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Abstract: International Monetary Fund lending continues to be criticized for possibly generating moral hazard in international financial markets. The empirical examination of this issue has focused exclusively on the potential distortions in the pricing of credit, in the form of lower spreads. To date no research has been conducted on the potential impact of IMF lending on the maturity composition of borrowing. This is a major omission because of the established relationship in the financial crises literature that shorter debt maturity increases the probability of financial crises. This paper contributes to the debate on whether IMF lending generates moral hazard in international financial markets in three respects. First, we examine for a sample of emerging and developing market economies whether after controlling for every thing else IMF lending leads to a shift in the composition of foreign debt towards riskier long-term debt. Second, we examine whether different IMF programs, other things the same, have different or similar impacts on the maturity composition of foreign debt. Third, we make an effort to account for the signaling and commitment effects of IMF lending. Using panel data for 71 emerging and developing countries for the period of 1992-97, we find that the impact of IMF programs is in general to reduce short-term debt flows relative to total debt flows, especially in the post Mexican crisis period. This suggests that IMF lending generates moral hazard in international financial markets from the perspective of the maturity composition of foreign debt. We also find that not all types of IMF lending generate moral hazard. Finally, we find that while there are significant signaling effects of IMF lending on the maturity of international debt, the commitment effects are much weaker.

Keywords: IMF, moral hazard, international lending, short-term debt

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1. Introduction

In the 1990s a number of emerging market economies experienced financial crises. One major cause of those financial crises appears to have been the reversal of short-term capital flows. The excessive accumulation of short-term foreign debt relative to reserves reduces the relative degree of "insurance" that existing reserves provide and increases vulnerability of the country to capital flows reversal.[1] The hypothesis that an increase in short-term foreign debt, ceteris paribus, increases the likelihood of financial crises has gained empirical support in the recent literature (Radelet and Sachs1998; Rodrick and Velasco1999).

However, we know little about the causes of short-term foreign debt accumulation and the shortening in the maturity of international debt. One hypothesis is that the fear of default risk leads to a shortening of debt maturity (Sachs and Cohen 1982). A related hypothesis is that the total level of indebtedness shortens the average debt maturity (Rodrick and Velasco 1999). A third hypothesis that has been advanced in the literature is that higher legal and judicial risks lead to a shortening of debt maturity. This hypothesis evolved from two different perspectives. The first is that the role of crony capitalism and the lack of transparency as in the East Asian crisis increased investment risk and resulted in shorter debt maturity.[2] The second is the role of contract enforcement in international capital markets.[3]

The goal of this paper is to examine whether IMF lending programs, while directed to preventing financial crises, lead, *ceteris paribus*, international lenders to perceive lower lending risks and generate moral hazard as reflected in a shift in the maturity composition of international debt toward long-term debt flows. The key issue we investigate therefore is whether lenders' perceptions about risk improve, tilting the maturity composition of lending in favor of long-term debt as the result of IMF involvement and the expectation of a bailout at times of crisis. To test this conjecture it is necessary to control for the "fundamentals"

[1]Several studies examine the role of liquidity in financial crises, see for example, Chang and Velasco (1998a, 1998b, and 1999), Goldfajn and Valdes (1997), Radelet and Sachs (1998), and Rodrik and Velasco (1999).
[2] See for example Radelet and Sachs (1998) and Rodrick and Velasco (1999).
[3] See for example Eaton and Gersovitz (1981), Sachs and Cohen (1982), Bulow and Rogoff (1988), Eaton and Fernandez (1995) and Cole and Kehoe (1997).

determining debt maturity as well as for the beneficial impact IMF lending programs may have in the form of commitment to economic reform by the client country.

The interesting twist is that if there is moral hazard and IMF lending reduces short-term foreign debt flows relative to total debt flows, this also would help reduce liquidity pressures and push back in time the likelihood of a crisis. In other words, there is the appearance, at least in the short run, that IMF programs trade moral hazard for financial crisis prevention.

The alternative hypothesis is that expected IMF lending does not distort investors' perceptions of risk so therefore IMF lending does not have a separate significant impact on the maturity composition of international debt

The empirical evidence to date on an IMF-induced moral hazard in international lending is only suggestive. In 1995 Mexico experienced the renowned Tequilla crisis at which time it was supported by a large IMF Stand-By Arrangement (SBA) for $18 billion. At that time it was argued that this large-scale lending would further encourage imprudent risk policies by lenders and borrowers, and setting the stage for, rather than preventing, later crises.[4] Later in 1997 and 1998 a number of East Asian countries experienced financial crises and were also supported by IMF lending arrangements. The IMF extended Indonesia, Korea, Thailand, and the Philippines SBAs for the amounts of $10 billion, $21 billion, $4 billion, and $1.4 billion, respectively. Also in 1998, two additional large countries, Russia and Brazil experienced financial crises and were supported with IMF lending programs that amounted to about $11 billion and $18 billion, respectively.

