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Catalytic IMF Finance in Emerging Economies  
Crises: Theory and Empirical Evidence

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Catalytic IMF Finance in Emerging  
Economies Crises:  
Theory and Empirical Evidence

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### **Abstract**

This paper presents an overview of the theory and empirical evidence on the IMF catalytic finance approach based on the experience with capital account crises in the last decade. While many previous studies on catalytic finance had found mixed, if not outright negative, evidence on the effectiveness of the catalytic approach the results of this paper, based on the eleven case studies of catalytic finance in the last ten years, are more positive. The analysis of many crisis episodes suggest a number of lessons, including: first, large-scale catalytic financing works better when debt levels are low and the country's commitment to reform is credible; second, large loans to countries with large debt levels are unlikely to be repaid quickly. third, rollover arrangements can complement "catalytic" financing. Overall, the empirical evidence seems consistent with the main implications of the theoretical literature on catalytic finance: notably, catalytic finance was more successful when larger amounts of money were on the table, consistent with the view that the size of IMF programs (larger amounts and front loaded) matters for the success of its intervention. By the same token, IMF program do not appear to have caused debtors' moral hazard; instead, large catalytic programs may have provided policy makers with incentives to implement difficult and costly adjustment policies and structural reforms. Nonetheless the issue of whether and under which conditions the IMF should rely on catalytic finance remains highly controversial. The analysis in this paper suggests that the pessimism about the effectiveness of catalytic finance is not warranted. If appropriately used under the right conditions catalytic finance can prevent destructive liquidity runs and avoid short run liquidity problems that require credible but feasible policy adjustment from turning a manageable problem into a much more severe crisis. However, the standard sequencing of catalytic financing first and then a restructuring if catalytic financing fails does not always offer the most effective response to a country's crisis. In some circumstances, it may be more effective to initiate a restructuring early on, particularly if the restructuring of some problematic claims can be combined with an IMF loan that seeks to prevent the restructuring from triggering a broader run. Thus, the case for catalytic finance relies on the ability to make correct objective assessment under conditions of high uncertainty of whether it is likely to succeed or not. Catalytic finance should be used cautiously, in full awareness of its benefits and potential risks.

## 1. Introduction

In the last decade many emerging market economies have experienced currency, financial and banking crises. At different times, Mexico, Thailand, Indonesia, Korea, Russia, Brazil, Ecuador, Turkey, Argentina and Uruguay (among other countries) have faced a large external financing gap resulting from sharp reversal of capital flows, and experienced a large drop in asset prices and economic activity. Even if current account deficits were sharply reduced via domestic policy adjustment and painful economic contraction, financing gaps remained large because of strong capital outflows and the unwillingness of investors to rollover short-term claims on the country (including its government, its banks and its residents).

Crisis resolution has thus involved, in addition to domestic adjustment, some combination of official financing (or 'bail-outs') by International Financial Institutions and other official creditors, and private financing in the form of 'bail-ins' of private investors (the latter is also referred to as private sector involvement (or PSI) in crisis resolution). Bail-ins can take various forms in a spectrum going from very coercive to very soft forms of PSI: at one extreme are defaults on external (and domestic) claims (as in the case of Ecuador, Argentina, Russia); somewhere between extremes are debt suspensions and standstills, semi-coercive debt exchange offers, semi-coercive rollover agreements (as in the case of Ukraine, Pakistan, Korea, Indonesia, Thailand); on the softer corner of the PSI spectrum are semi-voluntary rollover agreements and other mild forms of PSI (Brazil in 1999, Turkey in 2001) or outright bailouts with little PSI (Mexico in 1995, Turkey lately). Indeed, the issue of 'bailouts' versus 'bail-ins' -- or private sector involvement in crisis resolution -- is the most controversial question in the debate on the reform of the international financial architecture. See Roubini (2000, 2002a, b, 2004) and Roubini and Setser (2003, 2004) for a detailed discussion of the PSI debate.

In this debate, an important view holds that international currency and financial crises are primarily driven by liquidity runs and panics. According to this view, the global financial architecture should be reformed by creating an international lender of last resort. Not only such an institution would increase efficiency ex-post by providing large liquidity funds and thus ruling out avoidable and costly defaults. By severing the link between illiquidity and insolvency, it would also prevent crises from occurring in the first place (see Sachs (1995) and Fischer (2001)). The opposing view questions that international illiquidity is the main factor driving crises. In that case, liquidity supports may turn into a subsidy to insolvent countries, thus generating debtor moral hazard (see the Meltzer Commission Report (2001)). Accordingly, IMF interventions should be limited in frequency and size so to reduce moral hazard distortions, even if limited support would not prevent liquidity crisis.

The official IMF/G7 view is somewhat between the two extreme above: provided a crisis is closer to illiquidity rather than insolvency, a partial bailout (i.e. an official loan in limited amounts, i.e. that are smaller than the expected external financing gap) granted conditional on policy adjustment by the troubled debtor country can have a "catalytic effect", i.e. restore investors' confidence, maintain or restore market access, trigger voluntary lending and rollover of creditors' claims, thus fill in the financing gap not filled by official resources and therefore prevent destructive liquidity runs that have high

liquidation costs. (see Cottarelli and Giannini (2002) for an analysis of the IMF's catalytic approach and an assessment of its performance). But can partial catalytic bailouts be successful in avoiding a crisis or, as argued by many, only 'corner solutions' of full bail-outs or full bail-ins can prevent destructive runs? And if bailouts are not desirable because of moral hazard distortions, shouldn't the IMF provide a mechanism that can coordinate investors' behavior in the event of a crisis, such as a debt suspension/standstill or temporary capital controls, rather than liquidity? Also, what is the evidence on catalytic finance? Under which circumstances can it be expected to work? These questions on catalytic finance are hotly debated with very different views on the desirability and effectiveness of catalytic finance.

On these controversial questions of crisis resolution, there is a wide range of opinions but very little analytical and formal work. The G7 doctrine and framework for PSI policy has evolved over time. After the Asian and global crisis of 1998-99, the G7 and the IMF undertook a process of reform of the international financial architecture based on two components, crisis prevention and crisis resolution. In the context of crisis resolution, over the period 1999-2001 the G7 evolved towards a tentative consensus, the "Prague Framework", that was achieved during the Fall 2000 meetings of the IMF in Prague. This approach can be summarized as follows. Based on a case-by-case discretionary assessment of the crisis, the IMF should finance with large, possibly catalytic, packages when the crisis is closer to illiquidity and country policy adjustment can ensure solvency. The IMF should limit its financial support, and proceed with debt restructuring/reduction when a country is close to insolvency and unable to adopt adjustment measures to restore solvency. A combination of limited official financing, appropriate bail-ins (such as debt re-profiling or re-stretching or restructuring) and policy adjustment in cases between the two extreme --- whenever problems are more severe than illiquidity but not as severe as in insolvency.

This paper contributes to the current debate in theory and policy, first, by providing the description of theoretical models of catalytic liquidity provision by an international financial institutions, with particular reference to those models (such as Corsetti, Guimarães and Roubini (2004)) that are suitable to analyze the main policy trade-offs in the design of optimal intervention policy; and second, by assessing the empirical evidence on the effectiveness of catalytic finance in a sample of eleven recent capital account crises.

In the theoretical literature we analyze, a crisis can be generated by both fundamental shocks and self-fulfilling panics, while liquidity provision affects the optimal behavior of the government in the debtor country (i.e. we model moral hazard distortions). In a previous contribution of ours joint with Guimarães, we model the official creditor (the IMF or ILOLR) as a "large player" in the world economy, specifying its objective functions and resources. In doing so, we draw on the theoretical model by Corsetti, Dasgupta, Morris and Shin (2002) (hereafter CDMS) and the policy analysis by Corsetti, Pesenti and Roubini (2002), focused on the role of a large speculative trader in currency crises.

In such a model, the strategies of the IMF, international speculators and domestic governments are all endogenously determined in equilibrium. Under mild conditions, the equilibrium is unique: then one can carry out comparative statics analysis to assess the effect of different attributes of policy and markets on the likelihood of a crisis, including:

the size of liquidity support by the IMF, the relative precision of IMF information, the structure of incentives faced by the IMF, the seniority of IMF loans, domestic policy preferences underlying moral hazard distortions, and the structure of incentives of international funds managers.

There are two major areas in which the recent theoretical literature contributes to the debate on the reform of the international financial architecture: the effectiveness of catalytic finance and the trade-off between liquidity support and moral hazard distortions.

First, this literature lends support to the hypothesis of 'catalytic liquidity provision' by an official institution, although the success of partial bailouts is (realistically) limited to some intermediate range of macroeconomic fundamentals --- i.e. to conditions where the fundamentals are not too weak. In our equilibrium, the IMF does not have infinite resources as to close any possible financing gap opened by a speculative run. Yet, the prospect of contingent liquidity support reduces the range of fundamentals at which international investors find it optimal to attack a country, and therefore lower the likelihood of a crisis. This catalytic effect is stronger, the larger is the size of IMF funds, and the more accurate is the IMF information.

This result runs counter to the hypothesis, first presented by Krugman and King and then formalized by Zettelmeyer (1999) and Wyplosz and Jeanne (2000) that IMF bailouts can only work if they are complete. These authors based their view on the fact that, in models with multiple equilibria, partial bailouts cannot rule out the possibility of self-fulfilling runs, i.e. small IMF interventions are not an effective coordination mechanism of private investors. In this framework, liquidity support is effective only insofar as reduces liquidation costs in the presence of a run. Models drawing on the traditional bank run literature prescribes that the IMF should have very deep pockets. In the analysis underlying such view, the cost of crisis is independent of the size of the financial gap, i.e. the difference between short term obligations and the liquid financial resources available to the country. In other words, by falling either one cent or one billion dollars short of obligations, the country pays the same large cost. To a large extent, of course, this result is model-specific. More general and realistic models would allow for partial liquidation of long term investment (selling one bit of it may easily provide the required resources without incurring a macroeconomic crisis). Also, as all information is common knowledge, the only possible way in which the IMF can coordinate private markets is by ruling out the possibility of liquidity crises altogether --- i.e. by having enough resources to fill any possible financial gap. But by moving away from the assumption of common knowledge, recent models of speculation stress other ways in which a large player --- such as the IMF --- can affect market behavior and have a catalytic effect even when its resources are limited.

Corsetti Guimarães and Roubini (2003) (henceforth CGR) as well as Morris and Shin (2002) help understanding how and why catalytic finance can work. Within a global-game framework, liquidity support is effective both directly and indirectly. Directly, it reduces liquidation costs against speculative withdrawal of credit. Indirectly -- and this is key to the catalytic effect --- it reduces the number of speculators for each realization of the fundamental. In other words, the presence of the IMF means that, over some range of fundamentals, private investors are more likely to rollover their position rather than roll them off. The IMF can have an effect on the market even if its resources fall short of

what is needed to close completely any possible financing gap. 'Middle solutions' can work, not just 'corner ones.'

Second, contrary to the widespread view linking provision of large catalytic liquidity to moral hazard distortions, these models show that under certain circumstances liquidity assistance is crucial for the government to implement efficiency-enhancing but costly reforms. Specifically, the conventional view is that, by insulating the macroeconomic outcome from ruinous speculative runs, large liquidity assistance gives the government an incentive to avoid the costs associated with implementing good policies. But this is not the only possible consequence of an ILOLR. In fact, it is equally plausible that some governments be discouraged from implementing good but costly policies because their prospects of success is jeopardized by the country vulnerability to speculative runs. In this context, liquidity support provides governments with insurance against liquidation costs, allowing them to realize their desired plans. Our previous contribution builds a model that can generate both scenarios --- one with moral hazard distortions, the other one with complementarity between liquidity assistance and good policy behavior. Our results thus suggest the desirability of some official assistance also when the macroeconomic outlook is quite weak independently of government efforts.

The structure of the paper is as follows. Section 2 reconsider a summary model of catalytic finance and moral hazard distortions after Corsetti, Guimarães and Roubini (2003). Section 3 overviews other analytical studies of catalytic finance and surveys the empirical literature on this subject. Section 4 presents our empirical assessment of the success of catalytic finance based on a series of recent eleven cases studies of financial crisis and IMF catalytic programs. Section 5 presents our main conclusions.

## **2. A summary model of catalytic finance**

### **2.1. Main innovations of the model**

The analysis and model discussed below are related to the vast and fast-growing literature on the merits of bail-outs vs. bail-ins as a crisis resolution strategy and the arguments in favor of an ILOLR. Our analysis contributes to this literature in a number of dimensions.

First, most contributions analyze an ILOLR in models after Diamond and Dybvig (1983) -- D&D henceforth -- stressing the implications of multiple instantaneous equilibrium, and ignoring macroeconomic shocks or any other risk of fundamental insolvency. In contrast, we develop a model of fundamental default and speculative runs where a crisis may be anywhere in the spectrum going from pure illiquidity to insolvency (see for instance Allen and Gale (2000)). Thus, we present a more realistic specification of an open economy where fundamentals, in additions to speculation, can cause debt crises.

Our framework draws on the global games literature (see Carlsson and van Damme (1993) and Morris and Shin (2000)). As is well known, in global game models agents need not have common knowledge of the signal about fundamentals; the precision of individual information need not be the same; there will be some heterogeneity in speculative positions even if everybody is following the same optimal strategy. Arguably,

they provide a particularly attractive framework to analyze the coordination problem in financial markets at the onset of a crisis.

Second, many of the contributions drawing on D&D finesse the issue of moral hazard, thus downplaying a key policy tradeoff debate on the desirability of an ILOLR. The few contributions that do discuss moral hazard distortions generated by liquidity provisions, cannot give strong analytical support to their conclusions. One reason is that, when crises are modeled as a switch across multiple possible equilibria, comparative static analysis typically leads to different results depending on which equilibrium is selected, but there is no endogenous mechanism that leads agents to select one equilibrium over the other(s). This is not the case in models where the equilibrium is unique. In our model, we can perform proper comparative statics analysis, tracing the effect on government behavior of various assumptions about the IMF size, structure of incentives, precision of information and other features.

But apart from this methodological issue, there is a substantial difference between our analysis and previous literature. The conventional and analytical wisdom is that official finance exacerbates the moral hazard problem: the novel result from our analysis is that, under some circumstances, the existence of official liquidity assistance, even if conditional and catalytic, can give the debtor country the right incentive to implement policy adjustment.

Third, in the context of global games and the literature on the ILOLR building on them (see Morris and Shin (2002) but also Rochet and Vives (2002) for a closed-economy LOLR), in our contribution we model the role of official financial institutions as large players, whose behavior is endogenously derived in equilibrium. Many of our new analytical insights stem exactly from this feature of our model. In specifying the preferences of its shareholders or principals, we model a 'conservative' IMF, in the sense that it seeks to lend to illiquid countries, but not to insolvent countries. Given this set of incentives, in our equilibrium the IMF is more likely to provide liquidity support when the crisis is caused by a liquidity run, as opposed to crises that are closer to the insolvency corner.

Fourth, we take domestic expected GNP as the natural measure for national welfare, which may differ from the objective function of the domestic government because of (political) costs of implementing reforms and adjustment policies. We can therefore analyze the implications on the welfare of domestic citizens of alternative intervention strategies by the IMF.

Fifth, the global game framework in our study allows us to assess the role of IMF information precision in strengthening the IMF influence on private investors' strategies and government behavior. In general, a better informed IMF reduces the aggressiveness of private speculators, and therefore lowers the likelihood of a crisis. The role of information precision in catalytic finance, however, becomes much more important when the IMF can strategically signal its position to the market, e.g. choose to move before private investors. Finally, we report a few results on this issue drawing on CDMS and Dasgupta (1999). Indeed, the IMF can have a much stronger impact on market behavior, as an early move signals the IMF information to private investors. As shown by Dasgupta (1999), an IMF with sufficiently precise information can induce 'strong herding behavior' --- i.e. no attack at all as private funds managers disregard their private information and just rollover their debt.



Our framework provides a useful starting point for a number of extensions of the analysis. These include the optimal size of IMF interventions, seniority of IMF loans and the timing of IMF liquidity support. In our model, the IMF will optimally set the size of liquidity support as to minimize the likelihood of default --- assessing the relative importance of illiquidity vs. moral hazard distortions. Increasing the complexity of the model as to encompass risk aversion (the IMF loses money by lending to a crisis country) may make the IMF more conservative relative to our result. A similar consideration refer to the issue of the "preferred creditor status" of the IMF. If the IMF loans are senior relative to private creditors, other things equal the IMF will be more willing to intervene --- thus reducing the likelihood of a crisis. On the other hand, private investors would lose more in the event of default. They will therefore be less willing to rollover their debt. Our model fully accounts for the first effect, and provide a framework for a heuristic discussion of the second. A different specification of the IMF and investors payoffs can instead endogenize both effects.

## **2.2. Description of the catalytic finance model and its results**

Modeling policy trade-offs in the liquidity provision by an international institution raises a number of important issue in defining the objective functions of such an institution, as well as of the governments and international investors. Rather than delving into a micro-founded treatment of these issues, most contributions in the literature have adopted a pragmatic approach, stressing a few points while focusing on simplified specifications or reduced form models.

In what follows, we model an international institution providing liquidity to a crisis country (IMF) as a 'conservative' institution, willing to prevent the unnecessary costs associated with illiquidity, but unwilling to subsidize insolvent countries. In this sense, the payoff of such an institution is clearly increasing if a high fraction investors that decide to keep lending to the country, rather than fleeing and causing a liquidity problem.

On the other hand, investors may benefit from the IMF intervention, if this raises the amount of resources that are available for repayment by cutting on liquidation costs. Also along this dimension, in our model the payoff of international investors will be increasing in the likelihood and size of IMF interventions. Overall, therefore, we will model a case of strategic complementarity between the IMF and the international investors.

Quite different is the strategic interaction between the IMF and the government of a debtor country. Most of the literature pays attention to the case in which the actions by the IMF and the government are strategic substitute: the more the IMF intervenes, the weaker the incentive for the government to implement good but costly policies and reforms. In our analysis, this will be one possible outcome. But we cannot exclude cases of strategic complementarity: in equilibrium, it may be possible that governments be unwilling to implements good but costly policies, unless the IMF provides funds to fence off disruptive liquidity runs.

## 2.2.1 The model setup and equilibrium

In this section, we provide a short introduction to the main analytical building block of a model after Corsetti Guimarães and Roubini (2003), and a discussion of its main results. The specification is in the tradition of bank-run models, applied to international finance. The model consists of a small open economy operating for three periods, labeled 0, 1 and 2. For simplicity, the gross international rate of return is 1 (i.e. the net rate of return is zero) and both domestic and foreign agents are perfectly competitive and risk neutral. Domestic agents have access to highly productive but risky projects. International investors have therefore an incentive to lend to the country, but they are assumed to do so via international mutual funds run by qualified fund managers. The domestic risky projects yields a common economy-wide stochastic return  $R$  in period 2 --- in expected terms, this return is higher than the international rate of interest. Projects may nonetheless be liquidated in period 1 at a cost. Namely, early liquidation yields only a fraction  $1/(1+k)$  of the final return of the investment  $R$ . In addition, in the world economy there is an international institution (called IMF), that may lend to the country a stock of international liquidity  $L$  at the international interest rate in period 1.

