appetite. These countries have thus been able to avoid financial crises that temporarily slow economic growth and stunt economic development. Other countries that had lower levels of exposure to hard



currency debt have sustained terrible crises. We provide below an analytical framework to illustrate how this logic works and then provide empirical evidence for the long run.

### **3. International Financial Flows, Hard Currency Debt, Crises and Economic Growth: A Brief Conceptual Framework**

Our framework for thinking about financial crises follows Mishkin (2003) and Jeanne and Zettlemeyer (2005).<sup>5</sup> This view is inspired by an open-economy approach to the balance sheet view of the credit channel transmission mechanism. Balance sheets, net worth and informational asymmetries are key ingredients in this type of a model. Moreover the development of the financial system is crucial. The diagram in Figure 1 presents our chain of logic described below.

The basic framework for an emerging market suggests the following:

- Sudden stops or reversals in capital inflows are likely events when the capital account is liberalized or a country receives an unusually large level of inflows. The likelihood of a sudden stop is exacerbated by high levels of foreign currency debt relative to total borrowing and low levels of internationally tradable production relative to total output.
- Large capital inflows are often associated with a speculative attack on the currency or sharp currency drops associated with the eventual turnaround in the current account. This is especially so when policy makers have low credibility or low reserve positions.
- All else equal, foreign currency debt exposure in the face of a sudden depreciation of the exchange rate makes private and public debt default more likely. Private agents' balance sheets are impaired. The economy sinks into recession and revenues fall. Governments and private agents are more likely to default in such a scenario.

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<sup>5</sup> Mishkin's informal analysis follows a stream of literature from the late 1990s on the links between net worth, exchange rate depreciation, and crises.

This outline suggests that original sin interacts in a complex way with other fundamentals in contributing to crises. Moreover, the empirical evidence below shows this is the case. In the late nineteenth century and in the last 40 years, a number of countries faced surges of capital inflows with high levels of original sin but had credibility which allowed them to avoid sudden stops of inflows, keep their currencies stable and to avoid a cycle of contractionary depreciation.

#### **4. Empirical Evidence: The Potential Costs of Hard Currency Debt**

The goal of this section is to test the logic proposed in Figure 1. We present evidence that large capital inflows have often contributed to the likelihood of a currency crisis. These sharp and sudden depreciations were also likely to give way to debt crises when foreign currency debt was a significant percentage of the outstanding total *and* other pre-existing weaknesses were present. A higher propensity to have a crisis depends on these other controls that proxy for financial development and management.

Hence there is evidence that hard currency debt alone is not to blame for financial crises. Hard currency debt combined with good financial development is associated with a low propensity to experience debt crises in both periods of globalization. Strong financial development limits the probability of a currency crisis and the likelihood of a default in the event of a sharp currency drop. On the other hand, when other weaknesses in fundamentals are present, even relatively low exposure to foreign currency debt with a sharply depreciating exchange rate is associated with a substantial risk of a crisis. Decreasing dependence on foreign currency debt may not be sufficient to lead to financial stability.

We then focus on the economic costs of hard currency debt. We discuss how original sin and poor financial development *together* are often indirectly associated with temporarily lower economic growth and possibly to negative level effects on income because they hasten financial crises. These factors *together* are quite possibly responsible for significantly lower standards of living in countries that rely on foreign currency denominated capital inflows to help in the development process.

#### **4.1 The association between Foreign Capital Inflows and Financial Crises**

The first step in testing the above framework is to see whether foreign capital flows are key determinants of currency crises. We also condition on a number of important factors. Since we are using a non-linear (i.e., probit) model the impact of any variable depends on the levels of the other variables. This is one way to test how low financial development and unsustainable borrowing interact with original sin and other variables of interest. Specifically, we investigate below whether combinations of high ratios of hard currency debt to the total, poor reserve positions and other factors matter for crisis outcomes or whether original sin alone seems to matter the most.<sup>6</sup>

In column 1 and 4 of Table 1, we estimate a probit model where the dependent variable is one if there was a currency crisis and zero otherwise. Column 1 is for the period 1880-1913 and covers the experience of 18 countries listed below Table 1 while column 4 covers 45 listed countries between 1973 and 1997. We control for international and year-specific factors using the short term discount rate in Britain (1880-1913) and later the yield on the US six month treasury bill (1973-1997). We condition on the lagged level of net capital inflows (results in un-reported regressions show results are robust to using the five year moving average too), the ratio of hard currency government debt outstanding to total government debt (1880- 1913) or the within country average ratio of foreign currency debt to total debt issued on international markets based on Eichengreen, Hausman and Panizza data (1973-1992), the ratio of gold reserves to monetary notes in circulation or foreign currency reserves to M2 (1973-1999), and the presence of a banking crisis in the previous year.<sup>7</sup>

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<sup>6</sup> All data used in the following exercises are described in the data appendix.

