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VULNERABILITY, CRISIS AND DEBT MATURITY: DO IMF INTERVENTIONS SHORTEN THE LENGTH OF BORROWING?*

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Abstract
This paper studies how IMF lending affects countries' bonds maturity. Debt maturity was claimed to be one of the causes of the crisis of recent years: Too much short-term debt would be the seed of self-fulfilling crisis. In turn, one of the goals of the IMF interventions is to prevent crises and to alleviate their effects once they occur. I find evidence that, on average, IMF interventions reduce countries' debt maturity which would be a non-desirable effect. However, I also find evidence that the final effect depends on countries' fundamentals. The IMF would make countries borrow at longer terms (or reduce less the maturity) when the fundamentals are relatively weak.

Resumen
El presente artículo estudia cómo afectan los préstamos del FMI la madurez de los bonos. El plazo de los créditos fue sindicado como una de las causas de la última crisis: un exceso de deuda de corto plazo sería la semilla de una crisis autogenerada. A su vez, uno de los objetivos de las intervenciones del FMI es prevenir las crisis y si ocurren aminorar sus efectos. Se encuentra evidencia de que, en promedio, las intervenciones del FMI reducen el plazo de las deudas soberanas, lo que sería un efecto no deseado. Sin embargo, la evidencia también revela que el efecto final depende de los fundamentos del país. El FMI haría que los países alargarían (o acortarían menos) los plazos de su deuda cuando los fundamentos son relativamente débiles.

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1 Introduction

From time to time economies are hit by financial crises. In turn, the International Monetary Fund (IMF or Fund) has become the most important International Financial Institution lending money and assisting these economies to cope with such crises. Through its interventions, the Fund is likely to affect countries' capital market access and financial structure, which may affect their vulnerability to crisis (see, for example, Boz (2011) and Mody and Saravia (2006)).

In particular, this paper studies whether the International Monetary Fund's interventions affect countries' borrowing term structure. The issuance of too much short-term debt, either by the government or by the public sector, was recognized as one of the problems that has been present in the International Financial Architecture and one of the usual suspects leading to financial crises, for example Mexico (1994) and Asia (1998) (e.g. Rodrik and Velasco (1999) and Detragiache and Spilimbergo (2004)). As recently as 2010, European countries faced fiscal problems that have translated into debt-rollover difficulties.[1] Although, in these cases, the crisis may not have been clearly originated in excessive short-term borrowing, it has undermined investor confidence and has made difficult to find fresh funds to repay debt.

The Fund, through its interventions, pursues the stability of the international monetary system and, consequently, one of its goals is to take actions to prevent crises and act expeditiously once they occur. Suppose that IMF lending shortens the length of countries' borrowing. Then, this would actually be a negative consequence of its interventions if one of the possible causes of crises is the holding of too much short-term debt. On the other hand, if Fund lending allows countries to tap longer maturities it would be helping countries to reach a more convenient financial profile, reducing the probability of a financial crisis.

As will be discussed below there are forces related to the Fund's lending that prevent us from making an unambiguous conclusion ex-ante on this question. On the one hand, IMF interventions could improve countries' economic prospects and alleviate a situation of distress by allowing countries to borrow at longer terms. This is the case because countries find it difficult to borrow at longer terms in difficult situations (e.g. Broner et al. (2010)). On the other hand, if IMF intervention is not perceived as significantly improving the economic situation, and considering that the Fund is a de-facto senior lender, other lenders would prefer to lend short-term since it increases

[1] See for example The Economist on February 4 2010.

the probability that they will be repayed. Having shorter maturities than the senior lender is safer. Some authors have highlighted the issue of IMF seniority (e.g. Bi (2006) and Saravia (2010)) and recently some commentators have argued that seniority implicit in European countries' rescue packages was an important factor behind the failure to reduce spreads after the Greek and Irish packages, (see, for example, Gros (2010))

These trade-offs have opposite empirical implications and presenting this evidence is the principal goal of this paper.

There are some identification concerns that need to be tackled. Usually, the Fund lends money to countries that need it because they are already in some kind of distress, and it is difficult for these countries to borrow long-term during those periods. Thus, care has to be taken in not attributing to the Fund an effect that is actually a consequence of a crisis.

To face this potential problem, I instrument for IMF interventions. As expected, the presence of crises and countries' vulnerabilities shorten bond maturity. The evidence suggests that the effect of IMF loans on maturity is over and above what can be attributed to a crisis or countries' vulnerabilities. When instrumenting for IMF presence, this variable enters with a negative sign in the regressions meaning that, on average, the IMF presence shortens debt maturity. However, there is also evidence suggesting that countries' fundamentals are important to determine the final effect of an intervention. In particular, the evidence shows that the Fund enlarges the maturity of countries' debt when their solvency and liquidity situation is relatively weak and shortens it when the situation is relatively sound. Thus, this piece of evidence would suggest that the IMF helps countries to tap longer maturities in their debt when its assistance is needed more. This finding is stronger when using instrumental variables in a setting that also corrects for potential sample selection in bond issuance.

The paper also contributes to the understanding of the determinants of bonds' maturity derived, mainly, in the corporate finance literature discussed below. For example, countries with better solvency and liquidity indicators, with higher growth rates and higher level of development are able to borrow at longer terms

In a related paper, Mina and Martinez-Vazquez (2002) analyze whether IMF lending originates Moral Hazard. Their regression shows a negative sign of the IMF credit variable on the ratio of countries' net short-term debt. Our works differ in data and empirical approach. The data in this

paper is not aggregate, it faces the potential endogeneity problem using instrumental variables and finds that the final effect depends on countries' fundamentals.

The paper is organized as follows. The next section presents theoretical considerations that give a context for the empirical analysis. Section 3 presents the discussion of identification issues and a review of previous literature related to the instruments chosen. Section 4 describes the data and presents descriptive statistics. Section 5 discusses the results of the regressions concerning the control variables, section 6 instruments for IMF programs, section 7 presents the results when correcting for sample selection bias and section 8 concludes.

2 Theoretical Background

This section describes some theoretical works in the literature to provide a framework to the discussion in the paper. Since the goal of this work is to study empirically how IMF interventions affect debt maturity, I organize the discussion in three steps. First, I will discuss the relationship between short-term debt and countries' vulnerability to crises, then I discuss some of the reasons given for the existence of short-term borrowing despite the liquidity risk it implies and, lastly, I discuss how IMF interventions may affect debt maturity.

Issuing short-term debt creates liquidity risk derived from the mismatch between this short-term debt and the assets that can be used to repay it. For example, Chang and Velasco (2001) present a model in the vein of Diamond and Dybvig (1983) where the presence of short-term debt may exacerbate the existence of self-fulfilling crises; if many short-term debtors believe that there will not be rollover of this debt then there would be no refinancing and, consequently, a crisis would occur. Rodrik and Velasco (1999) also present a model where short-term debt can leave the borrowing country exposed to shifts in lenders' expectations.

Broner et al. (2010) link the existence of crises to the issuance of short-term debt, highlighting the role of the credit supply. In their model issuing long-term debt is costly because new information arrives in the short-run, after initial lending decisions have been made. Consequently, long-term risk-averse lenders charge a term premium for not being able to incorporate this new information into their contracts, facing a higher degree of uncertainty. The model also shows that this term premia increases during crises, which increases the issuance of short-term relative to long-term

debt. This finding is backed by empirical evidence in that paper: during crises short-term debt is issued and countries wait for tranquil times to issue long-term debt. Thus, causality from crisis to short-term debt is established as a possibility.

Despite the existence of the costs associated with short-term debt there are reasons why short-term borrowing would be desirable. Some of these reasons have been explored in the sovereign debt literature. Calvo (1988) and Missale and Blanchard (1994) focus on government incentives to liquate debts using inflation. Issuing short-term debt would be one instrument to ameliorate this incentive. Rodrick and Velasco (1999) and Jeanne (2009) argue that short-term debt acts as a commitment device. Short-term debt gives more incentives ex-ante to avoid default, through a more disciplined fiscal policy, which increases welfare.

