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Sovereign Debt Crises and Credit to the Private Sector

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Abstract

We argue that, through its effect on aggregate demand and country risk premia, sovereign debt restructuring can adversely affect the private sector's access to foreign capital markets. Using fixed effect analysis, we estimate that sovereign debt rescheduling episodes are indeed systematically accompanied by a decline in foreign credit to emerging market private firms, both during debt renegotiations and for over two years after the agreements are reached. This decline is large (over 20%), statistically significant, and robust when we control for a host of fundamentals. We find that this effect is different for financial sector firms, for exporters, and for nonfinancial firms in the non-exporting sector. We also find that the effect depends on the type of debt rescheduling agreement.

JEL classification: F34, F32, G32

Key words: sovereign debt, default, credit rationing, credit constraints

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1 Introduction

In the last two decades of the 20th century, emerging markets experienced a lending boom. Not surprisingly, this boom was accompanied by a number of sovereign debt renegotiation episodes. Many of these were followed by economic crises of different severity in “defaulting” countries. One channel through which economic activity can be affected by sovereign debt restructuring is the tightening of the external financial constraints for the private firms. Indeed, international capital market has become an important source of funds for the emerging markets’ private sector, contributing over 30% of total net capital inflows to emerging markets.¹ Now about 25% of emerging markets’ corporate bonds and bank credit are external, and this number is much larger for Latin American emerging economies.²

Recent empirical work has found various changes in credit patterns in the aftermath of financial crises (Blalock, Gertler, and Levine, 2004; Desai, Foley, and Forbes, 2004; Eichengreen, Hale, and Mody, 2001; Tomz and Wright, 2005) as well as changes in stock market behavior (Kallberg, Liu, and Pasquariello, 2002; Pasquariello, 2005). The empirical literature regarding the effects of sovereign defaults has focused on the impact on *sovereign* borrowing.³ However, to our knowledge, there is no systematic analysis of the effects of sovereign debt crises on the foreign credit to the private sector. In this paper, we focus on the short- and medium-run effects of sovereign debt renegotiations on *private firms’* access to foreign credit. In our exercise, we do not estimate the probability of sovereign debt crises; instead, we take these events as given and analyze their ex post effects.

¹See, for example, Chapter 4 of the Global Development Finance, The World Bank, 2005.

²See Chapter 4 of the Global Financial Stability Report, IMF, April 2005.

³Eichengreen and Lindert (1989) find that sovereign default does not seem to influence future access of sovereigns to the capital market. This finding is confirmed in a recent study by Gelos, Sahay, and Sandleris (2004) — they find that the probability of the sovereign’s market access is not strongly influenced by the sovereign default. On the other side of the debate, Ozler (1993) claims that the countries can only reenter the credit market after settling old debts, and Tomz and Wright (2005) find that over the last 200 years “about half of all defaults led to exclusion from capital markets for a period of more than 12 years.”

Debt rescheduling is not a discrete event, but rather a process. In many cases, an agreement takes a long time to be reached. One example is Mexico, which suffered a crisis in December 1994 but did not settle its debt rescheduling until May 1996. It is possible that both borrowing firms and foreign investors respond to the onset of negotiations in a different way than they respond to the final agreement.⁴ Therefore, we construct data on the onset of debt negotiations and consider separately the effects of the negotiations and the effects of reaching the final agreement.⁵ We also analyze the effects of different types of debt rescheduling.

Sovereign default can adversely affect foreign credit to private firms through lenders' reassessment of country risk (Drudi and Giordano, 2000) and via decline in aggregate demand that frequently accompanies a sovereign debt crisis and its resolution (Dooley and Verma, 2003; Tomz and Wright, 2005). We provide a detailed informal discussion of these and other channels through which sovereign debt crises can affect foreign credit to private firms. Our empirical analysis allows us to see which channels appear to be important and suggests avenues for more formal understanding of the transmission mechanism, which we pursue in a companion paper.

Our micro-level data on foreign bond issuance and foreign syndicated bank loan contracts come from Bondware and Loanware.⁶ We group privately-owned firms into financial and nonfinancial sectors, splitting the latter into exporting and non-exporting sectors, using information on the export structure of the country.⁷ For each sector, we calculate the total amount that firms borrowed on the bond market or from bank syndicates in each month. We do this for 34 emerging markets between 1981 and 2004. We also construct a number of indicators that describe various aspects of

⁴Arslanalp and Henry (forthcoming) find that Brady deals in fact lead to an increase in domestic stock market indexes and in the stock prices of U.S. banks that had significant exposure to the countries involved.

⁵Throughout the paper we will refer to the onset of debt renegotiations loosely as “default”, and to the end of debt renegotiations as “rescheduling”.

⁶Hale (forthcoming, 2007) shows that sovereign debt rescheduling has a large impact on the instrument composition of private borrowers' external debt. Thus, we are combining bond and bank financing to account for possible substitution between the instruments.

⁷We attempted to split our sample according to an industry's financial dependence (Rajan and Zingales, 1998). Unfortunately, these data are only available for the manufacturing sector, which will make us lose more than a half of our sample.

each country’s economy as well as factors that affect the world supply of capital to emerging markets, which we use as control variables. We analyze these data using fixed effects panel regressions.

We find systematic evidence of a decline in credit in the aftermath of a sovereign default.⁸ All the effects are statistically significant and economically important: After controlling for the effects of fundamentals, we find an additional decline in credit of over 20% below the country-specific average during the debt negotiations and for over two years after the agreement is reached. We analyze different types of debt rescheduling agreements and find that the decline in credit to the private sector does not occur after voluntary debt swaps and debt buybacks, and is smaller after agreements with commercial creditors as opposed to agreements with official creditors. Furthermore, the agreements that include new lending in the deal lead to a lower decline in credit to the private sector than the agreements that do not.

The distribution of this decline is uneven across firms: Credit to the exporting sector is not affected during the debt renegotiations but declines after the agreement is reached, while credit to the non-exporting sector declines during the renegotiations and then recovers within a year after the agreement is reached; credit to the financial firms also declines but by a smaller amount. Our tentative explanation for these findings is that exporters do not experience a decline in demand for their output, unlike domestic firms, and therefore are not affected during negotiations. When the agreement is reached, investors resume lending to the sovereigns but are less willing to lend to the private sector. While other sectors do not have any alternative and continue to borrow, exporting firms have an option to finance themselves through trade credit. We find that indeed trade credit increases after the agreement is reached.

It is worth emphasizing that this paper focuses on foreign debt financing of emerging market private firms. We do not analyze capital flows that occur in the form of trade credit, foreign direct investment (FDI), or funds raised on the stock market.⁹ We also exclude multinational and foreign

⁸In order to capture country risk premium properly, we exclude from the analysis all foreign owned firms.

⁹Auguste, Dominguez, Kamil, and Tesar (forthcoming) show that after the most recent crisis in Argentina, firms

owned companies from our sample. Thus, our results are limited to foreign borrowing by private domestically owned firms.

The remainder of the paper is organized as follows. In Part 2 we discuss the channels through which sovereign debt crises can affect private firms' foreign borrowing. Part 3 describes the empirical approach and the data. The results of the empirical analysis and their relation to the mechanism of the transmission of debt crisis effects to the private external borrowing are presented in Part 4. Part 5 concludes.

2 Effects of sovereign debt crises on lending to the private sector

In this section we informally discuss the channels through which sovereign default and debt rescheduling can affect foreign credit to domestically owned private firms. We assume throughout that the firms are not able to provide collateral to their foreign lenders.¹⁰ As a result, the firms will be subject to credit rationing and therefore the supply of credit will depend on their net worth (Stiglitz and Weiss, 1981; Calomiris and Hubbard, 1990; Mason, 1998). We also assume that firms need to borrow in order to produce and therefore their demand for credit depends on their production decisions. Finally, we assume that firms take sovereign default as exogenous and unexpected,¹¹ and therefore they commit to the production level before they know whether their sovereign will default. We proceed by discussing a number of consequences of sovereign defaults (onset of renegotiations) before we turn to the effects of actual agreements. We focus on the short-run effects and do not discuss structural changes in the economy such as entry or exit from certain sectors, as well as fire-sale FDI activity.

successfully raised funds through ADRs.

¹⁰Exporters might be able to pledge some of their output as collateral, however, such collateral is costly.

¹¹Recent models of endogenous sovereign default are Arellano (2004), Tomz and Wright (2005), and Yue (2005). For the recent empirical analysis of the vulnerability to crises in historical perspective, see Bordo and Meissner (2005).

2.1 Consequences of sovereign defaults

When the sovereign announces its inability to service the debt, investors might reassess the country risk and adjust the risk premium they charge all the borrowers from the country (Drudi and Giordano, 2000). In fact, in many cases credit rating agencies follow a “sovereign ceiling” practice, according to which none of the private borrowers can obtain a better rating than their sovereign. Thus, credit would become more expensive for all domestic firms and firms would decrease their borrowing.¹² The size of the decline in credit will depend on the price elasticity of demand for credit. One would expect that financial and exporting sectors would be more sensitive to the changes in the cost of credit: financial firms can rely on domestic liabilities such as deposits or can reduce their lending, while exporters can finance themselves through trade credit.

In practice, sovereign defaults are frequently accompanied by a decline in aggregate demand (Dooley and Verma, 2003; Tomz and Wright, 2005). This could be due to a current or expected monetary and fiscal tightening or to the conditionality that IMF involvement in the crisis resolution usually carries. Whatever the mechanism, the decline in aggregate demand would lead to a decline in the demand for the goods and services that non-exporting firms produce.¹³ This decline in aggregate demand will lead to two effects: First, since the firms precommit to the production level before they know whether their sovereign will default, they are likely to experience a decline in profits that would lead to a decline in their net worth, which, given the credit rationing environment, will tighten their borrowing constraints.¹⁴ Second, the firms will accumulate inventory and produce less next period, which means they will demand less credit. They will also utilize fewer inputs,

¹²The empirical literature shows that debt rescheduling by a sovereign on foreign debt may lead to persistent worsening of the terms of future borrowing for all ownership sectors (Hale, forthcoming, 2007; Ozler, 1993; Tomz and Wright, 2005).