The timing of the model is as follows. In period 0, domestic agents in the economy borrow an amount  $D$  from international mutual funds, and invest  $I$  in the risk project,  $M$  in a liquid international asset (foreign reserves) yielding the international rate of return.

The stock of debt  $D$  consists entirely of short term bonds, that can be rollover in period 1. In period 1, based on their information some fraction  $x$  of international investors may decide to withdraw their money, while the IMF simultaneously decides whether to provide the country with a loan of a fixed size equal to  $L$ . The economy face needs international liquidity to repay  $xD$ . If  $xD$  is small relative to  $M$  and  $L$  (in case the IMF decides to intervene), the country simply uses its reserves. If  $xD$  turns out to be larger than the liquid assets in the hand of the small country (whether or not the IMF intervenes), domestic agents liquidate a fraction  $z$  of long-term projects, receiving  $zIR/(1+k)$ .

In period 2, the country is left with a fraction  $1-z$  (if positive) of the initial investment and perhaps some fraction of reserves  $M$ . On the liability side, the country owes  $(1-x)D$  to private international investors and  $L$  to the IMF (if this has provided assistance in period 1). When its assets are above its liabilities, the country is left with a net positive amount of resources --- the country GNP --- that we take as a measure of national welfare. Otherwise the country defaults: for simplicity, it is assumed to pay all its creditors pro rata, ruling out seniority of the IMF loans. This assumption is analytically convenient and is not consequential for our main results (in the sense that we could derive similar results assuming that the IMF is repaid first).

Both the IMF and the international fund managers are strategic players with well defined objective function and resources (government objective functions and resources will be analyzed below, when we study moral hazard). To focus sharply on our analysis of catalytic finance and moral hazard distortions, it is actually sufficient to capture the main features of these players' preferences. As in Rochet and Vives, we assume that funds' managers face the following payoff structure. They receive a benefit  $b$  when they rollover their loans to the country and the country does not default in period 1. They

suffer a cost  $c$  (i.e. their utility is  $-c$ ) if they rollovers their loans and the country default. If they withdraw the money in period 1, they earn an intermediate level of utility, that we lump together and set equal to 0. This payoff structure is clearly not entirely realistic --- but it serves well the goal of our analysis and has obvious advantages over alternative, more complex structures that would lead to essentially the same results.

In specifying the IMF objective function, we use a similar approach. Here, we want to capture the idea that the IMF is concerned with the inefficiency costs associated with early liquidation, but cannot provide subsidized loans or grants to a country with bad fundamentals. The payoff of the managing board of the IMF is similar to that of private fund managers: if the country ends up not defaulting, lending  $L$  is the right thing to do. By providing liquidity, the IMF gets a benefit  $B$ . If the country defaults, instead, the IMF loses money when lending. Relative to not disbursing  $L$ , the benefit from providing liquidity is negative and equal to  $-C$ .

Note that, in the above specification of payoffs, the utility for funds' managers and the IMF is independent of the extent of default. Our analysis thus necessarily abstracts from distributional issues between the country and the creditors, as well as between private creditors and the IMF, that arise in debt crises.

The way in which information reaches the different agents is crucial in our model. In period 0 all agents have some common prior beliefs over the distribution of the fundamentals summarized by  $R$  --- which may also reflect the consequences of moral hazard in terms of good or bad behavior by the government of the country. These beliefs are common knowledge. In period 1 international investors and the IMF receive private (individual) unbiased signal about the realization of  $R$ , and based their decision on this signal. As is well known in the global game literature, the equilibrium in the model can be unique or multiple depending on the precision of the private signal relative to the public signal (in our case, the common prior over  $R$ ). We restrict our attention on models with a unique equilibrium by assuming that the private signal is always sufficiently more precise than the public signal.

We conclude our short description of our model by noting that, with a continuum of domestic and foreign agents, we can summarize the macroeconomic behavior of the model in a simple and intuitive way. If no international investors withdraw its loan to the country in period 1, there is a natural break even rate  $R_s$  that equate the total payoff of the project to the debt of the country net of foreign reserves, i.e.  $I \cdot R_s = D - M$ . Early withdrawals may however raise the minimum rate of return at which the country is solvent, since part of the long-term projects may be liquidated at a cost, and the 'break even rate' will also depend on whether the IMF disburse its loan  $L$ . For any fraction  $x$  of investors withdrawing their money in period 1, we can therefore define two thresholds of fundamentals, one conditional on the IMF intervening, the other conditional on the IMF not intervening, below which the country will default.

This consideration makes it clear that IMF interventions have catalytic effects through two channels. First, for any given fraction of speculators fleeing the country, liquidity support reduces the amount of long-term investment that needs to be liquidated. Second, indirectly, the presence of the IMF can reduce the number of investors willing to withdraw their loans for any given realization of the fundamental (lowering  $x$  for any given  $R$ ). This again reduces the liquidation costs from runs.

## 2.2.2 Equilibrium portfolio and lending strategies

We begin our analysis by characterizing the equilibrium in our three-period economy holding government policies constant (i.e., for a given distribution of the fundamental  $R$ ). Since government policies do not play any role in this part of our analysis, it is convenient to proceed by assuming that the ‘public signal’ that every agent share in period 0 about the distribution of the fundamental  $R$  is uninformative (so that the private signal are relatively much more precise).

According to our specification, in the interim period the IMF and the fund managers take their decisions independently and simultaneously. In effect, we envision a world in which the contingent fund  $L$  initially committed by the IMF may not be available ex post, and this is understood by fund managers, who correctly compute the likelihood of IMF interventions. As mentioned above, the idea here is that the IMF will refuse to lend if, according to its information, there is no prospect to recover its loans  $L$  fully --- so that contingent financial assistance would turn into a subsidy.

At the heart of our model lies the coordination problem faced by fund managers in the interim period. Fund managers are uncertain about the information reaching all other managers and the IMF, and therefore face strategic uncertainty about their actions. But the expected payoff of each fund manager from rolling over a loan to the country depends positively on the fraction  $(1-x)$  of managers not withdrawing in the interim period, as well as on the IMF willingness to provide liquidity. The IMF expected payoff from providing liquidity, in turn, depends positively on the fraction of agents who roll over their debt. Clearly, the decision by the fund managers and the IMF are strategic complements.

As in Corsetti, Dasgupta, Morris and Shin (2004) in our model there is a unique equilibrium<sup>1</sup> in which agents employ trigger strategies: a fund manager will withdraw in period 1 if and only if her private signal on the rate of return of the risky investment is below some critical value  $s^*$ , identical for all managers. Analogously, the IMF will intervene in support of a country in distress if and only if its own private signal is above some critical value  $S^*$ . Using the argument in CDMS, it can be shown that a focus on trigger strategies is without loss of generality, as there is no other equilibrium in other strategies.

One of the advantages of working within a global-game framework is that we can characterize the unique equilibrium in our economy in terms of four critical thresholds. The first two thresholds are critical values for the fundamental  $R$ , below which the country always defaults --- one conditional on no IMF intervention, the other conditional on IMF intervention. The other two are the thresholds  $s^*$  and  $S^*$  for the private signal reaching the funds managers and the IMF, discussed above.

The derivation of these thresholds (explained in detailed by CGR) is not relevant for the purpose of this paper. What is relevant is that they provide synthetic indicators to analyze ‘catalytic finance.’ First, in our model the IMF intervenes only to address liquidity problems as opposed to solvency problems. Hence while the country will always

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<sup>1</sup> It is a Bayes Nash equilibrium in which, conditional on a player signal, the action prescribed by this player's strategy maximize his conditional expected payoff when all other players follow their equilibrium strategy.

default if the fundamental is weak enough and it will always be solvent if the fundamental is strong enough, there will be an intermediate range of rates of return in which the outcome will depend on whether the IMF intervenes or not. Second, while the IMF will rationally and optimally decide whether to lend  $L$  to the country, its decision is still based on a signal which may turn out not to be correct ex-post. Hence, it is possible that the IMF makes 'mistakes'. Third, we can use comparative static analysis to assess the impact of raising the size of IMF loans, or the precision of its information, on the portfolio strategies by investors ( $s^*$ ) as well as on the likelihood of a crisis (the thresholds of the fundamentals).

### 2.2.3 Main analytical results on 'catalytic finance'

In our model is, crises have both a fundamental component and a speculative component. Not only must the rate of return be low enough for a speculative withdrawal to cause solvency crises: withdrawals are more likely when the fundamentals are weak. The presence of an institutional lender of liquidity -- even if with limited resources -- affects the strategy of the fund managers. By changing the likelihood of speculative withdrawals, its presence can therefore influence the macroeconomic performance of the country.

What are the effects of IMF lending on the likelihood and severity of debt crises? Abstracting for the moment from moral hazard issues, our analysis can be articulated in the following three questions:

1. Does a larger availability of resources to the IMF increase the 'confidence' of the fund managers in the country --- as captured by their willingness to roll over their loans for a relatively worse signal on the state of fundamentals?
2. To what extent does IMF lending affect the likelihood of a crisis?
3. Does the precision of the information of the IMF relative to the market matter? In other words, is the impact of IMF lending stronger as its information becomes more accurate?

Questions 1 and 2 above are answered by a single exercise, summarized by the following propositions: All thresholds in the model (both for the fundamental and for the private signals) are decreasing in  $L$  (see the proof in CGR).

Intuitively, if a larger  $L$  lowers  $s^*$ , this means that funds managers are now willing to rollover their loans for weaker private signals about fundamentals --- hence they are less aggressive in their trading. A larger IMF raises the proportion of investors who are willing to roll over their debt at any level of the fundamental. Moreover, since the rate of return is normally distributed, if the two thresholds below which the country defaults conditional on the IMF intervention and on no IMF interventions fall with  $L$ , and the signal  $S^*$  at which the IMF starts to intervene also falls with  $L$ , it must be the case that the ex-ante probability of a crisis is decreasing in  $L$ : bigger IMF interventions indeed lower the likelihood of a crisis. As a consequence of a lower probability of a crisis, a larger  $L$  raises the country's expected GNP.

These results lend theoretical support to the notion that an international lender of last resort increases the country's expected GNP not only through the direct effects of liquidity provision (interventions obviously reduce costly liquidation of existing capital). There is also an indirect effect on the coordination problem faced by fund managers: the possibility of interventions of size  $L$  lowers the threshold at which private managers

refuse to roll over their debt, to an extent that increases with the size of contingent interventions. It follows that an international lender can avoid some early liquidation even if it does not act ex post.

To enhance the comparison between our analysis and the literature (especially contributions stressing multiple equilibria and self-fulfilling runs in the framework of models after D&D), it is useful to look at the equilibrium in our model when the precision of signals becomes arbitrarily large. When all private signals are arbitrarily close to the true fundamental  $R$ , all thresholds converge to the same value. Yet, signals are not common knowledge and agents still face strategic uncertainty about each other actions (i.e., they do not 'know' each other action in equilibrium). But except in a measure-0 set in which the fundamental happens to be arbitrarily close to the corresponding threshold conditional on IMF intervention, either everybody withdraws early and the IMF does not intervene or nobody withdraws early. In this limiting case, there is no heterogeneity in managers' action, and there will be (almost surely) no provision of liquidity in equilibrium. Thus, the prediction of our model is observationally equivalent to the model with common knowledge after Diamond and Dybvig [1983] (see Corsetti, Guimarães and Roubini (2003) for a discussion).

In this case, all the benefit of a lender of last resort comes through the coordination effect (as the IMF almost never intervenes saving liquidation costs). To coordinate markets, however, the IMF need not have 'deep pockets'. A marginal increase in the size of conditional interventions  $L$  lowers the threshold  $s^*$  chosen by all agents in equilibrium (at which  $x$  endogenously drops from 1 to 0).

Question 3 in our list above raises an issue regarding the role, if any, of the relative precision of the information of the IMF. This is a central issue in the analysis of the influence of large players in currency crises by CDMS, as these players are usually believed to act on superior information. In our context, the main interest is in the equilibrium effect of improving the quality of IMF information.

What happens when the IMF private information becomes more accurate? As shown in CGR, an increase in the IMF information precision decreases all thresholds. Ceteris paribus, a higher precision of information by the IMF increases the willingness by fund managers to roll-over their loans to the country, and reduces the probability of default. Intuitively, if the IMF has the ability to estimate the state of the country fundamentals arbitrarily well, funds' managers need not worry about idiosyncratic noise in the IMF intervention decisions. Provided that the IMF's objective function is common knowledge, private investors understand its strategy (lending to possibly illiquid but not to insolvent countries). At the margin, increasing the accuracy of IMF information makes them more willing to lend, because they will be confident that the IMF assessment of the fundamentals will not be far away from their own assessment --- they can therefore expect the IMF to intervene when they believe that the state of the economy grant intervention.

We conclude this section with two notes. First, while we find a simultaneous game an appropriate and realistic description of the strategic uncertainty surrounding private and public behavior in a crisis, one could however think of stressing sequential decision making. For example, one could assume that funds managers take their portfolio decisions after being informed about the IMF's actual intervention. This change in the specification of the model raises a complex issue of strategic 'signalling' by the IMF,

making the model much more difficult to solve. There are however some restrictions to the game that would lead to an equilibrium with features similar to the one in our simultaneous game setup --- see for example CDMS and Dasgupta (1999). Even under these restrictions, however, one cannot rule out the existence of other equilibria, when the game is sequential.

Second, the IMF is usually assumed to have, "de facto" even if not "de jure", a 'preferred creditor status', i.e. its loans may have seniority in repayment relative to private credits. As shown in CGR, the main insights of our analysis as synthesized by our discussion above carry over in an economy where IMF loans have priority over private loans. Ceteris paribus, IMF seniority induces more liquidity provision. More liquidity provision tends to increase the willingness of fund managers to roll over their debt, and decrease the likelihood of crises.

But does IMF seniority makes a difference in terms of equilibrium allocation? There are two effects to consider. On the one hand, as the IMF gets a larger share of the country's resources in case of default, it is more willing to intervene. This effect makes a crisis less likely. On the other hand, conditional on a crisis, private investors are junior relative to the IMF, so that the return on their investment is lower. To compare equilibria with and without IMF seniority, the cost  $c$  falling on debt managers when they invest in a country that ends up defaulting should be higher in the case when IMF loans are senior. As shown in Corsetti, Guimarães and Roubini (2003), an increase in the penalty parameter  $c$  will tend to *raise* all thresholds. Fund managers will therefore be less willing to roll over debt, making a crisis more likely.

#### **2.2.4 Main analytical results regarding the trade-off between liquidity provision and moral hazard**

We now return to our original model (with simultaneous move by the IMF and private investors but without seniority of the IMF's loans) to address the issue of possible trade-offs between liquidity provision and moral hazard. We have seen above that the expected GNP of the country --- our measure of national welfare --- is increasing in the size of the IMF liquidity support for any given distribution of the fundamental. However, moral hazard considerations may invalidate such a conclusion, since liquidity assistance by the IMF could reduce the incentive for the government to implement costly policies that enhance the likelihood of good macroeconomic outcomes.

To develop our framework as to address this issue, we assume that the government can take a single costly action improving the expected value of  $R$  without affecting the variance of the distribution (the extension to a continuum of government actions is relatively easy). The government decides its level of effort in period 0, when international investors lend  $D$  to the country and the IMF states the size of its contingent intervention  $L$ . The action by the government is not observed at any point (and the IMF cannot make the provision of liquidity conditional on it).

In our model we focus on debtor moral hazard. Clearly, international liquidity support may also induce creditor moral hazard. To consider this latter issue in our framework, the initial debt level  $D$  should be taken as an endogenous choice variable --- allowing for investors' risk aversion.

When the government takes the action A (say, a policy reform and fiscal adjustment) that raises EOR by some amount  $\Delta$ , it suffers a welfare (falling on the government only). This is motivated by exogenous considerations, say, electoral costs of reforms and fiscal adjustment. Different from the IMF, we posit that the government welfare function is a combination of the welfare of the citizens of the country (summarized by expected GNP=expected consumption) and this welfare costs of action A.

Relatively to our previous analysis, it is convenient to focus on the limiting case when private signals become arbitrarily precise. An important reason is that, as the government affects the mean of the prior distribution, we need to relax the assumption of an uninformative public signal (beliefs over R now matters). With arbitrarily precise private information, we can do so without unnecessarily complicating the analysis. A second reason is that, as we have shown in the previous section, the case of arbitrarily precise private information brings the results of our model more closely into line with the predictions of models after Diamond-Dybvig, and therefore makes it easier to stress core differences between the two. Namely, all agents will take the same action in equilibrium for almost all realizations of R, so that in equilibrium there will be no heterogeneity (but the equilibrium is unique) and no partial liquidation (except in a measure-zero set). In equilibrium, therefore, we do not have to worry to track the fraction of projects which are liquidated prematurely: this will be either 0 or 1.

The logic of the model is straightforward. In deciding whether to undertake the action A, the government compares the utility costs of a reform A with the gains in expected GNP that come both in terms of higher average realization of R, and in terms of lower expected liquidation costs because of the drop in the probability of a run on debt. As the size of the IMF liquidity provision affects expected GNP, depending on parameter values there may be some critical L at which the government switches policy. The question is therefore how the net gain from the action A, varies with the size of the IMF, L. The answer is to a large extent surprising: the net gain from action A is decreasing in L if and only if the equilibrium probability of a crisis is sufficiently low (see CGR for detail).

This result states that the common view of moral hazard distortions from IMF interventions is not general, but corresponds to a specific case. Namely, when the probability of a crisis is 'less than 50 percent irrespective of government behavior', more abundant liquidity provision L reduces the extra utility a government gets for taking the costly action A. At the margin, liquidity provision lowers the government net gains from taking the costly action.

But suppose now that the country fundamentals be relatively weak, in the sense that the ex-ante probability of a crisis is more than 50 percent even if the government chooses the costly action A. Then, according to our result, more liquidity support raises the expected net gains from policy effort. Intuitively, if --- at some given L --- the probability of a failure is relatively high, the government has little incentive to bear the costs of improving the macro outcome: the chance that a good outcome will materialize is low whether or not it exerts any effort. In this case, additional liquidity provision is more likely to be helpful if the government takes the costly action, so it increases the incentives for good behavior. By reducing the likelihood of runs and their costs in terms of forgone output, larger support by an international lender of last resort improves the trade-off between the cost of government effort and the related improvement in the country's GNP.



Thus, relative to the traditional view, global-game models point to a different and intriguing possibility, one of strategic complementarity between the actions by the IMF and the domestic government (see the discussion of a similar result in Morris and Shin (2003)). When the *ex-ante* probability of a crisis is high, the payoff to the government from action A is increasing in L. Note also that the payoff of the IMF is increasing in the action A undertaken by the government.