The examination of the IMF-induced moral hazard hypothesis is a key component in the debate on financial crisis prevention and international financial architecture reforms. Alternatives to the large-scale IMF rescue packages have been suggested in different fora with the objective of reducing the frequency and severity of financial crises and apparent investors' moral hazard. Examples of these proposed reforms are the inclusion of collective action clauses and universal debt rollover options to loan contracts, and empowerment of IMF to impose a standstill on payments.[5]

[4] See for example Radelet and Sachs (1998), Furman and Stiglitz (1998) and Stiglitz (2002).
[5] Eichengreen and Mody (2001) evaluate the impact of IMF lending on costs of borrowing. Goldstein (2001)

This paper contributes to the literature on IMF-induced moral hazard in several ways. First, we expand on the existing literature that has examined the effect of moral hazard on the cost of borrowing. For the first time in this literature we examine the moral hazard question from the perspective of the maturity composition of international debt. This approach allows us to evaluate moral hazard based on observable investor actions.[6]

Second, we separately model and empirically examine the influences of the signaling and commitment effects of IMF programs. Signaling is defined as the degree of assurance that IMF lenders provides to third parties, such as lenders. This is modeled directly using the volume of IMF program credit. The commitment effect is brought by the IMF monitoring of the implementation of reform programs by borrowing countries. This is also modeled explicitly using the withdrawn IMF program resources. Modeling these two effects, while controlling for fundamentals, allows us to separate the potential moral hazard signaling the possibility of bailout from the changes in fundamentals induced by IMF lending programs. This helps us overcome a fundamental identification problem that mars the IMF-induced moral hazard literature.[7]

Third, we allow for the differential impacts of the various types of IMF lending programs, an issue that so far has not been studied in the IMF-induced moral hazard literature.[8] For example, SBA programs address short-term balance of payments problems with conditionality that focuses on macroeconomic reform. On the other hand, Enhanced Structural Adjustment Facility (ESAF) and Poverty Reduction and Growth Facility (PRGF) programs address longer term structural imbalances in addition to macroeconomic reform. Thus, the issue is whether the signaling and commitment effects of these programs as well as the associated moral hazard differ.

The rest of this paper is organized as follows. Section 2 provides a brief literature review drawing linkages between the international liquidity and financial crises literatures

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provides an extensive review of the different reform proposals of the international financial architecture.

[6] See Dell'Ariccia, Schnabel and Zettelmeyer (2002) for a measure of moral hazard based on *unobservable* investor actions and proxied by the recovery rate or the probability of being repaid in a crisis.

[7] For a discussion of the identification problem, see Dell'Ariccia, Schnabel and Zettelmeyer (2002).

[8] For an examination of the effects of IMF programs on the access to international capital markets, see for example, Bird and Rowlands (1997, 1999a, 1999b, and 2000), Bird, Mori, and Rowlands (1999). For an examination of the effects of IMF programs on the cost of borrowing, see for example Eichengreen and Mody (2000 and 2001). These authors discuss the signaling and commitment effects of IMF programs in examining the effect on countries access to international bonds markets, but do not empirically examine these effects nor

with those on IMF catalytic effects, and IMF-induced moral hazard. Section 3 builds a conceptual framework for how IMF financing may be related to moral hazard in international lending practices. Section 4 discusses the estimation methodology, the empirical model, and data. Section 5 presents the empirical results. We close with conclusions.

2. Literature Review

To set our research question in the proper context it is desirable to weave three different lines of research in the literature: a) the determinants of short-term debt and how it contributed to the financial crises of the 1990s, b) the catalytic effects of IMF lending on international markets, and c) whether IMF programs may induce moral hazard.

Short-term Debt and Financial Crises

Searching for explanations of the financial crises of the 1990s, the international liquidity literature has explained financial crises in terms of inadequate liquidity, causing capital flows reversal.[9] International investors reverse their capital flows as result of pessimistic expectations about inadequacy of foreign reserves to cover investors' immediate demand for loans, a proxy of which is short-term debt. If short-term debt exceeds foreign reserves, then the country is vulnerable to capital flows reversal and financial crises (Calvo and Mendoza 1996; Chang and Velasco 1998a, 1998b, and 1999; Goldfajn and Valdes 1997; Radelet and Sachs 1998; Bussiere and Mulder 1999; Rodrik and Velasco 1999).

Empirical evidence supports the role of inadequate liquidity in financial crises. Calvo and Mendoza (1996) found that Mexico's vulnerability to financial crises increased with the excessive issuance of large amounts of short-term, dollar-denominated Tesobonos. In addition, Radelet and Sachs (1998), Bussiere and Mulder (1999) and Rodrick and Velasco (1999), for example, found that a high ratio of short-term foreign debt to reserves is a robust indicator of financial crises; countries with short-term foreign debt that exceed reserves are more likely to experience a sudden and massive reversal in capital flows.

However, the reasons for the accumulation of short-term foreign debt have not been explored in depth in the literature. Sachs and Cohen (1982) have conjectured that default risk

separate them by IMF programs.

[9] See for example Rodrick and Velasco (1999).

shortens international debt maturity.[10] Just a few studies have examined the Sachs-Cohen conjecture. For example Rodrick and Velasco (1999) found that the level of indebtedness shortens the average maturity of debt using a panel of 32 emerging-market countries. These same authors found no supportive evidence that corruption reduces the average maturity of debt. Mina (2002) finds that an increase in legal and judicial risk, which is correlated to corruption, seems to influence the accumulation of short-term debt.[11]

The World Bank (2000) identified a number of push and pull factors, contributing to the reduction in bank lending maturity. Among the pull factors were tax incentives to short-term borrowing, capital account liberalization, financial deregulation, and rising interest rates in the borrowing countries. The Basle Accord on capital adequacy regulations and lenders' expectations of rescue packages targeted to short-term lenders are among the push factors. Our paper focuses on this latter point.

IMF Catalytic Effects

The focus of this large literature is whether IMF and World Bank lending catalyzes private capital flows, which are needed to cover the external finance needs of countries undertaking macroeconomic and structural adjustment. The catalysis stems from the informational role of the IMF and the liquidity of IMF programs (Rodrick 1996; Bird and Rowlands 2000).[12] In addition, by agreeing to an IMF program the government can signal its commitment to economic reform.