¹³Since there is no evidence of direct trade sanctions imposed in the aftermath of sovereign defaults (Martinez and Sandleris, 2004), we assume that there is no decline in demand for the exporters’ product. Rose (2002), on the other hand, finds that in the long run debt renegotiations do lead to a decline in trade. However, here we focus on the short run.

¹⁴Sandleris (2005) derives these effects in a context of endogenous sovereign default.

which will push the price of inputs down and lower the costs for all the firms (exporting as well as non-exporting), and therefore further lower their demand for credit.

Sovereign defaults are frequently accompanied by domestic banking crises, usually due to the fact that the government postpones the default decision and strains the banking system in order to service the debt, until it is no longer feasible.¹⁵ This would make domestic liquidity more scarce and would increase demand for foreign credit both from the banking system and from nonfinancial firms that find it difficult to borrow domestically.¹⁶

When a sovereign starts renegotiations of the debt, it is unlikely to be able to issue any new debt until the deal is settled. During this time investors might want to lend to the country for diversification reasons and thus might actually increase their supply of credit to the private sector.

Some sovereign debt crises are accompanied by currency collapses. Abstracting from the long-run effects of these currency collapses, we focus on the accounting effect of large changes in the real exchange rates.¹⁷ First, if most of the firms' costs are denominated in domestic currency, they will have to borrow less in foreign currency in order to obtain the same amount in domestic currency. Since most of foreign lending is denominated in "hard" currencies (Eichengreen and Hausmann, 1999; Eichengreen, Hausmann, and Panizza, 2002), this would mean a decline in demand for foreign credit. In addition, exporting firms experience a decline in their domestic input costs relative to their sales (which are denominated in foreign currency). This decline would lead to an increase in their profits and retained earnings, and would allow them to borrow less, i.e., demand less credit. On the other hand, domestic firms that are utilizing imported intermediate goods will experience an increase in their input costs and will therefore demand more credit. Finally, financial firms and nonfinancial firms selling in domestic markets will experience balance sheet effects (since

¹⁵As was the case in Russia in 1998.

¹⁶For the formal treatment of the interplay between domestic and foreign lending, see Caballero and Krishnamurthy (2002).

¹⁷Burstein, Eichenbaum, and Rebelo (2002) and (2004) show that domestic prices adjust very slowly after currency collapses and therefore real and nominal exchange rates move closely together in the short-run.

their liabilities are denominated in foreign currency while their assets are denominated in domestic currency), which would immediately lead to a decline in their net worth and tighten their borrowing constraints. Thus, currency depreciation would also lead to a decline in the supply of credit to non-exporting firms.

2.2 Consequences of sovereign debt rescheduling agreements

After the agreement is reached, the period of recovery from the debt crisis starts. Depending on the terms of the agreement, the country risk premium might fall or rise compared to what it was during the negotiations period: on one hand, the uncertainty regarding the terms of rescheduling is resolved, which will always lead to a decline in the risk premium; on the other hand, given the terms of the agreement, investors will reassess the probability of a future default and the size of their losses in case the default occurs. If the “haircut” (or debt reduction) is too high, investors would expect higher losses in the future, if the haircut is too low, they will expect that the sovereign will default again. In these cases, the country risk premium might actually go up after the agreement is reached.¹⁸

Aggregate demand after the debt rescheduling agreement is reached develops endogenously depending on how the country handles debt repayment. The same is true of the state of the domestic banking system. If the sovereign is mobilizing resources to repay the debt, aggregate demand will decline and the banking sector will suffer. However, if the sovereign receives new loans in conjunction with a debt rescheduling agreement, or if the agreement includes the deferment of payments on the debt, aggregate demand and the financial system can start recovering, reversing the demand effects discussed above.

Investors will resume lending to sovereigns, however, they might want to limit their exposure to any

¹⁸See Sturzenegger and Zettelmeyer (2005) and (forthcoming, 2006) for a presentation of the history of “haircuts” and other details of debt rescheduling episodes.

given country assets. Therefore, lending to the sovereign might mean less lending to the private sector — it will become more costly for the private sector to borrow abroad. This effect will manifest itself as a decline in the supply of credit to the private sector. Finally, if currency collapse accompanies default, real exchange rate tends to recover very slowly (Burstein, Eichenbaum, and Rebelo, 2004), thus, the effects of currency collapse will wear out but are unlikely to be completely reversed.

3 Empirical approach and data sources

The previous section presented a host of channels through which sovereign debt crises might affect private sector foreign borrowing. We now turn to empirical analysis and try to identify which channels are actually at play. In order to do that, we look at different measures of credit, as well as various types of debt rescheduling agreements.

In order to test for a decline in credit in the aftermath of a sovereign debt rescheduling, we estimate the following reduced-form equation, using regressions with fixed effects:

$$q_{it} = \alpha_i + \alpha_t + \beta_0 d_{it} + \beta_1 n_{it} + \gamma_0 r_{it} + \sum_{\tau=1}^K \gamma_{\tau} z_{\tau it} + \mathbf{X}'_{it} \eta + \varepsilon_{it}, \quad (1)$$

where q_{it} is a measure of credit, α_i is a set of country fixed effects absorbing the effect of initial conditions, α_t is a set of year fixed effects absorbing the effect of common trend, d_{it} is an indicator of a default month, n_{it} is an indicator of each month during which negotiations continue, r_{it} is an indicator of a rescheduling agreement month, $z_{\tau it}$ is an indicator that a rescheduling agreement occurred more than $\tau - 1$ but less than τ years ago (we set $K = 3$), \mathbf{X}_{it} is a set of control variables, and ε_{it} is a set of robust errors clustered on country. Specific definitions of all these variables are below. Data sources are described in detail in Table 9.

To test whether there is an immediate dampening of the effect after the rescheduling agreement, in

the above regression we replace z_{1it} 's with the $m_{\varsigma it}$'s which indicate that the rescheduling occurred exactly ς months ago. We include up to 11 months in the regressions, since further effects are captured by the $z_{\tau it}$'s, $\tau = 2, 3$. To see if the expectations of default play a role, we include up to 12 monthly leads in the regression as well.

3.1 Definition of sovereign debt rescheduling episodes: $\mathbf{d}_{it}, \mathbf{n}_{it}, \mathbf{r}_{it}$

The data on the dates of actual agreements on debt rescheduling are readily available from the Paris Club and the World Bank's Global Development Finance (2002), which describe all rescheduling episodes of commercial and official debt that occurred between 1980 and 2000, which we supplemented with data from subsequent issues of the Global Development Finance. These data include the terms of rescheduling. In addition to negotiated rescheduling episodes, the World Bank data include voluntary debt swaps and debt buybacks, which are also included in our sample.¹⁹ These data also allow us to differentiate between the agreements that include new loans and the ones that do not.

The dates of the onset of negotiations are not readily available. We trace them in the financial news using the Lexis–Nexis database. We search for the first mention of the sovereign debt renegotiation prior to each rescheduling episode in any English–language media. The number of these “defaults” and the number of debt rescheduling episodes for the countries in our sample are reported in Table 1. This table also shows how many of the rescheduling episodes were voluntary debt swaps and buybacks executed at market values, how many episodes were agreements with commercial creditors, and how many episodes included new lending.²⁰ Note that the number of defaults is substantially smaller than the number of agreements. This is due to two factors: first, some debt has been restructured more than once, and second, some rescheduling episodes such as swaps and

¹⁹As such, our definition of a rescheduling episode is much broader than that used in Reinhart, Rogoff, and Savastano (2003), Reinhart and Rogoff (2004), and Tomz and Wright (2005).

²⁰For a detailed description of big sovereign defaults in the 1990s, see Sturzenegger and Zettelmeyer (forthcoming, 2006).

buybacks were not preceded by a period of publicly known negotiations.

3.2 Credit to exporting and non-exporting sectors: q_{it}

From Bondware and Loanware data sets, we gather all foreign bond issues and foreign syndicated loan contracts obtained by emerging market firms between January 1981 and August 2004.²¹ Importantly, these do not include trade credit. For bonds issued through off-shore centers, we trace the true nationality of the borrower by the location of their headquarters. We exclude all the firms that are owned by the government or by multinational or foreign companies.²² For each firm in these data sets, we code whether or not it is in the financial sector; for nonfinancials, whether or not it is in the exporting sector, using the export structure of a country and the borrower’s industry of activity at a 4-digit SIC level.²³ We then aggregate the amounts (measured in U.S. dollars) of bond issues and of loans for each sector–country–month. We drop from our analysis countries for which the total amount of bonds and loans for both sectors was non-zero in fewer than 24 months out of 264 months in our data sample. This ensures that we have enough identifying observations for each country, and leaves us with the 34 countries listed in Table 1. Figure 1 and Table 2 summarize the amount borrowed by each sector in our sample.

We divide each amount by the U.S. consumer price index (CPI) to obtain the amount of credit for each sector–country–month in real dollars.²⁴ We then construct our dependent variables as a percentage deviation from the country–specific average for each of the sectors.²⁵ Due to the high frequency of debt crises in some countries, we do not exclude crisis periods from our means, which

²¹Bond data start in March 1991, because the bond market for emerging markets did not exist in the 1980s.

²²Desai, Foley, and Forbes (2004) find that multinationals expand their activities and credit as a result of currency depreciation.

²³Table 4 presents sample industries in exporting and non-exporting sectors.

²⁴Even though the wholesale price index (WPI) would be a more appropriate index to use, it does not vary at a monthly frequency. Using the producer price index (PPI) instead of the CPI does not make a difference — its correlation with the CPI is 0.98.

