

## CATALYSING PRIVATE CAPITAL FLOWS: DO IMF PROGRAMMES WORK AS COMMITMENT DEVICES?\*

*Ashoka Mody and Diego Saravia*

In this article, we examine whether IMF programmes influence the ability of developing country issuers to tap international bond markets and if they improve spreads paid on the bonds issued. We find that Fund programmes do not provide a uniformly favourable signalling effect. Instead, the evidence is most consistent with a positive effect of IMF programmes when they are viewed as likely to lead to policy reform and when undertaken before economic fundamentals have deteriorated significantly. The size of the Fund's programme matters but the credibility of a joint commitment by the country and the IMF appears to be critical.

Enhancing its members' access to international capital markets is widely regarded as an important objective of the International Monetary Fund (IMF or Fund). Though the objective is not an explicitly stated purpose in the Fund's Articles of Agreements, the flow of international capital is essential to such stated purposes as the stability of the international monetary system, efficient trade and productive resource use, and to providing confidence when a member country experiences difficulties with its balance of payments.<sup>1</sup> The Fund's interest in private international capital flows has, moreover, increased over the last decade. Reflecting this evolution, the Fund's former Managing Director, Horst Köhler (2001, p. 13) affirmed:

Because private flows are an indispensable source of financing for development, another crucial function of the IMF's new Capital Markets Department will be to strengthen our ability to help countries gain access to international capital markets.

Does the Fund succeed in its objective of 'catalysing' capital flows to developing economies? In policy circles, it is often taken as axiomatic that a Fund programme stimulates capital flows (Dhonte, 1997; Fisher, 1997). Bird and Rowlands (2001) say it is a 'commonly held view' that the IMF helps attract private capital to a country by endorsing the country's economic reform plan. They cite, for example, a UK Treasury Committee report on the IMF that refers to 'an all pervasive conventional wisdom' that an IMF programme buys a 'Good Housekeeping Seal of Approval'.

\* We are grateful to Rich Kelly for data and guidance on Fund programmes and to Marco Arena, Roger Betancourt, Graham Bird, Michael Bordo, Jim Boughton, Fernando Broner, Patrick Conway, Barry Eichengreen, Kristin Forbes, Federico Guerrero, Enrique Mendoza, Alessandro Rebucci, Carmen Reinhart, John Shea, Antonio Spilimbergo, Jeromin Zettlemeyer, seminar participants at the University of Maryland and three anonymous referees for helpful comments and suggestions. The views expressed in this article are those of the authors and should not be attributed to the International Monetary Fund.

<sup>1</sup> Article I of the International Monetary Fund's Articles of Agreement lists a number of objectives ('purposes') for the Fund. These include international monetary cooperation, facilitation of international trade to enable productive use of resources, exchange rate stability, establishment of a multilateral system of payments, and confidence to its members by making available the general resources of the Fund to permit 'correction of maladjustments' in their balance of payments without a high cost to the domestic or international economy.

However, when the question is put to the data, the statistical evidence goes the other way. In a recent review, Bird and Rowlands (2002) infer from the literature that Fund programmes not only do not enhance countries' access to capital markets, a programme may actually make things worse.

To reconcile the various views and assess the empirical evidence, it is useful to take a step back. What is the basis for expecting an IMF catalytic effect? Recent theoretical contributions focus on different mechanisms through which the Fund may catalyse capital flows. Some focus on the lending role of the IMF in the context of a financial crisis. In a crisis, liquidity provision by the Fund improves the incentives of private creditors to roll over their short-term loans to developing country borrowers (Morris and Shin, 2003; Corsetti *et al.*, 2003; Saravia, 2004). The extent of Fund lending can also influence country policy behaviour and hence capital market access. Other models emphasise the Fund's 'informational' role. The IMF can act as a screening device (Marchesi and Thomas, 1999), serving as an instrument that countries can use to signal to the market their reform commitment. Thus, the IMF, in its role as a delegated monitor, can help complete international capital markets (Tirole, 2002).

Despite their differing perspectives, the theoretical models all point to a non-linearity in the Fund's effectiveness when catalysing capital flows. Countries that are not vulnerable to external crises have no reason to benefit from IMF programmes. Those that are vulnerable – but are not yet perceived as highly illiquid or insolvent – will achieve the greatest catalytic gain from Fund intervention. And those countries that have passed into a state of crisis or insolvency will once again derive limited or no benefit from Fund programmes.

In line with the theoretical literature, we find strong evidence for the non-linearity predicted. Specifically, an IMF programme is effective when foreign exchange reserves and debt levels make the country vulnerable but the reserves and debt have not deteriorated to the point where their early restoration to more normal levels has a low probability. Our contribution, then, is to identify empirically the 'intermediate' vulnerability zone and, thus, to provide a more definitive empirical basis for the propositions and conjectures that have been made thus far without solid supporting evidence.

In finding evidence for nonlinearity, we cannot conclusively determine in favour of one theoretical perspective or another. However, as distinct from short-term rollover considerations, we lean in favour of a medium-term information and commitment interpretation of our results. First, the data we use are on long-term bonds. We use the term 'long-term' in the now commonly accepted sense of maturity longer than one year. The average maturity of bonds in our sample is about 7 years. Moreover, arms-length borrowing through bonds is more prone to informational problems than is the case with 'relationship' bank lending. While this focus gives our results a medium-term orientation, we cannot, of course, rule out that even longer-term bond purchases are informed by short-term considerations similar to those involved in rollover.

Second, we attempt to identify Fund programme characteristics associated with catalytic effects. Precautionary programmes are catalytic. These are programmes where a country contracting a programme nevertheless declares its intention not to avail itself of available Fund liquidity. In contrast, the amount of Fund lending does not appear to robustly catalyse capital flows. Also, repeated relationships between a country and the

Fund facilitate market access, implying value in the commitment to solve structural problems; but diminishing returns set in as use of Fund resources is prolonged, suggesting that beyond a point the commitment and the likelihood of improvement in performance begins to be called into question.

We infer, then, that in the medium term, a Fund programme is catalytic when it allows a country to signal commitment credibly to a course of economic reform under Fund monitoring, alleviating the risk of expropriation under incomplete contracts. In mediating as a 'delegated monitor' between the country and international investors, a Fund programme can potentially substitute for missing contracts and act as a joint commitment device that improves access to international capital.

For our empirical analysis, we use an approach developed by Eichengreen and Mody (2000, 2001) to evaluate the determinants of international bond issuance and of spreads charged on bonds at the time of their issuance. The use of transactional data on individual bonds reduces the severity of the reverse causality problem – i.e., the possibility that observed outcomes influence the likelihood of Fund programmes. This is so because the feedback from an individual bond issue to explanatory country aggregates is likely to be less serious than when the dependent variable is itself a country aggregate such as growth or capital flows. At the same time, by allowing a more careful consideration of timing than was possible in past studies, transactional data at higher frequency allows us to consider the date of issuance and spreads paid in the period following the initiation of a Fund programme more precisely and hence further reduces the problem of reverse causation.

In the next Section, we discuss the recent theoretical literature that highlights the conditions under which the Fund may be expected to catalyse capital flows. We then review the empirical findings on the catalytic impact of IMF programmes to identify key substantive conclusions and methodological issues. This is followed by a description of our methodology and data. The empirical results focus on the possibility of a differential catalytic response when the country's external fundamentals are in an 'intermediate' zone. We also examine the implications of certain programme features to uncover evidence in favour of an information role for the Fund in attracting private capital. The final Section concludes.

## 1. Theoretical Considerations

We use existing theoretical approaches to identify the specific roles that the IMF could play in catalysing private capital flows and the conditions under which such roles may be effective. In common, the different approaches recognise that the observed outcomes reflect the interaction among three parties: the private lenders (from whom flows have to be catalysed), the country (which seeks additional foreign capital), and the IMF. In evaluating these interactions, two considerations are of importance. First, is the IMF a substitute for or complement to private lending? Catalysis clearly depends on complementarities. Second, does the IMF change (or reinforce) country incentives to adopt policies conducive to repayment of private debt? Of particular concern is the possibility of 'moral hazard', i.e., the country may take steps that make debt repayment less likely. How the country will respond, the literature suggests, depends on country circumstances.