In terms of liquidity Bird and Rowlands (2000) argue that by putting at stake own resources, the IMF would improve the quality of adjustment advice. IMF lending achieves some risk-sharing function at the same time it helps reduce the financing gap in program countries. Private markets can respond positively to these two factors resulting in positive catalytic effects.

[10] In the sovereign debt literature (Eaton and Gersovtiz 1981; Bulow and Rogoff 1988; Eaton and Fernandez 1995; and Cole and Kehoe 1997), sovereign default risk results in the threat of trade sanctions, and the loss of reputation and future access to international capital markets.
[11] Countries with imperfect rule of law and imperfect contract enforcement, and high expropriation risk are less likely to protect creditors' rights and therefore are more likely not to pay back creditors in case of default.
[12] For a discussion of the different channels of IMF catalytic effects, see Cottarelli and Giannini (2002).

Despite the intuitive appeal of IMF catalytic effects, they have received only mixed support in the empirical literature. One strand of the empirical literature suggests that the presence of significant catalytic effects depends on whether private lending is a substitute or a complement to IMF lending (Bird and Orme 1981; Corneluis 1987; Joyce 1992; Bird 1994 and 1995). The evidence however leans towards IMF lending being a substitute for private capital flows (Hajivassiliou 1987; Faini *et al* 1991; Killick 1995), and therefore IMF lending does not generate significant catalytic effect.

Another strand of the empirical literature has expanded the examination of the catalytic effects to include public capital flows as well. Empirical evidence shows that IMF lending has a positive effect on public capital flows (Rowlands 1994; Bird and Rowlands 1997) but either no or negative effect on private capital flows (Ozler 1993; Rowlands 1994; Rodrick 1996).

We note two important observations about the linkage between the catalytic effects literature on the one hand and the moral hazard and financial crises literatures on the other. The first is that the logical sequence of the IMF catalytic effects hypothesis was questioned in Bird and Rowlands (2000). According to the catalysis hypothesis, IMF lending *leads* private capital flows. However, if private lending precedes IMF lending on the expectation of a bailout, we end up with moral hazard. We take account of this remark in our empirical model. The second is that the catalytic effects literature has largely ignored the influence of IMF lending on the maturity composition of capital flows, in particular short-term lending flows, which was a major contributing factor to the recent financial crises. We focus on the maturity composition of international capital flows in this paper.

IMF Moral Hazard

Several studies, for example, Calomiris (1998) and Meltzer (1998), have argued that IMF programs, as well the U.S. government financial support, have led to moral hazard with less prudent policies of risk taking by lenders during the Mexican and Asian crises.[13] The essence of the moral hazard hypothesis therefore is that expectations of IMF bailouts encourage international investors to pursue imprudent risk policies.

The empirical literature on moral hazard has focused on the existence of distortions in the pricing of credit to emerging economies. These studies have mainly examined whether IMF lending lowers risks to lenders and reduces bond spreads. Zhang (1999), Lane and Phillips (2000), and Kamin (2001) found evidence that bond spreads in emerging markets increase following crises in which IMF extended crisis lending. In other words, IMF crisis lending does not depress risk. These findings therefore lend no support to the IMF-induced moral hazard hypothesis. In addition, Dell'Ariccia, Schnabel, and Zettelmeyer (2002) found that by not supporting Russia's government after the 1998 crisis the IMF sent a signal to international financial markets that lenders will not be bailed out resulting in an increase in the level and the cross-country dispersion of spreads.

None of the above studies has analyzed the potential differential impact of the various IMF programs on moral hazard. These programs differ in their objectives, conditionality, country eligibility, and terms of borrowing. Eichengreen and Mody (2001) are an exception. They found first that IMF programs have a positive impact on market access as reflected in the ability of the country to issue bonds on international capital markets. Such positive impact, they argue, reflects the commitment to economic reform IMF programs bring. They also found that IMF programs have a negative impact on spreads, interpreted as reflecting the negative signaling effect of these programs. IMF programs could signal to international lenders about the depth of economic problems that borrowing countries face. Eichengreen and Mody (2001) found that the commitment effect is more robust than the signaling effect, which they argue provides evidence of the catalytic role of IMF programs or of the IMF-induced moral hazard. In addition, they found that SBA and EFF reduce the cost of borrowing since they strengthen the commitment to correcting macroeconomic imbalances, while ESAF does not.[14]

An interesting feature of the IMF-induced moral hazard literature is that none of the studies reviewed above explicitly takes into account the level of IMF lending. Some studies

[13] Meltzer (1998) argues that IMF lending is probably the most important contributing factor to the Asian crises. Other factors include Asian banks maturity and currency mismatches, and lenders inadequate monitoring of borrowers' balance sheets.

