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Does IMF Financing Result in Moral Hazard?

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Abstract

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The view that the IMF's financial support gives rise to moral hazard has become increasingly prominent in policy discussions, particularly following the 1995 Mexican crisis. This paper seeks to clarify a number of conceptual issues and bring some basic empirical evidence to bear on this hypothesis. While some element of moral hazard is a logical consequence of the IMF's financial support, such moral hazard is difficult to detect in market reactions to various IMF policy announcements and there is no evidence that such moral hazard has recently been on the rise.

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I. INTRODUCTION

1.   Does the availability of financial support from the IMF give rise to moral hazard? In other words, does the presence of the IMF, as an institution that lends to countries in crisis, create incentives for borrowers and lenders to behave in ways that makes a crisis more likely?[2] The view that it does has become increasingly prevalent in the wake of recent crises, notably in Mexico and Asia. Concerns over moral hazard have had an important role in recent discussions of "international financial architecture", the role of the Fund, and the need for involving (bailing in) the private sector in resolving financial crises.[3]

2.   It is inherently plausible that financing from the IMF generates some element of moral hazard. If the consequences of a financial crisis would be more dire if the Fund's support were not available—with even sharper exchange rate depreciation and inflation, greater asset price declines, and in some cases default—it seems inevitable that the availability of Fund support would dull both countries' incentives to take preventive action to avoid a crisis and lenders' incentives to exercise prudence. The presence of the Fund would thus encourage borrowers and lenders to take some risks that they would not otherwise have taken. But that is not necessarily a problem: on the contrary, it could reflect the Fund's success in alleviating uncertainties associated with trade and financial relations across national borders.[4] The key questions are whether the availability of Fund support encourages *imprudent* risks to be taken and whether these additional risks outweigh the benefit of the Fund's financial assistance in attenuating the costs of the crisis. Addressing these questions would in turn hinge in turn on a prior empirical question: *how important is any moral hazard created by the Fund in influencing borrowing countries' and lenders' behavior before a crisis?*

3.   Given the prominence of moral hazard in policy discussions—and the certainty with which its importance, or lack thereof, is often asserted[5]—it is surprising that there has been so little research investigating its empirical relevance.[6] While it is difficult to test for the

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[2]For a more general discussion of moral hazard see for instance the article by Y. Kotowitz in the *New Palgrave Dictionary*, 1987.

[3] See for instance Williamson (2000).

[4] Article I of the IMF's Articles of Agreement states the purposes of the IMF, of which (v) begins "To give confidence to members by making the general resources of the Fund temporarily available to them under adequate safeguards..."

[5] For instance, according to the Meltzer Commission report, the importance of moral hazard "cannot be overstated"; Paul Krugman replied "oh yes it can." (Quoted in Williamson 2000.)

[6] A few papers on this topic, which have appeared since the first draft of the present paper are discussed below: see Zhang (1999), Nunnenkamp (1999), and Willett (1999).

existence of moral hazard directly, the hypothesis that moral hazard is important does have some implications that can be examined in relation to evidence. This paper examines some preliminary evidence regarding these implications.

4.   The remainder of the paper is structured as follows. Section II discusses the concept of moral hazard in relation to IMF lending. Section III examines some empirical implications of moral hazard, based on the reactions of financial markets to events that may convey information regarding the availability of IMF financing. Section IV examines the scale of IMF disbursements, asking whether it seems sufficient to guarantee international lending. Section V presents some further discussion and conclusions.

II. CONCEPTUAL ISSUES

5.   Before examining empirical evidence of moral hazard, it is important to consider how moral hazard could arise in connection with the Fund's financial support. Moral hazard is a pervasive feature of insurance and other forms of risk sharing. It arises when the provision of insurance increases the *probability* of the event being insured against, usually because it diminishes the incentives for the insured party to take preventive actions. Any insurance entails moral hazard when the behavior of the insured party can influence the probability of the event insured against *and* there is either asymmetric information or some other reason the insurer cannot respond fully (by adjusting terms or canceling coverage) to behavior that leads to an increase in the event's probability.