<sup>7</sup> These variables are defined in the Data Appendix. The use of averages for the original sin variable arises so that we can bring the data forward to 2002. Similar data has not been compiled for the 1998-2002 period to the best of our knowledge. Results appears stable when restricting the sample to 1972-1997 and letting the variable vary by year since the original sin variable is highly persistent.

Columns 1 and 4 of Table 1 show that a large inflow of capital relative to GDP has a positive and statistically significant association with a currency crisis. The ‘original sin’ variable is not associated with a higher chance of a crisis in the first period but it is positively related to currency crises in the second period. Higher interest rates in the financial centers are associated with a higher chance of a currency crisis but this is not statistically significant in the second period. Lower levels of reserves are associated with higher probabilities of a currency crash in both periods but this result is only statistically significant in the first period. Finally there is some evidence that banking crises in the previous year are associated with crises in the current year in both periods.

Table 1 suggests that currency crises in both eras are driven by large inflows of foreign capital. On the other hand, the evidence is mixed on the role of hard currency debt. Since we have two different measures of exposure this could be driving some of our results. However, one would have thought that the more complete data from the late nineteenth century would have been the best means to find an impact on currency crises of hard currency debt since this includes domestic debt issues as well.

#### **4.2 Debt Crises and Hard currency Debt**

The next link in our framework in Figure 4 relates currency depreciation, liability dollarization and balance sheets to debt default. A pair of probit models (column 2 and column 5 in Table 1) uses the first year in which a country defaulted (partially or in whole) on its sovereign debt obligations as a dependent variable. Here we also find evidence consistent with our framework.

First we see that the marginal impact of a higher ratio of hard currency debt to total debt outstanding is associated with a higher probability of having a debt crisis in both waves of globalization *when there is also a currency crisis*. In the absence of a currency drop, the marginal impact of hard currency debt or original sin is positive only

in the latter period. Overall this is support for the observation that currency depreciation increases the real burden of foreign currency debt making default more likely.

This finding also suggests that foreign currency debt is more likely to be associated with a crisis as a side effect of large foreign capital inflows. Inflows heighten the possibility of a currency crisis which then may exacerbate the sustainability of a given level of hard currency debt.

In terms of proxies for financial development we have several findings. First, a banking crisis in the previous year is a positive and statistically significant determinant of debt crises. Low reserves relative to the money stock are also related to a higher likelihood of having a debt crisis but in neither period is this coefficient statistically significant.<sup>9</sup> We find strong support that original sin and balance sheets matter, but we also find evidence that strong financial systems are important for explaining the (lack of) incidence of major financial meltdowns.

### **4.3 Interactions between fundamentals and the likelihood of a debt crisis**

In Table 2 we probe into the marginal impact of hard currency debt. In non-linear models such as a probit, the marginal impact of a variable actually depends on the levels of the other included covariates. We focus initially on the predicted probability of having a debt crisis generated by the probit models for debt crises in Table 1; we then evaluate the probit model using the estimated coefficients, a 100 percent hard currency debt ratio and a range of values for the other included covariates that we believe are associated with financial development and financial robustness.

Define “excellent fundamentals” as an observation with the sample average reserve to money stock ratio, no banking crisis in the previous year and no currency crisis this year. Next, define “good fundamentals” as a country that has “excellent fundamentals” but falls victim to a currency crisis. A country with “bad fundamentals” has a banking crisis in the previous year and no international reserves. Finally the “worst fundamentals” represents a situation with no reserves and a twin banking and currency

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<sup>9</sup> Currency crises in the absence of hard currency debt are associated with a lower likelihood of a crisis in the second period until the ratio of hard currency liabilities is sufficiently high.

crisis. Finally, let the level of net capital inflows and the short-term interest rate be held at the sample mean.

The following conclusions are evident from Table 2 :

1) Scenario #1 shows that a 100 percent hard currency debt ratio and good fundamentals is not associated with a highly significant likelihood of a debt crisis in either period.

2) Scenarios 2 and 4 demonstrate that hard currency liabilities raise the predicted likelihood of having a debt crisis very significantly both for countries with good fundamentals and bad fundamentals.

3) A 100 percent ratio of hard currency debt relative to total debt (or international debt later on), combined with a move from the best to the worst fundamentals (a move from scenario #1 to scenario #4), raises the predicted odds of suffering a debt crisis by over 70 times in the first period and by about ten times in the second period.

#### **4.4 Foreign Currency Debt, Financial Crises, and Economic Growth**

We have now established that hard currency debt is not by itself necessarily a culprit for financial fragility. In this section, we examine whether hard currency debt has an impact on economic growth rates via its impact on financial crises.