The corporate finance literature pointed also to other reasons to issue short-term debt that may also be relevant in the present context. Diamond (1991), in a model of asymmetric information, argues that debtors with higher credit ratings would prefer to issue short-term rather than long-term debt because it allows them to take advantage of the information revealed in the near future by refinancing at better contractual terms. The cost of issuing short-term debt is that it would imply liquidation of the project in cases that it would not be socially desirable. Another reason given in this literature to explain short-term lending is that it allows for closer monitoring of debtors and for the modification of the contractual relationship in case that it is necessary to do so (see Diamond (1991), Diamond (1993) and Rajan (1992)).

I will turn next to the discussion of how IMF interventions would affect debt maturity, and through this channel, the probability of crisis occurrence.

The IMF may affect debt maturity through several channels. Tirole (2002, p. 99) argues that the IMF can act as a delegated monitor to "substitute for the missing contracts between the sovereign and individual foreign investors and to thereby help the host country to fully benefit from its capital account liberalization." He notes that missing contracts are not just a problem when foreigners lend to the sovereign. The problem is serious even when the lending is to private domestic borrowers. The ability of private borrowers to repay is a function of a variety of unpredictable government actions, which can de facto expropriate foreign lenders. Thus, if the role of the IMF as monitor is credible, its presence would reduce lenders' necessity of monitoring through short-term lending, as the works discussed above suggest.

Marchesi and Thomas (1999) argue that contracting with the Fund has an informational role. Having the Fund as monitor implies that countries are willing to accept some conditionality and this is typically costly to the country, at least in the short run. Thus countries borrowing from the Fund signal to capital markets their willingness or ability to undertake policies necessary for enhancing the probability of future debt repayment.

Thus, in the case that the IMF succeed in its monitoring role or as a signaling device, the reduction of the uncertainty that lenders face would reduce the term-premium discussed in Broner et al. (2010) allowing countries to tap longer maturities.

However, if a Fund intervention is not perceived as improving a country's economic situation or it is perceived as signalling a difficult situation or its role as monitor is not perceived as effective, its presence would reduce borrowing maturity.

Moreover, it is commonly recognized that the IMF is a *de facto* preferred (senior) creditor. Countries have shown a higher aversion to default on IMF loans than on loans from private creditors; using Eichengreen's (2003) words: "The IMF typically gets paid back (instances of arrears to IMF loans are the exception to the rule)."[2] This seniority implicit in IMF lending would have the opposite implications on debt maturity.

Bi (2006) presents a model of sovereign borrowing with risk-averse borrowers where a senior intervention increases the risk of dilution, increasing the incentives to issue short-term debt.

We can also draw conclusions on senior lending and debt maturity from a framework similar to Broner et al. (2010) discussed above. Although they only consider the case where non-senior lending is made to cope with a liquidity distress, it is possible to infer that if this lending were allowed to be senior, then borrowers would issue only short-term debt. This is the case because senior lending would be always available to cope with the liquidity squeeze if there were investment and borrowing in the first place. Thus, short-term lenders would be repaid by this new senior lending. This would occur even if uncertainty is not reduced by the IMF's presence.

In the corporate finance literature, Diamond (1993) also argues that allowing for senior future borrowing makes it easier to issue short-term debt in the present since it will be repaid with future senior lending. Allowing senior debt makes liquidation less likely (and refinancing more likely) and this would be an equilibrium in some cases.

[2]See Saravia (2010) and references therein for a discussion of this topic.

Summarizing, this section presents some of the reasons for the existence of short-term debt and why it may be a cause of the crises that countries recurrently face. It also discusses a reverse causality, that is, why countries are more likely to issue short-term debt during a crisis. From the above discussion it can also be inferred that there are considerations about IMF lending that lead to opposite empirical implications. On the one hand, IMF lending can help countries to overcome a difficult situation, allowing them to issue long-term debt. On the other hand, if the IMF is not perceived as an effective monitor, or if its presence did not signal an improvement in countries' economic situation, it would not help countries to reach longer maturities. In addition, IMF seniority would obstruct long-term lending since it jeopardizes what other non-senior lenders expect to recover.

3 Identification Issues

In the analysis of the way that IMF programs affect countries' debt maturity, it is necessary to be careful with identification issues that may be present. This is the case because countries that are likely to have an IMF program are also countries facing some kind of distress or vulnerability, such as, a financial crisis. Both, IMF programs and vulnerabilities are likely to affect debt maturity, as discussed in section 2. Thus, it is possible to assign to the IMF an effect on maturity that is actually a consequence of another phenomena such as a crisis.

The approach I take in the paper to make this problem less likely to occur is to instrument for IMF programs. To choose the instruments I follow previous works on the determinants of IMF lending. The variables used as instruments proved adequate in detecting the presence of the Fund, and they are not likely to be contemporaneously correlated with countries' distress.

The instruments used in this paper refer to the governance of the Fund and to external political factors. As a measure of IMF governance I use a country's share of total quota subscriptions, which determines the voting power of each country in the Fund. Each country member subscribes a quota to the Fund that gives voting rights. Not all country members have the same voting rights. As explained in the IMF's website: "Quota subscriptions generate most of the IMF's financial resources. Each member country of the IMF is assigned a quota, based broadly on its relative size in the world economy. A member's quota determines its maximum financial com-

mitment to the IMF and its voting power, and has a bearing on its access to IMF financing." (http://www.imf.org/external/np/exr/facts/quotas.htm).

As external political factors, I use countries' affinity with the US measured by its affinity in United Nations voting records.

Political proximity to the IMF main shareholders was found important to explain the Fund's presence in a country by several previous works. Thacker (2000) concludes that political proximity to the US is important to explain the Fund's presence in a country. He measures political proximity with voting patterns in the UN assembly. Vreeland (2005) also tests for political proximity using UN votes. He finds that moving closer to the US in this aspect increases the probability of having a program. Dreher et al. (2009) find that temporary Security Council membership increases the probability of receiving IMF loans. Other works link a country's geopolitcal proximity to Fund's major shareholders with some kind of preferential treatment. For example, Dreher and Jehnsen (2007) show that IMF loans' conditionality depends on countries' voting pattern in the UN General Assembly and Dreher et al. (2008) show that inflation forecasts are influenced by political connections.[3]

Barro and Lee (2005) also use political variables and variables that refer to the country-Fund relationship as instruments for IMF lending. They find that the higher is a country's quota share in the Fund, the higher the probability of it having a program. They also find that political affinity with the US and Europe increases the probability of having a program. Eichengreen, Mody and Gupta (2006) also analyze the determinants of IMF programs in a paper analyzing the interaction between these programs and sudden stops. As political indicators they also use UN voting and US foreign aid. Mody and Saravia (2009) study the determinants of the time elapsed between a crisis and a program. They find that this period of time is inversely related to countries' quota and there is evidence of the importance of political proximity with the US.

I find that countries with higher quotas and those with higher affinity with the US are more likely to be involved in a Fund program which is consistent with the majority of the works mentioned in the previous paragraphs.

Another potential identification problem is that of reverse causation. As noted, the direction of causation between vulnerability indicators and maturity is not clear; some argue that countries

[3] A piece of evidence at odds with these findings is in Stone (2008) where he presents an estimation where quota shares and UN voting alignment do not significantly affect IMF lending decisions.

cannot borrow at longer terms in distress (Broner et al. (2010)) and others argue that short-term debt is itself a cause of crisis. However, in our case, the problem of identifying the direction of causation may be less problematic. This would be the case since the dependent variable is the maturity of a particular bond rather than the stock of short-term debt. The maturity of a particular bond issuance is not likely to contemporaneously cause a crisis or make the country more vulnerable since it refers to a particular bond rather than an aggregate variable. The problem of reverse causation would be more serious when using aggregate variables such as, the stock of debt or the growth rate, as the dependent variable. [4]

4 Data and Descriptive Statisitcs

I seek to explain if the maturity of an emerging market bond is influenced by the presence of an IMF program. To study this I rely on data of about 3300 bonds issued by emerging countries in the period 1991 through 2001.[5]

The bonds included in this paper are of one-year or greater maturity. The average maturity of bonds in the sample is around six years. Bond markets have more of an arm's-length nature compared to bank lending where creditors and lenders often have longer-term relationships and where banks are able to undertake monitoring themselves at a level not possible for dispersed bondholders. This is an important aspect to consider in studying the effects of IMF interventions since the Fund could have a role as a "delegated monitor" in these markets, as discussed above.