6.   Moral hazard is inherently a forward-looking concept: where there is moral hazard in financial markets, borrowers and lenders are taking risks *now* based on their understanding of the support that they would receive in the future should certain eventualities arise. The treatment of particular situations may generate moral hazard to the extent that it influences these perceptions.

7.   In considering moral hazard resulting from IMF financing, it is important to consider that the Fund's support is not a simple cash payout (such as an insurer would make), but a loan to be repaid with interest. Thus, the amount of the "insurance benefit" paid by the Fund is the difference between and the interest rate at which the country could otherwise borrow (which, in crisis times, may be very high) and the Fund's rate of charge (which is tied to market interest rates in industrial countries).[7]

8.   In this regard, it is useful to compare the IMF's financial support to the liquidity support provided by a central bank to domestic financial intermediaries in its role as lender of last resort. In both cases, the financing is intended to be temporary, addressing liquidity

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[7] This point has recently been elaborated in an analytical model by Jeanne and Zettelmeyer (2000). Since estimates of subsidy element in IMF lending are small, they argue that moral hazard arising through this channel is probably not significant.

rather than solvency problems. In both cases, the availability of support may, in principle reduce the incentives of the entity receiving it to take other precautionary measures: for instance, the central bank's role as lender of last resort permits banks to hold fewer cash reserves and other liquid assets, while the Fund's role as an international lender may similarly reduce countries' incentives to hold international reserves. Similarly, both types of support may influence the behavior of creditors: depositors may be less cautious in depositing money in banks with access to the central bank's liquidity support—even if these banks are engaging in risky lending—just as the existence of the Fund's financial support may make international lenders less cautious—including in lending to countries following risky or unsustainable policies. At the same time, there are important differences. A domestic lender of last resort has resources that are, in principle, unlimited, which is clearly not the case with the Fund. On the other hand, central banks have important tools to counter the moral hazard that could otherwise result from such unlimited financing: they frequently have supervisory and regulatory responsibilities to rein in imprudent behavior, as well as the power to shut down banks that are insolvent. The Fund's surveillance may play a similar role, identifying and discouraging unsustainable behavior by countries; and when the IMF provides financing, it uses conditionality to ensure that this support is used to facilitate rather than postpone needed adjustments. But these tools of the IMF are considerably weaker than most central banks' powers to regulate and, if necessary, ultimately to shut down the financial institutions that rely on their liquidity support.

9.   A distinction can be made between *creditor-side* and *debtor-side* moral hazard. The availability of financial support from the Fund could entail moral hazard on either or both sides to the extent that it affects the prospective outturns for creditors, debtors, or both. But this distinction is not absolute, since international capital flows reflect the interaction of the behavior of borrowers and lenders. If the presence of the Fund implies that international capital flows continue to finance unsustainable or excessively risky behavior, it may not be possible to disentangle whether this results from the behavior of borrowers or lenders.[8] Moreover, unequal outcomes for treatment of different categories of creditors in a crisis does not necessarily entail moral hazard: even if one group of creditors tends to get off scot-free in a crisis while others bear the burden, the prior knowledge that payoffs in a crisis scenario will be unequal should in principle have already been build into asset prices and interest rate differentials, tending to balance between instruments' expected payouts. Indeed, under certain conditions—the rules of the game are known in advance, the net present value of total repayments is given, and creditors are not risk adverse and can choose freely in what form to lend—such differential treatment of creditors (in a crisis) would have no effect on creditors'

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[8]At the same time, there may be a case based on optimal risk-sharing—not to mention social equity—for reducing creditors' prospective returns in the event of a crisis and increasing them in the absence of a crisis. When creditors' returns are fixed regardless of whether or not there is a crisis, all the risk is borne by the borrowing country.

or debtors' incentives.[9] For this reason, even if, for instance, it were found that the Fund's financial support made it easier for a country to pay off its short-term creditors at the expense of its long-term creditors, or bond-holders at the expense of banks, that would not necessarily contribute to moral hazard, either by helping the countries finance unsustainable deficits or by creating the incentive to resort more heavily to short-term (or bond) financing. The savings from increased reliance on short-term (or bond) debt would be at least partially (or in the simplest case, fully) offset by a higher premium exacted by long-term (or bank) creditors.[10]