The time frame of analysis has a strong bearing on the interactions between the three parties – and, hence, on the incentives that motivate them. Much of the recent analysis has been motivated by the IMF's role in the midst of financial crises when the possibilities of substitution between the IMF and private creditors and the concerns about moral hazard become particularly acute. During a crisis, the size of IMF lending in relation to the debt that needs to be rolled over can sometimes be large. In contrast, in a longer-term perspective, IMF lending is not a substitute for financing the developmental needs of a country. As such, the catalytic influence of the Fund is likely to depend on whether the Fund is able to reinforce the country's commitment to a development programme and hence raise the likelihood that long-term lenders will be repaid.

Consider, first, the crisis literature. Morris and Shin (2003) and Corsetti *et al.* (2003) argue that the IMF's provision of liquidity would increase countries' incentives to take a costly adjustment effort and, thereby, catalyse capital flows when countries' fundamentals are in an intermediate zone, i.e., when the fundamentals are 'poor but not hopelessly so'. IMF liquidity induces complementary private finance, reducing the short-term pain of reform otherwise required by the country. However, if the crisis is extremely severe, then neither IMF funding nor the reform effort will be sufficient to assure lenders that they will be repaid. These models also warn that IMF provision of liquidity when not needed may cause slackening of country reform effort.

Using a different approach, Saravia (2004) also concludes that the effects of IMF lending on other creditors will depend on the country's solvency and liquidity condition. He focuses on the issue of seniority of the IMF. When the solvency and liquidity are relatively sound, the country can cover its financial needs from other non-senior sources and IMF financing is undesirable because it would only dilute existing creditors' claims. When the situation deteriorates, and the country cannot borrow from private (non-senior) lenders because of debt overhang considerations, IMF lending becomes necessary to continue with the valuable projects. Current lenders will be reassured by IMF lending and will have an incentive to continue financing ongoing projects, even though their claims will be diluted by the Fund. However, when fundamentals deteriorate further, exiting creditors would prefer to not continue with project financing and obtain the scrap value of the terminated project rather than see their claims diluted. Thus, this model also predicts a nonlinear effect of IMF lending programmes on availability of private finance and hence on risk spreads by private creditors.

But, in addition to lending, the Fund also plays a catalytic role through its monitoring function.<sup>2</sup> The Fund's knowledge of, and confidence in, the country's policies can help induce private capital flows. The Fund's website describes its role in these very terms:

<sup>2</sup> Each member country is required by Article IV of the Articles of Agreement, among other things, to foster orderly growth, price stability, and orderly monetary and financial conditions. Article IV authorises the Fund to oversee compliance of member countries with these obligations. The Fund is asked – and has agreed in the past – to monitor and certify a country's policy programme without any commitment of resources. A distinction may be made, in this context, between the role of the Fund's staff and that of its Board. A positive staff report can signal a professional judgment to investors that the country has a credible adjustment programme. The Board's approval sends a signal that the international community is prepared to support the country's programme. At least in theory, these two signals can be distinct and separable. The Fund's Board 'expressed some degree of reservation' about unbundling policy certification (or 'enhanced surveillance') from the use of its resources (Boughton, 2001, p. 413).

In most cases, the IMF, when it lends, provides only a small portion of a country's external financing requirements. But because the approval of IMF lending signals that a country's economic policies are on the right track, it reassures investors and the official community and helps generate additional financing from these sources. Thus, IMF financing can act as an important lever, or catalyst, for attracting other funds. The IMF's ability to perform this catalytic role is based on the confidence that other lenders have in its operations and especially in the credibility of the policy conditionality attached to its lending.<sup>3</sup>

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

The IMF, Tirole (2002, p. 99) argues, 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 liberalisation'. 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.

In its informational role – as a mechanism for a country to signal policy intentions while the Fund performs a delegated monitoring function – a programme's success in catalysing capital flow is likely to depend on several factors. Country commitment through the Fund, for example, is likely to be effective when countries are vulnerable but have not yet crossed thresholds that imply inability to service external debts even with Fund assistance. Thus, for example, a Fund programme is unlikely to catalyse new capital when solvency is at stake. Even if a country does not 'gamble for resurrection', as some have argued (Powell, 2002), new shocks will continue to prevent recovery.<sup>4</sup>

These considerations are consistent with the Fund's own preferred approach to early intervention. For example, in discussing policy towards access to Fund resources, the Fund's Treasurer's Department notes:

Over the years, it has come to be recognized that the efficacy of the mixture of adjustment policies and financing depends largely on the early adoption of corrective policy measures. Early resort to an adjustment programme supported by IMF resources can help to avoid more drastic policy actions that may otherwise be required, thereby limiting the impact of the adjustment on other members. (IMF, 2001a, p. 29)

<sup>3</sup> <http://www.imf.org/external/pubs/ft/exrp/what.htm>

<sup>4</sup> Powell (2002) suggests that a country's response to a Fund programme is likely to weaken as its economic situation deteriorates. Supporting that notion, Ivanova *et al.* (2001) find that larger government fiscal deficits, which they believe reflect internal political competition, are associated with more frequent programme failure.

A 1979 decision by Fund's Executive Board had an almost identical wording: 'Members should be encouraged to adopt measures ... at an early stage of their balance of payments difficulties or as a precaution against the emergence of such difficulties'.<sup>5</sup>

Complementing country commitment, the Fund can signal its own commitment in a variety of ways. Programmes with larger resources (in relation to country debt obligations) can be expected to be associated with better capital market access. However, the joint commitment is even stronger when the country does not actually use those resources. The delegated monitoring function should be particularly valuable in such programmes that are 'precautionary' in nature. In that situation, a country subjects itself to the discipline implied by a Fund programme without drawing on the available resources. Finally, the Fund can signal commitment by deeper engagement in a country. One measure of deeper engagement is the length of time over which a country contracts a Fund programme. Where problems are of a structural nature, markets are likely to value the continued presence of the Fund. However, excessive repetition of Fund programmes ('prolonged use') is likely to reduce the perception of the country's commitment and the Fund's ability to resolve matters.<sup>6</sup>

## 2. Findings in the Empirical Literature

In this Section, we briefly review the empirical studies on the catalytic effect of Fund programmes. We use the review to identify the key methodological issues that arise in such analysis to provide the context and rationale for our own empirical approach.

Killick *et al.* (1992) do a before–after comparison of *net* capital flows and find that these flows decline after an IMF programme is put in place. However, this evidence does not speak directly to the question at hand. Much of the decline is due to an increase in repayments rather than to a decline in *gross* inflows.

Bird and Rowlands (1997, 2001) are especially sceptical of the Fund's 'catalytic effect'. They find no empirical evidence for such an effect, consistent with their priors. IMF programmes are a sign of economic distress and they are not persuaded that the country's macroeconomic balances improve following the start of a programme. Similarly, in a regression to explain spreads charged on commercial bank loans, Ozler (1993) finds a positive sign on the dummy variable for an IMF programme, suggesting that the programme is an indicator of 'repayment difficulties'.<sup>7</sup> These studies, however, have their limitations. Ozler's results are quite sensitive to the inclusion of other explanatory variables. Once variables are added to characterise the loan and whether a country achieved sovereign status only recently, the magnitude of the coefficient falls sharply and it is no longer significant at the 5% level. The Bird and Rowlands (1997, 2001) and Ozler (1993) analyses also do not address the possibility that a drop in capital flows may trigger IMF programmes.

<sup>5</sup> Decision No. 6056-(79/38), March 2, 1979 in (IMF, 2001*b*, pp. 167–8).

<sup>6</sup> In light of results obtained by Stone (2002), loss of credibility when there is a high incidence of programme repetition may also reflect that such repetition reflects, in part, political affinity with the US, which serves to reduce the incentive to undertake demanding reform measures.

<sup>7</sup> Hajivassiliou (1987) has the same interpretation as Ozler (1993) in his estimate of a supply function for capital where he finds that a dummy variable representing IMF programmes (and also instances of debt rescheduling) is associated with reduced capital flows.

The one study that finds an indirect impact of IMF programmes on capital market access is that by Marchesi (2001). She examines a country's ability to reschedule its private debt obligations and finds that the presence of a Fund programme helps in this respect. She interprets her finding to imply that participation in a Fund programme signals a commitment to policy reform that is a precondition to debt rescheduling and continued market access.