The dependent variable used in the regression is the maturity of these bonds measured in years.[6] To choose the control variables I follow closely the literature on determinants of bond spreads, principally Eichengreen and Mody (2004) and Mody and Saravia (2006), and the literature on the determinants of debt maturity which contributions are mainly in the corporate finance literature.

The data sources for the dependent and explanatory variables are documented in Appendix A. Details on bonds issued and their characteristics are obtained from Bondware, a commercial data source. Bond characteristics included in the regressions are: the dollar value of the bond

[4] This reasoning is similar to the one used by Eichengreen and Mody (2004) and Mody and Saravia (2006) when studying bonds' spreads.

[5] The data I had access to has no information on more recent bonds' issuances. However, the period analyzed is one where severe crisis occur and where the IMF has intervened.

[6] The maturity variable includes decimal values to represent fractions of a year.

issued, whether the issuer was in the public or private sectors, the industrial sector of the issuer, the currency of issue, and whether the bond had a fixed or floating rate. The global variables included are: U.S. industrial growth rate during the quarter in which the bond was issued; the daily swap rate (as a measure of liquidity risk); and, as a measure of market uncertainty, the standard deviation of daily Emerging Market Bond Index (a commonly followed index of emerging market spreads) over the relevant quarter. I use several country characteristics as control variables. Country credit ratings provided by Institutional Investor are a measure of country wealth (being highly correlated with per capita income and wealth) and, more generally, an index of the likelihood of debt repayment. As measures of country solvency and liquidity, I include: external debt relative to GNP, a dummy variable for whether the sovereign has restructured debt within the previous year, the growth rate of real GDP, the variance of export growth, the ratio of short-term debt to total debt, the ratio of reserves to imports, and the ratio of domestic private credit to GDP. Note that the debt-restructuring variable used is not the same as debt rescheduling: restructuring reflects a positive effort at debt management and typically involves exchanging new debt for old, more expensive, or inflexible debt. As a proxy for the level of development and quality of institutions I use the stock of bank credit, an indicator of government stability and an indicator of democracy. Demirguc-Kunt and Maksimovic (1999) find evidence that the size of the banking sector–proxied here by the stock of bank credit– is also related to other variables measuring institutional quality and level of development. As discussed in that work, the effect of the size of the banking sector is an empirical matter. On the one hand, a more developed banking sector creates incentives to rely on short-term lending since this form of financing enables banks to use their comparative advantage in monitoring. However, banks' economies of scale also allow them to offer longer term contracts. In our setting this variable does not have a significant effect on maturity although it reduces the likelihood of issuing a bond as could be seen in the exercises when correcting for sample selection below.

The IMF variable used is an IMF program dummy taking the value of one in the month that a program begins until the month it finishes.

4.1 Descriptive Statistics

In the period analyzed, over 250 IMF programs were negotiated, with the number of programs varying between 20 and 35 per year, except in 1990 and 2000 when there were less than 20 programs. There is no trend in either the number of programs or the amount of financial support committed by the Fund. In particular, financial support has been large at times of crisis: the big jump in 1995 reflects the large package to Mexico and the large commitments in 1997 and 1998 following the East Asian and Russian crises. This study includes Stand-By and Extended Fund Facilities. Compared to assistance provided under the more common Stand-by Arrangement, assistance under an extended arrangement features longer program engagement–to help countries implement medium term structural reforms–and a longer repayment period. Both programs were related to financial assistance in crises.

Table 1 and table 2 show how the maturity of the bonds issued is related to the period of crisis indicators and other indicators of countries' fundamentals, while table 3 compares bond characteristics and some countries' indicators in periods when there is a Fund program with periods when there is no such programs.

Table 1 shows that bonds' average maturity is shorter when a country is facing a crisis such as a sudden stop, a banking crisis or an attack on the currency, while table 2 shows the correlation between maturity and countries' solvency and liquidity indicators such as the ratio of reserves to imports, GDP growth and the ratio of the banking sector's short-term debt to total debt.[7] It can be seen that the more vulnerable is a country's situation, as measured by these indicators, the shorter is the maturity of the bonds issued. The exception is the indicator of total debt over GDP where a higher ratio is related to a higher maturity.

Maturity of bonds issued is shorter in countries, and periods, where the Fund is present and this presence is related to countries' vulnerability, as shown in table 3. In countries where the IMF is present there is a higher ratio of debt to GDP, a lower growth rate, and a higher volatility of exports. However, the ratio of reserves to imports is positively related to Fund presence.[8]

The signs of the relation among maturity, crisis (or vulnerability) indicators and IMF programs are, generally, as expected from the discussion of the theoretical background in section 2. Countries

[7]This ratio refers to the stock of debt while the dependent variable of the regression is maturity of an individual bond issued.

[8]This could be the consequence of imputing the amount of the program in countries' reserves.

in crisis or with worse fundamentals rely more on shorter maturities and are also more likely to have an IMF program.

Of course, these correlations do not imply causality in any way but give a sense of the possible relation between crisis, vulnerability and maturity that, as discussed above, may imply an identification problem in the study of the effects of the IMF. In the next section I turn to a description of the empirical findings of the paper.

5 Base Regression Results

For comparison and as a base analysis, in table 4 I present the results of the determinants of bonds' maturity without instrumenting for IMF programs. Later, in section 6 I present the analysis when instrumenting for IMF programs while in section 7, I present results using an estimation method that controls also for the sample selection bias which may be relevant in our case given the structure of the data. Results derived under both methods are comparable and I present both to reinforce the findings of the paper.

As can be seen in table 4 there is a negative relationship between IMF programs and bond maturity although it is not significantly different from zero in this estimation.

In general, countries with better indicators are able to borrow at longer maturities as can be inferred from the ratio of debt service to exports, the ratio of short-term debt to total debt and the credit rating. The one exception being the ratio of total debt to GNP which has a positive sign.

As a proxy for the level of development and quality of institutions I use, as some works discussed below do, the stock of bank credit, an indicator of government stability and an indicator of democracy. Also the credit rating variable might be included in this group since it is a variable related to GDP per capita and countries' wealth as mentioned in section 4. The democracy variable has a negative sign in this regression but becomes positive when using instrumental variables. Government Stability is not significantly different from zero in this regression but becomes also significant when controlling for sample selection.[9]

Countries that were recently involved in a debt restructuring also have longer maturities in their bond issuance, which is the expected effect since the natural consequence of a debt rescheduling is

[9]These changes may be indicative of the importance of instrumenting for IMF presence and correcting for sample selection.

to extend the maturity of countries' debt.

The negative sign of the sudden stop and banking crisis indicators suggests that countries facing a financial crisis borrow at shorter terms or cannot tap longer maturities which was an effect discussed above.

The control variables used to capture external volatility– i.e. the EMBI volatility and export growth volatility– have a positive effect on maturity although not statistically significant in this regression.

We can relate these findings to the empirical literature in corporate finance. Some works in this field have used country characteristics as explanatory variables to explain firms' debt maturity and found systematic differences in the use of long-term debt between developed and developing countries. In developed countries, with better institutions, there is a higher proportion of long-term debt (see, for example Demirguc-Kunt and Maksimovic (1999) and Deesomsak et al (2009)). This finding is consistent with Diamond (1991), Diamond (1993) and Rajan (1992) that argue that short-term borrowing makes it more difficult for borrowers to defraud creditors and thus, countries with worse institutions are likely to find short-term borrowing.

6 Instrumenting for IMF interventions.

To face the potential identification problems discussed above in section 3, I instrument for IMF participation using Two Stage Least Squares.

Table 5 presents the first set of results. Column 1 reports the first stage regression's results where the IMF dummy is used as the dependent variable and the excluded instruments, quota shares and UN voting, jointly with the other explanatory variables in the main equation are used as regressors.