### **3. Survey of the theoretical and empirical literature on catalytic finance**

In this section we overview other analytical studies of catalytic finance and we survey the empirical literature on catalytic finance as a base for our empirical analysis in section 4.

#### **3.1. Theoretical models (to be completed)**

The literature recognizes the importance of reconsidering the policy tradeoffs between liquidity and moral hazard. Bank of England (2002) present a model that allows for fundamentals-driven runs, and assess the arguments in favor debt standstills, relative to official finance, as crisis resolution mechanisms. These authors discuss the implications of moral hazard but do not develop a model of the tradeoff between these objectives and the optimal intervention policy. Gale and Vives (2002) study the role of dollarization in overcoming moral hazard distortions deriving from domestic (but not international) bailouts mechanism (such as central bank injection of liquidity in a banking system subject to a run). Allen and Gale (2000a) introduce moral hazard distortions in a model of fundamental bank runs, but do not consider analytically the role of an international lender of last resort. Vives and Rochet (2002) study domestic lending of last resort as a solution to bank runs building on the global game literature. They find that liquidity and solvency regulation can solve the creditor coordination problem that leads to runs but that their cost is too high in terms of foregone returns. Thus, emergency liquidity support is optimal in addition to such regulations. However, they do not model the lender of last resort as a player --- as we do in our paper. Therefore, they do not analyze the optimal tradeoff between bail-ins and bail-outs and the role of a large official creditor (IMF) that is central to our study...

#### **3.2. Survey of empirical studies**

In recent years, there have been a number of empirical studies of the catalytic effect of IMF programs. Studies can be distinguished into three main groups: a. studies of the effects of IMF programs on the flows of private capital to emerging markets; b. studies of the effects of IMF programs on sovereign spreads; c. cases studies based on event analysis of the effects of IMF programs.

##### **3.2.1 Econometric studies of the effects on capital inflows**

A number of authors have studied the effects of IMF programs on various types of private capital flows using a variety of econometric techniques. A few caveats are necessary in considering these studies. First, most of these studies cover a sample period

before the capital account crises of the 1990s.<sup>2</sup> Thus, they can only tangentially analyze the effects of large catalytic IMF programs; a few studies mix some episodes from the 1990s with previous episodes. As the theory suggested the size of the IMF program needs to be large enough to have a catalytic effect. Second, these studies look at the short term effects of IMF programs on capital flows; as the discussion of the 1990s episodes below suggests catalytic effects may take time and show up only in the medium term; thus the narrow dynamic specification of these econometric studies will tend not to find positive effects. Third, there are important simultaneity issues: IMF program may be associated with a needed current account adjustment; thus, if the current account falls in a crisis and during an IMF program, all else equal net private capital flows will shrink or even turn negative; also, use of annual data, typical of these studies may not be able to capture the pre and post-IMF intervention effects on capital flows.

With these caveats in mind, most of the available studies have found a very small, and at times negative effect of IMF programs on private capital flows. For example Bird and Rowlands (1997, 2000) conclude that the effect of IMF programs on private capital flows is insignificant or, at times, negative; they only find catalytic effects of IMF programs on bilateral official flows. Similar results are found by Rodrik (1996). Marchesi (2001) finds a positive effect of IMF programs on the probability of creditors rescheduling external debt payments; but it is not clear if such rescheduling includes episodes of coercive, as opposed to voluntary, debt rescheduling. Insofar as it is in part the former effect that it is captured, this result would suggest that some IMF programs are associated with a bail-in of investors rather than a voluntary catalytic effect. Edwards (2003) finds that IMF programs have a negative effect on private portfolio flows.

### **3.2.2 Studies of the effects on sovereign spreads**

Here we consider only the most recent studies on the effects of IMF programs on sovereign spreads to concentrate on studies covering, at least in part, the most recent capital account crises. Haldane (1999) considered seven such episodes and found that IMF programs do not tend to reduce sovereign spreads; the announcement of such programs is associated with spreads remaining high for a significant period of time, or at times even increasing. But since large IMF programs are introduced for countries having severe debt servicing difficulties and, possibly, having lost market access, it is not surprising to see high spreads for a while; it takes time and policy implementation to reduce spreads. Eichengreen and Mody (2000) conduct more formal tests of the effects of IMF programs on spreads by looking at a large data set and using high frequency data. They find that IMF programs, more so EFF loans than traditional SBAs, tend to lower spreads, even if the effects are quantitatively small. Similar results are obtained by Mody and Saravia (2003) who find effects of IMF programs on both capital market access terms (greater issuance) and spreads. They also find evidence supportive of the theoretical models suggesting that catalytic effects work more for some range of economic fundamentals and when the size of the program is larger.

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<sup>2</sup> See Cottarelli and Giannini (2002) for a more systematic survey of the empirical literature that covers most of the earlier studies, in addition to some of the most recent ones.

### **3.2.3 Studies of the effects of IMF programs on the quantity of private capital flows**

A different set of studies have looked at the effects of IMF programs via cases studies. Many of these studies analyzed the effects of these programs on the quantity of private capital flows to emerging markets. Among these studies only two look at the more recent decade of large scale catalytic finance programs: these are Hovaguimian (2003) and IMF (2000). The IMF study covers eight of the capital account crises of the 1990s: Mexico 1994, Turkey 1994, Argentina 1995, Thailand, Indonesia, Korea in 1997 and Brazil 1998. The Hovaguimian study looks at the same episodes as well as four more recent ones, such as Argentina 2000-2001, Turkey 2001-2002, Brazil 2002 and Uruguay 2002.

Both of these studies reach a skeptical conclusion about the effectiveness of catalytic finance. The IMF study compares the projection of the IMF programs for the current account and the capital account in eight capital account crises with the actual outcomes. They find that the IMF program underestimated the current account adjustment that actually occurred and significantly underestimated the capital account adjustment (with actual private capital outflows being well in excess of what were the program projections). Hovaguimian reaches the same conclusion by considering the same cases studies and four more recent ones. Both studies come to the conclusion that the IMF programs did not have a catalytic effect on private capital flows over the time horizon of the original program: “The catalytic effect of programs in reversing outflows failed to materialize, at least in the short run.” (IMF (2002), page 8). Hovaguimian also notes that, in each one of the four additional programs considered in that study “the original program required augmentation or follow-up programs,” i.e. the catalytic effect did not occur. This study concludes that “IMF programs have been over-optimistic about the catalytic effect...it is important for policy makers to recognize the significant downside risks to reliance on the catalytic effect...IMF programs should be more selective about the cases where they rely on a catalytic effect”.

## **4. Empirical Evidence**

In this section we will provide a systematic empirical analysis of effectiveness of catalytic IMF program by considering all the IMF catalytic programs since 1990; the sample includes eleven case studies episodes.

Both studies of the effects of IMF programs in current account crises before 1990s and more recent studies of capital account crises in the 1990s reach the conclusion that catalytic effects of IMF programs have been limited; some studies find evidence of a catalytic effect on spreads but the effects on private capital flows seem to be modest, especially in the short run. In this section, we will reconsider this evidence by broadening the definition and scope of catalytic finance. Indeed, we will argue that a number of recent studies take too narrow a definition of catalytic finance and thus tend to underestimate the success of catalytic finance.

In taking an event study approach to the question of catalytic finance, we do not consider formal econometric tests of this issue and rely instead on inferences from the case studies under observation. While formal econometric tests of the effects of IMF programs on capital flows and the sovereign spreads are useful, at times econometric tests

do not capture the complex phenomena that one is trying to assess; indeed, as argued below, an assessment of the success of catalytic finance goes beyond testing the short run effects of such programs on net capital flows and the sovereign spreads. Also, as argued below, in testing catalytic finance one should concentrate on the capital account crises of the 1990s where large catalytic programs were implemented for the first time. Since the sample set is small, about eleven episodes of catalytic program, it is hard to do formal econometric tests over such a small sample. Thus, the usefulness of an event study analysis.

Indeed, a general observation is important at the outset of this empirical analysis. While there are about thirty or so studies of IMF catalytic finance, most of them, with the exception of a few recent ones, cover a sample period when large scale IMF programs (i.e. IMF programs in significant excess of normal quotas) were not in existence. It is only in the 1990s, in particular starting with the Mexican rescue of 1994-95 that we start to observe large scale exceptional IMF financing. Before 1994, IMF programs tended to be within quota with very few exceptions. This observation is crucial for the following reason. It is clear, based on the theoretical analysis provided in the previous section, that a catalytic effect is possible – but not guaranteed – only if the IMF program is large enough and the larger the size of the program the larger the potential catalytic effects. Before 1994, capital account crises of the type observed in the 1990s and after were rare (see Dornbusch (2001) for a classification of the 1980s crises as current account driven and the 1990s ones as capital account driven); thus, the financing needs in a crisis were also limited and the size of IMF programs usually within quota. While one can also study, as many have done in the past, the catalytic effects of IMF programs in these current account crises, the relevant analysis of catalytic effect is for the cases of the crises of the 1990s that were capital account driven, that implied very large external financing gaps and that required large scale IMF financing. Thus, most studies concentrating on data and cases from the pre-1990s period are not very relevant for an empirical assessment of the success of catalytic finance. Indeed, in the next section we will concentrate on the 1990s and post 1990s crises in our empirical analysis, as done by Hovaguimian (2003), IMF (2002) and Mody and Saravia (2003)<sup>3</sup>.

We thus present below a more detailed analysis of the main crisis episodes in the 1990s and discuss whether catalytic programs were successful or not in each case. The eleven case studies of incipient financial crisis and IMF resort to large catalytic finance that we will consider are: Mexico 1994, Argentina 1995, Thailand, Indonesia, Korea in 1997, Russia 1998, Brazil 1998, Argentina 2001, Turkey 2001, Brazil 2002 and Uruguay 2002. Before presenting a detailed country by country event study analysis, we look at these episodes on a comparative basis to derive a number of general observations, conclusions and inferences on catalytic finance that can be inferred from the individual cases studies.

In performing this empirical study we will rely both on the implications of the analytical model of catalytic finance presented in the previous section and on other considerations about the nature of catalytic finance presented in the literature (see for example Cottarelli and Giannini (2002) assessment of the features of catalytic finance).

A few of the major implications of our model can be summarized as follows:

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<sup>3</sup> The last study covers both the more recent period and previous pre 1990s periods.

1. Large IMF programs should be “limited” – rather than being “unlimited” in the sense of covering the entire financing gap – to qualify as catalytic.

2. Partial/limited IMF programs can be successful in catalyzing private capital flows to stay in rather than flee; however, the success of catalytic finance depends on the size of such programs; the larger the size of the lent funds, the higher – for given economic fundamentals – the chance that catalytic finance will succeed.

3. Large IMF programs may not necessarily induce debtors’ moral hazard; if they are limited and conditional, they may actually induce good policy behavior that would not have been induced in the absence of the financial support.

4. Catalytic finance is more likely to be successful if the economic fundamentals, while being weak, they are not excessively weak: in a country that is likely to be insolvent (low aggregate returns to investment) catalytic finance is unlikely to be able to prevent a crisis.

5. IMF programs can have a signaling effect, i.e. signal to the market that an IMF with superior information about the country’s fundamentals. by deciding to lend to the country is providing information to investors that they should stay in the country rather than rolloff their positions.

6. Also, while this is not in the current version of the model, an IMF program can signal that the crisis country is credibly committed to pursue painful economic reforms rather than reduce its policy effort, especially if the official lending does not lead to moral hazard but rather induces good policy effort.

Indeed, the analysis in the model provides a formalization of many of the channels through which IMF programs can provide a catalytic effect. For example, Cottarelli and Giannini identified five such channels: the pure insurance effect that in our framework is the pure catalytic effect of official money; the informational channel that in our model is at work if the IMF has superior information relative to the markets; the commitment channel where the IMF programs signals a credible commitment to policy reform; the policy design channel where the superior information and analytical skills of the IMF may lead to better design of reform policies; and the screening channel where countries may signal to markets that they are of a “good” policy type by undertaking costly adjustment programs.

#### **4.1. General lessons and results from an analysis of cases studies of catalytic finance in the last decade**

##### **4.1.1 Implications of forecast errors in IMF catalytic programs**

In assessing the success of catalytic programs of the last decade, is important to address an issue pointed out by critics of IMF catalytic finance: it is true, as recent studies have shown, that the current and capital account and the growth outcomes have been worse than expected relative to the original IMF program but this underestimate is not the most important criterion to assess catalytic finance. IMF programs, whether large and catalytic in content or small and not catalytic often fail to correctly forecast the output contraction, current account adjustment and capital outflows relative to ex-post outcomes. This forecast error has more to do with the general optimism by the IMF and local authorities in forecasting the evolution of a currency and financial crisis relative to actual

outcome. While these forecast errors are serious, they depend on biases that have little to do with the catalytic or non-catalytic elements of IMF programs; similar forecast errors occur for programs of normal quota size where there is no attempt to trigger catalytic effects from large IMF financing (see IEO (2002) paper). One should also notice that the size of the output contraction or current account adjustment in the year of the crisis is not a crucial criterion in assessing the success of an IMF program. In many episodes, the current account deficit before the crisis was very large, unsustainable and required a significant adjustment given various shocks and the needed external adjustment. Also, in many cases, the potential external financing gap, i.e. the sum of the pre-crisis current account deficit and the short term (including maturing) external claims that had to be refinanced were massive, often above 10% of GDP and sometime closer to 20%. Given the size of the external financing gap, no even large IMF program could be expected to fill the entire financing gap. Also, while catalytic on private flows, large IMF programs would not necessarily trigger enough private financing to fill the entire gap at unchanged pre-crisis current account levels. Thus, some significant current account adjustment would become necessary and trigger less of a capital inflow than otherwise. While the current account adjustment in many cases has been greater than expected and greater than desirable, one issue is how much larger the current and capital account would have been in the absence of an IMF program.

#### **4.1.2 Issue of the appropriate counterfactual in catalytic programs**

In other terms, and this is another point to keep in mind, one crucial issue that the event studies cannot fully address is the issue of the counterfactual. Current and capital account adjustment and growth contraction may have been large but how much worse would have economic and financial outcomes been in the absence of the catalytic IMF program. This counterfactual issue is essential for the cases that were considered by the IMF as liquidity cases that required large IMF finance. The issue is, thus, not how much the current account or capital account or growth adjusted but rather, how much more the adjustment would have been in the absence of a large IMF program. Take, for example, the cases of Mexico, Korea, Brazil in 1999 and 2002, Turkey in 2001, Uruguay in 2002 and even Argentina during the tequila contagion of 1995. These were, ex-post, the cases closer to a “liquidity run” where the IMF program avoided a total run and avoided the need to restructure in a coercive way external claims. If a large IMF catalytic program had not been in place, it is clear that the country would have had to coercively restructure its external claims, either before or after a formal default. While any counterfactual is hard to make, based on the experience of countries that have gone through a default, the potential output consequences of such a credit event could have been massive. So, while these countries had a serious crisis and output contraction, the issue is how much more severe, persistent and deep such a contraction would have been in the absence of a large catalytic IMF program. While some commentators have argued that debt standstills can be as good as large bailout packages in stemming a crisis, a careful study of comparable events suggest that such credit events would have had very serious real and financial consequences in these liquidity crisis episodes (see Roubini and Setser (2004) for an extensive analysis). Thus, the crucial omitted issue in any assessment of catalytic

program is the counterfactual; and one can argue that the crisis would have been much more severe when liquidity problems are dealt mostly with standstills.<sup>4</sup>

#### **4.1.3 Catalytic finance and the prevention of broader unobserved runs**

The next point to consider is that the same counterfactual issue is also relevant for the size of the incipient capital outflows and run on the country. In many liquidity cases, one cannot rule out the possibility that the absence of a large catalytic IMF program would have led to a much larger run on the assets of the country, including a run by local banks depositors and a rolloff on all short term domestic claims, especially the short term domestic debt of the sovereign. In most catalytic episodes, a run on bank deposits or a rolloff of domestic government debt did not occur, or was stopped because of the existence of a large IMF program: such bank runs or government debt rollofs would have been likely in Mexico, Korea, Brazil, Turkey, Uruguay. Thus, the observed private capital outflows do not correctly measure the extent of the potential domestic and international run that would and could have occurred without a large IMF program. The size of the potential domestic and cross border claims that could be rolled off was often much larger than the external financing gap once one considers the possibility of a domestic bank run and/or a rolloff of the short term domestic claims against the government. Thus, it is not possible to assess whether the catalytic effect of an IMF was successful or not without assessing the risks of such broader runs. In most cases discussed above, such broader run would have been very likely: after all there was not bank run in Mexico, Korea, Brazil, Turkey and the one in Uruguay was stopped in its track by the IMF package. And similarly, given the existence of a large stock of domestic government debt, a rolloff of such short term claims did not occur in Brazil, Turkey and Uruguay (and was partly avoided in Mexico too). Thus, regardless of the size of the actual capital outflows, the IMF program had certainly catalytic effects on such domestic claims.

#### **4.1.4 Are catalytic IMF programs partial or limited? Yes, but size does matter**

One of the important features of catalytic programs is that they should be limited or partial in nature; if they did fill the entire financing gap, they would not be catalytic. In this respect, it is clear that almost all catalytic IMF programs were partial and limited as the amount of committed resources was well below the incipient external financing gap. For example, Hovaguimian presents some estimates of the size of IMF programs relative to the external claims that could roll off in the last four catalytic programs: Argentina, Brazil, Turkey and Uruguay. In each episode, the size of the IMF program was well below the amount of claims that could have been rolled off. And in light of the observations in the previous subsection, that many more domestic claims were potentially able to flee, IMF programs, even when very large in size, have been catalytic. Some have argued that the Mexican program was not catalytic in that the size of it, about \$38 b including both bilateral U.S. resources and IMF fund, was large enough to allow all the holders of Tesobonos to exit at will with no capital loss. While the Mexican program was

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<sup>4</sup> As discussed below in more detail, even in catalytic program there is room and a role for semi-coercive forms of debt restretching, as in the cases of Korea and Uruguay.

indeed exceptional, it was not unlimited as the size of potential claims that could have run was larger than the stock of maturing tesobonos; it also included the potential run on domestic bank deposits in dollar and local currency; and the risk of a run on domestic local currency debt (the cetes). Also, as pointed out by Jeanne and Wyplosz, the ability of speculators to short a currency puts a potentially unlimited amount of pressures on reserves and can only be addressed with unlimited official resources.<sup>5</sup> Thus, if all the claims that could run or rolloff had done so, even \$38 b would have not been enough.