In light of the theoretical findings discussed above, it is important to note that the bulk of the literature – not just on the catalysing effect of the Fund but on the effectiveness of Fund programmes more generally – treats IMF programmes as undifferentiated. Thus, a single dummy variable represents the presence or absence of a Fund programme. However, programmes differ in their features and their effectiveness can be expected to depend on conditions prevailing in the country. As such, differences between Fund programmes and the relevance of country conditions have recently received some attention. In re-examining the catalytic effect of Fund programmes, Edwards (2000) finds that programme countries that have a recent history of lack of compliance with the agreed reform agenda are penalised in terms of access to capital markets. Thus, he finds evidence for an asymmetric effect: Fund programmes do not necessarily help, but programmes with non-compliance appear to hurt. The important point Edwards demonstrates is that the catalytic effect is likely to vary considerably across programmes and country circumstances.

Other evidence points to the importance of country conditions in determining IMF programme success. Ivanova *et al.* (2001), in explaining the success or failure of Fund programmes, distinguish between countries on the basis of internal political competition for resources. Stone (2002) focuses on a number of differences, important among which is a measure of the country's political affinity to the US as a proxy for the inability of the Fund to discipline domestic policy makers in that country.

Edwards (2000) also considers the possibility that self-selection into Fund programmes may bias the results. However, he finds that correction makes no difference to the results. This is not completely surprising. The determinants of Fund programme adoption are not well identified. While the broad determinants of selection into Fund programmes seem to be such variables as low growth, low reserves, and high debt, these variables do not do a good job in predicting participation in IMF programmes. For example, Garuda (2000) measures the propensity to adopt an IMF programme and finds within his low-propensity group several country-year observations that do have IMF programmes and within his high propensity groups many country-year observations that do not have IMF programmes.<sup>8</sup> Using a measure of 'crisis' based on the level of reserves, Conway (2000) finds a correlation of 0.25 between crisis and IMF programme incidence. Hutchison (2001) also finds a low correlation between his measure of crises and IMF programmes. Hutchison finds, moreover, in a probit estimate of programme participation, that while 80% of 'no programme participation' observations are correctly predicted, only a third of programme participation is predicted.

<sup>8</sup> He classifies countries by a 'propensity' score, i.e., by a measure of the likelihood that may be in a Fund programme. A country's propensity is derived from a probit as the probability of IMF programme participation and is a function of such variables as growth, inflation, reserves, and current account balances of current and past periods.

In this article, we account for country conditions and differences in Fund programmes when analysing the catalytic effect. Moving in this direction, a number of options open up, not all of which we pursue. In considering country conditions, we focus on the nonlinearity in the effectiveness of Fund programmes to the level of a country's external vulnerability. Among programme characteristics, we examine the implications of the size of lending, precautionary programmes, and length of Fund commitment. Thus, we do not pursue other programme features, such as degree of completion, which gave inconclusive results.

### 3. Methodology and Data

We seek to explain whether the risk premium (spread) charged on an emerging market bond and the likelihood of bond issuance are influenced by the presence and characteristics of an IMF programme. In doing so, we draw on a dataset of about 3,300 bonds, issued between 1990 and 1999 by emerging market and developing country issuers. By design, we focus on longer-term investments rather than rollover of short-term lending. While such distinctions are never clear-cut empirically, the implication is that we are more likely to be testing the IMF's role in alleviating the informational and commitment problems in international capital markets. The bonds included in this article are of one-year or greater maturity (the one-year mark being conventionally the cut-off for short-term lending). The average maturity of bonds in our sample is 7 years. Also, by focusing on bonds, we place the spotlight on that segment of international capital markets most prone to informational problems. Bond markets tend to be more of an arms-length nature compared to bank lending, where creditors and lenders often have longer-term relationships and where banks are able to themselves undertake monitoring at a level not possible for dispersed bondholders.

We build on a two-equation estimation approach developed in earlier papers; see Eichengreen and Mody (2001). The 'spreads' equation specifies the determinants of spreads charged and the 'selection' equation is a probit for the decision to issue the bond.

The spreads equation is a linear relationship:

$$\log(\text{spread}) = \beta\mathbf{X} + u_1 \quad (1)$$

The dependent variable is the logarithm of the spread. Throughout, the spread we use is the so-called primary or launch spread and is defined as the premium paid at the time of bond issuance over the risk-free rate for a bond of similar maturity and currency denomination. Because we use primary spreads, we do not 'follow' a particular bond 'over time'. Bond frequency issuance varies over time, resulting in varying numbers of bonds for a given country in any given time period.  $\mathbf{X}$  is a vector of issue, issuer, and period characteristics; and  $u_1$  is a random error. The  $\mathbf{X}$  vector contains a dummy variable for an IMF programme, other programme characteristics, and also interactions between the programme and country characteristics, as we discuss below in detail.

Since the spread will be observed only when the decision to borrow and lend is made, we correct for this sample selection problem. Assume that spreads are observed when a latent variable  $B$  crosses a threshold  $B'$  defined by:



$$B' = \gamma Z + u_2 \quad (2)$$

where  $Z$  is the vector of variables that determines the desire of borrowers to borrow and the willingness of lenders to lend (and will also contain the IMF programme variables and their interactions), and  $u_2$  is a second error term. We further assume that:

$$u_1 \sim N(0, \sigma), u_2 \sim N(0, 1), \text{ and } \text{corr}(u_1, u_2) = \rho.$$

This is a sample selection model *à la* Heckman (1979) and (1) and (2) can be estimated simultaneously by a maximum likelihood procedure.

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, we record a zero, and where they did we 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.<sup>9</sup>

### 3.1. *Evaluating IMF Programmes: Econometric Issues*

While the model described above considers the selection bias on account of the issuance or non-issuance of a bond, it does not deal with the more conventional issue in the IMF programmes literature of selection into an IMF programme. In our case, there are two key differences relative to the past literature. First, the outcome we observe is an individual bond issue. While a bond issue may be large and reflect broad market sentiment towards the country, a single bond issue is unlikely to trigger an IMF programme.

Moreover, our observations are at a much higher frequency than is the case with past studies. Dicks-Mireaux *et al.* (2000) note that how the timing of IMF programmes is specified makes a difference to the empirical results. Similarly, Kaminsky and Schmukler (1999) use daily announcements to track movements in stock markets and find, on average, that stock markets respond positively on the days agreements are reached with international organisations such as the IMF. Figure 1 shows that if the IMF programme is initiated at the time shown by the solid vertical line but the dotted line is the starting date that the econometrician uses, then we are likely to find a positive correlation between IMF programmes and spreads, reflecting reverse caus-

<sup>9</sup> Dell'Ariccia *et al.* (2002) follow a similar research strategy but also add as instruments in the probit equation the bonded debt issued in the previous year, the number of bonds issued in the previous year, the natural logarithm of per capita GDP in 1993, and a dummy variable for countries directly affected by the Asian crisis. Ideally, the instruments should influence the issuance decision but not the spreads. It is not obvious that these four variables fulfil that objective and, in practice, it is hard to find such variables. For example, Asian crisis countries were rationed during specific years but also paid higher spreads in those years. Hence, it is not sufficient to rely on exclusion conditions.

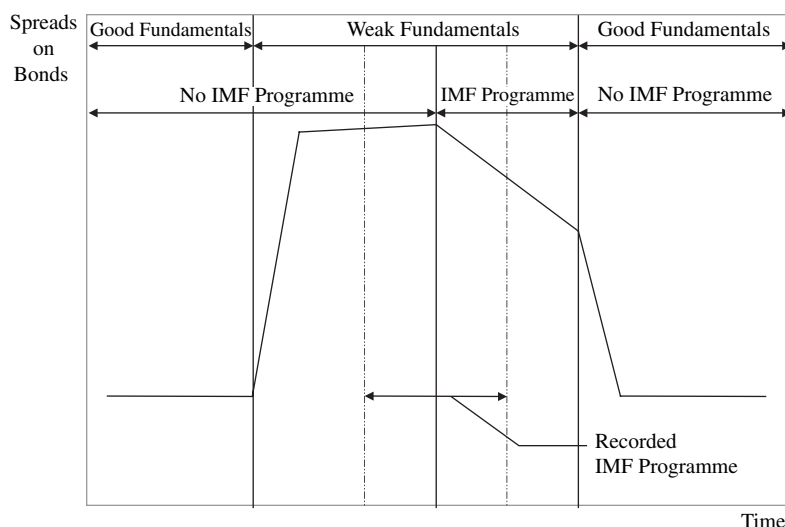


Fig. 1. *Econometric Implications of Timing IMF Programmes*

ation. However, if we take the actual, or more accurate starting time, then we are more likely to observe whether a Fund programme was associated with a reduction in spreads. A bond issuance is recorded on the day it occurs and the start of an IMF programme is recorded in our data in the month in which it occurs. Since the actual start of a programme reflects many considerations, including negotiations between a country and the Fund and internal Fund procedures, this further reduces the likelihood that there is significant feedback from an individual transaction to an IMF programme.