²⁵We use percentage deviations from the country–specific sample means for all continuous variables. Differences in means are captured by country fixed effects, while common trends are captured by year fixed effects.

biases the means downwards; therefore, the effects we find may be smaller than the true ones.

3.3 Control variables: X_{it}

The control variables are indexes that describe different dimensions of the economy.²⁶ In each case, the variables are used as percentage deviation from their 25-year country-specific average from 1980 to 2004 on a monthly basis. All the indexes described below are lagged by one month.²⁷

Since many of the variables we would like to control for are highly correlated, we construct the indexes using the method of principal components. Because a principal component is a linear combination of the variables that enter it, in cases when some variables are missing, other weights can be rescaled to compensate for missing variables. In this way, some of the gaps in the data may be filled, which in our case is a main advantage of using these indexes.

We group the variables in the following categories, summarized in Table 3.

- **International competitiveness.** A country's international competitiveness affects the profitability of firms in both the export and the import substitution sectors and therefore their demand for credit. It also reflects a country's ability to bring in enough foreign currency to service its foreign debt and thus will affect foreign investors' interest in the country. The following variables are used to construct the index: terms of trade, change in current account, index of the market prices of the country's export commodities,²⁸ and volatility of export revenues. This index is scaled by a measure of trade openness — the ratio of trade volume

²⁶We draw on the broad empirical literature on emerging market spreads to select our variables (Eichengreen, Hale, and Mody, 2001; Eichengreen and Mody, 2000a; Eichengreen and Mody, 2000b; Gelos, Sahay, and Sandleris, 2004; Kaminsky, Lizondo, and Reinhart, 1998; Mody, Taylor, and Kim, 2001).

²⁷This turns out not to make much difference in our estimates compared to the case when they are not lagged.

²⁸Many emerging markets rely heavily on the export of a small number of commodities. We identify up to five of these commodities (or commodity groups) for each country and merge these data with monthly commodity prices from the Global Financial Data and the International Financial Statistics. For each commodity, we calculate monthly percentage deviations from its 25-year average (1980-2004). For each country and each month, we construct the index as a simple average of relevant deviations of commodity prices. If a country is exporting a variety of manufactured goods and does not rely on commodity exports, this index is set to zero.

(sum of exports and imports) to GDP. Two principal components are retained for this index.

- **Investment climate and monetary stability.** This index accounts for the short-run macroeconomic situation in the country. It reflects demand for investment, the availability of domestic funds, and foreign investors' interest in the country. This index is constructed using the following variables: ratio of debt service to exports, ratio of investment to GDP, real interest rate, ratio of lending interest rate to deposit interest rate, inflation rate, ratio of domestic credit to GDP, and change in domestic stock market index. Three principal components are retained for this index.
- **Financial development.** The level of development of the financial market affects domestic funding opportunities for firms and, therefore, their demand for foreign credit. This index is based on the ratio of stock market capitalization to GDP, the ratio of commercial bank assets to GDP, and the degree of financial account openness, which reflects how easy it is for firms to access foreign capital directly. Only the first principal component is retained for this index.²⁹
- **Long-run macroeconomic prospects.** The economy's growth prospects affect the investment demand of firms. This index is based on the ratio of total foreign debt to GDP, the growth rate of real GDP, the growth rate of nominal GDP measured in U.S. dollars, and the unemployment rate. The first two principal components are used.
- **Political stability.** When the political situation in a country is unstable, it introduces uncertainty and leads to a decline in firms' investment and their demand for credit; furthermore, it may lead to foreign investors' concerns about their ability to collect their assets in the future. This index is adopted directly from the International Country Risk Guide (ICRG).
- **Global supply of capital.** This index reflects the availability of capital in general, changes

²⁹Chinn and Ito (2005) show that, in fact, financial openness and financial development tend to be correlated.

in investors' risk attitude, and their willingness to provide capital to emerging markets. This index is constructed on the basis of an investor confidence index,³⁰ the growth rate of the U.S. stock market index, the U.S. Treasury rate, the volume of gross international capital outflows from OECD countries, and Merrill Lynch High Yield Spreads. All variables are presented as percentage deviations from their 25-year average. Two principal components are retained and capture 65% of the variance.

In addition to these indexes, we include explicitly the real exchange rate, because it can affect the amount of borrowing measured in foreign currency directly, through the accounting effects described above.³¹ To control for the effects of banking crises that could accompany sovereign debt crises, we include an annual banking crisis indicator (Hutchison and Noy, 2005).

To further control for the country access to international capital markets, we include two more variables: a dummy variable indicating whether the country has an IMF agreement in place, and a dummy variable indicating whether the country experiences an influence of a "systemic sudden stop" in capital inflows in a given month.

Some creditors are not able or willing to lend to the countries that do not have an IMF agreement in place, therefore, supply of credit to these countries can be adversely affected, especially in the aftermath of sovereign default. We set this variable equal to one if either a standby or an extended funds facility is in place for each month for a given country. Since the IMF funding is extended to sovereigns, they might affect sovereign demand for funds from commercial creditors, but are not likely to affect private demand for foreign credit directly .

³⁰Yale School of Management Stock Market Confidence Indexes can be obtained from the Yale SOM web site.

³¹Nominal exchange rates were obtained from various data sources. For countries that changed the denomination of their currency, continuous series were constructed to reflect true changes in currency values.

4 Empirical findings

We analyze whether there is a reduction in credit due to sovereign default and renegotiations. We first focus on the medium run, including our main explanatory variable for up to three years. We then repeat the analysis with monthly indicators of the event.

The size of the coefficients in all regressions can be easily interpreted. The “impact” coefficient represents the size of the percentage change in credit relative to what it would have been without the currency default or rescheduling agreement in a given month. The coefficients on the annual indicators represent the size of the percentage change in credit in each month of the year τ since the depreciation episode, if that change was constant throughout the year, relative to what it would have been otherwise.

4.1 Main results

The results for the most broadly defined debt rescheduling episodes and for the total borrowing by all sectors are presented in Table 5. The first column presents a regression that does not include any variables associated with sovereign default and is just the test of our specification with respect to control variables. All the regressions in the table include year and country fixed effects. We can see that with the fixed effects included, the first two groups of indexes do not have a significant effect. Overall, our model explains 20% of the variance in the fluctuations of private borrowing.³²

All subsequent regressions include our variables of interest. The second column presents a regression with only default and rescheduling variables on the right-hand side. We can see that the credit declines immediately in the month of default, although this coefficient is not significant, then falls further during the negotiations, by about 30%, and even further, by an additional 14% in the first year after the agreement is reached. It recovers a third of the way in the second year and another

³²This is a rather large share given that our left-hand side is measured in percentage deviations from the country-specific means

third in the third year.

Column (3) adds our control variables, or “fundamentals.” We can see that part of the decline in credit found in column (2) is due to worsening of the fundamentals — the decline in credit during debt negotiations is just below 20%, which worsens to a 30% decline after the agreement is reached. The recovery pattern appears to be slower when we control for the fundamentals.

Figure 2 presents the coefficients, based on the model in column (3), on the sovereign default and rescheduling variables that are included at monthly frequency with their individual confidence intervals. The F-tests below measure the probability that the sum of the coefficients is zero for each time period: before the crisis, between the default (talks) and the agreement (deal), and after the agreement. We include 12 lead months (months before the default) in order to see if the debt crises were expected. We include up to 24 months of negotiations (only 12 are represented on the graph), and 12 months with two additional annual dummies for the time after the agreement is reached.³³

We find that there is no effect of the “expected” defaults: credit prior to the default is actually higher than the mean. We are also comforted by this finding — it appears that reverse causality or simultaneity of a “sudden stop” type is not a problem in our data.³⁴ This positive effect could be due to excessive capital inflows into a country prior to sovereign default, as was the case in Mexico in 1994; or it could be simply due to the fact that crises are included in the means and therefore credit during “normal” times is higher than the mean by construction. We also see that there are no signs of recovering credit both during the negotiations and for two years after the agreement is reached.

³³The picture represents an example of a timeline for the case when the negotiations take exactly a year. In the cases when the negotiations do not last as long, the “deal” line has to be moved to the left. If the negotiations take longer, the line has to be moved to the right. Only 12 months are included because there are very few cases for which negotiations take longer and therefore the confidence intervals are very large. The F-test is based on all 12 monthly coefficients and a dummy for the second year of negotiations.

³⁴Nevertheless, in the robustness tests section we also test for sudden stops’ effects directly.

Even though our dependent variable is measured as a percentage deviation from the country mean, we are concerned that it might still be persistent. In column (4) we allow for the AR(1) disturbance in the coefficients and find, reassuringly, that our point estimates and their significance levels are hardly affected by that change and that the estimated AR(1) coefficient is rather small at 0.08. We pursue this test further by including a lagged dependent variable on the right-hand side in column (5), and a country-specific lagged dependent variable in column (6). While we observe slight differences in the estimated coefficients, they are all within the same confidence interval as in our main specification (column (3)). This is not surprising, since the coefficients on the lagged dependent variable are small. In what follows, we will use the specification in column (3), which corresponds to equation (1), for our additional tests.

Before turning to more refined tests, we would like to summarize the insights we obtain from this estimation:

- In the aftermath of debt crises, the private sector experiences a 30-40% decline in foreign credit that persists for over two years.
- About a third of this decline is due to worsening fundamentals, banking system distress, currency depreciation, or the combination of these factors.
- Controlling for fundamentals, banking crises, and the real exchange rate, the estimated decline in foreign credit to the private sector is about 20% during debt renegotiations, which increases to 30% in the first year after the agreement is reached, and is still around 20% in the third year after the debt rescheduling agreement.

4.2 Different sectors

Table 6 and Figure 3 present the results of the reduced form estimation, where the left-hand side variable represents the total amount borrowed by a given sector of the economy. The specification

is the same as in column (3) of Table 5 and equation (1).