We follow closely Bordo and Meissner (2007b) who investigate the impact of financial flows.<sup>10</sup> Specifically we present a series of cross-country growth regressions which include as key explanatory variables net capital inflows and episodes of financial crisis. By including financial crises we can recursively track the impact on growth of the various explanatory variables such as hard currency debt via the crisis variable. We

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<sup>10</sup> Ranciere, Tornell and Westerman (2006) carry out an exercise that is also similar in methodology where the focus is the growth impact of capital market liberalization.

explore growth in non-overlapping five year periods for the sample 1880-1913 and then for the 1972-2002 sample.

#### **4.5 Multivariate Growth Regressions: Tracking the Growth costs of Liability Dollarization**

We explore these correlations further with multivariate regression analysis. Between 1880 and 1913 we use a set of twelve countries for which we have savings data and then a set of the same twelve plus seven other countries when we drop the savings variable from our regressions.<sup>12</sup> For the period 1972-2002 we look at the experience of 43 countries.

Our key control variables are the level of net capital inflows/GDP and the number of years that witnessed a financial crisis during the five year period divided by five. The coding for the crisis year dummy takes on the value 1 if it was the first year of a currency crisis, banking crisis, ‘twin’ crisis (i.e., a banking and currency crisis in the same year), debt crisis or if it was a year of ongoing currency and/or banking crisis. Based on evidence from our probit models above, hard currency debt---the focus of this study---is a key determinant of crises. If so, then such variables may have an indirect effect on growth. This is one way to gauge the economic costs of hard currency debt.

To capture the direct impact of global capital market integration, as we have done in previous work, we used the five year period average of the ratio of the net inflows to GDP. Of course, in an open economy, investment is the sum of two components: foreign savings (i.e., foreign borrowing---negative in the case of outflows), and national savings. Hence we also include the five year average of the ratio of domestic savings to GDP.<sup>13</sup>

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<sup>12</sup> The set of twelve countries includes: Argentina, Australia, Canada, Denmark, France, Germany, Italy, Japan, Norway, Spain, Sweden, United States. See the previous footnote for the full sample of 19 countries.

<sup>13</sup> Where we do include savings, we do not adjust the savings variable downward for countries with capital outflows because the main capital suppliers are already excluded from the data set. Also the current account data is not directly comparable with the Stone data which would make a proper adjustment difficult. This savings data is from Taylor (2002) who calculated the ratio of savings to GDP as the current account surplus divided by GDP plus the ratio of investment to GDP. We also substituted both savings measures with the investment ratio and found that the investment ratio was not statistically significant in the growth regressions.

The list of auxiliary explanatory variables is standard and based on Mankiw, Romer and Weil (1992) and later papers that study economic growth empirically. We include the following controls in Table 3: the logarithm of GDP per capita in the initial year of the five year period, the five year average of the population growth rate, the five year average of the percentage of the population enrolled in primary school, and the level of exports divided by GDP or imports plus exports divided by GDP in the latter period.

Regressions are of the form

$$\begin{aligned} \overline{Growth}_{it,t-4} = & \alpha_0 + \alpha_1 \left\{ \left( \frac{\overline{ForeignK}}{\overline{GDP}} \right)_{it,t-4} \right\} + \alpha_2 \overline{Crisis}_{it,t-4} + \alpha_3 \left\{ \left( \frac{\overline{Savings}}{\overline{GDP}} \right)_{it,t-4} \right\} + \alpha_4 (\overline{Enrol}_{it,t-4}) + \\ & \alpha_5 \left\{ \left( \frac{\overline{Exports}}{\overline{GDP}} \right)_{it,t-4} \right\} + \alpha_6 (\overline{\Delta \ln(Population)})_{it,t-4} + \alpha_7 \ln \left( \frac{\overline{GDP}}{\overline{population}} \right)_{it-4} + \mu_i + \delta_t + \varepsilon_{it} \end{aligned}$$

where *Growth* is the annual growth of real per capita output,  $\mu_i$  is a set of country “fixed effects,”  $\delta$  is a vector of indicators which is one for each five year period, and  $\varepsilon$  is an idiosyncratic error term for each country in each five year period.<sup>14</sup>

In columns I to IV of Table 3, we present results from regressions of the growth equation above for 1880-1913 and 1972-2002. Columns I and III leave out national savings which slightly expands the sample in the first wave of globalization.

The results on the standard growth controls (especially initial GDP and schooling) are in line with expectations from the rest of the empirical growth literature. Domestic savings is positive only in the second period (in the first period it is not statistically significant), school enrolment and trade exposure are positively related to growth in both periods. Initial GDP has a negative coefficient and it is statistically significant. This implies conditional convergence; population growth rates appear to be negatively related to growth but this variable is also not highly statistically significant.