As it turns out, the sign on the coefficient of the IMF programme in the spreads equation is typically negative, implying that a Fund programme is, all else equal, associated with lower spreads. Thus, if poor market sentiment towards a country leads to a Fund programme, then our result suggesting that a Fund programme lowers spreads would only be strengthened.

Further, explicit consideration of the selection bias problem is not undertaken here because, as the literature review has shown, Fund programmes are in place in a variety of circumstances that are not easily captured through a probit equation that forms the first step of the selection bias correction. Edwards (2000) finds that correction for selection bias does little to change his results. With our higher frequency data, predicting Fund programmes is likely to be even more difficult (not least because the right hand side variables are often measured at much lower frequencies). In addition, a variable that consistently works well in predicting participation in Fund programmes is past participation; see Barro and Lee (2001) and Bagci and Perraudin (1997). If this is a key omitted variable, then it appears to us that the best approach is to include it directly in the outcome equation. Indeed, our results below show that the history of past participation in Fund programmes has a significant bearing on capital market access. In addition, we include some nonlinear terms that also could proxy for some omitted variables.

### 3.2. *Variables and Data Sources*

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 spreads equation are: the dollar value of the bond issued, its maturity, 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 in both the spreads and selection equation are: US 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.

In both equations, we 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 an additional measure of countries' wealth (human capital, in this case), we use the proportion of people older than twenty-five years who have completed secondary school. Other more conventional measures of country solvency and liquidity 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 we use is not the same as debt rescheduling: restructuring reflects a positive effort at debt management and typically involves exchange new debt for old more expensive or inflexible debt. Also, while it is common to use the ratio of reserves to short-term debt as a measure of country liquidity, we use short-term to total debt and reserves to imports since we want to examine separately the influence of short-term debt and reserves.

The IMF variables we use in alternative specifications in the spreads and selection equation are: IMF programme dummy, a measure of repeated Fund programmes, the size of the programme relative to the country's external debt, and whether a programme was 'precautionary', i.e., if in practice there was no, or limited, drawing down of Fund resources.

### 3.3. *Descriptive Statistics*

Between 1990 and 2000, over 250 IMF programmes were negotiated (Table 1), with the number of programmes varying between 20 and 35 a year, except in 1990 and 2000 when there were less than 20 programmes. There is no trend in either the number of programmes or the amount of financial support committed by the Fund. In particular, financial support has been large at times of crises: the big jump in 1995 reflects the large package to Mexico and the large commitments in 1997 and 1998 followed the East Asian and Russian crises.

Table 2 shows that between 1991 and 2000, the period covered by this article, about one-third of all developing country and emerging market bonds were issued by bor-

Table 1  
*Frequency of IMF Programmes*  
 Number of Programmes per year (Size of programmes in billions of SDRs)

	SBA	EFF	ESAF	Total
1990	12 (1.70)	0 (0)	3 (0.56)	15 (2.25)
1991	19 (5.30)	2 (2.34)	8 (0.69)	29 (8.33)
1992	15 (2.74)	4 (4.59)	6 (0.44)	25 (7.78)
1993	13 (1.64)	2 (1.42)	7 (0.28)	22 (3.34)
1994	18 (2.61)	4 (1.49)	13 (2.19)	35 (6.29)
1995	21 (19.09)	2 (1.28)	7 (1.20)	30 (21.57)
1996	12 (3.52)	6 (14.25)	14 (1.30)	32 (19.07)
1997	10 (28.02)	4 (1.03)	7 (1.37)	21 (30.42)
1998	6 (11.71)	4 (10.01)	11 (1.06)	21 (22.77)
1999	7 (9.94)	4 (2.80)	9 (0.86)	20 (13.60)
2000	10 (7.36)	2 (3.66)	0	12 (11.02)
1990–2000	143 (93.62)	34 (42.87)	85 (9.95)	262 (146.45)

SBA: Stand-by

EFF: Extended Fund Facility

ESAF: Extended Structural Adjustment Facility (includes Structural Adjustment Facility and the now renamed Poverty Reduction Growth Facility).

rowers from countries with IMF programmes.<sup>10</sup> The spreads charged (yield to maturity minus the risk-free rate) on the bonds were typically higher for programme countries (406 basis points) compared with countries that did not have such programmes at the time the bonds were issued (223 basis points). Also, bonds issued by programme countries had shorter maturities (5.44 years versus 6.67 years). The size of an average borrowing is, however, about the same for issuers with and without Fund programmes.

It was thus the case that IMF programmes were associated with higher spreads and shorter maturities. This is not surprising, since Fund programmes were also associated with worse fundamentals: higher debt/GDP ratios, lower recent growth, and greater volatility. Countries with Fund programmes appear to have better credit quality in one dimension: among those that issued bonds, those with Fund programmes have higher reserves. Also, issuers with Fund programmes have had lower ratios of short-term debt to total debt; however, that may reflect their lack of access to short-term credit. In the next Section, we examine the relationship between Fund programmes and cap-

<sup>10</sup> Of the 3,295 bonds issued during this period, spreads are available on 3,066 bonds. We 'lose' another 76 bonds due to absence of complementary information. The ratio of bonds issued by countries in IMF programmes is almost the same whether we consider all bonds or only those that have the necessary information required for the analysis.

Table 2  
*Bond Issuance, Terms, and Country Characteristics*

	No Programme	Fund Programme	Total
<i>(a) Bond Issued</i>			
Number of bonds	2,156	1,139	3,295
Spread (basis points)	223	406	282
Maturity (years)	6.67	5.44	6.25
Amount (\$ millions)	154	177	162
Debt/GDP	0.27	0.43	0.32
Annual GDP growth (%)	5.04	3.29	4.40
Short-term/total debt	0.66	0.50	0.56
Reserves/imports (months of imports)	5.91	6.78	6.21
Volatility of exports	0.08	0.11	0.09
<i>(b) No Bond Issued</i>			
Debt/GDP	0.39	0.56	0.46
Annual GDP growth (%)	4.00	2.65	3.30
Short-term/total debt	0.55	0.49	0.52
Reserves/imports (months of imports)	4.89	4.68	4.83
Volatility of exports	0.14	0.18	0.16

ital market access after controlling for country fundamentals – and also for bond characteristics and global fundamentals.

#### 4. The Role of Country Fundamentals

As noted above, we jointly estimate the decision to issue a bond and the determination of the spread on the bond. A complete set of results for the base equation with the full set of control variables is reported in Appendix B. In the rest of this article, we continue to use the controls in this base equation but, to conserve space, report only the coefficients on the relevant IMF variables and their interactions with other determinants of bond issuance and spreads.

Fund presence at the time of bond issuance is seen in the selection equation to improve market access significantly, raising the frequency of bond issuance (Table 3). This is a very robust finding across a variety of specifications. Fund programmes are also associated with reduced spread. The point estimate suggests that the presence of a Fund programme reduces spreads by about 8%. The size and statistical significance of this coefficient does vary by the exact specification, but it almost always remains negative. Put together, the *prima facie* evidence is that, on average, the presence of a Fund programme is associated with an increased demand by international investors for the issuing country's bonds – the demand curve shifts outwards, resulting in more bonds issued at a higher price (and hence lower spread).