Results of the first stage regression are in line with the findings of the literature on the determinants of IMF programs (see Sturm et al. (2005) for a survey). Countries with lower reserves holdings relative to imports would be less able to to meet balance of payments difficulties and thus they are more likely to request an IMF program (Knight and Santaella (1997)). The variable debt service relative to exports is expected to be positive since higher values imply a higher probability of financial assistance. The statistical significance has been mixed in previous works. In this work

it enters with a positive sign and it is significantly different from zero (as in Rowlands (1995)). Something similar occurs with the ratio of total external debt to GNP. A higher level of this variable would imply a higher need of an IMF program. However the evidence in the literature is mixed (see Thacker (2000) and Bird and Rowlands (2001)). In this first stage regression it enters with a positive and significant sign. It is possible to see that the worse are debt and reserves indicators and the worse is the credit rating of a country the more likely is the presence of the Fund. The variable indicating the presence of a sudden stop is positive and the one indicating the presence of a banking crisis is negative which would suggest that the Fund was more reticent to intervene in crises involving banking problems.[10]

Political variables and variables related to IMF governance have also proved useful in predicting IMF programs in the literature. As expected countries with higher quota share and with closer links with the United States in the UN voting–our excluded instruments– are more likely to have a program.

The results show that countries with higher government stability and with democratic systems are more likely to have a program. Edwards and Santaella (1993) argue that crisis severity and political factors are important determinants of IMF lending. As political variables they use an indicator variable of democracy, an index of political stability and ideology of the government. They claim that democratic countries are less likely to have an IMF program and find weak evidence that dictatorial regimes and coup frequency are positively associated with Fund's presence. In this vein, Bird and Rowlands (2001) find that socialist countries have less chances of having an IMF program and that worsening civil liberties appears to be positively associated with a program. On the other hand, Vreeland (2005) argues that it is likely that countries with a political system with more veto powers are more likely to have a program. The intuition is that the IMF is used as an instrument to introduce some unpopular reforms.

The tables present the usual tests to see the quality of the instruments: The F statistic of joint significance of excluded instruments in the first step regression and the Sargan-Hansen overidentification test. Both tests support the validity of the instruments.

Column 2 of table 5 shows the results of the second stage regression. As can be seen, when instrumented, the effect of an IMF intervention becomes significantly lower than zero. Thus, this

[10]Mody and Saravia (2009) found that banking crises do not shorten the speed of an IMF intervention.

piece of evidence suggests that IMF lending by itself reduces the maturity of bonds issued in 3.9 years which is an economically relevant magnitude considering that bonds' maturity mean is six years in the sample.

Note that in this regression there are some variables related crises and countries' solvency that lose significance: the sudden stop variable and ratio of debt services to exports. Note also that the democracy variable becomes positive and significant. These changes jointly with the gain in significance of the IMF variable would be indicative of the importance of instrumenting for IMF programs and, thus, identifying the effects of IMF programs, crises and countries' fundamentals.[11]

Next, I study wether the effects of IMF interventions on debt maturity depend on the level of countries' fundamentals. Previous works studying the effects of IMF interventions on countries' capital market access, have shown that the ability of the IMF to catalyze capital flows to countries depends on their solvency and liquidity situation (see, for example, Morris and Shin (2006), Mody and Saravia (2006) and Saravia (2010)).

Although these works present different driving forces, they predict that capital flows and the cost of borrowing are not independent of the fundamentals. For example, Morris and Shin (2006) present a model with strategic complementarities while Saravia (2010) highlights the role of IMF's seniority. In particular both works mentioned predict that the IMF catalyzes flows when fundamentals are poor but not hopelessly so.

In this paper I study the effects of IMF interventions on loans' maturity, which may not necessarily be the same as the effects on market access that was the subject of study in the works mentioned in the previous paragraph. However, some of the channels through which the IMF might affect debt maturity discussed in the motivation of this work (e.g. monitoring, signalling device) are also channels given in the literature to explain the role of the IMF as a catalyzer of capital flows.

I will follow Mody and Saravia (2006) and present the interactions of IMF interventions with indicators of total debt, short-term debt and reserves levels.

From a methodological point of view, when using interactions involving the endogenous variable (IMF interventions in our case), it is necessary to instrument not only the endogenous variable by itself but also the terms involving its interactions in order to obtain consistent estimators.[12]

[11] There are also some changes in the statistical significance of other control variables but the sign is maintained.

[12] Using the predicted values of the first step regression to interact them with the variables of interest are likely to

To incorporate the new instruments I follow the advice in Wooldridge (2002) of interacting the IMF's instruments used before with the variables indicating the fundamentals of interest. Thus, the instruments used are the quota share, the UN voting and the product of these two with debt and reserves ratios (the countries fundamentals' indicators).

The following expression summarizes this discussion:

The main equation of interest is:

$$Maturity = X + IMF + IMF * Fundamental + \epsilon,$$

where X includes the regressors other than IMF and the variable "$Fundamental$" indicates the country's fundamental of interest in that particular equation (debt or reserves indicator in our case).

As explained, it is necessary to instrument the IMF and the $IMF * Fundamental$ variables using as instruments the "quota share", the "UN voting","quota share*Fundamental" and "UN voting*Fundamental."

Table 6 presents the results of the interactions. For presentational purposes I only report the results of the second stage regressions. I report, however, the F test of joint significance of the instrumental variables in the first stage and the Hansen's over-identification test and both indicate that the instruments are valid ones.

Column 1, column 2 and column 3 of this table present respectively the interactions of the IMF variable with Total External Debt over GNP, Short-Term Debt over Total Debt and Reserves over Imports.[13]

The negative sign of the IMF variable is maintained in the three estimations (although it is not significantly different from zero in the one where the interaction is with Short-Term debt). However, in the only case where the interaction is statistically significant at conventional levels is in the case of the interaction with the ratio of Debt/GNP. The sign of this interaction is positive meaning that IMF reduces more the length of borrowing the lower is the level of indebtedness and it actually increases maturity for high enough levels of debt. The results indicates that the IMF increases the length of borrowing in countries with debt ratios higher than 57% which is around

present problems of consistency in the estimations (see Wooldridge (2002) pp. 235-236 for a discussion on "forbidden regressions.")

[13]Of course the interacted variables are also included in levels in the regressions.

the upper quarter of the distribution[14]

As mentioned above, there are some works that found that the IMF is more effective in catalyzing capital flows to a country when its fundamentals are in an intermediate zone. When considering the length of borrowing there is some evidence that IMF programs would enlarge debt maturity when a country needs them more (i.e. weak fundamentals). The finding that the IMF shortens debt maturity when fundamentals are sound could be the consequence of the IMF revealing a difficult situation–or not as good as expected– in a country. It could also be the consequence of IMF seniority (see, for example, Mody and Saravia (2006)).

7 Selection Bias

Since the maturity of a bond will be observed only when the decision to borrow and lend is made there is a sample selection problem that may be biasing our results.

To deal with this potential sample selection bias I closely follow previous works in the literature on bonds' spread determinants (see, for example, Mody and Saravia (2006)) and use a sample selection model a la Heckman (1979).

In this paper, however, I also have to deal with the identification problems related to the presence of IMF programs discussed in previous sections .

The first equation in the sample selection model is the one explaining bonds' maturity:

$$Maturity = \beta X + \mu_1. \tag{1}$$

As before, X is a vector of issue, issuer, and period characteristics; and μ_1 is a random error.

The second equation of the sample selection model (selection equation) consists of a Probit estimate of the probability of issuing a bond. I assume that maturities are observed when a latent variable B crosses a threshold B' defined by:

$$B' = \gamma Z + \mu_2, \tag{2}$$

where Z is the vector of variables that determines the desire of borrowers to borrow and the

[14]The mean of this ratio is around 35%, with standard deviation of 26% and the percentile 75% starts at a debt ratio of 55.8 %.

willingness of lenders to lend (including the IMF program variable).