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<sup>14</sup> We correct the standard errors for heteroscedasticity by using robust standard errors. We also cluster these at the country level.



As per previous findings in Bordo and Meissner (2007b), there is no clear positive association between international capital inflows and economic growth. In no case is the coefficient statistically significant. It does appear that the inflows variable is negatively correlated with savings so that when savings is omitted the point estimate of this variable is biased downwards.

Moving on to crises, the weight of the evidence from Table 3 is that crisis periods are bad for growth. The point estimate on the average number of years in the five year period spent in some sort of crisis suggests that crisis periods bring growth down from long-run averages by one to two percent.<sup>15</sup> Crises represent significant temporary negative shocks to growth which are likely to have a level effect on income per capita.

#### **4.6 The Quantitative Impact of Hard Currency Debt on Growth**

Finally we investigate the quantitative impact on economic growth of hard currency debt. The combined evidence from Table 1 and Table 3 suggests that hard currency debt, by triggering financial crises, could be responsible for significant reductions in economic growth arising from those crisis events. How large could such an impact be? We first look at the predicted probabilities of having a crisis at various values of the fundamentals.

In Table 2 we exhibit the predicted probabilities of debt crises based on the probit models of Table 1 columns 2 and 5. In expectation, a country with “excellent fundamentals” would not have a crisis with a 98 percent predicted probability and would have a debt crisis with a predicted two percent chance.<sup>16</sup> Now look at the predicted values of growth from the growth model itself using the following equation

$$E(\overline{Growth}) = \hat{\alpha}E(\overline{X}) + \hat{\alpha}_2 E(\overline{Crisis}) = \hat{\alpha}E(\overline{X}) + \hat{\alpha}_2 \{1 \cdot \Phi(\hat{\beta}_z) + 0 \cdot (1 - \Phi(\hat{\beta}_z))\} = \hat{\alpha}E(\overline{X}) + \hat{\alpha}_2 \Phi(\beta_z)$$

<sup>15</sup> In fixed effects regressions for the 1972-2002 period the coefficient on crises is -0.01 and is statistically significant.

<sup>16</sup> This assumes one crisis per five year period that lasts one year. The effects will be larger if they last longer or crises are correlated as evidence suggests.

where  $\Phi(z)$  is the cumulative distribution function of the standard normal used in the probit model (i.e., the predicted probability of having a debt crisis at levels of the covariates  $z$ ) and the variables in  $X$  are the other controls used in the growth regressions besides the crisis variable.

Suppose a country has “excellent fundamentals” but also has 100 percent hard currency debt. Using the coefficient on the crisis variable,  $\alpha_2$ , from column IV of Table 1 (i.e., the 1972-2002 period), and the predicted probability of a crisis from column 2 of Table 2, the contribution to the average predicted growth rate is a decline in growth of 0.02 percent ( $-0.02 = -1.08 \cdot 0.02$ ). In this case, hard currency debt hardly seems injurious.<sup>17</sup>

Next we look at how hard currency debt interacts with other control variables in the probit equation. It turns out that high levels of hard currency debt combined with poor fundamentals is associated with significantly lower growth. Consider a country with the “worst fundamentals” in the probit models and 100 percent hard currency debt (also hold the other variables in  $X$  constant at their means). In the first and second periods respectively, we could see a loss in growth of just over two percent ( $-1.78 = -2.84 \cdot 0.63$ ) and 0.22 percent ( $-0.22 = -1.08 \cdot 0.21$ ). Both of these impacts are economically significant given mean growth rates of 1.33 and 1.7 respectively.

Finally consider a comparative static that raises hard currency debt from 50 percent of the total to 100 percent of the total. Focus on the period 1880-1913. Let fundamentals be the “worst” (i.e., holding reserves at zero, a currency crisis and a banking crisis occur in the previous year). Next calculate the predicted probabilities of a debt crisis under these two debt ratios using the probit model of column V of Table 1. Finally use the coefficients on the crisis variables in the growth regressions of columns II and IV in Table 1. Define  $HCDebt_{high}$  to be when the ratio of hard currency debt outstanding to the total is set to 100 and  $HCDebt_{low}$  is when the ratio is set to 50. In these situations, we find the following change in the expected (five-year average) growth rate:

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<sup>17</sup> Other covariates are defined at the sample means.