[14] Eichengreen and Mody (2001) interpret these results in terms of the policy conditionality of these programs. On the one hand, SBA and EFF have either pure macro conditionality or macro conditionality with light emphasis on structural reform, respectively. On the other hand, the ESAF conditionality stresses structural reforms.

have used a dummy variable to account for the effect of Mexican crisis lending (Zhang 1999), while others have compared investors' re-assessment of risk following an IMF large-scale lending (Kamin 2001; Dell'Ariccia, Schnabel, and Zettelmeyer 2002). However, none of the studies used in their empirical methodologies measures for IMF credit and withdrawn IMF credit to take into account the IMF signaling and commitment effects, as done in this paper. Another observation is that none of the above studies has examined observable investor actions, such as the increase in debt flows or in the average maturity composition of debt flows used in this paper. Observable investor actions can give a less ambiguous indication about investor moral hazard.[15]

3. A Conceptual Framework

Moral Hazard – A Definition

The IMF-induced moral hazard literature has focused on the distortions in the pricing of credit. Moral hazard in this literature is defined as the reduction in the pricing of credit in expectations of an IMF bailout (Zhang 1999; Dell'Ariccia, Schnabel, and Zettelmeyer 2002; Lane and Phillips 2000; Kamin 2001). Because what motivated the IMF-induced moral hazard literature is the recent financial crisis with excessive short-term borrowing relative to reserves, our interest is the effect of IMF lending on the *maturity of lending* and develop a definition of moral hazard accordingly. We define moral hazard as the relaxation in the maturity of lending in expectations of an IMF bailout.

Normally when lenders' perceptions about default risk worsen, they would tend to reduce the overall level of lending and shorten the maturity of lending. If risk perceptions improve, lenders would increase their overall level of lending and provide longer term loans. If expectations of an IMF bailout reduce investors' risk perceptions and generate an increase in the maturity of international loans, then such reaction could reasonably be used as a measure for the existence of moral hazard. But of course there are other reasons why the maturity structure of international loans may change. Therefore testing for the presence of moral hazard requires that we control for the fundamental determinants of the maturity structure of international loans and also the beneficial commitment effect to economic reform

[15] As Dell'Ariccia, Schnabel, and Zettelmeyer (2002) put it, "investor moral hazard really should refer to particular investor *actions*, such as an increase in risky lending or a reduction in monitoring, rather than an

that IMF programs may bring.

Empirically, we will compare the effect of IMF lending on the maturity of international debt flows before and after a major IMF rescue package. For our purpose, we select the Mexican crisis because it was the first large-scale spending program, which the IMF extended in the 1990s. Our approach is similar to that in Dell'Ariccia, Schnabel, and Zettelmeyer (2002), Lane and Phillips (2000), and Kamin (2001).

IMF Lending and the Signaling and Commitment Effects

Every time the IMF begins a program with a member country a signal is sent to potential creditors. We consider the content of the "signal" to be the "insurance" associated with the liquidity that IMF programs avail to the participating countries and the potential bailout of the country in a crisis. This "insurance" signaling may result in the underestimation of risks in capital markets and therefore in imprudent risk policies. This interpretation of the signaling effect of IMF programs differs from the signaling discussed by Eichengreen and Mody (2001) who view reaching an agreement with the IMF as a negative signal about the economic problem that the borrowing country faces. Our focus on the liquidity and "insurance" content of the signal is consistent with the liquidity aspect of the catalytic effect of IMF lending, we discussed earlier.

There is also a commitment effect of IMF programs. This is based on the conditionality and commitment to economic reform by the countries engaged in the IMF programs. Following Killick (1995) we assume that the commitment to IMF programs is reflected in the life of the program and the continued disbursements of credit tranches in the IMF program. If a program is discontinued before its intended life, this may be interpreted as an indication of imperfect or unsatisfactory program performance, thus indicating the unwillingness or the inability of the participating countries government to meet the performance criteria and conditionality in the IMF program.

However, an early termination of an IMF program or an interruption of disbursements does not necessarily indicate a lack of commitment. An IMF program could be terminated based on mutual agreement at the initiative of the participating country, which may feel the IMF program is no longer needed. Also, unforeseen developments can render program

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increase in the conditional repayment probability *per se*" (page 8).

targets unattainable. In such cases program termination does not necessarily imply lack of commitment to reform. If it were possible to find the reason for the termination of an IMF program, unilaterally because of lack of compliance with the IMF conditionality versus by mutual agreement due to the non-relevance or lack of need for the program, the interpretation of the "life of the program" or commitment effect would be unambiguous. Unfortunately, we do not have data on the nature of the termination. But this does not mean that private investors do not have that information. Most likely private investors do know why the IMF program has been terminated. Therefore, we will use the life of the program and the disbursement of credit tranches as proxies for the commitment effect in the empirical estimation, but cannot anticipate its sign and significance given the lack of information on the reasons for termination.

Identification of Lender and Borrower Moral Hazards

Moral hazard could theoretically arise on either the lender/investor side or the borrower/country side (Lane and Phillips 2000). Therefore, given the interaction between lenders and borrowers in financial markets, we cannot fully argue that IMF-induced moral hazard, if it exists, is attributable to investors alone. However, it is not the objective of this paper to make any distinctions between lender and borrower moral hazard. But, when controlling for borrowers' commitment to economic reform under IMF programs, we explore in effect lender moral hazard.

4. Estimation Methodology, Empirical Model and Data

We test for the presence of IMF lending induced moral hazard by comparing the effects of different *expected* IMF lending programs on short-term debt flows relative to total debt flows in the post Mexican-crisis period versus the pre-crisis period. By using *expected* IMF lending programs we appropriately model the relationship between private capital flows and IMF lending in which the former lead the latter in anticipation of bailouts.

Estimation Methodology

Because it is likely that a number of unobservable factors influence short-term capital

flows to a country over time, we account for those factors in the empirical model. The panel data model that we specify is an error component model (Hsiao 1986; Baltagi 1995; Wooldridge 2002), which takes the form

$$(1) \qquad Y_{it} = X_{it}'\beta + u_{it} \qquad i = 1, \ldots, N \qquad t = 1, \ldots, T$$

$$(2) \qquad u_{it} = \mu_i + v_{it}$$

where Y_{it} is the dependent variable, X_{it} is the vector of explanatory variables, u_{it} is the error term which includes unobservable country effects, and the subscripts i and t denote country and time periods. The error term u_{it} is assumed to comprise unobservable country-specific effects μ_i and a disturbance term v_{it} as in equation 2.