It is further assumed that:

$\mu_1 \sim N(0, \sigma), \mu_2 \sim N(0, 1), corr(\mu_1, \mu_2) = \rho.$

Estimating the determinants of market access requires information on those who did not issue bonds. For each country we consider three categories of issuers: sovereign, (other) public, and private. For each quarter and country where one of these issuers did not come to the market, I record a zero, and where they did I record a one.

Leung and Yu (1996) note that the estimation does not require the variables in the selection equation and the spread equation to be different. What is critical instead is to avoid multicollinearity between the variables in the spreads equation and the "inverse-Mills ratio" constructed from the selection equation. That, in turn, requires the value of the variables not be concentrated in a small range and that the truncated observations (no bond issuance) should not dominate the set of observations. In our case, most variables have a large range and about a third of the observations have a bond issued.

The estimation of this sample selection model does take care of the sample selection bias but does not allow us to avoid the bias related to the presence of IMF programs. To face this problem I follow the same instrumental-variables strategy as in previous sections.

Thus, the whole model estimation consists of two steps. The first step consists in estimating the predicted value of the IMF program variable and the predicted values of its interactions with the fundamentals of interest in each case. To do this, I employ in the first step regressions the same set of instruments as before; i.e. quota shares, UN voting, and the product of these variables with the fundamentals' indicators.[15]Second, these predicted values are used in the principal and selection equations in the standard Heckman (1979) model, equations 1 and 2, which are jointly estimated by maximum likelihood procedures.

[15]With the caveat that it is not possible to include in the first step estimation the variables related to bonds. This is the case because if a country did not issue a bond, the predicted value for IMF program would be missing. This prevents estimating the Probit in the Heckman model because these missing values would appear in all the cases where the binary variable in the probit is zero making impossible its estimation.

7.1 Results

Tables 7 and 8 present the estimations correcting for sample selection.[16] In the first one I instrument only the IMF participation and in the second I include the–instrumented– interactions of this variable with the debt and reserves' indicators. I do not present the results of the first-step regression to predict IMF program and its interactions for concreteness.

As can be seen in table 7, the effects of the control variables obtained in previous estimations (second column of table 5) are generally maintained when correcting for sample selection. Also, the presence of an IMF program in a country reduces its length of borrowing which is also similar to results reported and discussed previously.

In the participation equation, the variable referred to the (instrumented) IMF participation has a positive sign meaning that countries with a program in place are more likely to issue a bond. Results referred to control variables in this equation are similar to the ones presented in the previous works mentioned above and are self explanatory. Together, the results of the main equation and the participation equation, would imply that, on average, the IMF increases countries' chances of issuing bonds but at a lower maturity.

Table 8 presents the results of the interactions of the IMF variable with the debt and reserves' indicators. Columns 1 and 2 refer to the maturity and participation equation when the interaction involves the level of total debt relative to GNP, while columns 3 and 4 refer to the interaction involving short-term debt and columns 5 and 6 report the interaction with reserves.

The results of this set of exercises point in the same direction and reinforces the findings in table 6. The IMF shortens the length of borrowing when fundamentals are relatively sound and allows countries to tap longer maturities when fundamentals are weak. This can be seen in the positive sign of the IMF interaction with total debt and with the share of short-term debt (columns 1 and 3) and the negative sign of the interaction with reserves over imports.[17]

Now it is possible to add to the analysis the effects on the probability of issuing a bond (participation equation). The IMF increases the likelihood of issuing a bond when fundamentals are relatively weak.

We could interpret these findings as if the IMF helped countries to issue more debt at longer

[16]The first column in each set of regressions refers to the principal equation and the second one –"participation"– refers to the probit.

[17]Note that a higher level of reserves/imports implies better fundamentals (contrary to the debt levels).

maturities when it is needed more (weak fundamentals). When the solvency and liquidity situations are sound the IMF could actually worsen market access and shorten the term of borrowing. This could be the case because IMF interventions may reveal a difficult situation when it was not expected or could also be the consequence of IMF seniority (see, for example, Mody and Saravia (2006))

8 Conclusions

This paper is a first step in analyzing how IMF lending affects countries' debt maturity. Understanding this is an important– and not studied– issue since it may imply an undesired consequence of IMF lending: that it creates an incentive to issue short-term debt in countries where this has been recognized as a cause of recurrent crises.

The paper also presents evidence that countries facing a crisis and countries that are in a more vulnerable situation issue bonds with a shorter maturity. This is consistent with works showing that it is difficult for countries to borrow at longer terms during a crisis.

Since IMF lending is more likely to be present in countries that face some kind of crisis and/or are more vulnerable, there is the risk to attribute to the Fund an effect that is actually coming from a country's pre-existing distress. To address this problem, I instrument IMF lending using political and variables related to IMF governance that proved useful predicting Fund interventions and are not likely to be contemporaneously related to countries' distress.

The evidence in this respect shows that, by itself, IMF lending shortens the term structure of countries' borrowing over and above the effect that can be attributed to a crisis or a country's vulnerable situation. However, there is evidence that countries solvency and liquidity situation would be important in determining the effects of such interventions.

This piece of evidence suggests that the IMF has a positive effect on debt maturity in cases where countries' solvency and liquidity situation is relatively weak. Thus, the potential negative effect of shortening the length of borrowing would not be present when countries conditions suggest that it would be particularly harmful to do so.

Some previous works suggest that IMF would worsen capital market access when countries solvency and liquidity situation is either good or bad and would improve it in an intermediate

range. If we considered that lengthening debt maturity as a positive effect of IMF interventions, we would conclude that our findings support the view that IMF makes thing worse when fundamentals are in good shape but our evidence does not indicate that it makes things worse when fundamentals are poor.

As has been discussed in the theoretical literature, this finding is consistent with the fact that the fund is a senior lender and/or its presence in a country signals the presence of problems.

Table 1: Maturity and Crisis

	Maturity Mean		Maturity Mean
All	6.3		6.3
IMF program*	5.2	No IMF Program	6.7
Sudden Stop	6.1	No Sudden Stop	6.3
Banking Crisis*	6	No Banking Crisis	6.4
Succesful attacks*	4.1	No succesful Attack	6.3

A star indicates that the difference in means is statistically significant.

Table 2: Correlations

	Maturity
Reserves/Imports	0.064
Annual GDP growth	0.04
Short-Term Debt/Total Debt	-0.011
Total Debt/GDP	0.028

Table 3: IMF Programs, Bond Issuance, and Country Characteristics

	No Program	Fund Program	Total
Number of bonds	2156	1139	3295
Maturity (years)*	6.67	5.44	6.25
Amount ($ millions)*	154	177	162
Debt/GDP*	0.27	0.43	0.32
Annual GDP growth (percent)*	5.04	3.29	4.4
Volatility of Exports*	0.08	0.11	0.09
Reserves/imports (months of imports)*	5.91	6.78	6.21

A star indicates that the difference in means is statistically significant.

Table 4: Determinants of Maturity of bonds

Dependent Variable: Maturity			
Independent Variable	Coefficient	Independent Variable	Coefficient
IMF Program	-0.34	Public Bond	-1.98
	[-1.32]		[-3.72]***
Total external debt/GNP	2.47	Public Bond-Finance	-0.14
	[2.49]**		[-0.35]
Short-Term Debt/Total Debt	-3.16	Public Bond-Services	0.16
	[-2.25]**		[0.17]
Reserves/Imports	-0.09	Public Bond-Utilities	2.23
	[-0.90]		[3.41]***
Log(Amount Issued)	0.44	Private Bond	-0.51
	[2.63]***		[-0.69]
Growth rate of US IP	-123.00	Private Bond-Finance	-1.50
	[-2.61]***		[-3.21]***
Log(daily USSP10 Index)	-1.47	Private Bond-Services	-1.17
	[-1.77]*		[-2.32]**
S.D. daily log change in EMBI	22.01	Private Bond-Utilities	0.11
	[1.34]		[0.19]
Credit Rating	0.12	Latin America Country	-0.27
	[6.25]***		[-0.50]
Debt Managment in Past 4 quarters	1.16	East Asia and Pacific Country	-1.09
	[1.90]*		[-2.32]**
Growth rate of real GDP	11.70	Yen Denominated	-2.33
	[1.01]		[-5.63]***
Variance of monthly export growth	2.08	Mark Denominated	-1.02
	[1.42]		[-2.05]**
Bank Credit Stock	0.01	Euro Denominated	-0.99
	[1.01]		[-2.43]**
Fixed	2.80	Other Currency	-0.78
	[8.80]***		[-1.72]*
Total debt service/Exports	-2.55	Banking Crisis	-0.42
	[-2.51]**		[-1.97]**
Sudden Stop	-1.86	Government Stability	-0.08
	[-3.08]***		[-0.78]
Democracy Dummy	-0.36		
	[-3.25]***		
Constant		6.42	
		[1.64]	
Observations		3186	
R-squared		0.153	