$$\begin{aligned}
& E(\overline{Growth}_{1880-1913} | HCDebt_{high}) - E(\overline{Growth}_{1880-1913} | HCDebt_{low}) = \\
& \alpha_2 \{ E(\overline{Crisis} | HCDebt_{high}) - E(\overline{Crisis} | HCDebt_{low}) \} = \\
& \alpha_2 \left\{ \left[ 1 \cdot \Phi(\hat{\beta}_z, HCDebt_{high}) + 0 \cdot (1 - \Phi(\hat{\beta}_z, HCDebt_{high} = 100)) \right] - \left[ 1 \cdot \Phi(\hat{\beta}_z, HCDebt_{low}) + 0 \cdot (1 - \Phi(\hat{\beta}_z, HCDebt_{low})) \right] \right\} = \\
& \alpha_2 \{ [1 \cdot \Phi(\hat{\beta}_z, HCDebt_{high})] - [1 \cdot \Phi(\hat{\beta}_z, HCDebt_{low})] \} = \\
& -2.84 \{ [1 \cdot 0.63] - [1 \cdot 0.31] \} = -0.91
\end{aligned}$$

In other words a drop in the expected growth rate of -0.91 percent would occur when hard currency debt is raised from 50 to 100. A similar calculation for the period 1972-2002 reveals a drop of -0.19 percent. In both periods the average growth rate is roughly 1.5% per year. Hence a doubling of the reliance on hard currency debt is associated with significant losses in economic growth although the impact is stronger in the first period of globalization.

Another way of looking at this result is available. Between 1972 and 2002 a halving of the hard currency debt ratio, when poor fundamentals are in place, could eliminate much of the reduction to expected growth we found above and which we attributed to hard currency debt. On the other hand, in the first wave of globalization, we find that such a reduction in the hard currency debt only eliminates half of the lower expected growth that arises from 100 percent hard currency debt. Hard currency debt evidently plays a much stronger role in accounting for poor growth performance associated with crises in the second wave of globalization. Nevertheless, the overall impact on expected growth is much smaller relative to that in the first wave of globalization.

## **5. Discussion of the Overall Impact of Capital Inflows**

Our econometric exploration of two large and representative samples over two periods of globalization are suggestive of the following:

- Financial crises are associated with significantly lower growth in the years immediately following their onset. This is true in both periods of globalization.
- Financial development, which involves prudent policies to bolster reserves and avoid banking crises, can help shield countries from currency attacks, debt crises and lower growth due to crises.
- Hard currency debt can exacerbate the possibility of a debt crisis especially when there is a currency crisis and countries are financially fragile. Such crises seem to raise the value of net liabilities causing difficulties in meeting debt obligations.
- If hard currency debt matters for the likelihood of having a crisis, then raising the level of local currency debt is likely to keep growth at a steadier pace hence allowing countries to have permanently and significantly higher living standards than in the face of high hard currency debt burdens.
- This positive impact on living standards is, in expectation, larger for more financially robust economies.
- High amounts of hard currency debt can be managed and may not have an economically important impact on crises if other fundamental factors are in place.

## **6. Conclusions and Comparisons over Two period of Financial Globalization**

While we have attempted to make comparisons over the long run to find out the impact hard currency liabilities on crises and growth there are certain contrasts between the two periods as well. First, it is clear that the world is not the same today as it was 130 years ago. Hedging strategies are much more varied, the range of debt instruments, the global patterns of supply and demand have all changed. Second our inferences are based on data that is as comparable as possible, but the current debt data are lacking vital domestic debt information. Further research is in urgent need of a consistent panel data set for the recent period. It would be useful to have *all* debt outstanding not just the international debt data which is all we have been able to use for this study. Nevertheless, it is clear that over the two periods studied here financial integration has been an integral driver of economic outcomes.

There is however evidence that integration in both periods has been a key determinant of financial crises. Many factors play a role in financial fragility but there is evidence that foreign currency debt combined with a poor reserve position and a weak banking sector is a recipe for having a crisis outcome with a high probability. Countries can protect themselves from the pernicious cycle of rising borrowing and debt servicing costs via depreciation if they bolster their defenses in advance. The long run shows that many countries that did so were less likely to have crises—even in the face of hard currency debt. The final caveat is that conscious efforts to reduce foreign currency obligations must fully realize that such efforts may not push a country out of the crisis woods. Countries must fortify their financial systems as well or else the probability of a crisis will remain elevated and living standards will likely remain low.



## Data Appendix

Our measure of international capital market integration for the 1880-1913 period is based on Stone's (1999) total capital calls on the London market which includes public and private issues of debt purged of any refinancing issues.<sup>19</sup> The conventional wisdom for the period is that these gross flows were roughly equal to net flows for the capital importers (cf. Obstfeld and Taylor 2004).<sup>20</sup>

Most of the data underlying this paper was used in our previous work (Bordo and Meissner 2007a and b and Bordo and Meissner 2006) and is explained thoroughly in those sources. The bulk of the macro historical data set is that used in Bordo et. al. (2001). Even more expansive data descriptions and sources are listed in the working paper versions of our earlier work on crises in NBER working papers 11173 and 11897 and available upon request from the authors.