10.   Another implication of this reasoning is that, in a liquidity crisis, as opposed to a crisis where some element of default cannot be avoided, one cannot directly infer that Fund programs result in moral hazard from the fact that liquidity support is seemingly used to pay off those, such as the holders of Tesobonos in Mexico, who can easily pull their money out.[11] The logic can be illustrated again using the analogy of liquidity support to avert a bank run: the fact that funds received from the central bank as lender of last resort were used to pay off demand deposits would not in itself constitute moral hazard or create artificial incentives to hold demand deposits. If liquidity support stems a liquidity crisis based on self-fulfilling expectations, it protects all creditors, not only those who appear to receive the funds provided.

11.   One difficulty in assessing whether the availability of IMF financing may result in moral hazard is the difficulty of specifying the counterfactual. If IMF support were not available, a country would need to resort to other alternatives, possibly including but certainly not limited to default on its external debt. For instance, it could accept a larger currency depreciation, which would enable it to inflate away more of its domestic-currency debt and improve its external current account. Which alternative would in fact be adopted determines how the availability of a Fund program affects the relative returns on different types of debt.

12.   It is also possible that there is a more complex channel through which the Fund's financial support could contribute to moral hazard: by underwriting implicit guarantees that governments provide to investors at the ultimate expense of their own taxpayers. With this form of moral hazard, the Fund's financing would essentially be relieving liquidity

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[9]This reasoning, developed formally in Appendix I, is a variant of the Modigliani-Miller theorem, and is reminiscent of the analysis of debt buy-backs presented in Dooley (1988) and Bulow and Rogoff (1988).

[10] This assumes, of course, that information on the composition of debt is available to all creditors.

[11]A related observation is that if investors had really seen Tesobonos as guaranteed by the Fund, they would have had no reason to pull their money out in the first place.

constraints that would otherwise limit these governments' ability to use future tax revenues to finance current bailouts. In this case, by relieving one market distortion—a crisis country's limited access to capital markets—the Fund would be contributing to another one—the moral hazard associated with the government guarantees.[12] But here again, one would need to consider the counterfactual—since this argument assumes that in the absence of Fund support, financial institutions would be allowed to fail without compensation for depositors; the systemic implications of that approach—e.g., an intensification of bank runs—would then need to be considered.

13.   In light of these considerations, it would seem that the key questions are whether moral hazard induced by Fund programs is of sufficient practical relevance to be of major concern, and whether there is scope to reduce moral hazard further without unduly compromising the Fund's other objectives. The remainder of this paper addresses the first of these questions.

14.   Although expressions of concern over possible moral hazard created by the Fund has been prominent for some time—at least since the support to Mexico in early 1995—the policy discussion has been based more on speculation than evidence. Attempts to empirically investigate its relevance, even informally, are few (these are discussed in Section IV). While a definitive empirical test of Fund-induced moral hazard would be extremely difficult to devise, it is nonetheless useful to examine some potential indications of its relevance—as even casual empiricism is better than no empiricism at all. The following section will thus examine evidence on the market response to events that might have conveyed new information on the scale and terms on which Fund support was likely to be forthcoming. A significant market response would not prove that the Fund's support causes moral hazard, since such support could for instance be viewed as reducing the overall costs of a liquidity crisis—but the absence of such a response would suggest that the importance of moral hazard may have been overstated. The paper then goes on to examine whether the scale of the Fund's financial support is sufficient to have a major impact on investors' prospects of repayment.

III. Evidence from Market Prices

15.   One way of examining the practical relevance of moral hazard is with reference to indicators of market expectations, which may reveal whether the markets view the availability of Fund support as influencing their future returns. This section considers interest rate spreads as measures of perceived risk.

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[12]For instance Zettelmeyer and Jeanne (2000). To further develop this argument, one would have to clarify why such a government would need to rely on the Fund at all in order to obtain liquidity; i.e., why only the Fund and not the capital markets would recognize the country's solvency.