#### **4.1.5 The effects of catalytic programs on short-run and medium run growth**

Thus, in considering the effectiveness of catalytic finance, one should consider the growth performance of the country over a longer horizon. It is true that, in most episodes, the first year of the crisis was characterized by a sharp output contraction, the only exceptions being Brazil in 1999 and 2002. But in all the episodes closer to a liquidity run, the recovery of output growth was sharp and the crisis had a V-shaped pattern with a sharp output contraction in the crisis year followed by a sharp recovery. This pattern was clear in Mexico, Thailand, Korea, Turkey and Uruguay while in Brazil the output contraction was very small to begin with in the crisis year and the recovery solid in the following year. The output contraction in the crisis year was often severe but such contraction was partly related to the serious fundamental weaknesses – financial, fiscal, external or otherwise - that had triggered the crisis in the first place. Catalytic finance was not successful in the sense of preventing altogether sharp output drop in the crisis year (with the exception of Brazil); but it is not clear that the output drop would have been smaller if a debt suspension/standstill would have been imposed; if anything, there are good reasons to argue that such output drop would have been more severe. What is more important is that, after the initial crisis year output drop, the recovery was rapid and sustained in these liquidity episodes: unlike the crises of the 1980s that led to a decade of “lost growth” the economic recovery after the initial output contraction was very significant, suggesting that the IMF program contributed to the V-shaped recovery.

#### **4.1.6 Implications of catalytic programs**

The next point to consider is that some episodes were, based on a variety of criteria, relative successes of the catalytic approach as growth resumed rapidly about a year after the crisis, market access was restored, capital inflows in the medium run while falling in the short run, and the IMF resources were repaid in a rapid manner. These were the cases of Mexico, Argentina in 1995, Korea, Thailand, Brazil in 1999 and, with the exception of the last criterion (rapid IMF repayment over which there is still uncertainty), the cases of Brazil in 2001-2002, Turkey and Uruguay. In other cases, the catalytic approach clearly failed: Indonesia in 1997, Russia in 1998 and Argentina in 2001. However, the cases where the catalytic approach was clearly unsuccessful are mostly

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<sup>5</sup> This argument is more relevant when a country is still on a fixed peg. But even in a floating rate, speculative pressure against a currency as domestic and foreign investors try to dump domestic assets and purchase foreign ones can put such a pressure on the value of the currency that the central bank may be forced to intervene massively to avoid excessive exchange rate overshooting. A recent example is the case of the sharp fall of the floating Brazilian real in 2002.



episodes where the IMF and the official sector mistakenly diagnosed an insolvency situation as an illiquidity situation and thus tried a catalytic approach that was bound to fail. In the case of Russia, the consequences of the failed catalytic approach were modest for the IMF: while the headline program was large with over \$20 b of funds committed, the actual amounts disbursed by the IMF in 1998 before the plug was pulled were very small, about \$4 b. Indeed, the G7 and the IMF gave to Russia once chance in June 1998 to get their fiscal house in order in exchange of a large catalytic program; once, by August 1998, it became obvious that the Duma would not deliver the necessary fiscal adjustment the IMF pulled the plug and the catalytic program was stopped before most of the promised resources had been lent. Then, given the shallowness of the ensuing Russian recession and the recovery of the economy starting in 1999, Russia was able to rapidly repay the IMF, both its 1998 borrowings and the larger funds that had been borrowed in the first years of the transition to a market economy. Argentina in 2001 was another failure of the catalytic approach but, again, not because catalytic finance had failed per se but, rather, because the IMF mistakenly assessed an insolvency situation as an illiquidity one. In the case of Argentina the plug was pulled too late, after the IMF had disbursed significant amounts of resources that were augmented throughout 2000-2001. But more than a failure of catalytic finance that - by definition and theory - cannot avoid a crisis if insolvency is the problem, this case was a failure of diagnosis of the nature of the crisis: illiquidity was assumed to be the problem of Argentina when insolvency instead was at stake.

The case of Indonesia is also one of a failed catalytic approach but the amounts committed and disbursed by the IMF were more modest than in other cases of failed catalytic. Also, the severity of the Indonesian financial and economic crisis may be more related to the fundamental political and structural problems that were burdening the country than to the size and nature of the IMF's catalytic approach. In other terms, even an alternative strategy in Indonesia, either a much smaller IMF program or, alternatively, a much larger one would have not, in all likelihood, avoided the deep recession that engulfed this economy in 1998. In other terms, a catalytic program with relative modest resources (relative to other cases) failed not because of the excessively small or excessively large amounts of the committed IMF resources but, because the lack of political and policy credibility together with a violent social implosion and political regime collapse led to a massive output contraction that, in all likelihood, would have not been much different under any other scenario for the size of IMF resources. Thus, the failed cases of catalytic programs are cases where, given the ex-ante uncertainty about the nature of the crisis – illiquidity or insolvency – the IMF made the mistaken assessment that illiquidity was the problem. While these cases suggest that large catalytic resources should have not been committed in the first place, the ex-ante uncertainty about economic fundamentals and about the ability of the government to implement the fiscal and other commitments of the catalytic program led the IMF to try an large lending package approach that did not work. But it should be kept in mind that an alternative IMF approach, based on a much more modest financial exposure of IMF resources, would have not by itself dampened the severity of the crisis in these three episodes; the financial and economic crisis would have been of similar severity.

#### 4.1.7. Effects of catalytic programs on net private capital flows to the crisis country

The next empirical observation is that the effects of IMF catalytic programs on net private capital flows to the crisis country are quite mixed depending on the country considered. Moreover, while such effects were quite modest in the short run as in most cases inflows fell sharply in the crisis year or went into large net outflows, in the medium run the picture is more complex with several episodes where capital flows resumed at sustained rates a year or two after the crisis. Thus, while a pure catalytic effect on capital flows would argue that the existence of an IMF program would almost instantaneously have an effect on private flows, in reality the short run effects are usually very modest with IMF disbursement substituting for reduced or reversed private capital flows; but the medium term effects of catalytic finance are much more significant and successful in a number of episodes. Moreover, in the most successful catalytic episodes, net private capital flows to the crisis country, while falling relative to pre-crisis levels did not become negative, i.e. there were not net capital outflows but rather reduced capital inflows in the crisis year followed by a recovery of capital inflows in the years following the crisis. A few examples show this pattern. In Mexico, net private capital inflows in the two years before 1994 had ranged between 6% and 8% of GDP; in 1994 (the peso crisis occurred at the end of that year), net private inflows were reduced to about 5% of GDP, smaller but still significantly large.<sup>6</sup> In 1995, the year following the crisis in which the U.S. and the IMF provided a large catalytic program that amounted to about \$38 billion, the net private flows remained positive at about 2% of GDP; thus, there was not net private capital flight even in the most severe crisis period. In the following years, net private inflows recovered sharply and were above 4% of GDP in each of the years between 1996 and 1998. Thus, based on a criterion of a catalytic effect of IMF large finance, this program has a clear catalytic effect on private capital flows. This pattern for capital inflows is also consistent with the pattern for GDP growth with a sharp contraction in 1995 followed by a rapid and sustained growth recovery in 1996 and on.

Another example is the case of Argentina in 1995 that suffered of the Tequila effect of the peso crisis: the bank deposit run in 1995 was stopped by an exceptional IMF program. Not only the IMF program prevented a more destructive bank run; its effect on capital flows was also catalytic. Net private flows to Argentina had been quite volatile before 1995: highly positive in 1992, highly negative in 1993 and equal about a net positive of 2% of GDP in 1994. In 1995, those net private inflows shrank to a figure positive but close to 0% of GDP. Thus, they fell but there was no net private capital flight in that tequila crisis year. Net private flows remained close to 0% of GDP in 1996 but they then rapidly recovered to an average of 4% of GDP in 1997 and 1998. Thus, while net inflows shrank close to zero in the crisis year and the year after, they never became negative and they smartly recovered afterwards. Again, one would want to characterize this episode as one of successful catalytic finance as growth, after its contraction in 1995, rapidly recovered in 1996-98.

Another example of successful catalytic finance is that of Brazil in 1998-99. In 1995-96 net private inflows to Brazil had been above 4% of GDP on average; such positive inflows modestly contracted to about 3% in 1997; in 1998 the crisis year when

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<sup>6</sup> All the figures about private net capital flows for Mexico and the other cases below are taken from IMF (2002), Table A5.1.

the Russian collapse led to contagion to Brazil the net inflows modestly fell to about 2.5% of GDP as the first IMF program was put in place; again, no net outflows, only reduced inflows. When the IMF program was sharply augmented after the collapse of the peg in early 1999, net inflows for the year remained positive and equal to 1998 levels as a share of GDP. Then, in 2000 such net inflows sharply increased to a level above 5% of GDP. Note that Brazil, by the end of the year 2000, had mostly repaid the resources borrowed from the IMF in 1998-1999. The second Brazilian case of a catalytic approach was that in the 2001-2002 period; first in the fall of 2001, the IMF approved a new large loan program; next, in September 2002, as concerns in the markets about the Brazilian election and the likely victory of Lula increased, the IMF approved a new larger program with an headline of \$30 b to be disbursed over three years. The outcomes, in terms of net private capital inflows were as follows: in 2001, when the first program was designed, net private inflows remained positive, at about 2.5% of GDP, but below the 2000 levels. Then, in the severe stress year of 2002, net capital flows became negative to the tune of 0.9% of GDP. This figure shows a net capital outflow but it is still modest relative the severe pressures faced by Brazil in that year. In the following year, net private inflows became positive again while remaining modest (final figures for 2003 are still not available). The above four episodes are clear cases where the catalytic approach did work; in each case, net capital flows remained positive in the crisis year (modestly negative only in Brazil in 2002) and then recovered sharply in the years afterwards. GDP growth followed a similar pattern with a sharp contraction in the crisis year and rapid recovery afterwards (with Brazil being a successful outlier as both in 1998-99 and in 2001-02 growth only slowed down but remained positive on average, i.e. it did not become sharply negative as in the other crisis episodes).

Three other episodes of catalytic finance were also partly successful, as far as net capital inflows are concerned if one looks at their effects on the medium term: these are the cases of Korea in 1998, Turkey in 2001 and Uruguay in 2002. First, not that in these three cases GDP followed the typical V-shaped pattern, with a sharp contraction in the crisis year and a sharp recovery in the years after. Also, note that in these episodes the capital account showed a sharp contraction and actually a large net outflow in the crisis year (1998 for Korea, 2001 for Turkey, 2002 for Uruguay) but then recovered quite rapidly in the following years. So, while the IMF program did not have a catalytic effect on net private flows in the most severe crisis year, it did so over the medium term.

In the case of Turkey, the original program designed in December 1999 was not exceptional in size as it was limited to 300% of quota for three years. When economic conditions deteriorated in the fall of 2000, the program was augmented to 900% of quota in December 2000. After the currency crisis of February 2001, the program was augmented a second time in May 2001 to over 1500% of quota; and a third augmentation to 1300% of quota was approved in February 2002. We will discuss later whether supporting to such a large extent a country with weak fundamentals such as Turkey was warranted or not; even if with growth sharply recovering in 2003-2003 and with Turkey achieving primary surpluses above 5% of GDP in those years, one could argue that the catalytic bet of the IMF paid off. But consider now strictly the effects of the IMF programs of 2001 and 2002 on net private flows. The fact that the programs were augmented is a clear sign that the external financing needs were, over time, larger than originally forecast. Indeed, the IMF program financed not only net outflows in 2001 but

also ongoing fiscal and current account deficits in 2001-2003. But consider now strictly the effects on net private inflows. In 2000 the year of the initial normal quota program, net capital flows were positive and equal to 3.5% of GDP. Then, in the severe crisis year of 2001 (the currency collapsed in February, a banking crisis emerged and output sharply contracted in 2001), net capital flows were sharply negative to the tune of 11.5% of GDP. Indeed, with large current account deficits and large amounts of roll-off of cross border claims (both on banks and the government), the IMF program did not prevent a large capital outflow. However, in spite of such a large outflow, the large IMF program prevented a highly likely run on deposits and rolloff of domestic government debt that was very short term in maturity. Thus, while one does not observe a catalytic effect on net private capital flows (large outflows instead) a more severe bank run and government debt rolloff was indeed prevented. Thus, the 2001 program did have a significant catalytic effect on domestic short term claims: it prevented a destructive run on the banks and on the government that would have occurred with certainty in the absence of the large augmented IMF program. In the year following the 2001 crisis, a further augmentation of the IMF program did occur in 2002. And in 2002, after the sharp capital outflows of the previous year, net private capital flows recovered posting a small but positive net inflow of 0.7% of GDP. Thus, some partial catalytic effect on cross border flows did occur while the domestic bank deposits and government debt rollover conditions further improved. Further improvements in net capital inflows occurred in 2003 (final figures for net inflows for that year are not available yet) with growth recovery, fall in inflation and fall in real interest rates.

The case of Korea is similar to that of Turkey in that net private flows recovered only in the medium term. In the years before the crisis, net capital inflows to Korea had been highly volatile: 3% of GDP in 1994, falling to 1% of GDP in 1995 and then recovering to about 4% of GDP in 1996, the year before the crisis. The Asian crisis engulfed Korea only in late 1998 and the catalytic IMF program was designed only in December 1997 and augmented after the presidential election in early 1998. Thus, for the purposes of test of catalytic effects, 1998 is the crisis year and the year of the IMF program. In 1997, the contagion of the Asian crisis to Korea led to a sharp drop of net capital flows; in that year one observed net capital outflows of about 5% of GDP. Next, in 1998, the year of the actual implementation of the IMF program, net capital flows remained negative but not as negative as in 1997: the net capital outflows amounted to about 3% of GDP. The actual recovery of capital flows did occur in the year after the crisis, i.e. in 1999 when net capital flows became positive again and equal to about 3% of GDP.

Uruguay followed the pattern of Turkey and Korea: net positive capital inflows in the year before the crisis (2001), sharply negative capital inflows in the crisis year (2002) and significant recovery of positive net inflows in the year after the crisis one (2003). The IMF program did not have a catalytic effect on cross border net private capital flows in the crisis year of 2002; in that year Uruguay suffered of the massive contagion from the Argentine crisis as an incipient run on Uruguayan banks (where many Argentines were holding deposits) occurred after the banking and capital account restrictions in Argentina. The capital flight in Uruguay in 2002 was massive and equal to over 33% of GDP. The original IMF program in Uruguay in March 2002 was way too small (100% of quota) and not catalytic in its size; thus, it had to be massively augmented that year and

the eventual program became as large as 10% of GDP. While the IMF package was not catalytic on cross border flows, it had a strong catalytic effect on domestic claims: a potentially destructive run on the banking system was avoided when the exceptional IMF program allowed the central bank to play the role of a foreign currency lender of last resort to a heavily dollarized banking system; and the program also prevented a run on the domestic debt of the government that had to be rolled over in very large amounts.<sup>7</sup> Thus, it is clear that the absence of an IMF program would have led to an outcome similar in its severity to the collapse of the neighboring Argentina: bank runs and deposit freezes, rolloff of domestic debt and default on domestic and external public debt, imposition of severe capital controls and a even deeper credit crunch and output contraction. The catalytic effect of the IMF program should thus be interpreted as that of avoiding a more severe and destructive financial and economic meltdown like the one observed in Argentina. 2002 was a severely contractionary year for Uruguay but a much more severe economic and financial meltdown was prevented by the IMF program.

Finally, there were some episodes where catalytic finance obviously failed: the clear cut cases were those of Russia and Argentina in 2001 that ended in default. In both cases the large IMF program did not have a catalytic effect and eventually the IMF pulled the plug and currency collapse, capital controls, banking crisis and a sovereign default ensued. The two cases differ only in that the IMF pulled the plug much earlier in Russia than in Argentina (two months after the catalytic program in Russia, over a year in the Argentine case); thus, the amounts disbursed by the IMF in the crisis year were much smaller in Russia than in Argentina. In Russia, net private flow already turned negative in 1997, the year before the crisis being about 5% of GDP as capital flight was large. Capital flight remained large in 1998, the crisis year and the two successive years, ranging in the 4 to 6% of GDP in each of those years. In Argentina, net capital flows were positive until 2000 (2.7% of GDP that year) but then turned sharply negative in 2001 and the year following the December 2001 collapse (6.5% and 13.1% of GDP respectively in 2001 and 2002).

Catalytic IMF program also failed in preventing massive private capital flight in Thailand and Indonesia; note however that, in both cases, the amounts committed and disbursed by the IMF were smaller than in other large catalytic program; thus, the failure of catalytic finance could be partly imputed to the programs being underfunded. In the former country, net private flows went from a positive value of 11.2% and 9.6% of GDP in 1995 and 1996 to negative flows of 5.3% of GDP in 1997, the crisis year. Net private outflows became even larger in 1998 (above 15% of GDP) and remained very high in the following two years (above 10% of GDP per year). In part, this movement of the capital account reflects the sharp turnaround of Thailand's current account balance, from a large deficits until 1997 to a large surplus thereafter. While the current account adjustment in 1997 and 1998 reflected the credit crunch triggered by the capital account outflows, in successive years Thailand maintained a large current account surplus as part of its maintenance of a undervalued currency that had sharply depreciated in the crisis years.

In Indonesia, one observes a similar pattern. Net private inflows ranged between 4% and 6% of GDP in the three years before the crisis in 1997; in the crisis year the inflows remained positive and high at around 6% of GDP. But the Indonesia crisis

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<sup>7</sup> The government eventually did restructure its domestic and external debt on semi-coercive terms; this aspect of the program will be discussed below.

emerged in the second half of 1997 and worsened around the end of the year when an enhanced IMF program failed to catalyze a positive response as the country experience major political problems and outright violence and eventually the collapse of the Suharto regime in 1998. And indeed, in 1998 private capital outflows were close to 3% of GDP and flows remained negative and close to 1998 levels in 1999 and 2000.

#### **4.1.8 Catalytic programs and speed of IMF loans repayments**

Another important consideration is that catalytic programs also widely differ in the speed at which the IMF got repaid after providing large loans: if the IMF got repaid on time and rapidly, this is an element of success of the program in two dimensions: the IMF lending remained revolving and did not lead to a protracted exposure of the Fund to the crisis country; the ability of the country to repay the IMF rapidly is a signal that the country recovered its growth rate, regained market confidence, restored its market access and was thus able to successfully graduate from its IMF program. In terms of speed of repayment to the IMF, catalytic programs show a variety of experiences. The most successful cases were those that, based on many other criteria, were also a success: Mexico in 1994, Argentina in 1995, Korea in 1997 and Brazil in 1999. As the country experiences will present in detail, in each of these cases, the country repaid the IMF quite rapidly and, in case such as Mexico, ahead of time. Other cases are of a mixed success: Thailand was able to repay the IMF quite rapidly too but in this case, the country underwent a persistent and painful current account adjustment (from large deficit to a large persistent surplus) that implied a severe output contraction and that allowed the reduction in foreign liabilities and build-up of foreign reserves that ensured the ability to rapidly repay the IMF.