The above model can be treated as either a fixed or a random effects model, depending on the assumptions made about the error term. In the fixed effects model, we explicitly treat the unobservable country and possibly time effects as parameters to be estimated. In the random effects model, we assume that these effects are part of the error term and are not to be estimated. The decision to treat the effects as fixed or random is based on Hausman's specification test.

Empirical Model

The empirical model that we estimate is given by

$$\begin{aligned}(3) \qquad STDFTEDF_{it} \;=\; & \beta_0 + \beta_1 RGDP_{i,t-1} + \beta_2 TED_{i,t-1} + \beta_3 INSTCHNG_{i,t-1} \\ & + \beta_4 DEFICIT_{i,t-1} + \beta_5 OPENNESS_{i,t-1} + \beta_6 CREDIT_{i,t-1} \\ & + \beta_7 DEVALUE_{i,t+1} + \beta_8 IMFPROG_{i,t+1} + \beta_9 WITHDRAWN_{i,t+1} \\ & + u_{it}\end{aligned}$$

The dependent variable *STDFTEDF* is the net flows of short-term foreign debt as a percentage of total external debt net flows, *RGDP* is real GDP in billions of US dollars, *TED* is total external debt in billions of US dollars, *INSTCHNG* is the change in investors' perceptions about the institutional environment, which we proxy by the rule of law measure.

OPENNESS is the degree of openness of the economy, *CREDIT* is private credit as a percentage of GDP*, DEVALUE* is the annual change in the real exchange rate, *IMFPROG* is the IMF agreed program credit as a percentage of GDP, and *WITHDRAWN* is the withdrawn IMF program credit as a percentage of program credit. The composite error term is given by *u* as discussed above.

The IMF variables *IMFPROG* and *WITHDRAWN*, and the annual change in the real exchange rate variable *DEVALUE* are led one period ahead to account for investors' expectations of IMF lending and real exchange rate changes. The remaining explanatory variables constitute the economic fundamentals that may affect the maturity of international loans. These variables are lagged one period to allow for the fact that the changes in terms and conditions, in our case the maturity of the loans, that lenders will introduce in this period may reflect the fundamentals at the end of the previous period. Appendix A summarizes the methodology for constructing the dependent and the explanatory variables. These variables are similar to those used by Rodrick and Velasco (1999).[16]

The dependent variable, *STDFTEDF*, measures the importance of the short-term debt flows relative to total debt flows. Riskier countries, other things being equal, are expected to attract relatively more short-term debt flows. Real GDP, *RGDP*, accounts for the level of economic activity in the economy. Economies with higher GDP levels are expected to attract a lower proportion of short-term debt flows. The level of total external debt, *TED*, accounts for the overall level of indebtedness of the country. We expect to find positive relationship between short-term debt flows and the level of total debt; *ceteris paribus*, as total debt increases, default risk increases and therefore the relative importance of short-term debt flows would also increase. Changes in investors' perceptions about the institutional environment, *INSTCHNG,* captures changes in investors' perceptions about default risk and, *ceteris paribus*, is expected to lead to an increase in the relative share of short-term debt flows. The degree of openness of the economy, *OPENNESS*, is an indicator of the ability of a country to purchase foreign reserves in the economy. Therefore a higher degree of openness of the country lowers its default risk. Even if the economy does not have current account surplus, a more open economy is more integrated into the world economy, has better access

[16] In examining the determinants of extended debt maturity Rodrick and Velasco (1999) use income per capita in log form, the ratios of M2, external debt, and imports to GDP, and a corruption index.

to international capital markets, and is less likely to default on international debt than a less open economy. Hence, *ceteris paribus*, more open economies attract in relative terms less short-term debt flows and more long-term debt flows. Therefore, we expect to find a negative relationship between the degree of openness and the relative importance of short-term debt flows.

Private sector credit lagged one period, *CREDIT*, accounts for the degree of financial development in the economy. The more financially developed the country, the more likely it will be able to attract a higher proportion of long-term loans. Therefore we expect a negative sign for the estimated coefficient for *CREDIT*.

The annual change in the real exchange rate one period ahead, *DEVALUE,* takes into account the expectations about the appreciation and depreciation of the real exchange rate. Since the exchange rate is expressed as the number of domestic currency units per US dollar, a positive change indicates depreciation. We use the one period ahead exchange rate change in order to account for investors' expectations about exchange rate movements. Expectations about exchange rate devaluation would create uncertainty about the rate of return on investments and thus lending risk. As expectations about exchange rate devaluation worsen, the country is considered risky and therefore will attract relatively more short-term flows.

IMF agreed program credit as a percentage of GDP one period ahead, *IMFPROG*, accounts for investors' expectations of IMF liquidity provided under a rescue package. The expectations of an IMF program increase the perceived chances of bailout, improve risk perceptions and therefore result in a shift toward relative more long-term loans.[17] In the regressions below we use two specifications of this variable. One specification does not distinguish between the different IMF programs and aims to capture the overall lending effect of IMF programs. The other specification makes such distinction and aims at capturing the program specific effects.