Are Creditors Confident the Fund Will Save Them?

16.   One extreme hypothesis about moral hazard facing investors can quickly be dismissed by a simple look at interest rate data. If private creditors truly believed that the Fund completely guaranteed the debt service of its members, this would imply that all member countries, or at least those deemed "too big to fail," would face the same interest rate in a common currency. This is at odds with the wide range of interest rates that different countries face on their U.S. dollar borrowing; Figure 1 illustrates this rather basic but profound fact with interest rate spreads found in a sample of 18 emerging markets at end-1998. Note that Russia and Brazil, despite being possible candidates for an alleged "too big to fail" doctrine, had some of the highest spreads. Perception of a complete guarantee is also contradicted by the tendency of spreads to increase around times of crisis; e.g., the sharp widening of spreads in Asia during the recent Asian crisis (Figure 2). The existence of these spreads, and their fluctuations at times of crisis—indeed, even the fact that crises occur at all—confirm that market participants do not see a Fund program as eliminating risk. Evidently, they view Fund and other official support as limited in scale and/or contingent on uncertain developments. (This does not, of course, imply the extreme opposite view, that a Fund-supported program has absolutely no influence on market participants' prospects of repayment.)

Does the "News" Reveal Moral Hazard?

17.   One can also apply an event study, or "news"-based, approach to the moral hazard question. In this approach, one must first identify, on *a priori* grounds, discrete events that might have transmitted to markets new information affecting their view of the future availability of Fund financial support. In principle, secondary market bond prices should be observed to respond immediately to such news, *if* investors consider that the availability of IMF financing significantly affects the riskiness of their investments.

18.   The advantage of a news-based approach, with its tight focus on very short-term responses to discrete events, is its potential to sidestep the simultaneity and omitted variables problems that are the bane of econometrics.[13] Of course, such an analysis is still an imperfect way to detect moral hazard, though the net effect of its limitations is unclear. In particular, *the analysis cannot distinguish moral hazard (undesirable effects on economic behavior) from the desirable effects of the Fund in reducing the real economic damage of a crisis*, and this stacks the cards in favor of finding evidence consistent with moral hazard. On the other

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[13] For example, Zhang (1999) also uses bond spread evidence to look for signs of moral hazard, but uses a (pooled) time-series regression technique, rather than an event study approach. Using quarterly data over a sample period of about five years, Zhang includes a set of control variables, along with a dummy for the post-Mexican-rescue-period. Thus his focus is on the possibility that the handling of the Mexican crisis generated additional moral hazard. No evidence in support of this hypothesis is found.