We find that the effects of sovereign debt crises are not the same for all the sectors of the economy. Column (1) presents the results of our estimation for the financial sector — none of the debt crisis coefficients are significantly different from zero. This result is not surprising given that we control for the banking crises and the real exchange rate. Conditional on the fundamentals, foreign investors would like to maintain their relationship with banks and other financial institutions even if the sovereigns have defaulted on their debt.

Column (2) presents the results for the entire nonfinancial sector. Since the entire private sector that we analyzed in Table 5 consists of only financial and nonfinancial firms, the effect that we find for the entire economy has to show up in the nonfinancial sector, since the financial sector appears to be unaffected. Indeed, we find that the decline in credit to nonfinancial firms is about the same order of magnitude as for the whole economy, both during the negotiations and after the rescheduling agreement is reached.

Columns (3) and (4) split nonfinancial firms into those that are in the exporting sector, and those that are in the domestic (non-exporting) sector. Interestingly, we find that the decline in credit to the nonfinancial sector during debt renegotiations is only due to a decline in the non-exporting sector. On the other hand, the decline in the aftermath of the debt rescheduling agreement is entirely concentrated in the exporting sector.

It is relatively easy to make sense of the pattern we find for the non-exporting sector. Sovereign default increases uncertainty and tends to lower aggregate demand, thus negatively affecting both demand for credit by non-exporting firms and the supply of credit to them, as we discussed above. When the agreement is reached, the uncertainty is resolved and the aggregate output is likely to start recovering, restoring both demand and supply of credit for the non-exporting sector.

It is harder to understand the results we find for exporters. One potential explanation is that foreign lenders view exporters as more valued customers than the non-exporting sector. This could be due

because foreign banks tend to also have trade credit relationships with exporters and that exporters are able to supply some, albeit costly, collateral in the form of their international shipments. Thus, there is an option value to the banks for waiting until the uncertainty is resolved, which would explain the lack of decline in credit to exporters during the period of negotiations.

The decline in credit to exporters after the agreement is reached could imply that investors on average are not satisfied with the terms of the agreement and decrease their overall lending to the country. It could also be the case that once the agreement is reached, investors resume their lending to sovereigns, which can crowd out credit to the private sector. This crowding out can take the form of a higher cost of credit, which then would make firms look for alternative sources of funds. While non-exporting firms do not have many other options, exporters can substitute trade credit for other forms of financing. As shown in Figure 4, which plots total trade credit over the period around the debt rescheduling agreement, the amount of trade credit indeed increases right after the debt rescheduling agreement, and stays at the unusually high level for about 10 months. Further investigation of this issue is beyond the scope of this paper, given the problematic state of trade credit data.

We can summarize our findings in this section as follows:

- The decline in credit to the private sector in the aftermath of sovereign default is entirely concentrated in the nonfinancial sector.
- Among nonfinancial firms, the firms that are in the non-exporting sector experience a decline of about 12% in credit during debt renegotiations, while exporters are not affected during this period.
- In the aftermath of the rescheduling agreement, credit to non-exporting firms fully recovers, while credit to exporters declines by about 20% and stays at this low level for over two years.

4.3 Types of debt rescheduling

In the above analysis we define debt rescheduling quite broadly, including many varieties of debt reduction. It is reasonable to believe that voluntary debt swaps and debt buybacks by the government would not have the same effect as other forms of debt restructuring that involve maturity extension or a reduction in principal or interest payments. The agreements may affect investors' behavior differently depending on whether or not they include new credit. Finally, commercial and official debt restructuring may have different effects. We therefore estimate our model separately for different types of debt rescheduling, for the entire private sector of the country. Again, we employ the same specification as in column (3) of Table 5 and equation (1). The results are reported in Table 7.

In column (1), we include, in the same regression equation, separately the effects of buybacks and swaps and the effects of debt rescheduling episodes that exclude buybacks and swaps (see column (3) of Table 1 for the number of buybacks and swaps for each country). We can see that our main results are driven by the debt rescheduling agreements that do not include voluntary swaps and buybacks. Voluntary buybacks and swaps appear to be benign, if not beneficial: there is an increase in credit, although it is not statistically significant.

In column (2), we separate debt rescheduling episodes into those that included new money (new credit), and those that did not (see column (5) of Table 1 for the number of the agreements that included new money, by country). Agreements that include new money have a smaller effect on private sector foreign borrowing. Possibly, the agreements that do not carry with them new loans contain a worse signal about a country's future creditworthiness and increase the country risk premium to a larger extent. In addition, this finding is consistent with the hypothesis discussed above that when no new credit accompanies debt rescheduling, the economy might remain depressed for a longer period of time.

In column (3), we separate the effects of the agreements with commercial creditors from the effects

of the agreements with official creditors (see column (4) of Table 1 for the number of commercial agreements by country). We find that official debt restructuring leads to a larger decline in credit than commercial agreements. A potential explanation for this result could lie in the timing of debt negotiations — as a rule, official creditors negotiate with sovereigns before commercial creditors; thus, the agreement with commercial creditors contains no new information, especially if it just mimics the terms of the official agreement.

In the last column, we analyze the effects of the agreements that are harmful by all three criteria: agreements with official creditors that do not include new money and are not voluntary swaps or buybacks (only 41 out of 155 agreements enter this estimation). Our goal here is to get an idea of the quantitative decline in credit after the “worst–case scenario” episodes. We find a decline in credit of over 40% that persists for as long as three years.

Thus, we find that countries that reschedule their official debt and do not receive new loans as a part of a debt rescheduling agreement (like Russia) experience a larger decline in private external borrowing than the countries that reschedule their commercial debt, rely on buybacks and swaps and receive new loans as part of their rescheduling agreement (like Mexico).³⁵

4.4 Robustness tests

In this section we describe the robustness tests that we conducted. Table 8 presents some of the results. The rest of the results are not reported — they are available from the authors upon request.

In some cases, after financial crisis, the FDI activity increases, thus making the set of domestic firms smaller. Since we only include domestically owned firms in the analysis, we are concerned that the total amount of credit would go down simply because there are fewer domestic firms. To address this issue, in columns (1) and (2) instead of using the total amount borrowed on the left–hand side, we analyze separately the changes in average size of a loan or a bond issue and

³⁵Here and in all the regressions we control for country fixed effects.

the changes in the total number of loans or bond issues.³⁶ We find that both the average amount (measured in U.S. dollars) and the frequency of borrowing fall substantially after sovereign default. This suggests that our results are not coming purely from the composition effect, in which case we would not observe the decline in the average size of the debt issue.

In order to see whether the accounting effects of currency depreciation are important and are not properly controlled for by including the real exchange rate, we analyze the total amount of credit measured instead in national currency units. The results are reported in column (3). We find that the results are very similar to those with credit measured in U.S. dollars (the appropriate comparison is Table 5 column (5)), although the coefficients are slightly smaller.³⁷

To see if the effects are driven by the Russia–LTCM effects (Calvo and Talvi, 2005), we end our sample in 1998 (column (4)). We find that, although coefficients are slightly smaller than for the full sample, they are not significantly different. We lose significance for years 2 and 3 after the rescheduling agreement since we lose the effects of rescheduling episodes that occurred after 1995 — 50 out of 155 rescheduling episodes in our sample.

To see whether the effects are different for different credit markets, we split the amounts borrowed by bonds and loans. We find that our results are driven entirely by the loan market, not surprising given the composition of private debt presented in Figure 1 and in Table 2. We decided to keep bonds in our future regressions in order to account for possible substitution effects between the two instruments.

Since the results are driven by loans, we were worried that the debt crisis of the 1980s would have a disproportionate effect, since loans were the only credit instrument at that time. We find that this is not the case: When we limit our sample to the 1980s (column (5)), we find a decline in

³⁶We conduct this analysis for the nonfinancial sector only, since there is no observed decline in credit to the financial sector.

³⁷In this regression we do not include the real exchange rate on the right-hand side, because we use the nominal exchange rate to calculate the amount borrowed denominated in national currency, since actual borrowing occurs in foreign currency.

private credit only at the onset of debt negotiations and no significant effects of debt rescheduling. We think this is mostly due to the fact that foreign credit to the private sector was much less important during the 1980s (see Table 2). In fact, our results are driven mostly by the 1990s: when we re-estimate our model for the sample that starts in 1991, when the bond market began to expand (column (6)), we find that the effects are slightly larger, but not statistically different from the full sample results.

Calvo (1998) argues that capital flows to a country could dry up for reasons not completely in control of the country. Such “sudden stops” would not necessarily occur in all countries, and therefore would not be captured by our measure of the global supply of capital. Thus, we include an indicator that is equal to one in each month a given country was affected by a systemic sudden stop in capital inflows, according to Calvo, Izquierdo, and Talvi (2006). Since this variable is missing for many countries, we do not include it in the main specification. Its addition does not affect the results of our estimation.

Even though we include year dummies and control for the export commodity price index, we were worried that our results for exporters might be affected by the firms exporting oil and oil-related products. We exclude all oil industry firms from our calculations of the amount borrowed and find that the decline in credit for exporters is less persistent, but otherwise the picture remains unchanged.

To examine whether the effects are driven by “serial defaulters,” we excluded Argentina, Brazil, Mexico, Poland, and Russia from our sample.³⁸ We find that our results continue to hold. When we instead limit our sample to these five countries, we find that the picture is still the same, although the coefficients are not significant for the most part. To see whether our results are driven by Latin America, we exclude all Latin American countries from the sample and find that the results are qualitatively the same.

³⁸We also experimented with excluding other countries, and found that no single country is driving our results.

We changed the content of the indexes in various ways. The results do not seem to be sensitive to these changes. We also estimated the model with contemporaneous indexes rather than lagging them one period and found no significant changes.

Finally, to test whether the heterogeneity of the data is driving the results, we estimate our model separately for each country and then average the estimated coefficients for each variable. All of the coefficients of interest are within the same confidence interval as in the main specification.