### Country Sample:

Countries included in Empirical Samples, First Wave	
Set 1. Growth Regressions	n=18 countries include Argentina, Australia, Austria, Brazil, Canada, Chile, Denmark, France, Germany, Greece, Italy, Japan, Norway, Portugal, Russia, Sweden, Spain, United States.
Set 2. Crisis Regressions	n=18, countries include Argentina, Australia, Austria, Brazil, Canada, Chile, Denmark, France, Germany, Greece, Italy, Japan, Norway, Portugal, Russia, Sweden, Spain, United States.

Countries included in Empirical Samples, Second Wave	
Set 1. Growth Regressions	n=48, countries include Argentina, Australia, Austria, Bangladesh, Brazil, Canada, Chile, Colombia, Costa Rica, Denmark, Ecuador, Egypt, Finland, France, Germany, Ghana, Greece, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway,

<sup>19</sup> We also carried out tests (which are left unreported), using the current account relative to GDP as a measure of the net inflow or outflow of capital.

<sup>20</sup> The correlation between Stone's flows and the current account data from Jones and Obstfeld is -0.69.

	Pakistan, Paraguay, Peru, Philippines, Portugal, Senegal, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zimbabwe
Set 2. Crisis Regressions	n=45, countries include Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Denmark, Ecuador, Finland, France, Germany, Ghana, Greece, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, South Africa, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zimbabwe

### **Crisis Dating:**

As in Bordo et. al ( 2001) we date currency and banking crises using both qualitative and quantitative evidence. For all countries besides Austria-Hungary, Russia, New Zealand, South Africa, Mexico, Turkey, Egypt, Uruguay and India we have relied on the dates of Bordo et. al. in both periods. We have tried to date currency crises, when possible, by using an approach based on the exchange market pressure (EMP) methodology which looks at changes in reserves, the exchange rate and the interest rate.

Debt crisis dates are based on Beim and Calomiris (2001). Only private lending to sovereign nations is considered when building those default dates. Not every instance of technical default is included in the chronology, the authors identified periods (six months or more) where all or part of interest/principal payments were suspended, reduced or rescheduled. Some of those episodes are outright debt repudiations, while others were reschedulings agreed upon mutually by lenders and borrowers. Also data is taken from a spreadsheet underlying Reinhart, Rogoff and Savastano (2003).

### **Capital Inflows**

The data for the period 1880-1913 are from Stone (1999). These refer to the total of new issues on the London capital market in each year. The data for 1973-2002 are based on



Lane and Milesi-Ferretti (2006). We use the change in the net economic position (NEP) as a measure of net inflows of foreign capital.

### **Hard Currency Debt Ratios**

For the 1880-1913 period, we collected data from various national sources on hard currency debt (cf. Bordo and Meissner, 2007a) and augmented and compared this with data made available by Flandreau and Zúmer (2004). What we refer to as hard currency debt (or original sin) is debt that carried a gold clause or was made payable at a fixed rate in a foreign currency issued domestically or externally.<sup>21</sup> Our measure of original sin,  $OS$ , is the ratio of this quantity to total public debt outstanding:

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

For the current period we rely on data underlying Eichengreen, Hausman and Panizza (2005) and thank the authors for making these data available to us. These data reflect public and private obligations issued on external or international markets only and exclude totally domestic debt issues. Note that these data are within country averages for the period 1972-1997. Sensitivity tests show that

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<sup>21</sup> The data appendices and the text in our previous work on crises has more to say about the structure of this debt.