Clustered t-statistics in parentheses.
Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Two Stages Least Squares: Instrumenting for IMF presence

Step	First	Second
IMF Program	(LHS var)	-3.90
		[-4.96]***
Total external debt/GNP	0.66	2.20
	[7.29]***	[1.53]
Short term debt / Total debt	0.26	-4.81
	[2.54]**	[-2.98]***
Reserves/import	-0.07	-0.08
	[-8.57]***	[-0.68]
Log(Amount Issued)	-0.01	0.64
	[-0.87]	[3.16]***
Growth rate of US IP	-22.57	-140.10
	[-5.84]***	[-2.43]**
Log (Daily USSP 10 Index)	0.19	-1.06
	[3.06]***	[-1.16]
S.D. daily log change in EMBI	-2.85	28.45
	[-3.36]***	[1.34]
Credit Rating	-0.01	0.05
	[-12.22]***	[1.81]*
Debt management in the past 4 quarters	-0.02	0.41
	[-0.78]	[0.73]
Growth rate of real GDP	-1.36	5.34
	[-1.16]	[0.39]
Variance of monthly export growth	0.49	2.64
	[5.64]***	[1.96]*
Bank credit stock	0.00	0.01
	[3.07]***	[1.09]
Public Bond	-0.05	-1.78
	[-0.95]	[-3.07]***
Public Bond - Finance	0.02	0.42
	[0.29]	[0.81]
Public Bond - Services	0.03	0.30
	[0.23]	[0.31]
Public Bond - Utilities	-0.04	1.98
	[-0.65]	[2.46]**
Private Bond	-0.06	0.21
	[-1.92]*	[0.23]
Private Bond - Finance	-0.05	-2.34
	[-1.87]*	[-3.78]***
Private Bond - Services	0.08	-1.19
	[1.84]*	[-1.75]*
Private Bond - Utilities	0.05	-0.34
	[1.67]*	[-0.48]
Latin America Country	0.31	0.79
	[10.47]***	[1.31]
East Asia and Pacific Country	0.42	1.85
	[9.43]***	[2.05]**
Yen denominated	-0.07	-2.23
	[-2.63]**	[-3.98]***
Mark denominated	-0.09	-0.71
	[-2.63]**	[-1.3]
Euro denominated	-0.12	-1.34
	[-3.57]***	[-2.79]***
Other Currency	0.02	-0.61
	[0.82]	[-1.18]
Fixed	0.01	3.39
	[0.62]	[8.21]***
Total debt service/Exports	0.42	-0.33
	[7.53]***	[-0.36]
Sudden Stop in place	0.10	-0.21
	[2.32]**	[-0.3]
Banking Crisis in place	-0.20	-0.87
	[-10.5]***	[-2.92]***
Government Stability	0.02	0.15
	[2.49]**	[1.25]
Democracy Dummy	0.07	0.69
	[6.66]***	[3.04]***
Quota Share	0.31	
	[9.15]***	
UN voting	0.68	
	[14.85]***	
Constant	-0.74	0.67
	[-2.61]**	[0.16]
Observations	2410.00	2410.00
R-squared	0.58	0.15
F test (first stage)	174.11	
Hansen J statistic		2.62
(Overidentification test)		[0.1057]

Clustered t-statistics in parentheses.
Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Interaction of IMF Programs and Country Fundamentals

Variables	(1) Total External Debt/ GNP	(2) Short-Term Debt/Total Debt	(3) Reserves/Imports
IMF Program	-13.27	-3.41	-10.46
	[-3.95]***	[-1.08]	[-1.87]*
IMF program*(Total External Debt/GNP)	23.36		
	[2.83]***		
IMF Program*Short-Term Debt/Total Debt		0.23	
		[0.04]	
IMF Program*Reserves/Imports			2.87
			[1.40]
Total external debt/GNP	-3.70	2.01	1.65
	[-1.23]	[1.44]	[1.18]
Short-Term Debt/Total Debt	-4.02	-4.85	-5.81
	[-2.47]**	[-1.72]*	[-3.56]***
Reserves/Imports	-0.33	-0.05	-1.05
	[-2.19]**	[-0.40]	[-1.35]
Log(Amount Issued)	0.59	0.66	0.74
	[2.87]***	[3.24]***	[3.42]***
Growth rate of US IP	-154.97	-128.92	-140.60
	[-2.58]***	[-2.14]**	[-2.26]**
Log(daily USSP10 Index)	-1.78	-1.18	-0.86
	[-1.77]*	[-1.28]	[-0.84]
S.D. daily log change in EMBI	27.23	30.32	27.72
	[1.28]	[1.46]	[1.25]
Credit Rating	0.04	0.06	0.02
	[1.58]	[2.25]**	[0.53]
Debt Managment in Past 4 quarters	0.00	0.44	0.70
	[0.00]	[0.79]	[1.07]
Growth rate of real GDP	21.15	6.67	-10.04
	[1.47]	[0.51]	[-0.48]
Variance of monthly export growth	-0.45	2.36	2.55
	[-0.23]	[1.69]*	[1.87]*
Bank Credit Stock	-0.01	0.01	0.01
	[-1.33]	[1.01]	[1.52]
Public Bond	-1.74	-1.82	-2.08
	[-3.06]***	[-3.14]***	[-3.12]***
Public Bond-Finance	0.08	0.47	0.76
	[0.16]	[0.90]	[1.18]
Public Bond-Services	0.14	0.30	1.10
	[0.15]	[0.32]	[0.90]
Public Bond-Utilities	2.28	2.10	1.99
	[2.83]***	[2.64]***	[2.33]**
Private Bond	0.67	0.26	0.41
	[0.75]	[0.29]	[0.45]
Private Bond-Finance	-2.20	-2.32	-2.38
	[-3.57]***	[-3.88]***	[-3.82]***
Private Bond-Services	-1.41	-1.23	-0.84
	[-2.01]**	[-1.86]*	[-1.03]
Private Bond-Utilities	-0.41	-0.41	-0.31
	[-0.58]	[-0.57]	[-0.41]
Latin America Country	1.02	0.65	1.31
	[1.76]*	[1.00]	[1.53]
East Asia and Pacific Country	0.87	1.61	1.85
	[0.98]	[1.78]*	[1.80]*
Yen Denominated	-1.91	-2.22	-2.25
	[-3.42]***	[-3.84]***	[-3.84]***
Mark Denominated	-0.44	-0.70	-0.68
	[-0.80]	[-1.30]	[-1.18]
Euro Denominated	-0.97	-1.30	-1.86
	[-2.03]**	[-2.73]***	[-2.69]***
Other Currency	-0.57	-0.65	-0.49
	[-1.11]	[-1.29]	[-0.88]
Fixed	3.18	3.39	3.26
	[7.77]***	[8.26]***	[7.53]***
Total debt service/Exports	-0.30	-0.72	-3.05
	[-0.31]	[-0.81]	[-1.61]
Sudden Stop	0.34	-0.26	-0.01
	[0.46]	[-0.38]	[-0.02]
Banking Crisis	-1.88	-0.74	0.05
	[-4.56]***	[-2.36]**	[0.08]
Government Stability	0.17	0.13	0.24
	[1.40]	[1.06]	[1.49]
Democracy Dummy	0.48	0.62	0.62
	[2.23]**	[2.94]***	[2.77]***
Constant	6.74	0.96	3.67
	[1.27]	[0.21]	[0.77]
Observations	2,410	2,410	2,410
R-squared	0.145	0.165	0.092
F test (first stage)	172.83	165.96	187.95
Hansen J statistic	3.53	3.863	8.738
Overidentification test	[0.1712]	[0.1449]	[0.0127]**