5 Concluding remarks

We empirically confirm that, during debt renegotiations and in the aftermath of rescheduling agreement, foreign credit to emerging market private firms declines by over 20%. We find that the negative impact of debt renegotiations and debt rescheduling agreements varies by the type of borrower. Some of the differences across the types of borrowers are unexpected and intriguing and deserve theoretical investigation.

In addition to simply documenting the decline in private external borrowing in the aftermath of sovereign debt crises, this paper makes further empirical contributions by analyzing the effects of different types of debt rescheduling and looking at different types of borrowers.

Our findings suggest that taking into account the impact of sovereign default on domestic firms is important: not only because of the direct costs associated with decline in foreign credit and therefore production in the economy, but also because such decline in credit can hamper future economic growth and therefore make subsequent defaults more likely. However, bailing-out the sovereigns would not be a cure: even in cases when default was formally prevented through multilateral negotiations, credit to the private sector declined before and after the agreement was reached. On the other hand, using voluntary forms of debt reduction did not lead to such adverse effects on credit to the private sector (these are usually not preceded by lengthy negotiations).

It is important to note that we only focus on foreign credit provided to private firms. Moreover, our sample only includes firms that have direct access to foreign capital — firms that tend to be large. If their access to foreign capital is impaired, they are likely to turn to domestic banks, thus crowding out the credit to smaller firms. Thus, even though we do not consider small firms in our analysis, our results are suggestive of a decline in total credit in the economy and, two-way causality notwithstanding, may partially explain the decline in economic activity observed after sovereign debt crises.

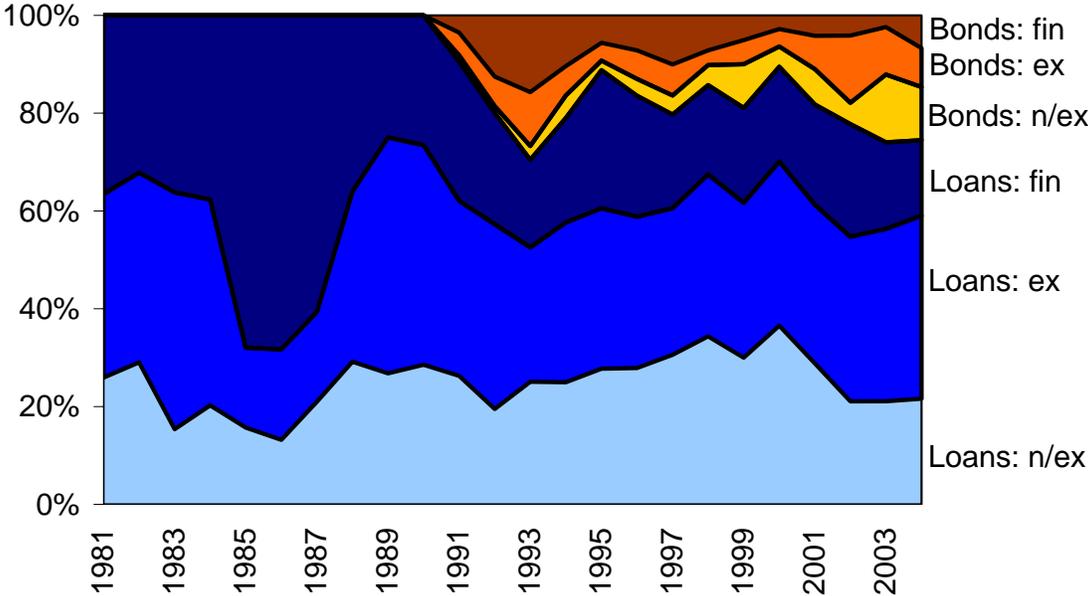
References

- ARELLANO, C. (2004): "Default Risk, the Real Exchange Rate and Income Fluctuations in Emerging Economies," Paper presented at the NBER IFM SI 2004.
- ARSLANALP, S., AND P. B. HENRY (forthcoming): "Is Debt Relief Efficient?," *Journal of Finance*.
- AUGUSTE, S., K. M. DOMINGUEZ, H. KAMIL, AND L. L. TESAR (forthcoming): "Cross-Border Trading as a Mechanism for Capital Flight: ADRs and the Argentine Crisis," *Journal of Monetary Economics*.
- BLALOCK, G., P. J. GERTLER, AND D. I. LEVINE (2004): "Investment Following a Financial Crisis: Does Foreign Ownership Matter?," Paper presented at SCCIE workshop on "Firms in Emerging Markets" May 20, 2005.
- BORDO, M., AND C. MEISSNER (2005): "The Role of Foreign Currency Debt in Financial Crises: 1880-1913 vs. 1972-1997," NBER Working Paper No. 11897.
- BURSTEIN, A. T., M. EICHENBAUM, AND S. T. REBELO (2002): "Why Are Rates of Inflation So Low After Large Devaluations?," NBER Working Paper No. W8748.
- BURSTEIN, A. T., M. EICHENBAUM, AND S. T. REBELO (2004): "Large Devaluations and the Real Exchange Rate," NBER Working Paper No. W10986.
- CABALLERO, R., AND A. KRISHNAMURTHY (2002): "A Dual Liquidity Model for Emerging Markets," *American Economic Review*, 92, 33–37.
- CALOMIRIS, C. W., AND R. G. HUBBARD (1990): "Firm Heterogeneity, International Finance, and 'Credit Rationing'," *The Economic Journal*, 100(399), 90–104.
- CALVO, G. (1998): "Capital Flows and Capital Market Crises: The Simple Economics of Sudden Stops," *Journal of Applied Economics*, 1, 35–54.
- CALVO, G., AND E. TALVI (2005): "Sudden Stops, Financial Factors and Economic Collapse in Latin America: Learning from Argentina and Chile," NBER Working Paper 11153.
- CALVO, G. A., A. IZQUIERDO, AND E. TALVI (2006): "Phoenix Miracles in Emerging Markets: Recovering without Credit from Systemic Financial Crises," NBER Working Paper 12101.
- CHINN, M. D., AND H. ITO (2005): "What Matters for Financial Development? Capital Controls, Institutions, and Interactions," NBER Working Paper 11370.
- DESAI, M. A., C. F. FOLEY, AND K. J. FORBES (2004): "Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Crises," NBER Working Paper No. W10545.

- DOOLEY, M. P., AND S. VERMA (2003): “Rescue Packages and Output Losses Following Crises,” in *Managing currency crises in emerging markets*, pp. 125–41. NBER Conference Report series. Chicago and London: University of Chicago Press.
- DRUDI, F., AND R. GIORDANO (2000): “Default risk and optimal debt management,” *Journal of Banking and Finance*, 24, 861–891.
- EICHENGREEN, B., G. HALE, AND A. MODY (2001): “Flight to Quality: Investor Risk Tolerance and the Spread of Emerging Market Crises,” in *International Financial Contagion*, ed. by S. Classens, and K. Forbes. Kluwer.
- EICHENGREEN, B., AND R. HAUSMANN (1999): “Exchange Rates and Financial Fragility,” NBER Working Papers: 7418.
- EICHENGREEN, B., R. HAUSMANN, AND U. PANIZZA (2002): “Original Sin: The Pain, the Mystery, and the Road to Redemption,” in *Currency and Maturity Matchmaking: Redeeming Debt from Original Sin*. Inter-American Development Bank.
- EICHENGREEN, B., AND P. H. LINDERT (1989): *The International Debt Crisis in Historical Perspective* chap. 1 - Overview. The MIT Press, Cambridge, Massachusetts.
- EICHENGREEN, B., AND A. MODY (2000a): “Lending Booms, Reserves and Sustainability of Short-Term Debt: Inferences from the Pricing of Syndicated Bank Loans,” *Journal of Development Economics*, 63(1), 5–44.
- (2000b): “What Explains Changing Spreads on Emerging-Market Debt? Fundamentals or Market Sentiment?,” in *The Economics of International Capital Flows*, ed. by S. Edwards. University of Chicago Press.
- FRANKEL, J. A., AND E. A. CAVALLO (2004): “Does Openness to Trade Make Countries More Vulnerable to Sudden Stops, or Less? Using Gravity to Establish Causality,” NBER Working Paper 10957.
- GELOS, R. G., R. SAHAY, AND G. SANDLERIS (2004): “Sovereign Borrowing by Developing Countries: What determines market access?,” IMF Working Paper.
- GLICK, R., AND M. HUTCHISON (2005): “Capital Controls and Exchange Rate Instability in Developing Countries,” *Journal of International Money and Finance*, 24(3), 387–412.
- HALE, G. (forthcoming, 2007): “Bonds or Loans? The Effect of Macroeconomic Fundamentals,” *Economic Journal*.
- HUTCHISON, M., AND I. NOY (2005): “How Bad are Twins? Output Costs of Currency and Banking Crises,” *Journal of Money, Credit and Banking*, 37(4), 725–752.
- KALLBERG, L. G., C. H. LIU, AND P. PASQUARIELLO (2002): “An Examination of the Asian Crisis Part I: Regime Shifts in Currency and Equity Markets,” mimeo, Stern School of Business.