Figure 1. Yield Spreads on Dollar-Denominated Debt
(In basis points; as of December 31, 1998)
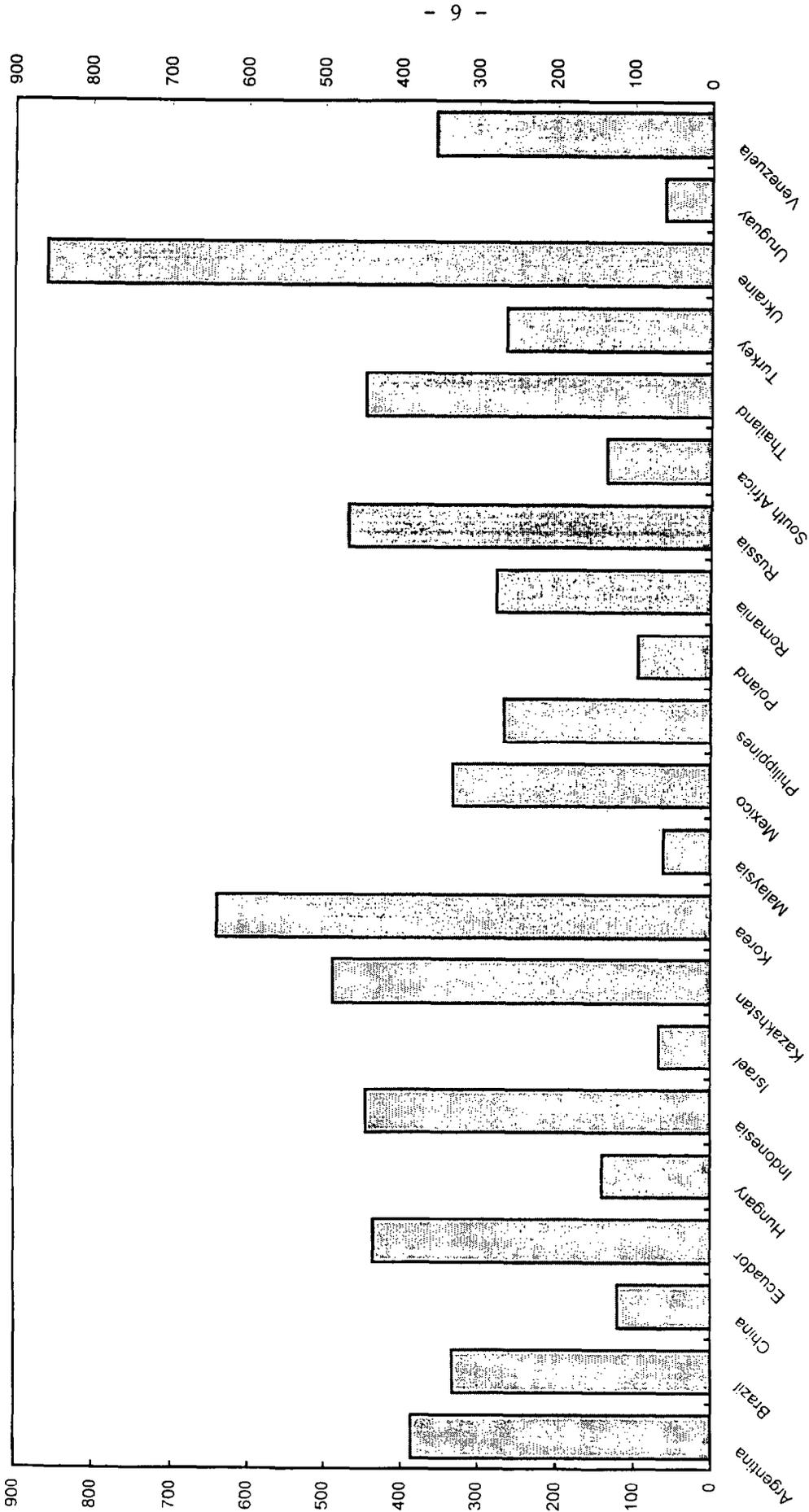
Source: Bloomberg.

1/ Yield spreads are calculated by comparing domestic U.S. dollar-denominated debt with U.S. Treasury bonds maturing on similar dates.