Our primary interest is not in the average effects but in examining if the IMF catalytic effect varies by country conditions. However, before turning to that central question, note briefly the implications of these results for the problem of 'reverse causality', which so vexes all studies of IMF programmes. If 'reverse' causation were dominant, with market aversion causing a Fund programme, we would have found a negative coefficient on the Fund programme dummy in the selection equation and a positive

Table 3  
*Interaction of Country Characteristics with Fund Programmes*

	Log of spreads at time of issue			
	(1)	(2)	(3)	(4)
IMF programme, low range	-0.079 (-2.63)	0.042 (0.66)	0.502 (2.74)	0.695 (2.00)
IMF programme, high range			-0.113 (-1.07)	-0.316 (-2.49)
<i>IMF programme interacted with:</i>				
EMBI volatility		-0.260 (-0.09)		
Export growth volatility		-1.178 (-3.36)	-1.245 (-3.59)	-1.440 (-4.00)
Low range of Debt/GNP				-1.907 (-1.74)
High range of Debt/GNP				0.587 (2.45)
Low range of Reserves/Imports			-0.418 (-2.46)	
High range of Reserves/Imports			0.049 (1.59)	
			Probability of Issuance	
IMF programme, low range	0.269 (8.03)	0.082 (0.76)	-0.366 (-2.10)	-1.935 (-5.56)
IMF programme, high range			0.902 (8.46)	1.316 (8.02)
<i>IMF programme interacted with:</i>				
EMBI volatility		-1.850 (-0.56)		
Export growth volatility		2.005 (2.42)	2.003 (2.41)	2.703 (3.26)
Low range of Debt/GNP				6.609 (6.15)
High range of Debt/GNP				-2.555 (-9.23)
Low range of Reserves/Imports			0.023 (0.17)	
High range of Reserves/Imports			-0.217 (-7.88)	
Number of observations	7,772	7,772	7,772	7,772
Number of bonds	2,952	2,952	2,952	2,952
Log of likelihood	-5,863.2	-5,847.3	-5,775.7	-5,756.5

*Note.* These regressions all have bond, global, and country controls as specified in the full regression presented in Appendix B. z-statistics are presented in parentheses.

coefficient in the spread equation. If we repeat this regression with all control variables other than the country characteristics (i.e., if we keep the bond features and the global variables but drop the country controls such as the debt to GDP ratio), then we *do* find that the IMF dummy is negative and highly significant in the selection equation and positive and significant in the spreads equation. Clearly, the failure to control for the country variables results in this misattribution of the country weakness to IMF programmes. The omission of relevant country controls in some of the studies cited above could be the reason for their reaching a bleaker conclusion on IMF programmes than is warranted.

Before considering the non-linear effects highlighted by theory, we briefly report on interactions between IMF programmes with domestic and external volatility faced by the country. When entered independently, the volatility of the country's exports (the standard deviation of the monthly growth of exports) is associated with higher spreads and lower probability of bond issuance suggesting that volatility shifts the supply of funds to the left (see Appendix B). This is consistent with the Catao and Sutton (2002) finding that under conditions of macroeconomic volatility sovereign debt defaults are more likely and hence will result in reduced access and higher spreads. When we interact export volatility with the IMF programme dummy, the interaction term enters with a negative and significant sign in the spread equation. The evidence supports the possibility, discussed above, that the Fund programme acts a commitment mechanism that counteracts the effect of domestic volatility. In contrast, the interaction, for example, of Fund programmes with the volatility of the Emerging Market Bond Index (the EMBI) is statistically insignificant in the selection and spreads equation, suggesting that a country with a Fund programme is not insulated from high volatility in international capital markets.

To examine the nonlinearity of interest, we specified a piece-wise linear function. We split the reserves-to-imports ratio at the median, creating two variables: the reserves-to-imports in the low range and in the high range. Column 3 of Table 3 reports the coefficients for the IMF dummy intercepts and the interaction terms for low and high ranges of country reserves-to-imports. For countries with low reserves, the results suggest that spreads are higher with a programme rather than without a programme. The IMF effect improves with reserve availability and a Fund programme turns beneficial when the reserves cover at least 4 months of imports. At the median value of reserves to imports (about 4.5 months of imports), the effective coefficient on the Fund programme is  $-0.16$ , i.e., a Fund programme lowers spreads by about 16%. However, past the median value of reserves to imports, the Fund effect worsens again, and turns to a small positive effect on spreads when reserves are larger than about a year's worth of imports. The effects on probability of issuance are also nonlinear and we find, in particular, that the IMF's assistance in improving the probability of issuance declines after the median value of reserves-to-imports, though the magnitude of the effects are not large in this case.

The evidence, therefore, suggests that if a country's reserves are very low, Fund programmes are unable to compensate for the economic difficulties faced by the country. In contrast, when reserves are low – but have not yet fallen to the extremely low levels that signify deeper structural problems – Fund programmes can be very effective. The results further suggest that as reserves increase Fund effectiveness falls off, as may be expected.

We repeated the same methodology with debt-to-GNP ratio, with similar results.<sup>11</sup> Thus, once more we created two variables, one with the debt-to-GNP ratio in the low range (below its median value) and another in the high range. We interacted these two variables with the IMF dummy to test if these interactions vary with the range in which the debt-to-GNP ratio falls. The results support the analysis above. The estimates presented in Column 4 of Table 3 imply that IMF programmes are effective in reducing spreads when the debt-to-GNP ratios are between 36 and 54%. For debt-to-GNP,

<sup>11</sup> Results were similar also when considering short-term to total debt.

interactions with IMF programmes are also strongly non-linear in influencing the probability of issuance, with the favourable effects on issuance lying in the range of 24 to 63%. Interestingly, Pattillo *et al.* (2002) find that an external debt to GDP ratio of about 35% marks the threshold beyond which additional debt accumulation has a negative effect on growth. This threshold is at the lower end of our estimated range in which the Fund has a catalytic effect. Thus, once a country has crossed the threshold, the Fund can counteract the negative impact of the high level of debt, but at a diminishing rate.

In summary, the results clearly support the idea that the IMF is catalytically effective when external fundamentals are in an intermediate range, as predicted by models focusing on the lending role of the IMF (Morris and Shin, 2003; Corsetti *et al.*, 2003; Saravia, 2004). These empirical findings can, however, also be interpreted in the context of the IMF's informational role, allowing countries to signal reform efforts via the IMF as a commitment device. The value that the market places on the IMF's ability to act as commitment mechanism would also depend on countries' fundamentals and we would expect, once again, that the IMF would catalyse capital flows when the country fundamentals were in an intermediate range. In other words, the IMF would be effective when the restoration of the external imbalances had a reasonable likelihood.

## 5. Implications of Fund Programme Design

In this Section, we explore three dimensions of IMF programmes:

- (i) size of lending (normalised by country debt);
- (ii) whether a programme was 'precautionary' or not; and the
- (iii) 'prolonged' use of Fund resources.

Increased Fund lending may improve access to bond markets either because markets believe that available IMF resources will facilitate repayment of private debts or because a larger lending size reflects greater commitment to economic reforms and, hence, improved capacity to honor new contractual obligations. In column 1 of Table 4, we replace the IMF programme dummy with the amount committed (as a percentage of the country's long-term debt). The results suggest that programme size is possibly important, though the result is not robust. Larger programmes both increase the probability of bond issuance and lower spreads. The results imply that an additional programme size equal to 10% of the country's long-term debt lowers spreads by about 10%. However, the effect on spreads is not robust to the inclusion of other programme characteristics (columns 2 and 3). While availability of IMF funds may relieve short-term difficulties in repayment of private funds, over a more medium term, the Fund also has to be repaid and so over that longer time horizon, the country's repayment capacity is not improved by the mere fact of an IMF loan. In fact, to the extent, the IMF is a preferred creditor, it is possible that some private creditors may take the view that their repayment prospects have in fact become worse.