Of the three cases of failed catalytic, Indonesia, Russia and Argentina in 2001, two – Indonesia and Argentina - led to a long term exposure of the IMF to the country and, in the case of Argentina, the IMF resources are clearly still at risk. In the third case, Russia, the country was able to repay the IMF relatively rapidly for two reasons: first, few of the funds in the catalytic program of 1998 were disbursed at the time when the plug was pulled (even if the IMF had some significant additional exposure from its previous programs to the country; second, policy reform after the crisis, default and debt servicing reduction after the restructuring, a real depreciation and some luck (with oil prices and other exported commodity prices recovering) helped Russia to achieve a rapid build-up of reserves that allowed the country to rapidly reduced its exposure to the IMF.

The last three recent cases of catalytic programs, Turkey, Brazil in 2001-2002 and Uruguay remain open cases as far as the IMF repayments is concerned. In each case, the catalytic program has been successful, so far, in avoiding a more severe financial and economic meltdown and in restoring growth and some market access. But in each case, the IMF exposure had to be augmented, it remains large and the ability of the country to start repaying the IMF highly in doubt: both Turkey and Brazil have very large repayment obligations to the IMF in 2005 and 2006 and it looks highly unlikely that they will be able to make net repayments to the IMF in the scale required by the agreed program. Also, in a number of episodes, the greater reliance on SBAs with longer repayment fuse, as opposed to SRFs with shorter repayment schedules, as means of providing funding to the crisis country, has signaled that the IMF was aware that these

countries would not be able to reduce their IMF exposure in a rapid manner. Indeed, many recent episodes of catalytic finance imply medium to long term financing by the IMF of both external and domestic financing needs rather than the short-term revolving nature of IMF programs. Also, a number of countries have been, over the last decade, repeatedly involved in IMF programs, namely Argentina, Brazil, Turkey suggesting an element of prolonged use of IMF resources, as opposed to temporary catalytic support.

#### **4.1.9 The reliance on augmentation of IMF programs**

Critics of IMF catalytic programs have pointed out that the augmentations of initial programs are prima facie evidence of the relative failure of such programs: such augmentations were evident in a number of cases: Korea, Brazil, Argentina, Turkey, Uruguay for example. But one should consider the complex set of factors that have led to augmentations. First, projection errors in IMF programs led to underestimate of the financing needs. In this respect, a survey of mission chiefs by the IMF's Independent Evaluation Office suggested that excessive optimism is built into programs as way to satisfy the program requirement that progress towards stability in being achieved. Second, mixed performance of the crisis country in terms of implementation of the initial IMF program, led to limited policy credibility that induced investors to flee rather than stay in; under conditions of uncertainty most investors decide it was safer to rolloff claims, thus putting pressure on the needed official resources for the . Third, since the advent of the new U.S. administration a different approach to crisis resolution has been attempted. The Rubin-Summers approach to crisis resolution had features of a "Powell Doctrine": i.e. decide in advance which cases deserves catalytic finance and which not and then, deal with the former ones by providing "overwhelming" amounts of support to achieve the desired catalytic effect. Instead, the new U.S. administration, by being rhetorically skeptical of large IMF programs has often taken an incrementalist approach: start with underfunded programs and do not rely on coercive PSI; but then be forced by the facts to augment the program once the initial funds are not sufficient to trigger a catalytic effect: thus, in many cases the country did eventually receive large amount of official support but only after small programs and delay failed to trigger a catalytic response. Thus, augmentation has been the by-product of the unwillingness to use overwhelming financial support when deemed to be necessary. Thus, in this dimension, augmentation is a signal of an inappropriately designed catalytic program, rather than a failure of the program to have a catalytic effect if appropriately funded. Indeed, the theoretical model presented in section 3 suggests that the catalytic effect will be the larger the large the size of the IMF loan is. Thus, in some episodes, it could be argued that a catalytic approach failed because the initial program was not large – or Powell sized – enough and thus it did not provide a catalytic kick to investors.

#### **4.1.10 Is catalytic inconsistent with soft forms of bail-in of the private sector?**

Some have argued that the fact that some large IMF programs have been accompanied by softer form of bail-in of the private sector is a signal that these programs did not have the intended catalytic effect. Indeed, in the model we presented, the provision of IMF lending is catalytic without the need for any additional explicit creditor

coordination efforts by the official creditor. But the issues are more complicated than that. Note that, in a ideal case, the mere existence of a large catalytic program would lead investors to stay in, rather than flee, even in the absence of actual disbursement of the IMF loans: the signal that IMF loans are available could have a catalytic effect in inducing so much private rollovers that the IMF funds do not need to be actually disbursed. In a second, more realistic case, the IMF resources need to be lent in order for private investors to decide to stay in and, thus, voluntarily finance the remaining part of the financing gap. In both cases, IMF funds play the role of leading to an automatic resolution of the collective action problem of many investors whose individual interest is to flee but whose collective interest would be to stay in and rollover claims. Even in catalytic programs, this collective action problem may not be resolved by the disbursement of IMF funds as risk aversion and limited policy credibility of the sovereign may lead investors to prefer to flee rather than stay. This coordination problem is the reason why, in many but not all, catalytic programs, soft and relatively non-coercive form of bail-in have been introduced to reinforce the catalytic elements of the program: in Korea, this took the form of a coordinated and semi-coercive rollover of the cross border lines; in Brazil 1999, the monitored agreement to maintain cross border exposure to reduced levels after the 1998 rolloff; in Brazil 2002 even a softer voluntary understanding between the sovereign and its creditor banks to maintain cross border exposure; in Turkey a failed attempt to have a monitored, but not enforced, agreement to maintain cross border interbank lines in Uruguay, a catalytic program followed by a semi-coercive restructuring of all public debt. In Argentina in 2000-2001, there was very little PSI, in spite of the rhetoric to the contrary, in the Blindaje program as there was no implied involvement of foreign investors, i.e. the commitments to maintain or increase exposure were made only by domestic banks and pension funds. Also, these operations were to occur at the high market rates and, thus, be effective voluntary apart from some soft moral suasion. And indeed, the June 2001 megaswap was done at market rates, thus implying very large costs, in NPV terms, to Argentina's debt burden. In summary, some elements of bail-in or PSI are not inconsistent with a catalytic approach; when the assessment is made that a pure catalytic approach may not work, soft ways to induce investors to stay in rather than flee are consistent with a catalytic resolution of a financial crisis.<sup>8</sup>

#### **4.1.11 Did catalytic programs lead to creditor and/or debtor moral hazard?**

Many have expressed concern that IMF programs lead to creditor and debtor moral hazard. But economic theory, as described in our analytical model, suggests that reality is more complex: IMF financial support may induce a sovereign who would have not otherwise had the incentive to undertake policy adjustment and reform to do so under the expectation that IMF catalytic lending would reduce the risk of a crisis. Thus, the first empirical question is whether IMF catalytic programs have exacerbated debtor's moral hazard or rather dampen it? All in all, there is little evidence that IMF have increased debtor moral hazard both before a crisis and, more relevant for our case of catalytic

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<sup>8</sup> Of course, in failed catalytic programs, such as Indonesia, Russia and Argentina, the failure of catalytic finance led to large coercive forms of bail-in, in the form of outright default by the sovereign or by private sector firms.



finance, when a crisis does occur. The best example of a case where the IMF program made the difference between the sovereign being willing to take difficult economic reforms because the existence of an IMF program significantly reduced the risk that such reforms, without financial support, were doomed to fail, is that of Brazil in late 2002 when the IMF program induced the newly elected president Lula to take tough actions on the primary balance and on other macro policy dimension; since investors were concerned about the credibility of Lula, it is clear that Brazil would have collapsed, in the absence of the \$30 b IMF program, even if Lula had taken the same policy actions as the run of concerned investors required large amounts of liquidity in the short run; conversely, it is highly unlikely that Lula would have made those difficult policy choices in the absence of a large IMF program as the absence of official finance would have doomed even a most ambitious macro program. Other episodes where the carrot of a large catalytic program induced policy makers to undertake difficult macro adjustments and other structural and financial reforms are Mexico in 1995, Argentina in 1995, Korea in 1997-98, Thailand in 1997-98, Brazil in 1999, Turkey in 2001 and Uruguay in 2002. In each one of these cases, important and costly macro and financial adjustments were necessary to resolve the core causes of the crisis but liquidity needs in the short run would have not been eliminated by policy adjustment alone as external financing gaps were too large and the signal from policy changes to investors' behavior too slow to induce a large rollover and reflow of private capital in the short run necessary to avoid outright debt suspensions. Thus, in each case one could convincingly argue that the sovereign would have been much less likely to undertake painful policy actions in the absence of a large IMF program as the chance of policy actions alone to stop the crisis would have been minimal. Thus, the catalytic program induces good policy reaction rather than induce moral hazard.

Note also that, even in failed catalytic programs, it is not obvious that expectations of IMF financial help were the reason behind the failure of policy makers to undertake the necessary policy actions. The political stalemate in Russia and the Duma would have prevented the necessary fiscal actions even in the absence of an IMF program; the June 1998 program made little difference to the ability of Russian policy makers to undertake the necessary reforms. Similarly, Argentina attempted in 2000 and 2001 several macro and fiscal adjustment actions that were eventually insufficient to prevent the crisis; failure to adjust the primary balance early on had more to do with a weak coalition government, the conflict between central government and provinces and the overall political economy of fiscal policy in Argentina than on the expectations of an IMF bailout package. Similarly, the political economy of Indonesia, especially the violence of the local indigenous population against the Chinese minorities and the slow but inexorable collapse of the authoritarian and corrupt regime of Suharto, are much more important in explaining the failure of a relatively modest in size catalytic program rather than IMF induced moral hazard.

For what concerns creditors' moral hazard, as opposed to debtors', such form of moral hazard is not essential for the issue of whether catalytic finance is successful or not. Creditors' moral hazard may lead to excessive lending at too low a spread to emerging market economies; but it does not directly affect the success of catalytic finance. At the margin, one can argue that creditors' moral hazard may induce them to rollover, rather than rolloff, their claims and roll them over at lower spreads; this may,

all else equal, make catalytic programs more successful. Econometric evidence on creditors' moral hazard is very limited with the exception of a couple of episodes of clear moral hazard play, Russia in 1998 and Turkey in 2001-2002. In both cases, there was significant capital flight, rolloff of investors' claims and a crisis was not averted. But in Turkey, IMF programs had eventually a catalytic effect as broader runs were averted; also, the creditors' moral hazard implied that Turkish spreads were much lower than they would have otherwise been.

#### **4.1.12 Catalytic is more likely to succeed after a move to a float**

Economic theory suggests that catalytic finance is more likely to be successful when economic fundamentals are weak, but not too weak. When the debt path is unsustainable or when the exchange rate regime is inconsistent with economic fundamentals, catalytic finance will not succeed. Here we consider the interaction between catalytic programs and exchange rate regimes. In the next section, we study the relation between catalytic finance and measures of solvency.

For what concerns exchange rate regimes, the first point to note is that all the fixed or semi-fixed exchange rate regimes in the sample of countries in our study eventually collapsed during a speculative attack. The only case of a non-fixed regime is that of Brazil in 2001-2002 as its pegged had collapsed already in 1999. In all other cases, the IMF catalytic program was introduced around the time of the currency crisis. In some cases, the catalytic approach was first used to prevent a currency crisis from occurring; in other cases, the catalytic program was first introduced only after the currency had already collapsed: Mexico, Korea, Thailand, Indonesia, Brazil 2002, Uruguay. Catalytic programs were introduced as a way to avert a currency crisis from occurring in Argentina 1995, Russia 1998, Brazil in 1998, Turkey in 2000, Argentina in 2001. Only in one of these cases, Argentina in 1995, the program was successful in preventing a currency crisis from occurring; and one can argue that, at that time, Argentina's fundamentals were still consistent with currency board. In all the other cases, the peg collapsed as it was inconsistent with economic fundamentals, be it the large current account deficit, the loss of competitiveness or unsustainable fiscal policies and debt accumulation. Thus, catalytic finance was not successful in preventing a currency crisis when fundamentals were inconsistent with such a peg. In some cases, after the collapse of the peg, the catalytic program failed altogether as it was inconsistent with a broader range of economic fundamentals (Indonesia, Russia, Argentina 2001). In other cases, the move to a float and the augmentation of the initial catalytic program led to a relative success of the catalytic approach: Korea, Turkey, Thailand. In other cases, the catalytic approach was initially attempted only after the peg had collapsed (Mexico, Thailand, Indonesia Brazil, 2002, Uruguay). These cases were relatively successful when economic fundamentals were consistent with the country's solvency: Mexico, and possibly – but not yet definitively – successful at dealing with crises after an unsustainable peg had been broken rather than the futile attempts to prevent such a currency value shift.

#### **4.1.13 Catalytic finance is more likely to succeed if fundamentals are weak, but not too weak.**

If a country is insolvent, catalytic finance cannot prevent a debt restructuring; but if a country is solvent – possibly conditionally on policy adjustments – but illiquid, IMF catalytic finance can prevent a sovereign debt crisis from occurring. The evidence is consistent with the view that catalytic programs failed when the country was insolvent based on debt ratios and ability to perform sufficient primary adjustment to stabilize the debt ratio: examples are Russia in 1998 (based on the public debt to revenues ratio) and Argentina in 2001, based on the public debt to GDP ratio and the external debt to export ratio. Indonesia' catalytic program also failed, in spite of the fact that the pre-crisis public debt ratio was low – before the crisis; other fundamental political and financial vulnerabilities were severe in Indonesia.

Conversely, the success cases of catalytic finance were all cases where, based on standard criteria of solvency (both debt levels and existence of persistent primary or external gaps) the country appeared conditionally solvent (i.e. solvent conditional on necessary policy adjustment) but illiquid: Mexico, Argentina in 1995, Korea and Thailand, Brazil in 1999. Note that in the case of Argentina in 1995 and Brazil in 1999, both the debt stock (and the fiscal flow balance and other macro fundamentals for Argentina) were significantly better than in 2001. This explains why catalytic finance worked in 1995 in Argentina but not in 2001. So, the success stories were those of solvent but illiquid countries that needed policy adjustment and that had the political willingness to undertake such adjustments.

Finally, the most difficult cases are the most recent ones of catalytic finance - Turkey, Brazil in 2001-2002, Uruguay – as their fundamentals are significantly weaker than those of the success stories but not as weak of the failed cases. These latest episodes share with the failed cases one important characteristic: very high levels of public and external debt relative to various measures of debt servicing capacity – as well as large stocks of short term liabilities - that put in question the sustainability of the debt path. But they also differ from the failed cases in three crucial aspects: first, the sovereign has credibly signaled its commitment to eliminate primary gaps and stabilize the debt ratios by running large primary balances; second, they all have now flexible exchange rates that allow them to absorb external shock more flexibly; third, they have started to implement a series of other macro and structural reforms. Thus, while in these cases, catalytic support has been successful in the sense of avoiding a more severe crisis and a destructive rolloff of domestic and external claims, the success has been limited in several dimensions: first, the exposure of the IMF is at best medium long term as these countries will not be able to repay their IMF loans any time soon since their problems are large enough that market access at low interest rates is not feasible yet; second, the political sustainability of large fiscal adjustment and other reform efforts is not assured.

## **4.2. Individual case studies experiences with catalytic IMF finance in the crises of the last decade<sup>9</sup>**

### **4.2.1 Size of IMF's Crisis Lending**

The headlines announcing a new multibillion-dollar IMF bailout--sometimes backed by additional "bilateral" financing from major countries—have often painted a misleading picture of the amount of money the IMF, along with bilateral creditors, actually made available to a crisis country. In some successful cases, confidence was reestablished relatively quickly, and the country did not have to draw on its entire package. In some less successful cases, the amount of financing actually provided fell well short of the amount promised--whether because the country failed to meet its policy commitments or because the combination of policy adjustment and financing failed to calm the markets, and the country defaulted before all available funds had been disbursed. Moreover, the desire to produce an impressive headline number has led to financing packages that include money from sources whose actual commitment was far weaker and less well-defined than the IMF's. Bilateral commitments can be available for disbursement alongside IMF funds (first line of defense, as in Mexico, Thailand, and Brazil in 1998–99) or can be available only if conditions are worse than expected and if the debtor country reaches a supplemental agreement with countries providing the extra financing (second line of defense, as in Indonesia and Korea).<sup>10</sup>

The headline commitments and the actual disbursements in major recent IMF programs are summarized in table 1. Only in Turkey and the most recent Brazil program have actual disbursements been close to the announced headline commitment.

A number of variables other than the size are relevant for assessing a bailout's impact. A meaningful difference exists between countries that can repay their bailout loans quickly and those that cannot. A difference also exists between financing a temporary and a permanent fall in private exposure to the crisis country. In the worst-case scenario, the official sector finances a permanent fall in private-sector exposure to the crisis country and in turn is left with long-term exposure of its own to the crisis country.

### **4.2.2 "Catalytic" Lending and Rapid Repayments**

The typical case for large-scale official financing is that a large rescue loan is needed for a short period to stop a liquidity run. No effort needs to be made to seek explicit commitments from private creditors to maintain their exposure. Rather, the combination of financing and adjustment is expected to lead private creditors and investors to conclude that they should keep their money in the crisis country. This is the "catalytic" approach to crisis resolution.

Both relatively rapid repayment of the IMF and a fairly rapid halt to the fall in private-sector exposure should mark a successful "catalytic case." Table 2 and figures 1 to 3 show how quickly various crisis countries have been able to repay their IMF and bilateral loans. Tables 3 and 4 show changes in the exposure of private external creditors--both international banks and international bondholders--during recent crises. A full

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<sup>9</sup> This sub-section is partly based on Roubini and Setser (2004).

<sup>10</sup> The United States did not participate in Thailand's bilateral financing package.

accounting would also look at changes in the financial claims of domestic residents, but such data are not available on a cross-country basis.

Mexico, Korea, and Brazil in 1999 fit the typology for a successful “catalytic” case reasonably well. Mexico fits nearly perfectly. After three years, Mexico had almost completely repaid its rescue loan, bank loans were only a little below precrisis levels, and Mexico’s stock of outstanding bonds had gone up. Korea and Brazil also fit the basic typology reasonably well. Both were able to repay the IMF quickly, and in both cases, private creditors stopped pulling funds out relatively quickly. However, both countries also succeeded only after important mid-course corrections. As will be discussed in detail later, Korea had to supplement official support with a rescheduling of its interbank debts to obtain the time it needed to recover. Brazil’s success came only after it managed to exit from its peg with less disruption than most expected, and it too actively monitored interbank rollovers after exiting from its peg. Nonetheless, the basic pattern was the same as in Mexico: Large IMF disbursements, complemented by commitments from private creditors, let the country avoid default, and large repayments to the IMF followed in relatively short order.