- KAMINSKY, G., S. LIZONDO, AND C. M. REINHART (1998): “Leading Indicators of Currency Crises,” *IMF Staff Papers*, 45, 1–48.
- LANE, P., AND G. M. MILESI-FERRETTI (1999): “The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries,” IMF Working Paper No. 99/115.
- MARTINEZ, J. V., AND G. SANDLERIS (2004): “Is it Punishment? Sovereign Defaults and the Declines in Trade,” mimeo, <http://www.columbia.edu/~gms118/research.htm>.
- MASON, R. (1998): “An Options-based Model of Equilibrium Credit Rationing,” *Journal of Corporate Finance*, 4, 71–85.
- MODY, A., M. P. TAYLOR, AND J. Y. KIM (2001): “Modelling Fundamentals for Forecasting Capital Flows to Emerging Markets,” *International Journal of Finance and Economics*, 6, 201–216.
- OZLER, S. (1993): “Have Commercial Banks Ignored History?,” *American Economic Review*, 83(3), 608–20.
- PASQUARIELLO, P. (2005): “Are Financial Crises Indeed ”Crises”? Evidence from the Emerging ADR Market,” mimeo, Ross School of Business at the University of Michigan.
- RAJAN, R., AND L. ZINGALES (1998): “Financial Dependence and Growth,” *American Economic Review*, 88(3).
- REINHART, C. M., AND K. S. ROGOFF (2004): “Serial Default and the “Paradox” of Rich to Poor Capital Flows,” *American Economic Review*, 94, 51–74.
- REINHART, C. M., K. S. ROGOFF, AND M. A. SAVASTANO (2003): “Debt Intolerance,” *Brookings Papers on Economic Activity*, 1, 1–62.
- ROSE, A. (2002): “One Reason Countries Pay Their Debts: Renegotiation and International Trade,” NBER Working Paper 8853.
- SANDLERIS, G. (2005): “Sovereign Default: Information, Investment and Credit,” mimeo, Columbia University.
- STIGLITZ, J. E., AND A. WEISS (1981): “Credit Rationing in Markets with Imperfect Information,” *The American Economics Review*, 71(3), 393–410.
- STURZENEGGER, F., AND J. ZETTELMEYER (2005): “Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings, 1998-2005,” IMF Working Paper WP/05/137.
- (forthcoming, 2006): *Defaults in the 90s*. MIT Press.
- TOMZ, M., AND M. L. WRIGHT (2005): “Sovereign Debt, Defaults and Bailouts,” Paper presented at the NBER IFM SI 2005.

Figure 1: Composition of new foreign borrowing by private domestically owned firms in the sample



YUE, V. (2005): "Sovereign Default and Debt Renegotiation," mimeo, New York University.

Figure 2: Percentage deviation of the amount borrowed from its country mean

All firms

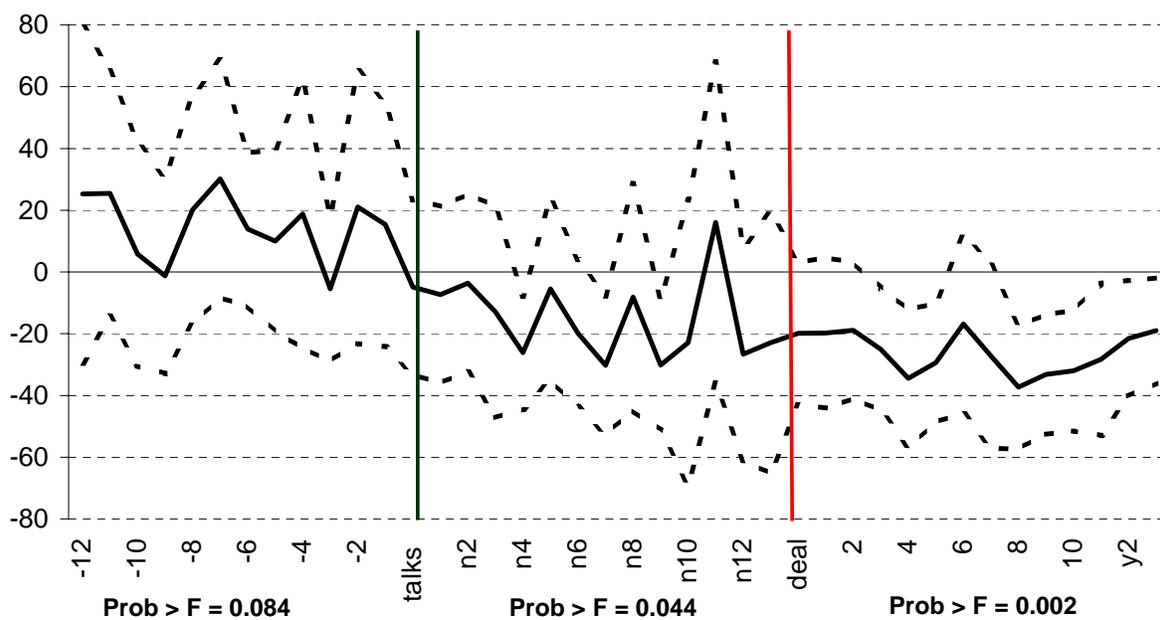


Figure 3: Percentage deviation of the amount borrowed from its country mean: by sector