The amount committed in a Fund programme is not necessarily disbursed – programmes may be 'precautionary'. In these cases, the country is willing to accept the Fund's



Table 4  
*Influence of Programme Features on Bond Market Spreads and Issuance*

	Log of spreads at time of issue			
	(1)	(2)	(3)	(4)
IMF amount/debt	-1.033 (-2.78)	-0.468 (-1.26)	-0.032 (-0.08)	-0.957 (-2.51)
Precautionary programme:				
Outset		0.047 (0.87)	0.019 (0.33)	
Turned		-0.150 (-3.82)	-0.091 (-2.14)	
Supplemental Reserve Facility			-0.162 (-2.66)	
Number of months in IMF programme, 1987-90				-0.035 (-6.67)
Square of Number of months in IMF programme, 1987-90				0.001 (6.32)
	Probability of Issuance			
IMF amount/debt	4.806 (12.58)	4.031 (9.53)	2.651 (5.60)	4.876 (12.49)
Precautionary programme:				
Outset		-0.112 (-1.67)	-0.071 (-1.08)	
Turned		0.258 (5.30)	0.146 (2.49)	
Supplemental Reserve Facility			0.479 (5.76)	
Number of months in IMF programme, 1987-90				0.076 (17.91)
Square of Number of months in IMF programme, 1987-90				-0.002 (-15.45)
Number of observations	7,772	7,772	7,772	7,772
Number of bonds	2,952	2,952	2,952	2,952
Log of likelihood	-5,840.0	-5,829.6	-5,820.9	-5,696.5

*Note.* These regressions all have bond global, and country controls as specified in the full regression presented in Appendix B. z-statistics are presented in the parentheses.

monitoring (and its implied costs) without using the available funds, although the committed resources are available for use, if necessary. Countries pay the Fund a commitment fee to keep alive the option of using the agreed upon resources and, at the same time, voluntarily accept the Fund's conditionality. Such precautionary use could signal to the market a country's willingness to undertake necessary reforms and repay debt obligations to private creditors. Referring to the programme contracted by Brazil in 2001, the Fund (IMF, 2003*a*, p. 7) states: 'The authorities considered that they could achieve a more positive market signal if they did not draw the resources made available under the arrangement, although these remained available should the need arise.' The Fund's Board of Directors describes the signalling potential of these programmes in the following terms (IMF, 2003*a*, p. 24): 'Directors felt that precautionary arrangements had been a useful instrument to signal the Fund's endorsement of a member's policy. Such arrangements helped to foster close collaboration between the Fund and the member . . . and had helped boost the confidence of the international financial community . . .'

Programmes may be precautionary in two senses. First, at the time the programme is agreed upon, the borrowing country may declare its intention not to draw on the resources made available. While this is not a contractually binding restriction, and the country can change its mind with no penalty, declaration of the intent not to borrow implies that Fund resources are not critical. Rather the country is volunteering to subject itself to the discipline of the Fund's programme. Second, the country may negotiate a Fund programme and draw on Fund resources initially but thereafter voluntarily halt disbursements while keeping the IMF programme in place. Such programmes may be referred to as 'turned precautionary'.<sup>12</sup> Programmes that 'turn' precautionary are larger in size than the 'outset' precautionary programmes and, presumably, have more demanding policy conditionality. Of the 245 programmes between 1991 and 2000 covered in this analysis, only 38 were precautionary at the outset and 13 'turned' precautionary. However, of the bonds issued while a country was in a Fund programme, over 45% were during precautionary programmes (18% were during precautionary at outset and 33% were during 'turned' precautionary).

How do precautionary programmes fare? Column 2 of Table 4 shows that precautionary programmes of the two varieties ('outset' and 'turned' precautionary) have differing implications. The results suggest that 'declared' precautionary programmes do not have a significant effect. In contrast, turned precautionary programmes add significantly to the value of the IMF's presence both in terms of spreads and access.

Recall, that 'turned' precautionary programmes are significantly larger than the 'outset' precautionary programmes.<sup>13</sup> Thus, the highly significant sign on the 'turned' precautionary dummy reflects the benefits deriving both from the precautionary nature of the programme and the large resource size associated with it. Thus, the size of the amount coefficient and its significance falls when considering these programmes. The evidence suggests, therefore, that those subjecting themselves to the Fund's discipline can benefit even when the resources are not drawn – the available cushion helps.

Another Fund facility that combines large resource size and precautionary intent – and a potentially powerful signalling effect – is the 'Supplemental Reserve Facility (SRF)'. This Facility was created to provide assistance to countries experiencing exceptional balance of payments difficulties arising from a sudden and disruptive loss of market confidence. Substantial resources under the facility are made available 'if there is a reasonable expectation that the implementation of adjustment policies and adequate financing will result, within a short period of time, in an early correction of such difficulties' (IMF, 2003*b*, p. 12). The premise is that a country in the midst of a crisis is subject to a loss of confidence even though the fundamentals are relatively sound. The goal is to bring back confidence to the country and, at the same time to prevent 'contagion' or the loss of confidence from spreading to other countries. The SRF often overlaps with programmes that turned precautionary.<sup>14</sup> As such, in Column 3

<sup>12</sup> The country chooses to continue the arrangement and pay the commitment fee rather than simply cancelling it.

<sup>13</sup> The median size of 'outset' precautionary programmes is about 40 million SDRs whereas that for 'turned' precautionary programmes is almost 10 times larger at 330 million SDRs. When normalised by country debt, the 'turned' precautionary programmes are still much larger.

<sup>14</sup> The analysis here includes those loans that were made under 'exceptional circumstances' and were thus similar in intent to the SRF. Countries that have contracted an SRF and used it as precautionary include Brazil (1998), Korea (1999), Mexico (1995 and 1997) and Thailand (1997).

of Table 4, we find that when including SRF programmes the coefficient of ‘turned precautionary’ falls from 0.15 to 0.09.

These findings can be linked back to our discussion of country fundamentals. Though the fundamentals in countries with ‘turned precautionary’ programmes are worse than in non-programme countries, they are superior to those in countries with other forms of IMF programmes. In particular, ‘turned precautionary’ countries do better than other programme countries with respect to lower debt/GDP ratios, higher growth, and lower volatility. In contrast, their reserves/import ratios are not very different from those in countries with other programmes. Thus, an interpretation of our results is that ‘turned precautionary’ countries are vulnerable to external pressures and that the vulnerability has further led to a liquidity problem. However, because the underlying fundamentals are not yet beyond a point of no return in the short run, a reform programme with IMF support carries credibility.

Finally, we ask if there may be diminishing returns to a country’s repeated interactions with the Fund. Two opposing forces may be at work here. Repeated Fund involvement may be warranted in light of medium-term problems that the country faces and may reflect a joint commitment on the part of the country and the Fund to resolve the problems. However, it may be the case that ‘prolonged’ use of Fund resources implies an inability to resolve the problems at hand and is an indicator, therefore, of more deep rooted problems. The term ‘prolonged’ use has many different indicators but one of them recently proposed by the IMF’s new Independent Evaluation Office is the existence of a programme for more than 70% of the time over a given period.

Thus, we examine if repeated Fund presence in a country makes a difference to its effectiveness in this nonlinear manner. The measure of repeated Fund presence we use is the number of months that a Fund programme was in place in the country just prior to the start of the 1990s, during the four-year (48 month) period from 1987 to 1990. Use of a prior time period ensures that we do not pick up a reverse causation from poor market access to a high frequency of Fund programmes. It turns out that there is a high correlation between the number of months the country had a programme in the late 1980s and the number of months a programme was in place in the 1990s. This persistence suggests that our measure of the Fund’s ongoing involvement in a country reflects a combination of continuing economic difficulties and the inability of the Fund and the country to work together to achieve the necessary reforms. Since we have already controlled for external indicators such as debt and reserves, the number of months that the Fund programme was in place in the late 1980s proxies for these other (unobserved) country characteristics and the Fund–country relationship. With this interpretation in mind, the result supports the speculation above (see Column 4). Continued Fund presence helps up to a point. These results suggest that the ‘turning point’ is at about 18 months out of the 48-month window over which our measure of repeated interaction is taken. Beyond that length of time, continuing Fund effectiveness in helping with market access begins to decline and at about 35 months, or about 75% of the time window, continued presence raises spreads. At that point, investors apparently believe that the problems are either deep-rooted or that the Fund is unable to exercise the necessary influence to resolve them. These results and interpretation are consistent with Conway’s (2001) conclusion that a continuing

Fund–country relationship reaches diminishing returns; see also Bird and Rowlands (2002).

To summarise the findings in this Section, the evidence suggests that constructive engagement between the Fund and the member country can be demonstrated in different ways. Credibility may be established by the size of the programme, and thus resources made available do matter but not robustly for spreads. However, the results also show that voluntary country commitment under so-called ‘turned’ precautionary programmes help by signalling country intentions under Fund discipline. The programmes under the Supplemental Reserve Facility (SRF) have also been of this nature. Finally, while continued relationship with the Fund helps, where Fund programmes are excessively repeated, the credibility of effective reforms seems to be called into question by the market.

## 6. Conclusions

By taking into account country conditions and programme features, we take forward the agenda on the catalytic effectiveness of Fund programmes. In light of the negative conclusions of much of the earlier research, we approach the empirical challenge in light of the recently proposed theoretical frameworks that recognise the interplay between the country, private creditors, and the Fund. A common prediction of the differing theoretical perspectives – emphasising the Fund’s liquidity provision and informational roles – is that IMF programmes will be most effective in catalysing private capital flows when the country’s external fundamentals are in an ‘intermediate’ range. We find strong confirmation of that predicted nonlinearity. We also examined the implications of some features of IMF programmes to distinguish between its lending and information roles in catalysing capital flows. Though the distinction is difficult to identify, the evidence for an independent or complementary informational role appears strong.