Rapid repayment in these cases was not a product of small rescue loans. IMF and US bilateral lending to Mexico totaled 6.8 percent of its pre-crisis GDP, IMF lending to Korea was 3.8 percent of GDP, IMF and bilateral lending to Brazil in 1998–99 was 2.2 percent of GDP (the total commitment to Brazil was closer to 4 percent of GDP, but not all was disbursed). While the amount lent to these countries was not as large in proportion to pre-crisis GDP as recent lending to Turkey, Uruguay, and Brazil in 2002–03, it was larger than the amounts provided in many other cases.

Rapid repayment seems primarily to have been the product of lending to the right countries. All three countries had relatively low precrisis debt to GDP levels. Both fiscal and external debt levels were manageable before the crisis and generally remained manageable after the crisis shock. All three had made policy mistakes that had drained the government’s foreign-currency liquidity, notably hanging on to pegged or heavily managed exchange rates for too long. But all three also were, with reasonable adjustments, effectively solvent. Brazil in 1998–99, though, is a less clear-cut case than Mexico and Korea. Its comparatively small export base created a high debt-to-exports ratio, and the crisis shock pushed its government debt stock toward potentially troublesome levels.<sup>11</sup>

#### **4.2.3 Cases of Slow Repayment, Default, or Both**

In other cases, large initial loans failed to create--or to create as rapidly as initially envisioned--conditions that allowed for the rapid repayment of the IMF’s initial loan. In most of these cases, the exposure of private creditors to the crisis country did not stabilize--or it stabilized at a low level and then failed to rebound strongly. These “slow

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<sup>11</sup> Brazil’s debt-to-GDP ratio sharply increased after 1999, but so did the primary balance. The primary balance went from approximately zero in the first Cardoso administration (1995–98) to a significant surplus above 3% of GDP in the second Cardoso administration (1999–2002). The increase in Brazil’s debt--and the substantial stock of both foreign-currency and short-term debt--left Brazil vulnerable to further difficulties.

repayment” cases are worth a bit more scrutiny, in part because the causes of slower-than-expected repayment differed substantially.

### *Thailand and Indonesia*

In Thailand and Indonesia, substantial amounts of official financing were made available but still fell well short of the amounts needed to cover all maturing short-term external debt. These programs were truly catalytic: The hope was that the available financing, combined with policy adjustments--monetary tightening following a float plus various structural changes to address weaknesses in the private sector--would combine to restore the confidence of the external creditors of Thai and Indonesian banks and firms. In neither case did the approach work as planned. Domestic balance-sheet weaknesses were larger than anyone anticipated, and the needed restructuring of the domestic financial and corporate sectors ended up taking a long time and proved more costly than initially expected.

IMF lending failed--for a host of reasons--to stop the rolloff of external lending in both Thailand and Indonesia. These two cases nonetheless have important differences. Thailand had dug itself into a deep financial hole before its crisis by financing large current account deficits with short-term external debt. Its \$46 billion stock of short-term external bank debt was enormous, both absolutely and relative to Thailand's economy.<sup>12</sup> The Thais often complain that they did not receive as much financial support as other countries, in part because the United States did not contribute to Thailand's bilateral support package. It is true that Thailand received a comparatively small IMF loan--\$4 billion, or a little over 2 percent of its precrisis GDP. But a \$10 billion commitment from other Asian economies and commitments from the World Bank and the Asian Development Bank augmented the IMF loan, and the overall amount of financing made available to Thailand by the end of 1998 (6.3 percent of precrisis GDP) was not significantly smaller than that made available to Mexico. Thailand's real problem was that it simply had much more short-term external debt than most countries.

Thailand's IMF program did succeed at stabilizing domestic financial conditions fairly rapidly, particularly after a new government took control in November 1997. Domestic bank depositors by and large did not flee; domestic financial conditions stabilized in the course of 1998; Thailand avoided a burst of inflation following its devaluation; and bank and corporate restructuring proceeded more rapidly than in Indonesia, though not as rapidly as in Korea. But domestic stabilization did not halt the exodus of external creditors. Table 4.3 shows that external bank claims fell by \$35 billion between mid-1996 and mid-1999. A more complete measure of external exposure over a slightly longer time frame tells the same story: Total external claims on Thai banks, firms, and the government fell from \$102.2 billion at the end of 1996 to \$45.9 billion at the end of 2000 (World Bank's Global Development Finance 2003). Thailand's large current account surplus after 1997, not official lending, financed most of this \$56 billion fall in private external exposure. Between end-1996 and end-2000, Thailand ran a \$41.2 billion cumulative current account surplus.

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<sup>12</sup> The overvalued baht overstated the true size of Thailand's economy, when expressed in dollar terms. Consequently, even the ratio of short-term debt to precrisis GDP was extremely high--25 percent. --This ratio actually understated the extent of Thailand's debt problems.

Thailand's IMF program effectively tided it over until its precrisis current account deficit turned into a large postcrisis current account surplus that allowed it to pay back a large share of the external debts it had built up in the boom years. After 2000, Thailand had little trouble repaying the IMF out of its ongoing current account surplus.

Indonesia experienced a more dramatic and persistent collapse in output than Thailand. The combination of Indonesian firms scrambling for foreign exchange to pay their debts and Indonesian citizens withdrawing money from the domestic banking system in order to move their savings abroad led to a dramatic fall in the exchange rate. While Thailand was by and large able to avoid a domestic bank run, Indonesia was not, in part because initial bank closures were handled poorly.

But Indonesia's difficulties had deeper reasons. The country clearly needed to be willing to dismantle the tight nexus between the state, Suharto's family, and a set of well-connected businessmen in order to qualify for international help. The international community was reluctant to help Suharto unless he showed real commitment to reform. Yet, any reform was sure to disrupt established business patterns. Suharto's regime had been around for a long time. As the economic and financial crisis deepened, many wealthy Indonesians with ties to the Suharto regime decided to hedge their bets and move more of their savings abroad. Creditors who had lent to firms closely tied to Suharto also had strong cause to get out if they could. The combination of the international community's reluctance to support Suharto unless he demonstrated clear commitment to change and the desire of Indonesia's elite to hedge against the risk of real change made resolving Indonesia's crisis unusually difficult.

Indonesia ended up receiving a significant amount of external support. But relatively little of that support came during the fall of 1997, the peak of Indonesia's crisis. Most of the assistance came as part of a program to help pick up the pieces during the course of 1998 and 1999. Table 4.3 also shows that Indonesia experienced a smaller fall in private exposure than Thailand. However, this smaller rolloff illustrates the difficulties of relying solely on the changes in the exposure of external creditors to assess the success of IMF programs. The most likely explanation for the smaller rolloff is that the more dramatic collapse in output and enormous fall in the exchange rate left fewer debtors in a position to repay. Only after financial conditions stabilized did the external exposure to Indonesia start to fall rapidly. As in Thailand, the fall in private exposure exceeded the financing the IMF made available. The combination of the exchange rate depreciation and a sharp reduction in domestic output turned precrisis current account deficits into large postcrisis current account surpluses, and the foreign exchange these surpluses generated, in turn, helped to finance an orderly unwinding of the country's external debts. The substantial restructuring of interbank claims as well as the external debt of corporate borrowers needed to unwind the imbalances built up in the boom are covered in detail later.

### ***Russia***

Russia is an unusual case. The catalytic IMF program in the summer of 1998 obviously failed to avoid a default. However, Russia still could repay its 1998 IMF loan quite quickly, for two reasons. First, the amount of new IMF financing in the course of 1998 was quite small. Russia received only the first installment of its IMF loan, since the IMF cut off further financing after it became clear that limited financing and lukewarm

(at best) implementation of fiscal reform had failed to calm the markets. IMF exposure only increased from around \$13 billion to around \$19 billion in the course of 1998 (an increase of \$6 billion, or 1.5 percent of Russia's precrisis GDP). Second, Russia's default and devaluation proved to be more damaging to the world and far less damaging to Russia than most expected.<sup>13</sup>

One key reason for the limited impact of Russia's sovereign default on its domestic economy is that Russia's small domestic banking system played little role in financing private business. Wiping out Russian banks had little economic impact, particularly because most domestic deposits in failed banks were just transferred to a large state bank--Sberbank. The positive impact of the devaluation on economic activity, as Russian production displaced imports, more than offset any negative impacts from a weak banking system. Finally, the loss of access to financial markets had the salutary effect of forcing Russia--and particularly the government of Russia--to live within its means. The combination of the economic rebound, lower debt payments to private creditors, improved fiscal policy, and above all a bit of good luck--a surge in oil prices--let Russia start to repay the IMF relatively quickly.<sup>14</sup>

### *Argentina*

Argentina experienced two crises in the 1990s; the first one was in 1995 following the tequila crisis in Mexico. The second one was in 2000-2001 and led to the financial crisis of 2001. The first crisis was successfully contained through a catalytic IMF program that stopped a large bank run and was successful to maintain the pegged parity of the currency board. While output sharply dropped in 1995 given the credit and interest rate crunch following the contagion from Mexico, growth rebounded sharply in 1996 and 1997. Thus, the catalytic approach did succeed in 1995.

But a second crisis emerged in 2000 after the Argentine economy fell into a recession following a series of external shock that started in the second half of 1998. By 2000 the recession was deepening and the country lost domestic and international market access in the fall of 2000. The January 2001 catalytic IMF program (the Blindaje or shield) provided enough money to cover all of the sovereign's financing needs in the first quarter of 2001. But even this substantial financing package (roughly \$15 billion, or 5.4 percent of GDP) would have worked only if Argentina were able to raise some funds from the markets in the remainder of that year.<sup>15</sup> When it became clear that the initial program was not working--the economy continued to shrink, external private creditors were not willing to provide additional financing, and a domestic bank run started adding pressure on reserves--the program was augmented by a bit more than \$8 billion in the fall of 2001. This brought the IMF's total commitment to \$23.8 billion (8.2 percent of GDP). The augmented program, however, collapsed before all these funds were disbursed. In

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<sup>13</sup> Russia's default precipitated widespread contagion, in part because many leveraged international investors had taken out large bets on Russia.

<sup>14</sup> Russia owed around \$14 billion to the IMF even before it encountered financial difficulties in 1998 as a result of the IMF financing to support Russia's transition. Our assessment focuses on how quickly Russia was able to bring its IMF debt levels back down to precrisis levels. By 2001, Russia had made net repayments back to the IMF well in excess of the additional funds it received in 1998.

<sup>15</sup> The initial program included a series of commitments by Argentina's domestic creditors (banks and pension funds) to provide additional financing. These commitments are discussed in detail later.



December, Argentina was forced first to declare a bank holiday (the Corralito and then Corralon), then to default on its external debt and finally to devalue.

The IMF program did not primarily finance the repayment of Argentina's international sovereign bonds: Data from the World Bank's *Global Development Finance* indicate that public and publicly guaranteed external debt to private creditors--largely sovereign bonds--fell by only \$2 billion in 2001.<sup>16</sup> In this case, however, the small reported fall is somewhat misleading: There is little doubt that domestic purchases of international sovereign bonds, notably \$3 billion by Argentina's pension funds, offset payments on international bonds held abroad in excess of \$2 billion.<sup>17</sup> Moreover, Argentina had grown accustomed to financing interest payments on its existing bonds by selling yet more bonds, so its inability to place new bonds no doubt added to its financial troubles. Yet the \$9 billion in net lending from the IMF in 2001, the \$10.6 billion fall in Argentina's reserves, and a similar but harder-to-track fall in the banking system's own reserves did not primarily finance the repayment of international bonds. A domestic deposit run of roughly \$16 billion and a substantial fall in international banks' lending to Argentina's banks and private firms were far more important sources of pressure. Argentina's difficulties in accessing international markets no doubt contributed to the run by other creditors, but maturing international bonds were not the primary source of financial pressure on Argentina.

After default and devaluation, Argentina began to generate substantial current account surpluses. These surpluses have allowed it to pay interest and some principal on its loans to the IMF and the multilateral development banks (MDBs) and, after the first part of 2002, to begin to rebuild its reserves. However, it is clear that Argentina could not--and would not--repay the IMF and the MDBs in full on time--a fact that was recognized in Argentina's 2003 IMF program. Argentina is clearly a case where catalytic financing failed: The IMF loan helped to finance a permanent capital outflow, and the IMF was left with long-term exposure to a financially weak country.

### ***Turkey***

Turkey's IMF catalytic program has worked partially so far. Turkey's government so far has been able to raise the financing it needs to avoid default despite its large debt load and substantial annual borrowing. The Turkish lira has stabilized, the economy has started to grow again, and Turkey has generally delivered the large primary surpluses it promised. However, Turkey is not in a position to repay the IMF according to schedule. The IMF lent Turkey almost \$10 billion in 2001, and \$9 billion in 2002. The IMF's total lending to Turkey--\$23 billion, or over 11 percent of Turkey's precrisis GDP--is far more than what the IMF and the United States lent to Mexico in 1995. While Mexico was making substantial net payments back to the IMF and the United States in the second and

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<sup>16</sup> Public and publicly guaranteed external debt owed to private creditors fell from \$66.1 billion to \$64.1 billion (World Bank's *Global Development Finance* 2003). Technically, the domestic holdings of international bonds are not external debt, but many countries do not track who holds their international bonds and report all international bonds as external debt.

<sup>17</sup> The Government of Argentina estimated that \$5.5 billion of its maturing bonds in 2001 were held externally. Net payments to external creditors of \$5.5 billion and net domestic issuance of "international bonds" of \$3.5 billion would produce the fall of \$2 billion reported in *Global Development Finance*. Around \$1 billion of the government of Argentina's short-term also was held externally.

third years of its crisis, Turkey has yet to start to make significant payments. Turkey therefore falls in a different class than Mexico, Brazil, and Korea.

IMF lending to Turkey effectively financed two things. First, the IMF was indirectly helping Turkey to finance its large budget deficits--a nominal deficit of 16 percent of GDP in 2001 and 14 percent of GDP in 2002. Large deficits meant that Turkey's overall government debt was growing rapidly.<sup>18</sup> The sums worked only if existing domestic creditors rolled over their debts and provided the government with some new financing, and the IMF provided the additional external financing needed to sustain large ongoing budget deficits. The IMF typically lends money to a country's central bank, not to its government, but in this case the central bank acted as an intermediary, and the money the IMF provided was clearly used to provide noninflationary financing for the government.<sup>19</sup> Second, the inflow of foreign exchange from the government's external borrowing made it possible for the external creditors of Turkey's banking system to reduce their exposure without triggering a crisis. Directly and indirectly, the foreign exchange that the IMF provided to the government of Turkey provided the foreign currency that Turkey's banks needed to repay the cross-border loans that they had taken out before the crisis to finance their bets on high-yielding Turkish treasury bills. In 2001, \$10 billion from the IMF was matched by a \$10 billion fall in external bank lending to Turkey. External creditors stopped pulling funds out in 2002. This allowed the \$9 billion in the IMF lending in 2002 to finance an increase in Turkey's reserves.

Turkey's initial 2001 catalytic IMF program was based on extremely optimistic assumptions about Turkey's ability to repay the IMF quickly, though it should have been clear all along that Turkey had at best a need for medium-term--not short-term--financing. Turkey's high initial debt levels, large stock of short-term domestic debt, and high domestic real interest rates implied that growing debt levels would accompany a program based on disinflation and real fiscal adjustment. If all went well, the large increase in the government's debt stock that the IMF helped to finance would not generate future problems. With time, interest rates would come down, lowering the budget deficit and reducing Turkey's annual financing need. A growing economy would, over time, reduce Turkey's debt-to-GDP ratio, as it started to occur in 2003. Turkey eventually would be able to not only finance its ongoing budget deficits on its own but also raise the funds to repay the IMF. Any realistic assessment would have suggested that Turkey's fiscal stabilization was not going to happen quickly.

Turkey's finances have now improved, in part because the perception that it is now too strategically important to fail helped to lower the real interest rate it has to pay on its debts. Turkey has done its part as well, running a significant primary surplus and keeping inflation under control. Falling real interest rates on Turkey's domestic debt translate quickly into a smaller budget deficit, so it is possible that Turkey may be able to raise the financing its needs in 2004 without additional official support. Turkey, though,

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<sup>18</sup> These high nominal deficits were the result of the burst of inflation after the collapse of the peg in 2001; real, inflation-adjusted deficits were significant but much lower.

<sup>19</sup> An increase in the government's external debt is consistent with either growing reserves or a fall in the private sector's external debt--as the external inflows that finance the government's ongoing budget deficit also provided foreign exchange that can either be saved in reserves or finance net repayment of private debts. In 2001, there were large net payments on the private-sector external debts. In 2002, more of the inflow from the IMF was saved as reserves.

has the ability to tap into an \$8.5 billion medium- to long-term loan from the US government in 2004, should it choose to do so to limit the amount of debt that it needs to place domestically. Alternatively, Turkey might tap this loan to help repay the IMF. Turkey is scheduled to repay the IMF \$8.9 billion in 2005 and an additional \$10.3 billion in 2006. These payments, though, will probably be deferred. It will be surprising if Turkey is able to make large repayments before 2007 or 2008, or even later. Since large-scale IMF disbursements started at the end of 2000, and the pace of IMF lending picked up in 2001, when all is said and done and assuming no further crisis occurs, the IMF is likely to have provided Turkey with a large six- to seven-year loan, not a large two- to three-year loan.

### ***Brazil and Uruguay***

It is still too early to make a definitive assessment of the success of recent IMF programs in Brazil and Uruguay. Both countries have recovered financially from their crises, but they certainly risk not being in a position to repay the IMF rapidly. Both have received large amounts of financing: Disbursements to date are 10.1 percent of Uruguay's precrisis GDP and 5.2 percent of Brazil's precrisis GDP. Brazil's debt levels increased substantially between 1998 and 2002, so both countries now have substantially higher debt levels than in the "quick repayment" cases of Mexico, Korea, and Brazil in 1998–99.

Brazil's commitment to fiscal adjustment has been impressive, and financial conditions have stabilized. In 2002, in contrast, the IMF loan and an IMF-approved fall in Brazil's own reserves effectively permitted a large rolloff of bank loans as international banks desired to sharply reduce their exposure to Brazil.<sup>20</sup> However, this has had a price: Brazil's net reserves remain small, particularly in relation to the short-term external debt of Brazil's private sector and the government's own domestic dollar-linked debts. Brazil's low reserves, in turn, make it difficult for it to repay the IMF quickly without putting its own financial health at risk, even though domestic financial conditions have stabilized and external creditors have stopped pulling money out of Brazil. Uruguay will be discussed in more detail later, since it combined large-scale IMF financing to stop a run by both external (largely Argentine) and domestic depositors with a debt exchange to extend the maturity of its government's bonded debt. But even after its bond exchange, Uruguay's high overall debt levels, its high rates of domestic dollarization, and its small net reserves call into question its capacity to repay the IMF quickly.