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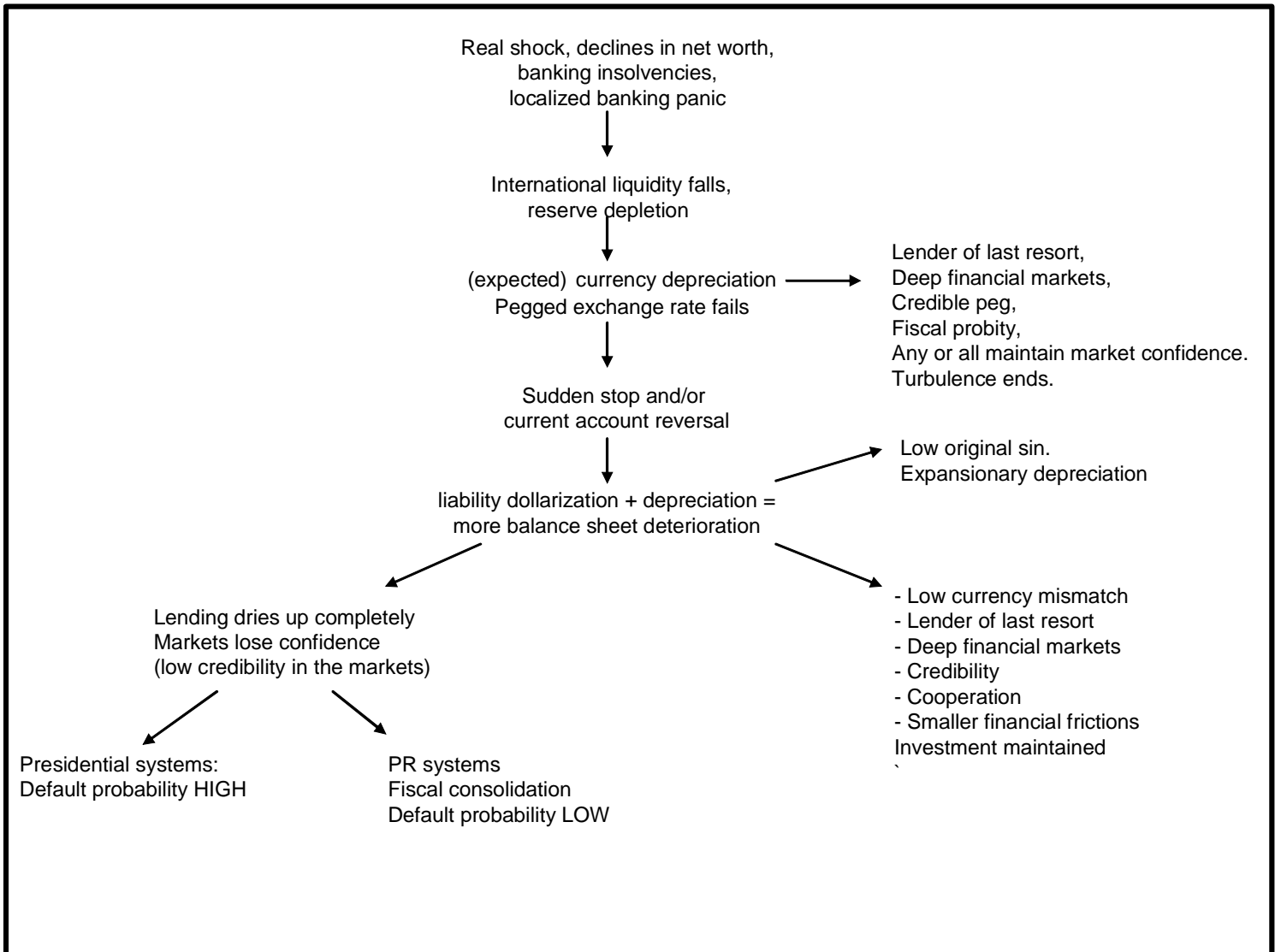
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**Figure 1 Framework for Balance Sheet Crises**



Covariates	First Wave of Market Integration 1880-1913			Second Wave of Market Integration 1973-2002		
	(1) Currency	(2) Debt	(3) Avg. value <sup>a</sup>	(4) Currency	(5) Debt	(6) Avg. value <sup>a</sup>
Lag of Level of Net Inflows/GDP	0.003*** (0.001)	–	1.79	0.003** (0.001)	–	1.08
Original Sin	-0.00008 (0.00022)	-0.00006 (0.00005)	52.46	0.0013** (0.0003)	0.0004* (0.0002)	77.63
Original Sin x Currency Crisis	–	0.0003* (0.0002)	2.05	–	0.007** (0.005)	5.84
Lag of Short term real UK/US Interest Rate	0.021** (0.009)	-0.0020 (0.0013)	2.75	0.0003 (0.0019)	0.003*** (0.001)	6.98
Lag of Reserves/Money	-0.0004** (0.0002)	-0.0002 (0.0001)	48.46	-0.00005 (0.0001)	-0.00007 (0.00007)	50.78
Lag of Bank Crisis	0.04 (0.06)	0.03** (0.02)	0.05	0.08*** (0.03)	0.01* (0.01)	0.10
Currency Crisis	–	-0.003 (0.005)	0.04	–	-0.21** (0.21)	0.06
Country-Years	508	508		1088	1088	
Countries	18	18		45	45	
Obs. P	0.04	0.012		0.06	0.02	
Pred. P (at x-bar)	0.03	0.005		0.04	0.01	
Pseudo-R <sup>2</sup>	0.11	0.22		0.10	0.15	