We infer from the nonlinear influence of country fundamentals and the informational role of the Fund (allowing a country to signal its reform efforts while the Fund acts as a delegated monitor) that a joint commitment of the country and the Fund to the reduction of vulnerability is crucial to the operation of a catalytic effect. Thus, a Fund programme is not an automatic or standardised ‘good housekeeping’ seal of approval.<sup>15</sup> Investors appear to value the Fund’s participation in resolving the country’s external payment difficulties but only when they view it is as likely that the effort will be successful.<sup>16</sup>

<sup>15</sup> The gold standard, which apparently did provide a ‘good housekeeping seal’, was associated with a narrow range of prudential macro policies (Bordo and Rockoff, 1996). In contrast, the current range of IMF member countries – and the variety of economic challenges facing them – leads to a much larger variation in appropriate economic policy measures. Obstfeld and Taylor (2002) conclude even in the case of the gold standard that its credibility was diminished in the interwar period (1925–31) and unlike Bordo *et al.* (1999), they find that only those who devalued before re-entering the gold standard benefited in the form of lower spreads. The implications of the Obstfeld and Taylor analysis is, thus, similar to ours: country conditions matter in determining the credibility of policy actions.

<sup>16</sup> It is not straightforward to distinguish a ‘good’ catalytic effect from a ‘bad’ one in which moral hazard predominates. We find that Fund effectiveness in catalysing flows declines as the country’s own repayment capacity becomes less credible, which suggests that moral hazard is not dominant. Moreover, moral hazard is likely to reflect itself in cross-country effects rather than a renewed burst of imprudent lending to the country that enters into a Fund programme (Lane and Philips, 2000).

## Appendix A. Data Sources and Construction of Variables

### A.1 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).

### A.2 Global Variables

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

US ten-year swap spread.

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

## Appendix B. Base Regression

As discussed in the main text, the data on bond spreads is analysed in a two equation framework, the spread equation of interest and a 'selection equation', which measures the likelihood of bond issuance. While there are statistical reasons to correct for selection bias, the information from the selection equation can be used jointly with the results of the spread equation to interpret the influence of the explanatory variables in a supply-demand framework (Eichengreen and Mody, 2000). Thus, for example, a higher credit rating raises the likelihood of bond issuance and lowers spreads (the risk premium) charged. We interpret this finding as an increase in demand for bonds as ratings rise. In contrast, a higher debt-service ratio is associated with more frequent bond issuance and with higher spreads, suggesting that larger debt-service obligations lead to a greater supply of bonds for which a higher premium is typically required.

In Tables 3 and 4 of the main text, where we use this framework, we present only the variables of direct interest to this article. In this Appendix, we present the full details of the base regression, which corresponds to the Column 1 of Table 3. The signs and significance of the controls variables presented here remain very similar across the various variations in Tables 3 and 4. The first two columns of the Table in this Appendix present the coefficient and z-statistic for the variables in the 'selection equation', the probit; and the next two columns refer to the spreads equation.

While much of the Table is self explanatory, a few comments are in order. In earlier work (Eichengreen and Mody, 2001), we used the US 10-Year Treasury Rate as one of the 'global' variables. That variable gave ambiguous results. In ongoing work, we find that US industrial growth rate gives a consistent sign and also has an intuitive explanation in terms of US higher growth improving credit quality for emerging market borrowers. Thus, a higher US growth is associated with lower spreads and more frequent bond issuance, as if the demand for emerging

market bonds shifts to the right when the US grows more rapidly. Another new variable used in this analysis is the standard deviation of the daily log change of the EMBI index. A higher standard deviation implies greater market uncertainty with respect to pricing of bonds. We find that such uncertainty reduces bond issuance significantly and raises spreads (though the effect on spreads is not always significant at the 5% level).

Among country variables, the credit rating measure correlates strongly with country *per capita* income and wealth and, hence, the ability to repay debts. A higher rating increases the frequency of bond issuance and reduces spreads. We also add a measure of human capital (percentage of population above 25 with secondary education), which is similarly associated with more frequent issuance and lower spreads. Thus, increased wealth in both forms is seen to increase the demand for an emerging market's bonds. In contrast, a higher debt-servicing needs increase bond issuance but at a higher cost (though the coefficient in the spreads equation is positive, is not significant in this specification; however, in some specifications, the coefficient does achieve statistical significance).

Notice also that 'lambda', the inverse-Mills ratio is negative and significant. Thus, these bond and issuer characteristics unobserved by the econometrician but favourable to bond issuance also result in lower spreads. Correction for sample selection bias is thus relevant since the omitted (unobserved) variables are statistically relevant in the determination of spreads.

Table A1  
*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 _11_dzf
Imports (IMP)	US\$	Quarterly	IFS	q#c 71_dzf
Domestic bank credit (CLM_PVT)*	National	Quarterly	IFS	q#c 32d_zf
Short-term bank debt (BISSHT)†	US\$	semi-annual	BIS	
Total bank debt (BISTOT)‡	US\$	semi-annual	BIS	
Credit rating (CRTG)	Scale	semi-annual	Institutional Investor	
Years of education	Percentage of the population older than 25 years with secondary school complete.	1990 value	Robert Barro's website <sup>  </sup>	
Debt restructuring <sup>§</sup>	Indicator	Annual	WDT/GDF	

\*Credit to private sector.

†Cross-border bank claims in all currencies and local claims in non-local currencies of maturity up to and including one year.

‡Total consolidated cross-border claims in all currencies and local claims in non-local currencies.

§Indicator variable, which is equal to 1 if a debt rescheduling took place in the previous year and zero otherwise.

<sup>||</sup><http://post.economics.harvard.edu/faculty/barro/data.html> (Educational Attainment data).

Table A2  
*Constructed Variables*

Debt/GNP	EDT/GNP
Debt service/exports	TDS/XGS
GDP/growth	$0.25\ln[\text{GDP90}_t/\text{GDP90}_{\{t-1\}}]$
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 programme 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 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/](http://www.state.gov/www/issues/economic/trade_reports/)).

US industrial production: Federal Reserve Swap rates and EMBI from Bloomberg.

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 A3  
*Base Regression Results*

	Probability of bond issuance (Selection equation)		Log of spread at the time of issue	
	Coefficient	z-statistic	Coefficient	z-statistic
<i>Bond Characteristics</i>				
Log amount			-0.028	(-1.94)
Maturity			0.010	(4.92)
Yen			-0.328	(-7.14)
Deutsche Mark			-0.098	(-2.25)
Euro			-0.074	(-1.54)
Other currencies			-0.204	(-4.70)
Fixed rate			0.365	(10.88)
<i>Global Variables</i>				
U.S. growth rate	50.058	(10.18)	-24.582	(-5.12)
Log swap rate	-0.387	(-9.71)	0.485	(11.29)
EMBI volatility	-17.624	(-11.36)	6.148	(4.24)
<i>Country Characteristics</i>				
Credit rating	0.029	(23.39)	-0.044	(-23.62)
Proportion of educated people	0.017	(9.28)	-0.006	(-2.86)
Debt/GNP	-1.041	(-12.85)	0.805	(8.22)
Debt service/exports	1.329	(25.04)	0.096	(1.17)
Debt restructured dummy	1.117	(15.42)	-0.497	(-10.26)
GDP growth	1.601	(1.56)	-9.559	(-6.60)
Short-term debt/total debt	-0.675	(-8.73)	0.852	(7.41)
Export growth volatility	-2.200	(-5.54)	0.778	(3.39)
Reserves/imports	0.102	(11.09)	-0.010	(-0.86)
Bank credit stock/GDP	-0.000	(-0.84)	0.001	(1.62)

Table A3  
Continued

<i>Sector</i>				
Public	0.040	(1.01)	0.018	(0.29)
Finance			-0.129	(-1.96)
Services			0.484	(3.12)
Utilities			-0.081	(-1.20)
Private	0.677	(19.89)	0.072	(1.49)
Finance			-0.203	(-6.21)
Services			0.123	(2.49)
Utilities			-0.129	(-3.13)
Latin America Dummy			-0.046	(-1.22)
IMF programme dummy	0.269	(8.03)	-0.079	(-2.63)
Constant	-0.176	(-0.93)	5.245	(27.79)
Lambda			-0.522	(-10.94)
Number of observations			7772	
Number of bonds			2952	
Log of likelihood			-5,863.2	