## **5. Conclusions**

This paper presented an overview of the theory and empirical evidence on the IMF catalytic finance approach based on the experience with capital account crises in the

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<sup>20</sup> The BIS reports that consolidated bank claims on Brazil fell from \$142 billion at the end of 2001 to \$103 billion at the end of 2002—a fall of \$39 billion. Brazil's net reserves fell by about \$12 billion during this period while the IMF's exposure increased by \$12.5 billion. Thus, the IMF's "catalytic" lending helped Brazil finance the exit of international banks without having its own (gross) reserves fall too much. The bank rolloff stopped in 2003, when Brazil's new government demonstrated its commitment to maintain a credible fiscal policy.

last decade. While many previous studies on catalytic finance had found mixed, if not outright negative, evidence on the effectiveness of the catalytic approach the results of this paper, based on the eleven case studies of catalytic finance in the last ten years, are more positive. Among these episodes, we can distinguish three groups: the more clear cases of success (Mexico in 1995, Argentina in 1995, Korea in 1997-98, Brazil in 1999 and, partially, Thailand in 1998); the clear cases of failure (Indonesia in 1998, Russia in 1998, Argentina in 2001); and some recent cases that are still too close to call as they look as a partial success: a wider financial crisis was prevented by the IMF catalytic program but their long run outcomes are still pending (Turkey in 2001, Brazil in 2001-2002, Uruguay in 2002).

There are some general lessons that one derive from these experiences.

**First, large-scale catalytic financing works better when debt levels are low and the country's commitment to reform is credible.** Large official loans buttressed by policy reforms--and in some cases by efforts to encourage the rollover of private claims--were most successful in Mexico, Argentina in 1995, Korea, and Brazil in 1999. All four countries experienced relatively rapid economic recovery, either regained market access (Mexico, Argentina and Brazil) or saw their external debt stabilize at a lower level (Korea), and were able to repay the IMF and--in the cases of Mexico and Brazil--their bilateral creditors relatively rapidly. These four countries went into their crises with lower debt levels than other crisis countries and were willing and able to implement needed policy changes. In other cases, the commitment of even large amounts of financing did not prevent a default (Russia and Argentina in 2001). A combination of larger initial debts, rigid exchange rates, and poor policy performance--especially on the fiscal side--prevented catalytic IMF financing from generating the quick turnaround in market confidence needed to allow the country to finance ongoing deficits in the market.<sup>21</sup> In the case of Indonesia, severe policy and political problems (the collapse of a long standing political regime and the related violence) led to a failure of the catalytic approach. Note that in the case of Argentina debt and deficits by 2001 were much worse than in 1995; so while Argentina looked solvent in 1995, by 2001 was effectively insolvent. The success of some recent cases of large-scale financing (Turkey, Brazil, and Uruguay) remains open to question. Exceptional support and policy adjustment have so far prevented default (but with a coercive debt reprofiling in Uruguay), but debt levels are high, and the political feasibility of maintaining large primary surpluses remains uncertain.

**Second, large loans to countries with large debt levels are unlikely to be repaid quickly.** Providing exceptional financing to countries with high debt levels exposes the IMF to large financial risks, even when the country is committed to making significant fiscal-policy adjustments. In the worst cases, as in Argentina, the program may fail completely. Widespread default precludes rapidly raising funds to repay the IMF, and even in the best case, the threat that the country may default on the IMF may push the IMF into defensive lending. However, recent experience suggests that even in cases where IMF lending and the country's own efforts avoid default, relatively heavily indebted countries may not be in a position to obtain access to private financing on the scale needed to both cover their ongoing financing needs and repay the IMF quickly

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<sup>21</sup> For the IMF's own assessment of recent IMF programs, see IMF (July 2002a). For a comprehensive assessment of the official sector's role in crisis management, see Frankel and Roubini (2003).

(Brazil, Turkey, and Uruguay). Here, the IMF is effectively lending for the medium and long terms, not the short term. Large loans to heavily indebted countries imply that the IMF will have a very large exposure to a small set of borrowers for some time, leaving the IMF's finances at risk, should conditions (domestic or external) turn sour. Still, in these three latter cases, one could argue that the IMF took a calculated and justifiable risk as each country commitment to a large fiscal primary adjustment that stabilized the debt ratio and to other macro and structural reforms that made debt solvency more likely.

**Third, rollover arrangements can complement “catalytic” financing.**

In two catalytic success stories--Korea and Brazil in 1999--large IMF lending was supported--after a lag--by commitments from bank creditors to roll over their interbank exposures. These programs blurred the line between a pure “catalytic” approach--which provides financing to reassure investors so they won't want to exit--and more coercive bail-ins, since the commitments to roll over exposure themselves blurred the line between forced maintenance of exposure and a voluntary commitment. Such a strategy's success, however, depends on the circumstances. Argentina tried to supplement “catalytic” financing with a soft and relatively voluntary bail-in of domestic creditors (it targeted domestic creditors because it believed that they would be most inclined to voluntarily commit to maintaining their exposure and provide new financing). However, Argentina's overall finances were unsustainable, and this approach failed miserably.

**Fourth, the implications of analytical models of catalytic finance are supported by the empirical experience.** Indeed, catalytic finance was more successful when larger amounts of money were on the table, consistent with the view that the size of IMF programs (larger amounts and front loaded) matters for the success of catalytic finance. Also, IMF programs do not appear to have caused debtors' moral hazard; instead, large catalytic programs provided policy makers with incentives to implement difficult and costly adjustment policies and structural reforms. And the strength of economic fundamentals did matter for the success of catalytic finance: countries that were illiquid but conditionally solvent were successful while in countries in which debt levels were close to conditions of insolvency catalytic finance failed. Catalytic programs were not able to prevent a currency crisis from occurring when fundamentals were inconsistent with a pegged parity while they were more successful in preventing a wider crisis after the country had been forced off the peg, especially when policy adjustment after the move to a float was credible and committed.

**Fifth, the issue of whether and under which conditions the IMF should rely on catalytic finance remains highly controversial.** Some are of the view that such a tool has been abused in the last few years and suggest a return to normal access limits and recourse to debt suspensions and standstills even in semi-liquidity cases.<sup>22</sup> The analysis in this paper suggests that the pessimism about the effectiveness of catalytic finance is not warranted. If appropriately used under the right conditions catalytic finance can prevent destructive liquidity runs and avoid short run liquidity problems that require credible but feasible policy adjustment from turning a manageable problem into a much more severe crisis. It is clear that, without catalytic IMF programs, Mexico in 1995, Argentina in 1995, Korea in 1998, Brazil in 1999 and 2002, Turkey in 2001 and Uruguay in 2002 would have been forced to default on their large sovereign claims (in all cases but Korea), would have been forced to impose severe restrictions on their bank liabilities, both

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<sup>22</sup> See Roubini and Setser (2004) for a more systematic analysis of these issues.

domestic and foreign and would have been forced to impose draconian capital and exchange controls. Those who claim that these crises would have been resolved with smaller output and other losses if standstills rather than large IMF financing had been used bear the burden of proving that the standstill solution for these episodes would have had less severe consequences than in the case of Argentina. One can certainly argue that debt standstills, bank holidays and capital and exchange controls would have been highly disruptive. Thus, in these cases catalytic finance, augmented by appropriate ways to bail in private investors was a safer and more successful bet.

In practice, there clearly has been a strong tendency to steer away from heavy-handed efforts to involve private creditors at the early stages of most crises. The first step in the official sector's response to almost every crisis has been to provide official financing as the crisis country undertakes policy adjustments and to hope this combination convinces private creditors to stop pulling money out. More coercive approaches were adopted only if policy adjustment and official financing did not work. Bail-ins have been tools of later resort, if not of last resort.

This approach reflects the preference of most crisis countries not to take steps that would jeopardize their future market access, as well as concerns that the use of coercive approaches in systemically important countries would trigger domestic runs, contagion and jeopardize the flow of market financing to emerging economies. It also reflects the real uncertainties that confront policymakers: Is a country simply illiquid or is its illiquidity a symptom of deeper insolvency? Are policymakers in the crisis country truly committed to making policy adjustments? How will markets respond to the proposed combination of policy adjustments and official financing? In the face of these uncertainties, the IMF and its major shareholders have been reluctant to deny some countries liquidity solely on their judgment about the strength of the countries' financial position. It is far better to provide the country with some money and let the market decide whether the country has to seek a restructuring.

Any decision to seek a debt restructuring does risk making the country's difficulties worse, at least in the near term. Consequently, it often makes sense to see if credible policy adjustments supported by official financing can spare a country the risks of a restructuring. However, the preference to keep the hope of avoiding a restructuring alive also reflects a bias toward giving catalytic financing a chance, even when the odds of success are low. However, the standard sequencing of catalytic financing first and then a restructuring if catalytic financing fails does not always offer the most effective response to a country's crisis. In some circumstances, it may be more effective to initiate a restructuring early on, particularly if the restructuring of some problematic claims can be combined with an IMF loan that seeks to prevent the restructuring from triggering a broader run. Thus, the case for catalytic finance relies on the ability to make correct objective assessment under conditions of high uncertainty of whether it is likely to succeed or not. When the answer to this question is no based on the best probabilistic assessment of the nature of the crisis, relying on a catalytic approach is a mistake that, as the case of Argentina suggest, will lead to a more severe crisis and to reputational and financial risks to the IMF. Thus, catalytic finance should be used cautiously, in full awareness of its benefits and potential risks.

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**Table 1 IMF and bilateral first- and second-line financing, billions of dollars (percent of GDP in parentheses)**

Country	IMF plus bilateral commitment	Peak disbursement	IMF commitment	IMF disbursement	Bilateral commitment	Bilateral disbursement
Mexico (1995)	38.9 (9.6)	27.6 (6.8)	18.9 (4.6)	15.8 (3.9)	20.0 (5.0)	13.5 (3.3)
Thailand <sup>a</sup> (1997)	14.0 (7.7)	11.2 (6.2)	4.0 (2.2)	3.5 (1.9)	10 (5.5)	8.8 (4.8)
Indonesia (1997)	26.3 (11.6)	10.8 (4.7)	11.3 (5.0)	10.8 (4.7)	15.0 (6.6)	0
Korea (1997)	40.9 (7.7)	19.4 (3.7)	20.9 (4.0)	19.4 (3.7)	20 (3.8)	0
Russia <sup>b</sup> (1998)	15.1 (3.5)	5.1 (1.2)	15.1 (3.5)	5.1 (1.2)	0	0
Brazil (1998–99)	32.9 (4.1)	17.5 (2.2)	18.4 (2.3)	13.3 (1.6)	14.5 (1.8)	9.5 (1.2)
Turkey (1999–2002)	33.8 (17.0)	23.1 (11.6)	33.8 (17.0)	23.1 (11.6)	0	0
Argentina (2000–01)	23.1 (8.1)	13.7 (4.8)	22.1 (7.8)	12.7 (4.5)	1.0 (0.4)	1.0 (0.4)
Uruguay <sup>c</sup> (2002)	2.7 (14.5)	2.2 (11.8)	2.7 (14.5)	2.2 (11.8)	1.5 (8.0)	1.5 (8.0)
Brazil (2001–02)	35.1 (6.9)	30.1 (5.9)	35.1 (6.9)	30.1 (5.9)	0	0

- Bilateral data for Thailand were available only on an annual basis.
- Russia had already drawn on the IMF to support its overall transition, and it had \$14.2 billion in outstanding IMF loans when it received the additional \$15.1 billion commitment. If Russia had obtained the full new 1998 crisis package, total exposure could have reached \$29.3 billion, or around 7.5 percent of precrisis GDP.
- Uruguay's bilateral loan was a four-day bridge to an augmented IMF program

Note: Peak disbursement is not necessarily the sum of IMF and bilateral peaks. In some cases, IMF disbursements helped pay back bilateral financing, so the peaks came at different points in time. Data on bilateral financing are quarterly. Bilateral financing provided through the restructuring of Paris Club debt is excluded from these totals.

Sources: International Monetary Fund, [www.imf.org/external/fin.htm](http://www.imf.org/external/fin.htm), for financial data; Moody's Investor Services for GDP data; US Treasury for Mexico and Brazil's bilateral financing data; *Global Development Finance* for Thailand's bilateral data; and authors' calculations.

**Table 2. How quickly were IMF (and bilateral first-line) loans disbursed, and how fast were they repaid?**

Country	Peak disbursement (billions of dollars, percent of GDP in parentheses)	Quarters to reach peak	Quarters to repay half the peak disbursement	External debt, Precrisis (percent of GDP)	Fiscal debt, Precrisis (percent of GDP)
Mexico	27.6 (6.8)	4	9	34	31
Thailand	11.2 (6.2)	12	17 <sup>a</sup>	60	5
Indonesia	10.8 (4.7)	13	–	43	24
Korea	19.4 (3.7)	4	8	32	12
Russia	5.1 (1.2)	2	4	35	52
Brazil (1998–99)	17.5 (2.2)	3	7	25	40
Turkey (2000–02)	23.1 (11.6)	13	–	57	56
Argentina	13.7 (4.8)	4	–	51	45
Uruguay	2.1 (11.3)	8 <sup>b</sup>	–	81	38
Brazil (2001–02)	30.1 (5.9)	9	–	44	65

a. Thailand's IMF exposure peaked after nine quarters, and it repaid half of that exposure after 17 quarters. At that point in time, it had not repaid half its bilateral lending. However, we do not have data indicating Thailand's bilateral repayments after the end of 2001.

b. Debt levels are still rising.

– = The country has not yet repaid half its loan.

*Sources:* IMF and bilateral first-line lending data are from IMF and the US Treasury; debt data are from Moody's (apart from Mexico's precrisis debt data, which are from the IMF). Moody's debt numbers for Brazil are higher than other sources. The IMF, drawing on the government of Brazil's own definition of its debt, reports lower debt levels for Brazil: 35 percent in 1997 and 49 percent in 2000.

**Table 3. Changes in IMF/ bilateral exposure and in international bank claims on crisis countries, billions of dollars**

Country	Net disbursements			Net change in external bank exposure		
	After one year	After two years	After three years	After one year	After two years	After three years
Mexico <sup>a</sup>	23.8	12.9	5.2	-7.3	-4.5	-3.3
Thailand <sup>b</sup>	2.8	3.3	3.3	-15.7	-30.0	-40.4
Indonesia	3.9	9.5	10.7	-8.3	-13.8	-18.3
Korea	16.8	10.8	6.0	-28.9	-36.9	-43.2
Russia	2.5	-1.1	-3.7	-24.1	-31.4	-38.9
Brazil (1998) <sup>a</sup>	17.5	1.8	3.7	-22.4	-17.5	-14.9
Turkey	11.2	20.2	22.1	-8.3	-12.5	-10.1
Argentina	8.9	9.3	10.5	-13.4	-40.7 <sup>c</sup>	-44.3 <sup>c</sup>
Uruguay	1.6	2.3	n.a.	-1.9	-2.5	n.a.
Brazil (2001)	10.8	26.2	n.a.	-7.0	-18.0	n.a.

n.a. = not available

a. Includes bilateral financing.

b. Thailand received additional bilateral financing, but this financing is not included because of a lack of quarterly data on bilateral disbursements and repayments.

c. Break in series with pesification; last observation is end of 2001.

Note: In Argentina, the international bank statistics include some of the dollar-denominated operations of foreign-owned local banks. Note also that Brazil started drawing on a precautionary facility with the IMF in 2001 as Argentina's crisis intensified; the scale of pressure on Brazil intensified significantly in 2002.

Sources: Data are from Bank for International Settlements ([www.bis.org/statistics/hisstat8.htm](http://www.bis.org/statistics/hisstat8.htm) [table 8, Total foreign claims]); US Treasury; and International Monetary Fund.

**Table 4 Changes in IMF/ bilateral exposure and in international debt securities outstanding, billions of dollars**

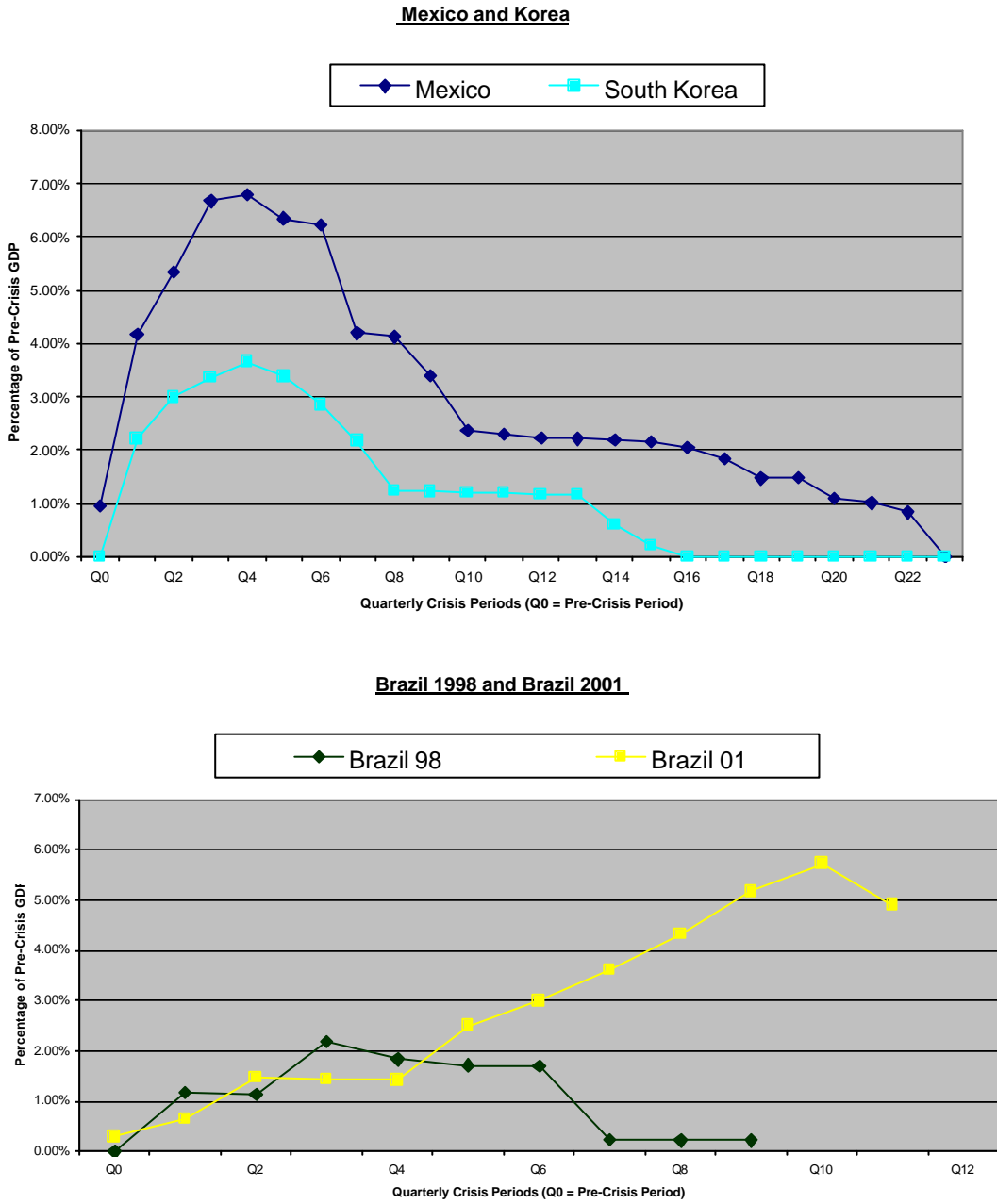
Country	Net disbursements			Net change in bond exposure		
	After one year	After two years	After three years	After one year	After two years	After three years
Mexico	23.8	12.9	5.2	2.3	15.3	23.7
Thailand	2.8	3.3	3.3	0.0	1.4	0.9
Indonesia	3.9	9.5	10.7	4.0	3.4	-1.2
Korea	16.8	10.8	6.0	7.6	4.8	4.7
Russia	2.5	-1.1	-3.7	5.9	4.9	3.1
Brazil (1998)	17.5	1.8	3.7	0.0	10.1	21.4
Turkey	11.2	20.2	22.1	-0.5	0.8	4.1
Argentina	8.9	9.3	10.5	15.2	14.6	16.7
Uruguay	1.6	2.3	n.a.	0.4	0.5	n.a.
Brazil (2001)	10.8	26.2	n.a.	10.9	17.0	n.a.

n.a. = not available

Note: International debt securities outstanding can go up as a result of Brady-to-eurobond exchanges, which are relevant for both Mexico and Brazil. The data series does not include outstanding Brady bonds. International debt securities outstanding can also increase as a result of the exchange of domestic debt for international bonds. This is relevant for Russia, which exchanged GKO for eurobonds in June 1998, and for Argentina, which exchanged domestic bonds for eurobonds in the megaswap.