*Note:* Robust standard errors in parentheses clustered by country. Lag in net inflows is  $\Delta$ NEP unsmoothed; Countries included in the first wave sample are Argentina, Australia, Austria, Brazil, Canada, Chile, Denmark, France, Germany, Greece, Italy, Japan, Norway, Portugal, Russia, Sweden, Spain, United States. Countries included in the second wave sample are Argentina, Australia, Austria, ,Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Denmark, Ecuador, Finland, France, Germany, Ghana, Greece, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, South Africa, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, Uruguay, Venezuela, RB, Zimbabwe

<sup>a</sup> – based on currency crisis sample

*Significance at* \* -  $p < 0.10$ , \*\* -  $p < 0.05$ , \*\*\* -  $p < 0.01$

Table 2 Likelihood of Debt Crises: First and Second Waves		
Economic Conditions	Pr(Debt Crisis)	
	First Wave	Second Wave
	1880-1913	1972-2004
<p><i>Scenario #1: Excellent Fundamentals</i></p> <p>Original Sin = 100</p> <p>Original Sin x Currency Crisis = 0</p> <p>Gold Coverage Ratio = Average</p> <p>Currency Crisis = 0</p> <p>Bank Crisis Last Year = 0</p>	<0.01	0.02
<p><i>Scenario #2: Good Fundamentals</i></p> <p>Original Sin = 100</p> <p>Original Sin x Currency Crisis = 100</p> <p>Gold Coverage Ratio = Average</p> <p>Currency Crisis = 1</p> <p>Bank Crisis Last Year = 0</p>	0.20	0.10
<p><i>Scenario #3: Bad Fundamentals</i></p> <p>Original Sin = 100</p> <p>Original Sin x Currency Crisis = 0</p> <p>Gold Coverage Ratio = 0</p> <p>Currency Crisis = 0</p> <p>Bank Crisis Last Year = 1</p>	0.08	0.07
<p><i>Scenario #4: Worst Fundamentals</i></p> <p>Original Sin = 100</p> <p>Original Sin x Currency Crisis = 100</p> <p>Gold Coverage Ratio = 0</p> <p>Currency Crisis = 1</p> <p>Bank Crisis Last Year = 1</p>	0.63	0.21

**Table 3 International Financial Integration and Growth, Five Year Periods, 1880-1910 and 1972-2003**

*Dependent Variable: Average Five Year Percentage Growth Rate of GDP per Capita in non-overlapping periods*

Covariates	First Wave of Market Integration 1880-1910		Second Wave of Market Integration 1973-2002	
	(I)	(II)	(III)	(IV)
Avg. Net Capital Inflows/GDP	-0.022 (0.118)	0.11 (0.12)	-0.005 (0.031)	0.013 (0.034)
Avg. Years in Crisis‡	-0.91 (0.67)	-2.84** (1.15)	-1.35*** (0.42)	-1.08*** (0.38)
Avg. Percentage School Enrollment	0.24 (0.24)	0.64** (0.22)	0.02 (0.03)	0.03 (0.03)
Avg. Exports/GDP	0.02 (0.04)	0.02 (0.14)	0.05*** (0.02)	0.04** (0.02)
Avg. Population Growth Rate	-0.28 (0.80)	0.75 (0.97)	0.06 (0.37)	-0.05 (0.40)
Average Savings/GDP	–	-0.06 (0.10)	–	0.12** (0.05)
Ln GDP per capita in first year of 5 yr period	-5.31* (2.96)	-4.49 (4.96)	-5.72*** (1.30)	-6.81*** (1.40)
Constant	36.91* (20.35)	27.15 (38.19)	52.60*** (11.65)	60.84*** (12.39)
Mean Country Growth Rate (% per year) (std. dev)		1.33 (1.69)		1.73 (2.02)
Mean Years in crisis (std. dev)		0.12 (0.20)		0.18 (0.29)
Number of country years	105	62	241	241
Number of Countries	19	12	48	48
R <sup>2</sup> -within	0.26	0.43	0.30	0.33

*Note:* Fixed effects models presented with robust standard errors clustered by country in parentheses. Models for each wave include dummies for years 1880, 1885, 1890, 1895, 1900, 1905, 1910 and 1973, 1978, 1983, 1988, 1993, and 1998, respectively. ‡ - Average years of financial crisis is the sum of dummies for whether a country experienced a currency, banking, or debt crisis. Hausman-Taylor  $\chi^2 = 10.68$  ( $p < 0.56$ ) and 45.95 ( $p < 0.001$ ) for first and second waves respectively, favors fixed effects over random effects for second wave.

*Significance at \* -  $p < 0.10$ , \*\* -  $p < 0.05$ , \*\*\* -  $p < 0.01$*