Figure 2. Bond Spread Indices, January 1994 - June 1999
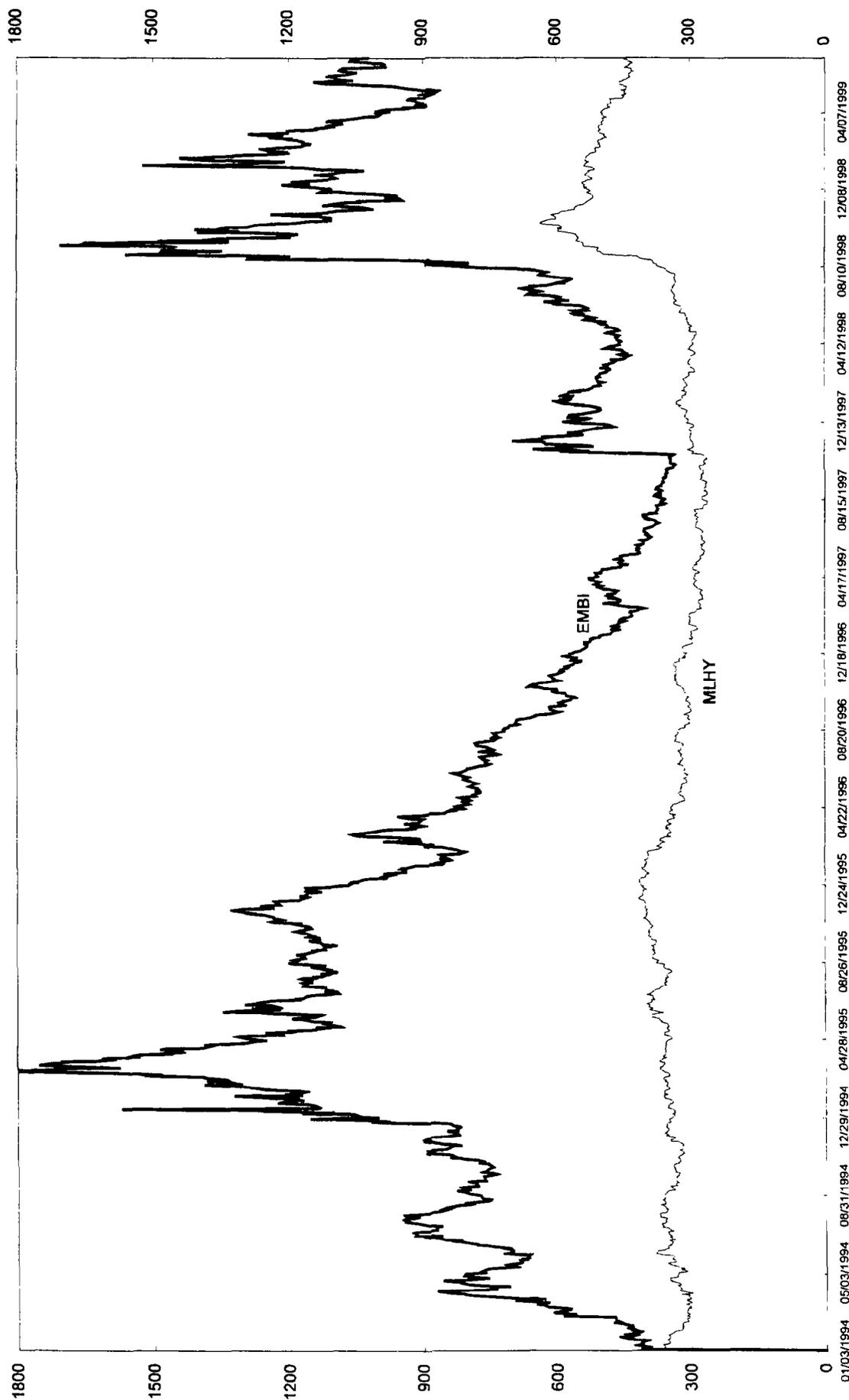
Source: J. P. Morgan.

hand, it is possible that some of the events studied were not entirely "news," having been earlier anticipated by markets, and this would make it more difficult to detect moral hazard. In any case, it should be emphasized that this event study approach essentially looks not for the existence of, but rather for *changes* in the degree of, Fund-induced moral hazard. It is therefore especially relevant to the question of whether changes in policies affecting IMF lending during the 1990s have led to an increase in moral hazard.

The "events" we examine can be grouped into the following three categories, to be discussed in turn:

(i)   Announcement of new IMF-supported programs at the outset of financial crises: Mexico in 1995 and East Asia (Thailand, Indonesia, and Korea) in 1997. The case of Mexico is of particular interest, since it has been cited as setting an important precedent, even contributing directly to the crises in Asia a few years later. (It is also the only case to have received any empirical attention—others' findings will be discussed below.) The usual argument is that the size of the IMF support for these countries increased moral hazard; we look for declines in emerging market bond spreads that would support this hypothesis.[14]

(ii)   News about the size of the Fund's total financial resources or the amounts that can be lent to individual members: the large step increase in members' contributions ("quotas") in 1999, the Fund's decision to raise its "access limit" in 1994 and the introduction of the Supplemental Reserve Facility in 1997. The hypothesis is that creditors may have seen these policy decisions as making their investments safer in the future, which should be reflected in diminished spreads.