*International Monetary Fund*  
*Pontificia Universidad Católica de Chile*

*Submitted: 14 October 2003*

*Accepted: 6 April 2005*

## References

- Bagci, P. and Perraudin, W. (1997). 'The impact of IMF programs', The Institute For Financial Research Working Paper no. 35, Birkbeck College, University of London.
- Barro, R.J. and Lee, J.W. (2001). 'IMF programs: who is chosen and what are the effects?', presented at the Second Annual IMF Research Conference, <http://www.imf.org/external/pubs/ft/staffp/2001/00-00/arc.htm>.
- Bird, G. and Rowlands, D. (1997). 'The catalytic effect of lending by the international financial institutions', *World Economy*, vol. 20 (7) (November), pp. 967-91.
- Bird, G. and Rowlands, D. (2001). 'Catalysis or direct borrowing: the role of the IMF in mobilising private capital', *World Economy*, vol. 24 (1) (January), pp. 81-91.
- Bird, G. and Rowlands, D. (2002). 'Do IMF programmes have a catalytic effect on other international capital flows?', *Oxford Development Studies*, vol. 30 (3), pp. 229-49.
- Bordo, M. and Rockoff, H. (1996). 'The gold standard as a good housekeeping seal of approval', *Journal of Economic History*, vol. 56 (2) (June), pp. 389-428.
- Bordo, M., Edelstein, M. and Rockoff, H. (1999). 'Was adherence to the gold standard a "good housekeeping seal of approval" during the interwar period?', National Bureau of Economic Research, Working Paper no. 7186.
- Boughton, J.M. (2001). *The Silent Revolution: The International Monetary Fund: 1979-1989*, Washington DC: The International Monetary Fund.
- Catao, L.A. and Sutton, B.W. (2002). 'Sovereign defaults: the role of volatility', IMF Working Paper No. 02/149, Washington DC.
- Conway, P. (2000). 'IMF programs and external balance: the crisis-participation dynamic', University of North Carolina, mimeo.
- Conway, P. (2001). 'Evaluating Fund programs', University of North Carolina, mimeo.
- Corsetti, G., Guimaraes, B. and Roubini, N. (2003). 'The tradeoff between an international lender of last resort to deal with liquidity crisis and moral hazard distortions: a model of the IMF's catalytic finance approach', available at: <http://www.stern.nyu.edu/globalmacro/>.
- Dell'Ariccia, G., Schnabel, I. and Zettelmeyer, J. (2002). 'Moral hazard and international crisis lending: a test', IMF Working Paper 02/181, Washington DC.
- Dicks-Mireaux, L., Mecagni, M. and Schadler, S. (2000). 'Evaluating the effect of IMF lending to low-income countries', *Journal of Development Economics*, vol. 61 (2) (April), pp. 495-526.



- Dhonte, P. (1997). 'Conditionality as an instrument of borrower credibility', IMF paper on Policy Analysis and Assessment no. 2.
- Eichengreen, B. and Mody, A. (2000). 'What explains changing spread on emerging market debt: fundamentals or market sentiment?', in (S. Edwards, ed.), *Capital Flows and the Emerging Economies: Theory, Evidence, and Controversies*, pp. 107–34, Chicago: University of Chicago Press.
- Eichengreen, B. and Mody, A. (2001). 'Bail-ins, bail-outs, and borrowing costs', *IMF Staff Papers*, vol. 47 (Special Issue) (September), pp. 155–87.
- Edwards, M. S. (2000). 'Reevaluating the catalytic effect of IMF programs', presented at the Annual Meeting of the American Political Science Association, available at: <http://www.rci.rutgers.edu/~mse>.
- Fisher, S. (1997). 'Applied economics in action: IMF programs', *American Economic Review*, vol. 87 (2) (May), pp. 23–7.
- Garuda, G. (2000). 'The distributional effects of IMF programs: a cross-country analysis', *World Development*, vol. 28 (6) (June), pp. 1031–51.
- Heckman, J. (1979). 'Sample selection bias as a specification error', *Econometrica*, vol. 47 (1) (January), pp. 153–61.
- Hajivassiliou, V. (1987). 'The external debt repayment problems of LDC's: an econometric model based on panel data', *Journal of Econometrics*, vol. 36 (1–2) (September–October), pp. 205–30.
- Hutchison, M. (2001). 'A cure worse than the disease? Currency crises and the output costs of IMF-supported stabilization programs', National Bureau of Economic Research, Working Paper No. 8305.
- International Monetary Fund (2001a). 'Financial organization and operations of the IMF', Treasurer's Department, Washington DC.
- International Monetary Fund (2001b). 'Selected decisions and selected documents of the International Monetary Fund', Washington DC.
- International Monetary Fund (2003a). 'Adapting precautionary arrangements to crisis prevention', Policy Development and Review Department, Washington DC, available at: <http://www.imf.org/external/np/pdr/fac/2003/061103.htm>
- International Monetary Fund (2003b). 'Access policy in capital account crises – modifications to the supplemental reserve facility (SRF) and follow-up issues related to exceptional access policy', Policy Development and Review and Treasurer's Departments, Washington DC, available at: <http://www.imf.org/external/np/tr/access/2003/pdf/011403.pdf>
- Ivanova, A., Mayer, W., Mourmouras, A. and Anayiotos, G. (2001). 'What determines the success or failure of Fund-supported programs?', IMF Working Paper (November), Washington DC.
- Kaminsky, G.L. and Schmukler, S.L. (1999). 'What triggers market jitters: a chronicle of the asian crisis', *Journal of International Money and Finance*, vol. 18 (4) (August), pp. 537–60.
- Killick, T., Malik, M. and Manuel, M. (1992). 'What can we know about the effects of IMF programmes?', *World Economy*, vol. 15 (5) (September), pp. 575–97.
- Köhler, H. (2001). 'Promoting stability and prosperity in a globalized world', remarks by IMF Managing Director, Council of the Americas, Washington, DC, May 7, available at: <http://www.imf.org/external/np/speeches/2001/050701.htm>
- Lane, T. and Phillips, S. (2000). 'Does IMF financing result in moral hazard', IMF Working Paper No. 168, Washington DC.
- Leung, S.F. and Yu, S. (1996). 'On the choice between sample selection and two-part models', *Journal of Econometrics*, vol. 72 (1–2) (May), pp. 197–229.
- Marchesi, S. (2001). 'Adoption of an IMF programme and debt rescheduling. An empirical analysis', Centro Studi Luca D' Agliano, Development Studies Working Papers, No. 152.
- Marchesi, S. and Thomas, J. P. (1999). 'IMF conditionality as a screening device', *ECONOMIC JOURNAL*, vol. 109 (454) (March), pp. 111–25.
- Morris, S. and Shin, H.S. (2003). 'Catalytic finance: when does it work?', Cowles Foundation Discussion Paper no. 1400, Yale University, available at: <http://cowles.econ.yale.edu>.
- Obstfeld, M. and Taylor, A.M. (2002). 'Sovereign risk, credibility and gold standard: 1870–1913 versus 1925–1931', National Bureau of Economic Research Working Paper 9345.
- Ozler, S. (1993). 'Have commercial banks ignored history?', *American Economic Review*, vol. 83 (3) (June), pp. 608–20.
- Pattillo, C., Poirson, H. and Ricci, L. (2002). 'External debt and growth', IMF Working Paper WP/02/69, Washington DC.
- Powell, A. (2002). 'Countries in payments' difficulties: what can the IMF do?', International Monetary Fund Seminar Series (International); No. 2002–66:1–[36], May 2, available at: [http://www-intapps.imf.org/Res/Seminars/SemPapers\\_all.asp?scope=res](http://www-intapps.imf.org/Res/Seminars/SemPapers_all.asp?scope=res).
- Saravia, D. (2004). 'On the role and effects of IMF seniority', PhD Dissertation, Chapter 1, University of Maryland at College Park.
- Stone, R. (2002). *Lending Credibility*, Princeton: Princeton University Press.
- Tirole, J. (2002). *Financial Crises, Liquidity, and the International Monetary System*, Princeton: Princeton University Press.