Clustered t-statistics in parentheses.
Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Sample Selection and Instrumenting IMF program

Variables	Maturity	Participation
IMF Program	-6.51	3.87
	(-4.62)***	(18.85)***
Total external debt/GNP	4.09	-2.69
	(2.75)***	(-21.51)***
Short-Term Debt/Total Debt	-3.06	-1.41
	(-2.20)**	(-10.07)***
Reserves/Imports	0.32	0.10
	(2.79)***	(5.20)***
Log(Amount Issued)	0.81	
	(4.13)***	
Growth rate of US IP	-14.02	62.03
	(-0.37)	(8.04)***
Log(daily USSP10 Index)	-2.34	-0.69
	(-4.81)***	(-10.31)***
S.D. daily log change in EMBI	34.66	-15.70
	(1.98)**	(-7.10)***
Credit Rating	0.04	0.06
	(1.33)	(18.15)***
Debt Managment in Past 4 quarters	1.53	0.43
	(2.62)***	(4.24)***
Growth rate of real GDP	21.75	2.85
	(1.72)*	(1.57)
Variance of monthly export growth	1.12	-1.73
	(0.79)	(-4.86)***
Bank Credit Stock	0.01	-0.00
	(1.04)	(-2.85)***
Public Bond	-1.33	-0.27
	(-2.37)**	(-5.12)***
Public Bond-Finance	0.22	
	(0.43)	
Public Bond-Services	0.63	
	(0.63)	
Public Bond-Utilities	1.99	
	(2.51)**	
Private Bond	0.52	0.30
	(0.57)	(6.43)***
Private Bond-Finance	-2.10	
	(-3.49)***	
Private Bond-Services	-1.40	
	(-2.05)**	
Private Bond-Utilities	-0.68	
	(-0.95)	
Latin America	-0.34	0.64
	(-0.60)	(11.85)***
East Asia and Pacific	-0.56	0.80
	(-0.69)	(11.58)***
Yen Denominated	-1.99	
	(-3.69)***	
Mark Denominated	-0.32	
	(-0.58)	
Euro Denominated	-0.98	
	(-2.28)**	
Other Currency	-0.58	
	(-1.17)	
Fixed	3.24	
	(8.19)***	
Total debt service/Exports	-1.58	0.41
	(-1.83)*	(3.89)***
Sudden Stop	0.14	0.08
	(0.23)	(0.67)
Banking Crisis	-0.56	0.64
	(-1.94)*	(12.08)***
Goverment Stability	0.42	0.07
	(4.56)***	(5.13)***
Democracy Dummy	0.71	-0.04
	(3.33)***	(-1.91)*
Constant	3.87	-0.68
	(1.40)	(-2.30)**
Observations	6,792	6,792
F test (first stage)	372.54	
Hansen J statisitc		1.43
Overidentification test		[0.2318]

Clustered standard errors in parentheses.
Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: Sample Selection and Interaction of IMF programs

	Debt/GNP		Short-Term Debt/Total Debt		Reserves/Imports	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Maturity	Participation	Maturity	Participation	Maturity	Participation
IMF Program	-31.88	-8.62	-16.57	-0.20	5.07	9.51
	(-3.17)***	(-10.67)***	(-1.97)**	(-0.22)	(1.09)	(19.60)***
IMF Program*(Debt/GNP)	53.20	26.66				
	(2.45)**	(14.41)***				
IMF Program*(Short Term/Total Debt)			18.86	7.55		
			(1.05)	(3.52)***		
IMF Program*(Reserves/ Imports)					-5.57	-2.79
					(-2.85)***	(-14.53)***
Total external debt/GNP	-16.95	-14.69	5.38	-2.90	7.55	-2.05
	(-1.69)*	(-16.89)***	(3.15)***	(-17.45)***	(5.53)***	(-15.77)***
Short-Term Debt/Total Debt	-6.78	-3.35	-9.58	-3.96	1.30	0.51
	(-2.79)***	(-15.84)***	(-1.37)	(-5.14)***	(0.75)	(2.79)***
Reserves/Imports	-0.12	-0.15	0.23	0.06	2.65	1.25
	(-0.64)	(-5.79)***	(1.85)*	(2.45)**	(3.15)***	(15.35)***
Log(Amount Issued)	0.75		0.81		0.77	
	(3.72)***		(4.09)***		(3.85)***	
Growth rate of US IP	14.08	81.59	-38.98	56.66	5.27	72.10
	(0.36)	(10.20)***	(-0.96)	(7.42)***	(0.14)	(9.23)***
Log(daily USSP10 Index)	-3.20	-1.10	-2.38	-0.66	-2.36	-0.70
	(-4.94)***	(-14.87)***	(-4.80)***	(-9.87)***	(-4.94)***	(-10.26)***
S.D. daily log change in EMBI	1.45	-33.96	36.34	-16.46	32.58	-18.22
	(0.07)	(-13.18)***	(2.07)**	(-7.45)***	(1.87)*	(-8.11)***
Credit Rating	-0.02	0.04	0.03	0.07	0.06	0.08
	(-0.61)	(11.38)***	(0.76)	(15.50)***	(1.74)*	(22.76)***
Debt Managment in Past 4 quarters	1.84	0.78	1.30	0.62	1.51	0.57
	(3.12)***	(7.74)***	(2.29)**	(5.79)***	(2.68)***	(5.67)***
Growth rate of real GDP	1.83	-3.71	9.41	3.20	26.83	6.28
	(0.14)	(-1.97)**	(0.74)	(1.75)*	(1.99)**	(3.38)***
Variance of monthly export growth	-7.54	-5.85	2.02	-1.48	2.15	-1.04
	(-2.01)**	(-14.82)***	(1.19)	(-3.72)***	(1.44)	(-2.77)***
Bank Credit Stock	-0.01	-0.01	0.01	0.00	0.00	-0.00
	(-0.99)	(-11.04)***	(1.24)	(0.21)	(0.34)	(-3.81)***
Public Bond	-1.40	-0.31	-1.19	-0.26	-1.25	-0.28
	(-2.41)**	(-5.66)***	(-2.14)**	(-4.86)***	(-2.26)**	(-5.21)***
Public Bond-Finance	-0.24		-0.06		-0.26	
	(-0.43)		(-0.12)		(-0.48)	
Public Bond-Services	0.36		0.53		0.18	
	(0.38)		(0.57)		(0.19)	
Public Bond-Utilities	1.91		1.79		1.86	
	(2.37)**		(2.22)**		(2.31)**	
Private Bond	0.25	0.28	0.44	0.31	0.39	0.30
	(0.28)	(5.76)***	(0.49)	(6.57)***	(0.44)	(6.31)***
Private Bond-Finance	-2.03		-2.04		-2.05	
	(-3.45)***		(-3.44)***		(-3.46)***	
Private Bond-Services	-1.29		-1.33		-1.37	
	(-1.95)*		(-1.98)**		(-2.03)**	
Private Bond-Utilities	-0.51		-0.60		-0.55	
	(-0.73)		(-0.84)		(-0.78)	
Latin America	0.51	0.99	-0.60	0.43	-0.55	0.30
	(1.04)	(15.43)***	(-0.80)	(7.44)***	(-0.88)	(5.58)***
East Asia and Pacific	-0.16	-0.15	0.75	0.18	-0.09	-0.17
	(-0.18)	(-1.92)*	(0.87)	(2.47)**	(-0.10)	(-2.15)**
Yen Denominated	-2.20		-2.06		-2.21	
	(-3.97)***		(-3.84)***		(-4.03)***	
Mark Denominated	-0.19		-0.25		-0.12	
	(-0.37)		(-0.45)		(-0.23)	
Euro Denominated	-1.00		-1.04		-0.95	
	(-2.34)**		(-2.40)**		(-2.24)**	
Other Currency	-0.45		-0.44		-0.52	
	(-0.93)		(-0.90)		(-1.05)	
Fixed	3.41		3.29		3.35	
	(8.24)***		(8.22)***		(8.35)***	
Total debt service/Exports	0.52	0.71	-0.45	0.36	0.13	0.95
	(0.47)	(7.15)***	(-0.50)	(2.97)***	(0.13)	(9.38)***
Sudden Stop	1.65	1.20	-0.29	0.23	-1.34	-0.41
	(1.57)	(8.84)***	(-0.48)	(1.97)**	(-1.92)*	(-3.41)***
Banking Crisis	-2.72	-0.17	-0.79	0.74	-1.44	0.40
	(-3.94)***	(-2.49)**	(-1.84)*	(10.69)***	(-4.70)***	(7.65)***
Goverment Stability	0.42	0.09	0.31	0.02	0.44	0.10
	(4.56)***	(6.47)***	(2.69)***	(1.26)	(4.73)***	(7.13)***
Democracy Dummy	1.07	0.07	0.77	-0.08	0.87	-0.05
	(4.18)***	(2.78)***	(3.27)***	(-3.22)***	(3.85)***	(-1.95)*
Constant	21.04	8.32	8.08	1.11	-6.52	-5.22
	(2.50)**	(12.53)***	(1.50)	(2.19)**	(-1.72)*	(-11.41)***
Observations	6,792	6,792	6,792	6,792	6,792	6,792
F test (first stage)	259.98		284.46		360.09	
Hansen J statisitc	2.513		1.093		2.221	
Overidentification test	[0.2847]		[0.5789]		[0.3294]	