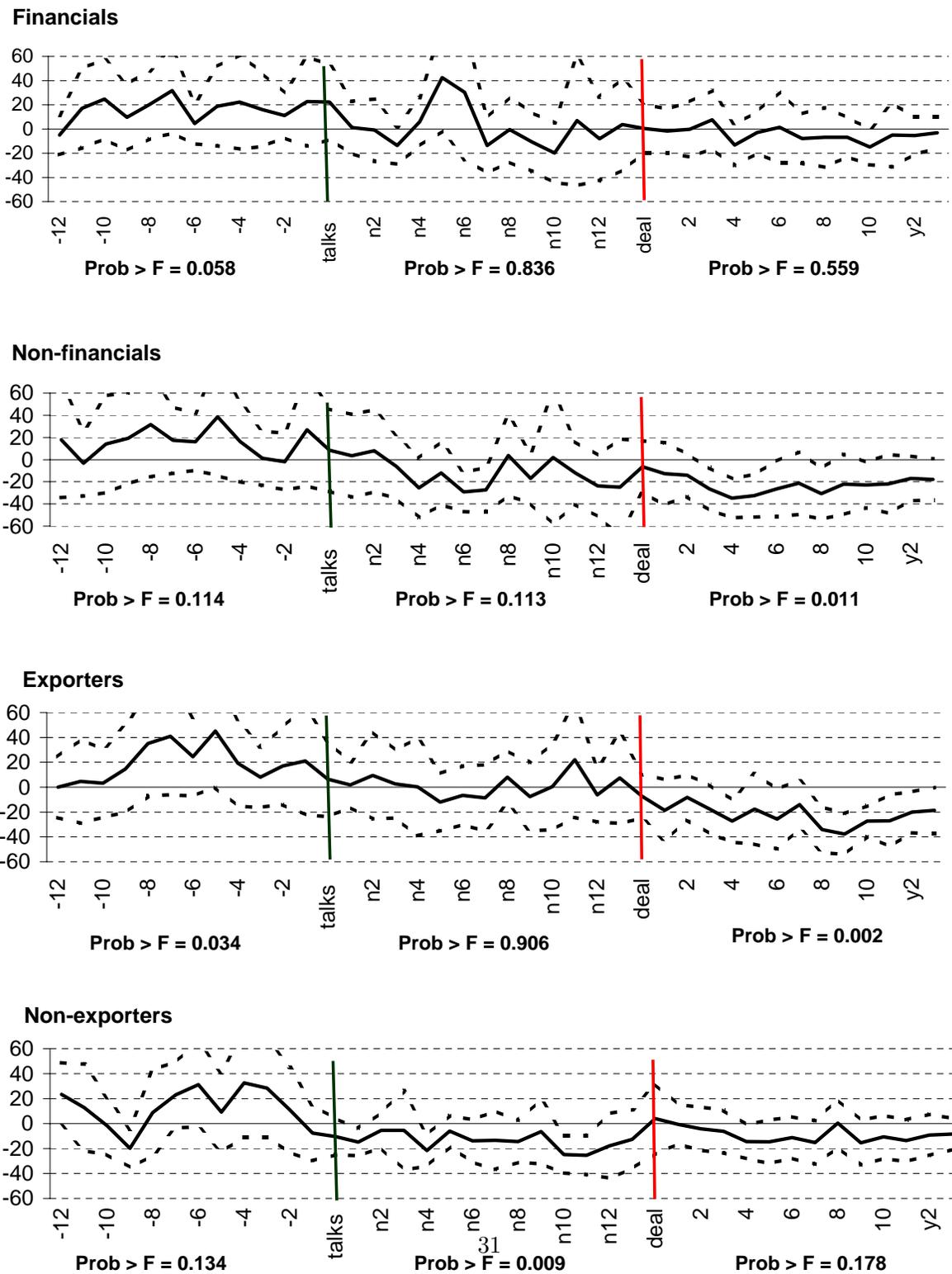


Figure 4: Total trade credit flows around the debt rescheduling agreement

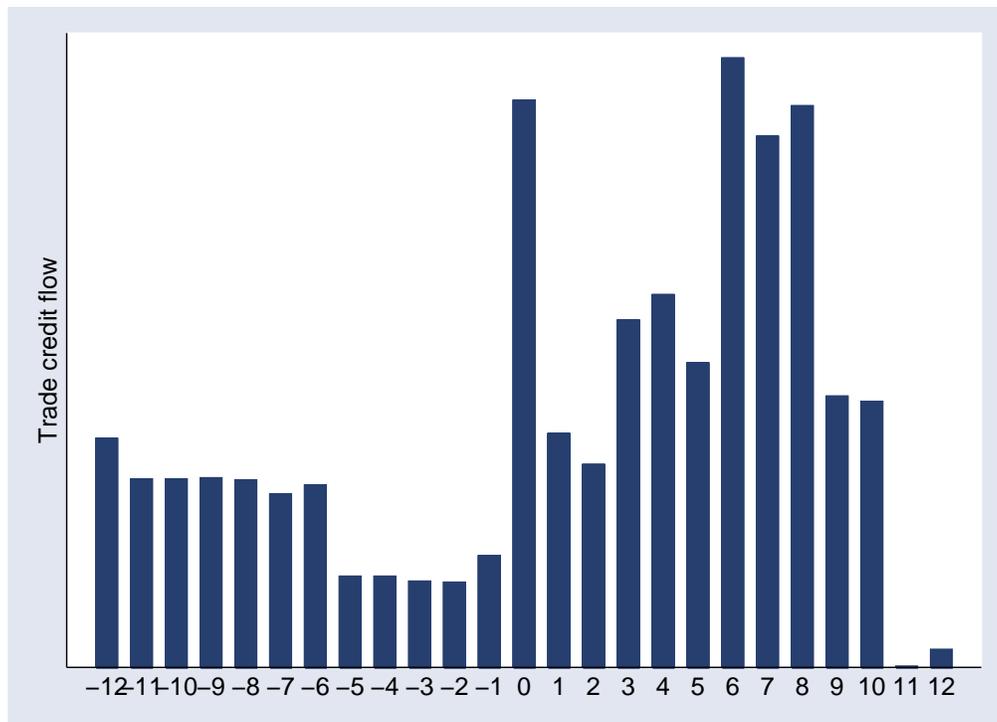


Table 1: Number of “default” and “rescheduling” episodes by country

Country	“Defaults”	All Reschedulings	Swaps and buybacks	Commercial reschedulings	Include New money
	(1)	(2)	(3)	(4)	(5)
Algeria	2	4	0	2	0
Argentina	5	19	10	14	4
Bahrain	0	0	0	0	0
Brazil	4	17	7	13	3
Chile	4	10	1	8	4
China	0	0	0	0	0
Colombia	4	4	4	4	2
Croatia	1	1	0	0	0
Czech Republic	0	0	0	0	0
Egypt	2	2	0	0	0
Ghana	0	2	0	0	0
Hong Kong	0	0	0	0	0
Hungary	0	0	0	0	0
India	0	0	0	0	0
Indonesia	1	3	0	1	0
Korea	1	1	0	0	0
Malaysia	0	0	0	0	0
Mexico	3	26	15	23	4
Pakistan	3	4	0	0	0
Peru	4	6	0	2	1
Philippines	6	11	4	6	3
Poland	8	15	1	9	0
Qatar	0	0	0	0	0
Romania	3	6	0	4	0
Russia	3	10	0	0	0
Saudi Arabia	0	0	0	0	0
Singapore	0	0	0	0	0
Slovakia	0	0	0	0	0
South Africa	1	5	0	5	0
Taiwan	0	0	0	0	0
Thailand	0	0	0	0	0
Turkey	1	2	1	2	0
United Arab Emirates	0	0	0	0	0
Venezuela	4	7	2	7	2
Total	60	155	45	100	23

Table 2: New borrowing by emerging markets' private domestically owned firms in the sample

	Total	Total	Fin.	Loans			Total	Fin.	Bonds		
				Total	Nonfinancial	Nonfinancial			Total	Nonfinancial	Non-fin.
				Total	Exp.	Not exp.			Total	Exp.	Non-exp.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1981	29.2	29.2	10.7	18.5	11.0	7.6					
1982	26.6	26.6	8.6	18.1	10.3	7.7					
1983	16.1	16.1	5.8	10.3	7.8	2.5					
1984	19.6	19.6	7.4	12.2	8.3	4.0					
1985	19.4	19.4	13.2	6.2	3.2	3.1					
1986	17.2	17.2	11.7	5.4	3.2	2.3					
1987	14.4	14.4	8.7	5.7	2.6	3.0					
1988	13.3	13.3	4.8	8.5	4.6	3.9					
1989	22.6	22.6	5.6	16.9	10.9	6.0					
1990	29.4	29.4	7.8	21.6	13.2	8.4					
1991	44.0	39.8	12.5	27.3	15.7	11.6	4.2	1.6	2.6	2.0	0.6
1992	51.7	41.4	11.8	29.6	19.5	10.1	10.3	6.5	3.8	3.1	0.7
1993	64.8	45.7	11.6	34.1	17.8	16.3	19.1	10.2	9.0	7.1	1.8
1994	83.8	66.2	17.9	48.3	27.4	20.9	17.6	8.7	8.9	5.0	3.9
1995	111.2	98.7	31.4	67.3	36.5	30.8	12.5	6.2	6.2	4.0	2.2
1996	147.3	123.1	36.4	86.6	45.6	41.1	24.2	10.5	13.7	8.6	5.1
1997	209.9	167.3	40.2	127.1	62.9	64.2	42.6	21.1	21.5	13.3	8.2
1998	105.7	90.6	19.3	71.3	35.0	36.3	15.1	7.6	7.5	3.2	4.3
1999	81.5	66.1	15.8	50.2	25.8	24.4	15.4	4.1	11.3	4.0	7.3
2000	140.1	125.4	27.1	98.2	47.0	51.2	14.7	3.9	10.8	5.0	5.8
2001	97.3	79.5	19.9	59.6	31.6	28.0	17.7	4.1	13.7	6.6	7.0
2002	81.4	63.3	18.7	44.5	27.4	17.1	18.1	3.4	14.7	11.2	3.5
2003	102.9	76.2	18.2	58.0	36.3	21.7	26.7	2.5	24.3	10.0	14.3
2004*	64.7	48.2	10.0	38.2	24.2	14.0	16.5	4.3	12.2	5.1	7.0
Total	1594.1	1339.3	375.4	963.9	527.8	436.1	254.8	94.5	160.2	88.5	71.7
% of total		84.0	23.5	60.5	33.1	27.4	16.0	5.9	10.1	5.6	4.5

*Through August 2004.

Measured in bln. USD. Numbers for loans represent the size of facilities, not actual amounts drawn.

Table 3: Summary of indexes

Concept	Variables	Notes	Indexes
International competitiveness	Terms of trade	Scaled by trade	1.1
	Change in CA	openness	1.2
	Export commodity prices	Lagged 1 month	
	Volatility of export revenues		
Investment climate and monetary stability	Debt service/Exports	Lagged 1 month	2.1
	Investment/GDP		2.2
	Real interest rate		2.3
	Lending rate/Deposit rate		
	Inflation rate		
	Domestic credit/GDP		
Financial development	Change in stock market index		
	Stock market cap./GDP	Lagged 1 month	3.1
	Comm.bank assets/GDP		
Long-run macroeconomic prospects	Financial account openness		
	Foreign debt/GDP	Lagged 1 month	4.1
	Growth rate of real GDP		4.2
	Growth rate of GDP in USD		
Political stability	Unemployment rate		
	ICRG political stability index	Lagged 1 month	5.1
Global supply of capital	Investor confidence index	Not lagged	6.1
	Growth rate of US stock mkt. index		6.2
	US Treasury rate		
	Gross capital outflows from OECD		
	ML High Yield Spread		

Table 4: Sample industries in exporting and non-exporting categories

Exporting	Non-exporting
Chemicals	Food and drinks
International airlines and shipping	TV and radio services
Oil and gas industry	Communication services
Motor vehicles	Construction and related
Minerals and timber	Utilities
Electric services	Retail
Manufactured goods	Restaurants, hotels, leisure
Agricultural products	Electric services
Food, drinks, tobacco	Transportation and storage
Steel and aluminum	Domestic airlines and shipping

Table 5: Effects of debt crises on total amount borrowed

	(1)	(2)	(3)	(4)	(5)	(6)
Month of default		-12.01 (10.04)	-7.84 (13.85)	-8.49 (17.97)	-7.33 (14.15)	-12.5 (14.43)
Debt rescheduling process		-30.13*** (7.25)	-18.80** (9.38)	-18.39*** (6.44)	-14.74* (8.81)	-20.14** (8.92)
Month of debt rescheduling		-44.37*** (11.65)	-23.36** (11.82)	-23.80** (10.58)	-22.84** (11.17)	-27.05** (12.39)
Year 1 since debt rescheduling		-43.70*** (8.04)	-29.67*** (9.30)	-29.49*** (6.00)	-26.94*** (9.21)	-32.50*** (10.45)
Year 2 since debt rescheduling		-34.26*** (8.86)	-23.99** (9.90)	-23.72*** (6.31)	-20.38** (9.30)	-23.62** (9.95)
Year 3 since debt rescheduling		-17.99** (8.83)	-20.96** (9.28)	-21.31*** (7.07)	-18.26** (7.85)	-20.69** (8.18)
Index 1.1	-5.07		-5.41	-5.52***	-4.20	-3.61
Index 1.2	0.73		0.81	0.74	0.92	0.95
Index 2.1	3.46		2.04	2.08	1.87	0.56
Index 2.2	-1.34		-2.20	-2.13	-2.38	-2.63
Index 2.3	-1.94		-2.36	-2.32	-3.61**	-4.18**
Index 3.1	6.43**		6.29**	5.69***	5.76**	5.50**
Index 4.1	3.07**		2.98**	3.03***	2.68**	2.65**
Index 4.2	-0.37		-0.41	-0.33	-0.24	0.04
Index 5.1	1.03***		0.93***	0.97***	0.84***	0.79***
Index 6.1	-17.42***		-16.72***	-15.96***	-15.97***	-15.80***
Index 6.2	18.78***		18.57***	17.86***	16.57***	16.79***
Real exchange rate	-13.17***		-11.42***	-11.14***	-9.73***	-9.27***
Banking crisis indicator	-25.07***		-26.05***	-25.55***	-25.92***	-25.84***
IMF agreement indicator	-19.20***		-12.50*	-12.48***	-11.85*	-10.52*
Lagged dependent variable					0.083***	*country
Constant	-74.88***	-57.28***	-76.88***	49.88***	-72.34***	-74.65***
Observations	5515	9186	5515	5485	5244	5244
Adjusted R^2	0.20	0.18	0.20		0.20	0.21
ρ (AR)				0.08		

Dependent variable: total amount borrowed in percentage deviations from the mean.

Country and year fixed effects are included in all regressions.

Robust standard errors clustered on country are in parentheses.