Withdrawn IMF program credit one period ahead, *WITHDRAWN,* accounts for investors' expectations about the country's commitment to economic reform program agreed

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[17] An alternative interpretation is that the expectation of an IMF program is perceived by lenders as an enhancement of the country's ability to pay back creditors because of the improved foreign reserves position. However, lenders would also know that IMF credit also has to be re-paid and with priority over all other credit. Thus in net terms an increase in relative long-term lending would be a reflection of bailout.

with the IMF. If lenders expect that the country is committed to the economic reform program, then country will be able to withdraw the available IMF program resources, and there will be the expectation that the country fundamentals will improve and therefore it will be safer to increase the maturity of the loans.

Data Sources

We construct a balanced panel data set of 71 developing and emerging market economies for the period 1992-1997.[18] The data set is drawn from three main sources:

HISTORY OF IMF LENDING. Data on IMF lending arrangements for each country are obtained from the IMF website. Lending arrangements include the type of lending facility, the date of the arrangement, date of expiration or cancellation of the arrangement, the size of credit agreed, the actual credit withdrawn, and credit outstanding, all three measured in thousands of special drawing rights (SDRs). For the sample countries, lending facilities included SBA, EFF, and ESAF.[19]

The data on IMF lending presents several limitations. First we are not able to distinguish between IMF programs that expired from those which got cancelled since only two dates are provided: dates of arrangement and expiration or cancellation. Establishing whether a program was cancelled is important in understanding the participant country's commitment to economic reform, country risk, and ultimately the behavior of short-term international debt.

The assumption is that expired arrangements would indicate that the country met IMF conditionality and therefore it was committed to economic reform during the life of the arrangement. This would be associated with a lower default risk, and therefore less need for

[18] The countries included are Argentina, Bangladesh, Bolivia, Brazil, Bulgaria, Burkina Faso, Cameroon, Chile, China, Colombia, Congo, Costa Rica, Cote d'Ivoire, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kenya, Korea, Liberia, Madagascar, Malawi, Mali, Mexico, Morocco, Mozambique, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Romania, Russia, Senegal, Sierra Leone, Somalia, Sri Lanka, Sudan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Uruguay, Venezuela, Vietnam, Yemen, Zambia, and Zimbabwe.

[19] We examine neither Structural Adjustment Facility nor the Poverty Reduction and Growth Facility programs because they were not available in the post- and pre-crisis periods, respectively, and therefore we would not be able to compare the effects of these programs in both periods.

short-term debt in relative terms. Cancelled arrangements, in contrast, would indicate either a lack of commitment to reform by the participant country or a termination based on mutual agreement. If the cause for termination is a lack of commitment, this would lead to an increased country risk and force the country to rely relatively more on liquid and reversible short-term capital for its financing needs. The impact of early termination by mutual agreement on short-term capital flows is less clear. The effect would depend on the reasons for early termination.[20] These data limitations mean we need to employ caution interpreting the empirical estimates for the commitment effects of IMF lending.

GLOBAL DEVELOPMENT FINANCE. Global Development Finance (GDF) provides data on private capital flows to 138 developing countries. GDF breaks down capital flows by maturity, type of borrower, type of creditor, and the form of flows. Net flows of total debt comprise net flows of short-term debt, long-term debt and IMF credit. Net flows of short-term debt are the change in the short-term debt stock less the change in interest arrears. The stock of total debt includes short-term debt, long-term debt, and the use of IMF credit. Short-term debt has an original maturity of one year or less.

INTERNATIONAL COUNTRY RISK GUIDE. The International Country Risk Guide (ICRG) is a publication of The Political Risk Services (PRS) Group, a commercial service that provides financial, economic, and political risk assessment for international investors. ICRG's indexes are based on polls of experts and the data comprise monthly observations starting 1982 on 140 developed and developing countries.[21] PRS also issues an academic version of ICRG - IRIS3 – which is the actual source in this paper. IRIS3 include annual figures for quality of governance indicators over the period 1982-1997. In this paper, we use

[20] It may be possible that the adequacy of reserves, as in the case of Egypt's SBA (1993-96), could signal the need for IMF assistance.

[21] There are several advantages to using ICRG's data set. The data set are based on polls of experts' opinion and ratings, designed for cross-country comparability. The data series span larger set of countries for longer time period than alternative data sets. For example the most widely used alternative data source, Transparency International Corruption Indexes, has less country coverage, shorter time series, and narrower scope than IRIS3. On the other hand being based on polls of experts, the data are subjective and experts' opinions may be influenced by a country's current economic performance. However, as Kaufmann, Kraay, and Zoido-Lobaton (1999) argue, there is strong correlation of the ICRG variables with other objective measures and ratings of legal and judicial risk from other data sources.

rule of law as an indicator of investors' perceptions about the quality of institutions.[22]

The rule of law is defined in ICRG as "reflecting the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes." The variable ranges from 0 to 6. Lower scores indicate "a tradition of depending on physical force or illegal means to settle claims." Upon changes in government, new leaders "may be less likely to accept the obligations of the previous regime." Higher scores indicate "sound political institutions, a strong court system, and provisions for an orderly succession of power."

5. Empirical Results

The use of F tests reveals the presence of unobservable effects in pre- and post-crisis periods and the Hausman specification test suggests the appropriateness of the random effects model. Table 1 presents the empirical results from different specifications of the estimating equation (3) above. These specifications differ in how the IMF lending variables are specified. The first specification includes the effect of IMF lending in general. The other three specifications are for the different IMF lending programs. We discuss first the IMF lending variables for the four specifications and later we discuss the results for the control variables.