Clustered standard errors in parentheses.
Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A DATA SOURCES AND CONSTRUCTION OF VARIABLES

Bond characteristics

The bond data set, obtained from Bondware, supplemented by the former Emerging Markets Division of the International Monetary Fund for the early 1990s, covers the period 1991 to 1999 and includes: (a) launch spreads over risk free rates (in basis points, where one basis point is one-hundredth of a percentage point) (b) the amount of the issue (millions of US$); (c) the maturity in years; (d) whether the borrower was a sovereign, other public sector entity, or private debtor; (e) currency of issue; (f) whether the bond had a fixed or floating rate; (g) borrower's industrial sector: manufacturing, financial services, utility or infrastructure, other services, or government (where government, in this case, refers to subsovereign entities and central banks, which could not be classified in the other four industrial sectors).

Global variables

United States industrial production growth rate: average of month-month growth rate over a quarter.

United States ten-year swap spread.

Emerging Market Bond Index: standard deviation of difference in log of daily spreads.

Countries included in the sample:

Argentina, Bangladesh, Barbados, Bolivia, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Guatemala, Hong Kong, Hungary, India, Indonesia, Jamaica, Kazakhstan, Kenya, Korea, Kuwait, Latvia, Lithuania, Malaysia, Mexico, Morocco, Nigeria, Oman, Pakistan, Papua New Guinea, Paraguay, Peru, Phillipines, Poland, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, Vietnam.

Table 9: Country Characteristics

Variable	**(billions)**	**Periodicity**	**Source**	**Series**
Total external debt (EDT)	US$	Annual	WEO	D
Gross national product (GNP, current prices)	US$	Annual	WEO	NGDPD
Gross domestic product (GDPNC, current prices)	National	Annual	WEO	NGDP
Gross domestic product (GDP90, 1990 prices)	National	Annual	WEO	NGDP_R
Total debt service (TDS)	US$	Annual	WEO	DS
Exports (XGS)	US$	Annual	WEO	BX
Exports (X)	US$	Monthly	IFS	M#c|70__ dzf
Reserves (RESIMF)	US$	Quarterly	IFS	q#c$\|\|_1 l_dzf$
Imports (IMP)	US$	Quarterly	IFS	q#c$\|\|71__dzf$
Domestic bank credit (CLM_PVT)[1]	National	Quarterly	IFS	q#c$\|\|32d__zf$
Short-term bank debt (BISSHT)[2]	US$	semi-annual	BIS	
Total bank debt (BISTOT)[3]	US$	semi-annual	BIS	
Credit rating (CRTG)	Scale	semi-annual	Institutional Investor	
Democracy	Indicator	Annual	Cheibub et al. (2009)	
Debt restructuring[4]	Indicator	Annual	WDT/GDF	
Sudden Stop	Indicator	Annual	Eichengreen, Gupta and Mody (2008)	
Banking Crises	Indicator	Annual	Caprio and Klingebiel (2003)	

1) Credit to private sector.
2) Cross-border bank claims in all currencies and local claims in non-local currencies of maturity up to and including one year.
3) Total consolidated cross-border claims in all currencies and local claims in non-local currencies.
4) Indicator variable, which is equal to 1 if a debt rescheduling took place in the previous year and zero otherwise.
5) http://post.economics.harvard.edu/faculty/barro/data.html (Educational Attainment data).

Table 10: Constructed Variables

Debt/GNP	EDT/GNP
Debt service/exports	TDS/XGS
GDP/growth	$0.25*\ln[GDP90_t/GDP90_{t-1}]$
Standard deviation of export growth	Standard deviation of monthly growth rates of exports (over six months)
Reserves/imports	RESIMF/IMP
Reserves/GNP	RESIMF/GNP
Reserves/short-term debt	RESIMF/BISSHT
Short-term debt/total debt	BISSHT/BISTOT
Domestic credit/GDP	CLM_PVT/(GDPNC/4)

Sources: International Monetary Fund's World Economic Outlook (WEO) and International Financial Statistics (IFS);IMF program data from the IMF's Executive Board Documents and Staff Estimates;World Bank's World Debt Tables (WDT) and Global Development Finance (GDF); Bank of International Settlements' The Maturity, Sectoral, and Nationality Distribution of International Bank Lending. Credit ratings were obtained from Institutional Investor's Country Credit Ratings. Missing data for some countries was completed using the US State Department's Annual Country reports on Economic Policy and Trade Practices (which are available on the internet from http:www.state.gov/www/issues/economic/trade_reports/).
U.S. industrial production: Federal Reserve Swap rates and EMBI from Bloomberg.

Table 11: Variables' Average and Standard Deviation

Variable	Mean	Std. Dev.	N
Maturity of bonds	6.3	6.051	3186
IMF Program in place	0.34	0.474	3186
Log(Amount Issued)	4.716	0.913	3186
Growth rate of US IP	0.004	0.003	3186
Log(Daily USSP10 Index)	3.838	0.397	3186
S.D of daily log change in EMBI	0.017	0.008	3186
Credit Rating	48.271	14.463	3186
Total external debt/GNP	0.323	0.193	3186
Debt Management in the past 4 quarters	0.129	0.335	3186
Growth rate of real GDP	0.011	0.009	3186
Variance of monthly export growth	0.089	0.087	3186
Short-term debt/ Total debt	0.568	0.141	3186
Reserves/import	2.081	1.144	3186
Bank Credit Stock	2.32	12.835	3186
Public Bond	0.221	0.415	3186
Public Bond - Finance	0.13	0.336	3186
Public Bond - Services	0.003	0.059	3186
Public Bond - Utilities	0.067	0.25	3186
Private Bond	0.598	0.49	3186
Private Bond - Finance	0.389	0.488	3186
Private Bond - Services	0.047	0.211	3186
Private Bond - Utilities	0.066	0.249	3186
Latinamerican Country	0.463	0.499	3186
East Asia and Pacific	0.314	0.464	3186
Yen denominated	0.105	0.306	3186
Mark denominated	0.053	0.224	3186
Euro denominated	0.058	0.234	3186
Other Currency	0.093	0.291	3186
Fixed	0.725	0.447	3186
Total debt service/Exports	0.344	0.279	3186
Sudden Stop in place	0.048	0.213	3186
Banking Crisis in place	0.324	0.468	3186
Government Stability	7.848	1.868	3186
Democracy	4.013	1.234	3186

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