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

Table 6: Effects by type of borrower

	Financial	All	Nonfinancial	
	(1)	(2)	Exporting	Not exporting
	(1)	(2)	(3)	(4)
Month of default	20.15 (15.82)	4.84 (18.46)	1.62 (14.43)	-13.62** (6.07)
Debt rescheduling process	-0.47 (11.14)	-16.56* (9.22)	-3.64 (6.98)	-12.60** (5.94)
Month of debt rescheduling	-0.78 (10.70)	-8.86 (12.36)	-9.67 (10.16)	3.95 (15.13)
Year 1 since debt rescheduling	-5.08 (8.09)	-25.30** (10.00)	-23.42*** (7.99)	-8.34 (6.67)
Year 2 since debt rescheduling	-6.43 (8.33)	-18.41* (10.45)	-21.79** (8.98)	-9.31 (8.89)
Year 3 since debt rescheduling	-3.77 (7.15)	-19.24* (10.05)	-19.88** (10.03)	-8.61 (6.53)
Index 1.1	-3.40	-4.67	-1.91	-4.67
Index 1.2	1.14**	0.70	-0.47	1.48**
Index 2.1	2.45	2.02	1.96	3.35
Index 2.2	-1.23	-2.87	-3.50	1.21
Index 2.3	0.01	-1.13	-1.60	2.15*
Index 3.1	5.12*	4.78**	5.14**	1.58
Index 4.1	2.53*	2.25	2.23	0.38
Index 4.2	-0.14	-2.85	-0.48	-2.39
Index 5.1	0.35	0.69***	0.50*	0.50**
Index 6.1	-5.51	-15.56**	-12.91***	-8.23**
Index 6.2	1.74	16.43***	8.79**	8.60**
Real exchange rate	-6.63**	-8.70***	-6.53***	-5.57***
Banking crisis indicator	-16.26	-20.56*	-11.90	-12.58
IMF agreement indicator	-10.21	-15.71***	-4.59	-9.87*
Constant	-43.21**	-88.22***	-76.99***	-62.47*
Observations	5504	5480	5442	5466
Adjusted R^2	0.17	0.19	0.17	0.18

Dependent variable: total amount borrowed by sector in percentage deviations from the mean. Robust standard errors clustered on country are in parentheses. Year and country fixed effects are included.

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

Table 7: Effects of different types of rescheduling

	(1)	(2)	(3)	(4)
Month of default	-5.07 (14.28)	-5.87 (13.40)	-6.07 (14.24)	-1.65 (13.74)
Debt rescheduling process	-16.60* (8.83)	-16.75* (9.58)	-15.57* (8.01)	-8.16 (7.72)
	No buybacks and swaps (a)	No new money (b)	Official (c)	Intersection of (a) (b) (c)
Month of debt rescheduling	-39.68*** (11.24)	-18.62 (11.66)	-44.60*** (14.75)	-33.5*** (13.0)
Year 1 since debt rescheduling	-41.10*** (9.95)	-28.54*** (8.74)	-46.44*** (10.69)	-43.6*** (10.2)
Year 2 since debt rescheduling	-29.22*** (10.13)	-29.66*** (9.52)	-28.64*** (10.57)	-37.3*** (10.2)
Year 3 since debt rescheduling	-26.62** (11.08)	-28.84*** (8.19)	-27.60** (11.14)	-43.7*** (11.0)
	Buybacks and swaps	New money	Commercial	
Month of debt rescheduling	16.08 (20.61)	-15.53 (12.65)	-4.43 (11.68)	
Year 1 since debt rescheduling	10.44 (12.48)	-11.26 (10.59)	-10.57 (8.08)	
Year 2 since debt rescheduling	4.27 (11.82)	-23.47*** (7.53)	-16.01** (7.15)	
Year 3 since debt rescheduling	12.08 (14.32)	-27.86*** (9.16)	-21.58*** (5.78)	
Constant	-76.67*** (19.96)	-77.62*** (20.83)	-74.70*** (20.78)	-74.24*** (21.95)
Observations	5515	5515	5515	5515
Adjusted R^2	0.21	0.20	0.21	0.20

Dependent variable: total amount borrowed in percentage deviations from the mean.

Robust standard errors clustered on country are in parentheses.

Year and country fixed effects and all control variables are included.

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

Table 8: Robustness tests

	Average size of loan/issue (1)	Number of loans/issues (2)	National currency (3)	Year < 1999 (4)	Year < 1991 (5)	Year > 1990 (6)
Month of default	14.40 (49.71)	33.39 (34.26)	-5.40 (16.04)	-4.40 (15.33)	-16.05* (8.50)	-9.75 (27.44)
Debt rescheduling process	-55.40*** (13.11)	-25.81* (15.30)	-13.87** (6.90)	-14.81* (8.85)	-4.74 (4.68)	-35.10** (16.44)
Month of debt rescheduling	-46.20** (23.32)	-47.76* (24.74)	4.54 (18.01)	-21.42* (11.55)	-5.83 (8.88)	-27.05 (16.58)
Year 1 since debt rescheduling	-35.58* (21.23)	-48.44*** (15.31)	-18.91* (11.31)	-20.13* (10.59)	-5.44 (10.10)	-36.88*** (12.08)
Year 2 since debt rescheduling	-52.92*** (18.00)	-40.23** (17.40)	-17.45 (11.67)	-12.12 (11.45)	-1.22 (7.63)	-28.01** (11.04)
Year 3 since debt rescheduling	8.67 (26.24)	-19.03 (26.44)	-18.43* (9.67)	-12.40 (8.99)	-15.70** (6.62)	-24.16** (11.09)
Index 1.1	0.74	-8.41	-3.98	-0.82	-1.75	-7.17*
Index 1.2	-0.18	-0.23	1.80*	-0.04	0.48	0.62
Index 2.1	6.74	3.15	3.14	1.12	0.78	4.37
Index 2.2	-7.19*	-6.22*	-2.02	-2.57	1.32	-3.95
Index 2.3	-4.41	-7.46*	-0.66	-3.16	2.52	-2.32
Index 3.1	12.56**	11.76**	5.59**	9.15**	-4.43	6.04*
Index 4.1	4.09*	5.55*	-0.32	4.42**	5.65	1.19
Index 4.2	1.07	-4.14	-3.20	1.91	1.58	-2.61
Index 5.1	1.02**	1.75***	0.39	0.78***	0.10	1.17***
Index 6.1	-30.25	-29.95***	-20.95***	-51.26***	-17.28	-15.63**
Index 6.2	23.12*	38.57***	14.41***	37.66***	16.52	18.60***
Banking crisis	-15.89	-18.19	-17.40**	-16.73*	-16.41***	-19.98
IMF agreement	-15.46	-18.82	-12.91*	-10.53	3.28	-20.28***
Real exchange rate	-0.55	-9.07		-15.18***	3.41	-10.27**
Constant	-61.59	-90.59	-5.85	121.69***	-31.93	-85.86***
Observations	5826	5826	5962	4186	1697	3818
Adjusted R^2	0.05	0.06	0.22	0.25	0.11	0.17

Dependent variables in percentage deviations from the mean.

Robust standard errors clustered on country are in parentheses.

Year and country fixed effects are included.

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

Table 9: Data formats and sources

Variable	Frequency	Units	Source
Primary bond issues	by issue	#, US\$	Bondware
spread	by issue	bp	Bondware
maturity	by issue	years	Bondware
Syndicated loan contracts	by contract	#, US\$	Loanware
spread	by contract	bp	Loanware
maturity	by contract	years	Loanware
Export industries	constant	list	CIA Factbook, UNCTAD
Secondary bond spreads	monthly	bp	Bloomberg, Datastream, etc.
Onset of negotiations	by event	date	Lexis–Nexis news
Debt rescheduling	by event	date	Paris Club, GDF (2002)
Terms of trade	annual	index	UNCTAD
Current account	monthly	US\$	IFS line 78al
Real exchange rate	monthly	index	IFS line rec
Export commodity prices	monthly	index	Authors' calculations (see text)
Exchange rate regime	monthly	list	Reinhart & Rogoff (2004)
Exports	monthly	n.c.units	IFS line 90c
Imports	monthly	n.c.units	IFS line 98c
GDP	monthly	n.c.units	IFS line 99b, GFD
Debt service	monthly	US\$	Joint BIS-IMF-OECD-WB data
Investment	monthly	n.c.units	IFS line 93e
Lending rate	monthly	percent	IFS line 60p
Deposit rate	monthly	percent	IFS line 60l
CPI inflation rate	monthly	percent	IFS line 64x
Nominal exchange rate	monthly	n.c./US\$	IFS line
Domestic credit	monthly	n.c.units	IFS line
Sovereign credit rating	monthly	index	S&P, Moody's, EIU
Stock market indexes	monthly	index	Ibbotson, GFD, Bloomberg
Stock market cap.	monthly	n.c.units	GFD
Comm. banks assets	monthly	n.c.units	IFS lines 20-22
Capital access	annual	index	Milken Institute
Fin. account openness	annual	index	IMF, Glick and Hutchison (2005)
Total foreign debt	quarterly	US\$	Joint BIS-IMF-OECD-WB data
Industrial production	monthly	index	WB
Unemployment rate	monthly	percent	IFS line 67r, GFD
Political stability	monthly	index	ICRG
Investor confidence	monthly	index	Yale SOM
US stock market index	monthly	index	GFD
US Treasury rate	monthly	percent	Federal Reserve
Gross capital outflows	monthly	US\$	Lane and Milesi-Ferretti (1999)
EMBI index	monthly	index	J.P.Morgan/Bloomberg
IMF program	monthly	binary	IMF web site
Sudden stop	monthly, annual	binary	Calvo, Izquierdo, and Talvi (2006), Frankel and Cavallo (2004)
Banking crisis indicator	annual	binary	Hutchison and Noy (2005)
Trade credit	monthly	US\$	Joint BIS-IMF-OECD-WB data

Note: See text for description of Bondware and Loanware, GFD is World Bank's Global Development Finance, IFS is International Financial Statistics, GFD is Global Financial Data, EIU is Economist Intelligence Unit, ICRG is International Country Risk Data. Most data sets are available through Yale University Library.