Overall IMF Lending and Moral Hazard

Expectations of IMF lending seem to reduce lending risk and relative short-term debt flows in the post Mexican crisis period. Expected IMF lending, regardless of the type of the lending program, seems to have statistically significant influence on reducing lending risk and relative short-term debt flows. An increase in IMF credit relative to GDP by one percentage point resulted in the reduction of short-term relative debt flows by about three percentage points. This influence, however, was not statistically significant during the pre-crisis period, suggesting the likelihood of moral hazard only in the post crisis period. One drawback of this specification is that we are not able to measure withdrawn IMF resources and therefore control for the commitment effect of IMF programs.

[22] Regression results based on other governance quality indicators are available from the authors.

SBA and Moral Hazard

Controlling for fundamentals and the IMF commitment effect, expected SBA lending reduced relative short-term debt flows in both periods, with a much more pronounced reduction in the post-crisis period.

Expected withdrawn SBA resources, however, increased relative short-term debt flows in both periods. We therefore would say that the more expected commitment to economic reform resulted in higher lending risk and more relative short-term debt flows. But this is counter to our expectations and the role of the commitment effect. Two alternative interpretations are possible. First, expected withdrawn SBA resources add to the indebtedness of the country and therefore increase lending risk. Second, as countries are expected to withdraw more SBA resources, there are less "liquid" reserves that could cover lenders' claims. The liquidity of SBA lending stems from the short-term nature of the program both the problems it addresses and the period of time over which disbursements are made.

In summary expectations of SBA lending reduced relative short-term debt flows in both periods with the magnitude of the reduction multiplying in the post-crisis period. This seems to suggest that moral hazard was present in SBA lending even before the Mexican crisis and the IMF bailout magnified the moral hazard remarkably.

EFF and Moral Hazard

The influence of expected EFF lending was statistically significant in the post-crisis period. Similar to that of SBA, expected EFF lending reduced relative short-term debt flows and generated moral hazard.

The influence of expected withdrawn EFF resources was also similar to that of SBA in the post-crisis period. In the pre-crisis period, however, the influence of expected withdrawn EFF is consistent with the commitment to economic reform interpretation. More

expected withdrawn EFF resources implied more commitment to economic reform, reduced lending risk, and therefore reduced relative short-term debt flows.

How can we interpret the change in the influence of expected withdrawn EFF

between the pre- and post crisis periods? Owing to the very nature of EFF, which addresses structural imbalances, more withdrawal of resources is associated with more commitment to economic reform. In the pre-crisis period, such commitment to economic reform increased investors' confidence and reduced lending risk. The IMF large-scale lending in the Mexican crisis seems, however, to have shifted investors' responses to incentives from responding to and rewarding structural reform to short-term liquidity. By withdrawing more resources, a country's indebtedness increases and less liquidity is left in the pipeline to meet liabilities, which increases lending risks, and therefore increases relative short-term debt flows.

ESAF and Moral Hazard

The influence of expected ESAF lending was statistically insignificant in the post-crisis period. In the pre-crisis period, however, expected ESAF lending increased relative short-term flows, suggesting that such lending did not depress lending risk as in the case of SBA and EFF, and therefore did not generate moral hazard. This result could be explained in terms of the nature of the program and eligible countries. Countries with ESAF programs are low-income countries, which require structural adjustments and therefore are high lending risk. Therefore investors would extend more relative short-term debt flows in lending to these countries.

The influence of expected ESAF withdrawn resources was similar to that of EFF. In the pre-crisis period more withdrawn resources indicated more commitment to economic reforms and were rewarded by less relative short-term flows. In the post-crisis period, investors rewarded liquidity availability more than commitment to economic reform.

The similarity of the influence of expected withdrawn EFF resources to that of ESAF could be due the focus of both programs. Although EFF and ESAF differ in that the former is a regular lending facility while the latter is a concessional lending facility, both focus on structural adjustments and have longer time horizons than SBA.

Results for the Control Variables

The results for the other control variables are in general consistent across the four estimated specifications. The level of real GDP appears to lower risk in the pre-crisis period leading to a reduction in the relative role of short-term debt. However, higher levels of real GDP lead to the opposite result in the post-crisis period.

An increase in the level of total external debt, *ceteris paribus*, increases relative short-term debt flows, a result that is expected because of the associated increase in lending risk.

Improvement in the rule of law as expected reduces relative short-term debt flows, a result consistent with the results of Mina (2002). These effects are largely magnified in the post-crisis period. The influence of the fiscal deficits for the most part is as expected to increase the relative share of short-term debt since the larger the deficits the higher the risk of a financial crisis. The degree of financial development and is expected to decrease the relative share of short-term debt. Although this is the result in some of the specifications, in some other cases it takes the opposite sign leading to increases in relative short- term debt. The expected real exchange rate devaluation is expected to lead to increases in relative short-term debt flows because of the increase in risk. This is the result consistently found in the post-crisis period for all specifications, but not for those in the pre-crisis period. It would seem like investors re-assessed risk in the post-crisis period.

6. Conclusion

In this paper we have examined the issue of whether IMF lending generates moral hazard through its effects on the maturity composition of international debt flows. The importance of a perspective based on the maturity of international debt stems from the significant role that short-term capital flows played in the 1990s international financial crises. We found that IMF programs in general tend to reduce short-term debt flows relative to total debt flows especially in the post Mexican crisis period and therefore generate moral hazard. In particular, SBA and EFF lending reduced short-term debt flows, suggesting that these two programs may have generated moral hazard by leading lenders to ease the term structure of

their loans. In contrast, we found that ESAF lending did not reduce relative short-term debt flows, thus suggesting that this type of operation does not generate moral hazard. The commitment effect of IMF programs had little influence on short-term debt flows.