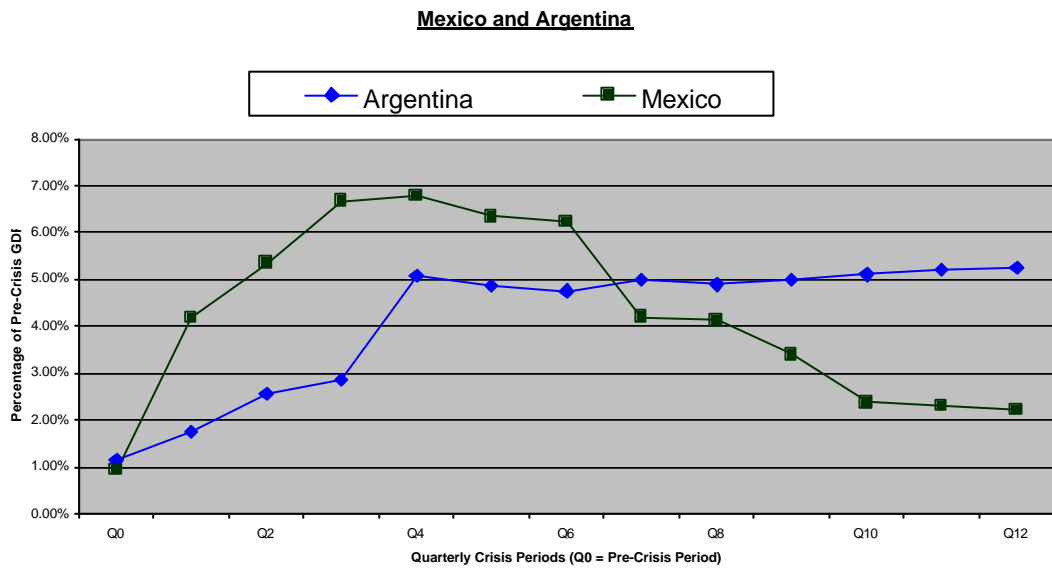
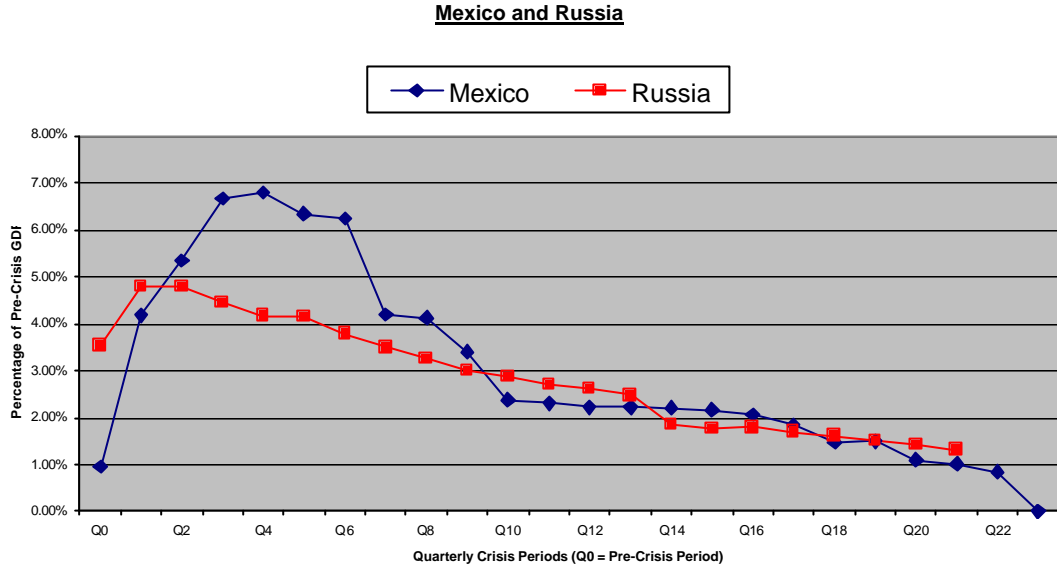
Sources: Data are from Bank for International Settlements ([www.bis.org/statistics/secstats.htm](http://www.bis.org/statistics/secstats.htm) [table 15B, Bonds and notes]); US Treasury; and International Monetary Fund.

**Figure 1 IMF and BIS loans outstanding**

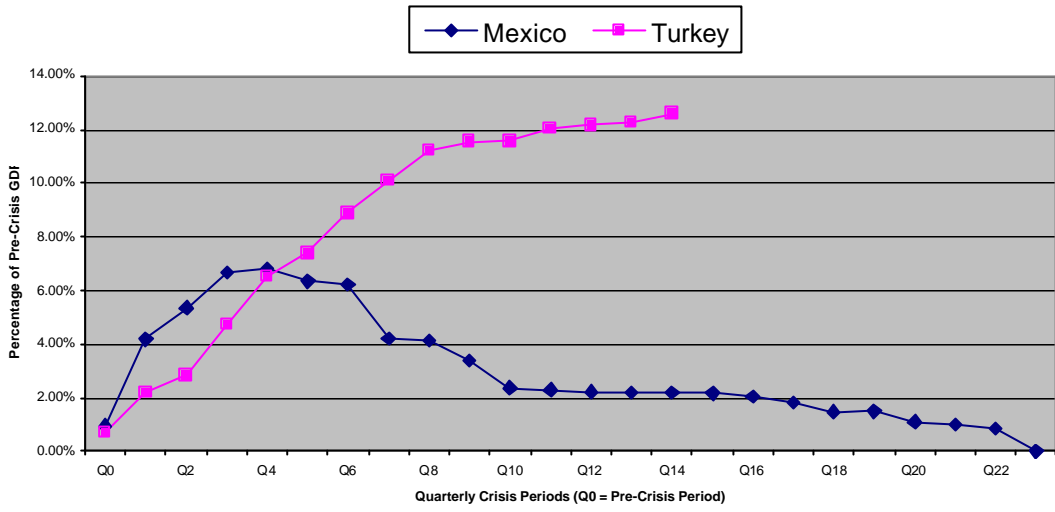


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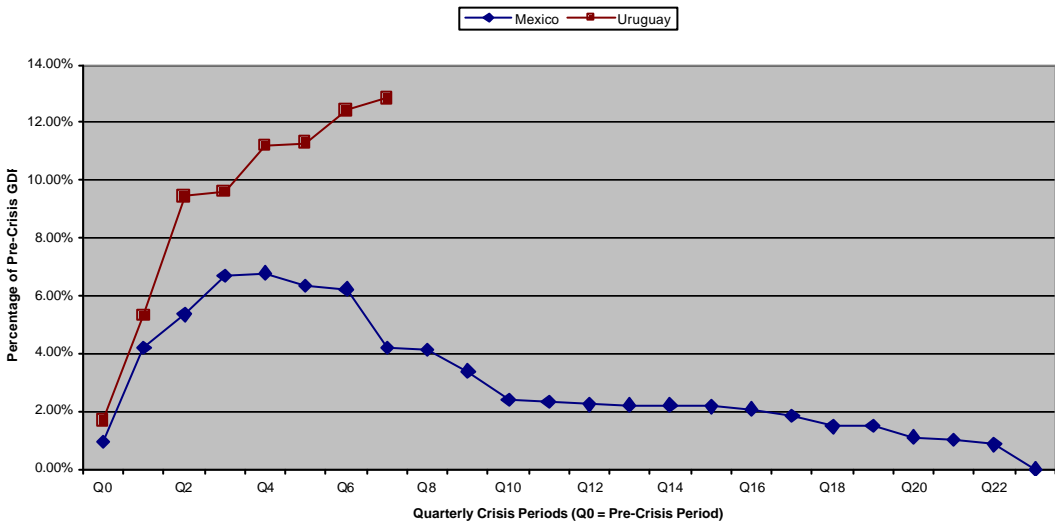
Figure 2 IMF and ESF loans outstanding



### Mexico and Turkey

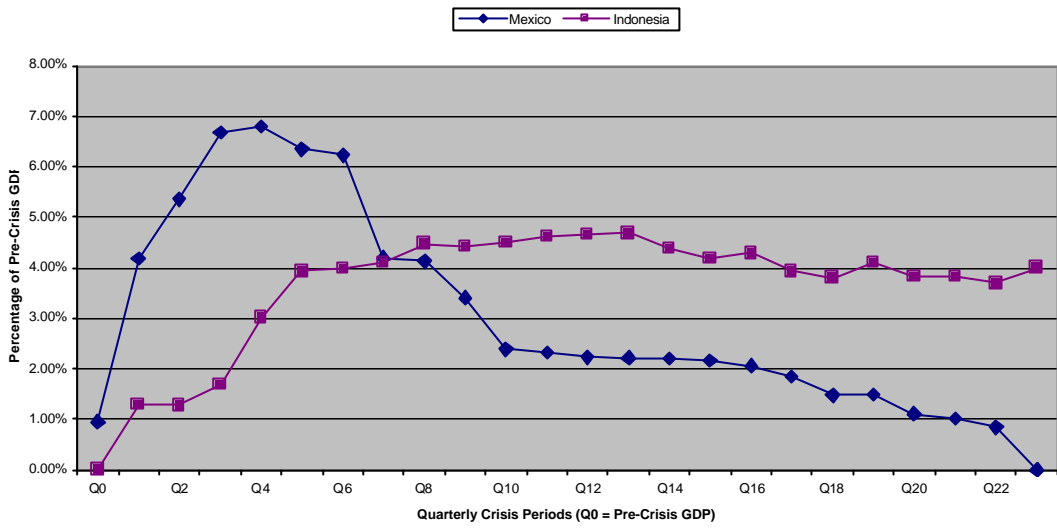


### Mexico and Uruguay

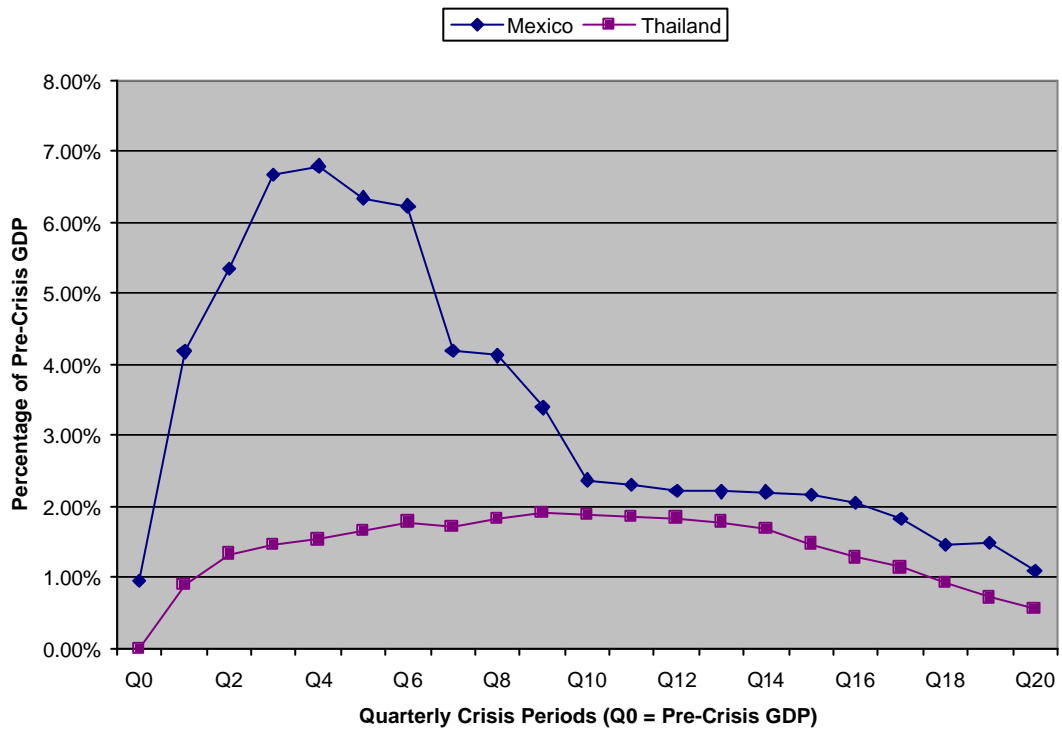




**Mexico and Indonesia**

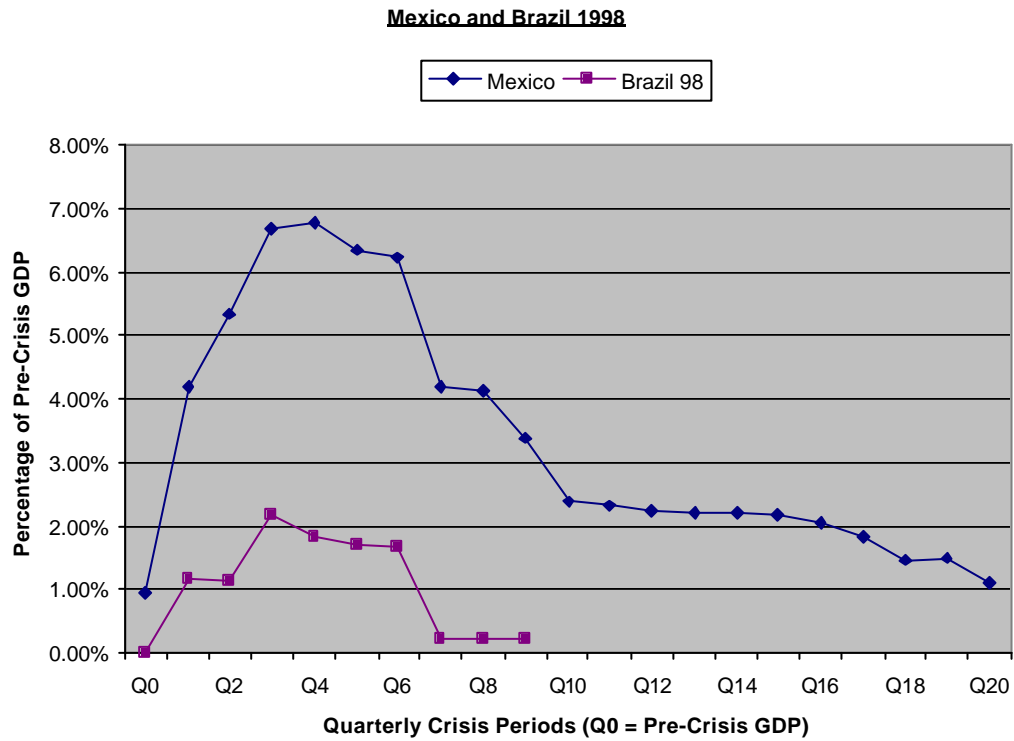
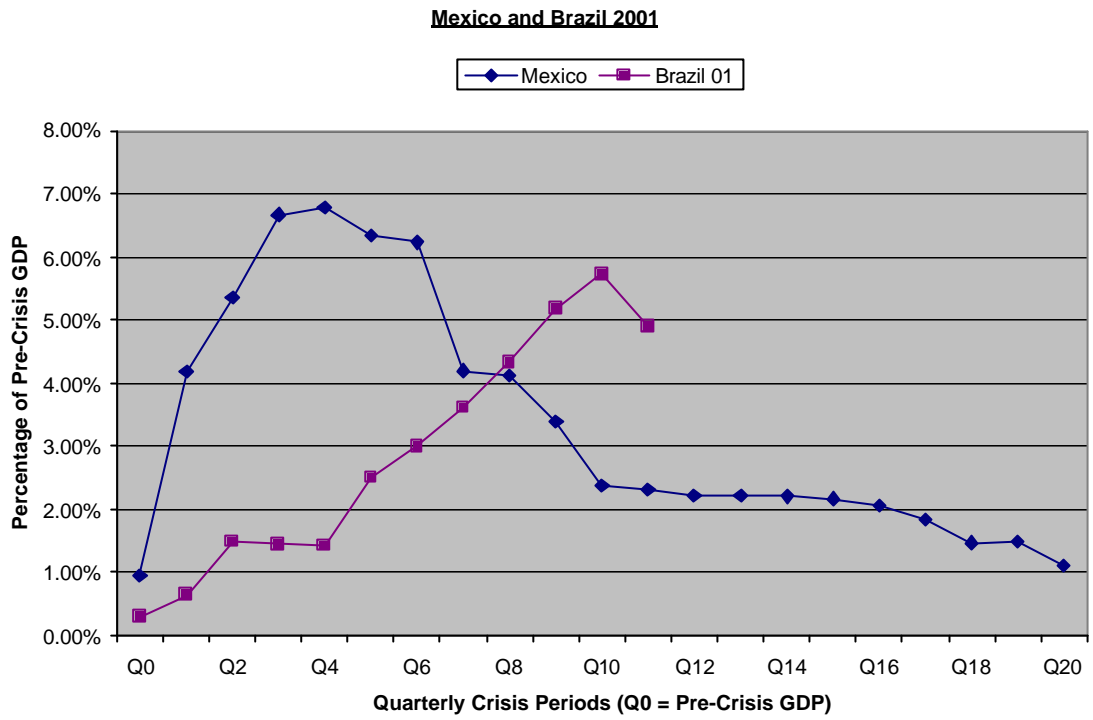


**Mexico and Thailand**



Source:

**Figure 3 IMF and bilateral loans outstanding**



**Source:**