Table 1: **Effect of IMF Programs on Short-term Lending Flows**
Dependent Variable: Net Short-term Debt flows (% Net Total Debt Flows)

	IMF Credit		SBA		EFF		ESAF	
	1992-94	1995-97	1992-94	1995-97	1992-94	1995-97	1992-94	1995-97
$RGDP_{i,t-1}$	-0.097***	0.008***	-0.004**	0.005***	-0.001	0.007**	-0.006***	0.010***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)
$TED_{i,t-1}$	0.384***	-0.044	0.293**	0.539***	0.676***	0.008	0.277***	0.191**
	(0.101)	(0.065)	(0.123)	(0.088)	(0.213)	(0.104)	(0.103)	(0.099)
$LAWCHNG_{i,t-1}$	-20.928***	-107.212***	-14.698***	-136.088***	-9.241**	-93.344***	-10.556***	-103.115***
	(1.853)	(18.161)	(1.632)	(13.727)	(3.858)	(23.934)	(1.722)	(15.520)
$DEFICIT_{i,t-1}$	1.376***	-1.913	1.432***	-3.243***	2.516***	-2.990	2.171***	0.816
	(0.451)	(1.693)	(0.392)	(1.101)	(0.486)	(2.778)	(0.358)	(1.711)
$OPENNESS_{i,t-1}$	-0.215***	0.100**	-0.694***	0.609***	-0.269***	0.303***	-0.498***	0.352***
	(0.058)	(0.050)	(0.076)	(0.119)	(0.088)	(0.095)	(0.079)	(0.057)
$CREDIT_{i,t-1}$	0.082	-0.120	0.462***	-0.804***	-0.181	0.267***	0.290**	-0.188**
	(0.188)	(0.081)	(0.180)	(0.129)	(0.248)	(0.104)	(0.082)	(0.076)
$DEVALUE_{i,t+1}$	-0.575***	2.640***	-0.490***	2.665***	-0.426***	2.381***	-0.227***	3.010***
	(0.095)	(0.556)	(0.045)	(0.603)	(0.084)	(0.519)	(0.082)	(0.413)
IMF Credit	-0.421	-2.913**						
	(0.967)	(1.265)						
SBA			-12.270***	-55.455***				
			(3.646)	(2.928)				
Withdrawn SBA			0.618***	1.966***				
			(0.137)	(0.112)				
EFF					-1.104	-25.460***		
					(5.429)	(4.237)		
Withdrawn EFF					-0.778***	1.565***		
					(0.294)	(0.244)		
ESAF							2.927**	0.503
							(1.175)	(1.038)
Withdrawn ESAF							-0.962***	0.625***
							(0.210)	(0.087)
Constant	47.177***	18.045***	58.288***	7.821	50.143***	-20.602	70.590***	-13.072
	(9.451)	(11.848)	(5.889)	(15.184)	(7.956)	(21.975)	(8.715)	(17.716)
No. of Obs.	113	74	111	70	111	70	111	70
Wald Chi squared	8598	326	1268	9862	1072	51615	798	2380

APPENDIX A

Construction of Explanatory Variables

The purpose of this appendix is to clarify the construction of the IMF variables and the other explanatory variables. We first discuss the construction of IMF program variables. In the following table we summarize the methodology and data sources for the other explanatory variables. We use the size of IMF arrangement, and the size of non-withdrawn resources to proxy for the signaling and commitment effects, respectively. Because we use the size of lending agreed, a stock figure, we construct the IMF agreed program credit variable for the lifetime of the arrangement as

$$IMFPROG = \frac{A * SDR\$}{GDP}$$

where the numerator is the IMF agreed program credit in SDRs, A, and converted at the end of period SDR/US$ exchange rate, *SDR$*, and *GDP* is nominal GDP. Despite the fact that the agreed program credit is a stock figure reached at the start of the program, the IMF program credit values could change with the change in the SDR/US$ exchange rate or with the nominal GDP. If the exchange rate or the nominal GDP changes during the lifetime of the program, the IMF program credit as a percentage of GDP is likely to change. We proxy for the commitment effect by the percentage of IMF withdrawn resources to agreed program credit.

Table A1: Methodologies and Data Sources for Explanatory Variables

Variable	Unit	Methodology and Data Source(s)
	Dependent Variable	
Short-term Debt Flows (net)	Percentage of net total debt flows	Global Development Finance
	Explanatory Variables	
Real GDP (*RGDP*)	Billions of US$.	Real GDP expressed in 1995 market prices; World Development Indicators
Total External Debt (*TED*)	Billions of US$	Global Development Finance
Institutional Change (*INSTCHNG*)	Units	International Country Risk Guide using rule of law indicator
Fiscal Deficit (*DEFICIT*)	Percentage of GDP	World Development Indicators
Openness (*OPENNESS*)	Percentage of GDP	Sum of exports and imports as percentage of GDP; calculated from World Development Indicators
Change in Real Exchange Rate (*DEVALUE*)	Percentage change	Annual change of real exchange rate; calculated from International Financial Statistics
Private Credit (*CREDIT*)	Percentage of GDP	Credit extended to private sector as percentage of GDP; calculated from World Development Indicators
IMF Credit (*IMF Credit*)	Percentage of GDP	Stock of IMF credit as percentage of GDP; calculated from Global Development Finance and World Development Indicators

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