(iii)   News regarding the Russia program in the summer of 1998. This high-profile case of IMF-involvement represents a more complex set of events. Large disbursements in both June and July 1998 could have been read as confirming a too-big-to-fail doctrine, increasing moral hazard (at least for investments in other large countries). However, as argued below, events in mid-August 1998 could have been read in the other direction, with the real news being the *absence* of (further) IMF support.

Note that for some of the above "events," a sequence of several sub-events can be identified in the daily news, and it will be important to look for a response to each.

We consider daily data, focusing on the Emerging Markets Bond Index (EMBI), but also discussing spreads on individual countries' bonds in some cases. A simple graphical presentation of the data will be very useful, but we also complement this with basic statistics on bond spread movements within narrow windows around IMF-related events.

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[14]On the other hand, Willett (1999) argues that the support to Mexico may not have increased moral hazard, precisely because investors must have observed how very controversial it was and concluded that similar support in future crises was quite uncertain.

Figures 3–6 plot daily time-series for bonds spreads in various timeframes surrounding the above events. Table 1 provides a closer look, isolating and quantifying absolute movements in spreads in windows of 2, 3, 5, and 10 business days for each event. (The narrowest window is in principle the preferred indicator, but may miss market reactions to news that somehow leaked.) To put these movements in perspective against typical short-run movements in bond spreads, Table 1 also presents these changes as ratios to the standard deviation of spread changes.

Before considering the various events in detail, a number of general points emerge about the time-series behavior of bond spreads embodied in the EMBI (Figure 2). First, spreads show considerable fluctuation: during 1994-99 for example, one standard deviation of the EMBI level was about 40 percent of its mean value of roughly 800 basis points. Second, a good deal of this variation is associated with 3 subperiods, beginning from December 1994, October 1997, and August 1998, and corresponding to the (public) onset of the Mexican, Korean, and Russian crises, respectively. Note that in each of these cases, the EMBI rose much more abruptly than it subsequently declined, notwithstanding prominent IMF announcements and disbursements soon after the first two of these episodes.

19.   We begin with **Mexico in 1995**: did the scale, or other aspects of the design, of this Fund-supported program shift creditors' expectations of how they would fare in future crises? Figure 3 shows that spreads rose sharply from late December 1994. Subsequent announcements from the IMF in early 1995 did not prevent further increases, let alone quickly return spreads to their pre-crisis levels. This pattern contradicts the moral hazard hypothesis, though of course it is possible that such a broad look is contaminated by other developments unrelated to IMF actions.

20.   Looking more finely at individual events, Table 1 shows that bond spreads actually increased around the first two announcements considered. There is some evidence that the other two announcements—which occurred only a day apart—were associated with a decline in spreads. As Figure 3 shows, however, this decline was only a blip on the way to yet higher spreads, so there is no sign that it ushered in a new "post-Mexico" era of increased moral hazard. Still, the decline may not have been random—note that it was fairly large in relation to the standard deviation of 1- or 2-day movements. Since the EMBI includes a bond for Mexico itself, it is important to check that this decline did not reflect the Mexican bond only (since an IMF-supported program may narrow the program country's own spreads due to the perception that the combination of policies and financing envisaged in the program will restore sustainability, rather than through raising the perceived probability and size of future bailouts.) A look at bonds from 7 other countries indicates that the decline in spreads around January 31-February 1, 1995 was not limited to Mexico, with a similar decline occurring in Poland, and somewhat larger declines occurring in Argentina, Brazil, Bulgaria, Nigeria, and Venezuela; for the Philippines, the spread was essentially flat.

21.   Since it has been argued that the IMF's response to the Mexican crisis set the stage, in terms of moral hazard, for the Asian crisis just a few years later, it is particularly interesting

Figure 3. Yield Spreads and IMF Support for Mexico
October 1994 - March 1995

Press release on increase in annual access limit (10/24/94)

Announcement of SBA negotiation for Mexico (1/6/95)

Press release: Camdessus sees US$ 7.8b IMF credit for Mexico (1/26/95)

Approval of SBA for Mexico (2/1/95)

Press release: Camdessus to recommend that IMF commit additional US $10b for Mexico (1/31/95)

EMBI

Argentina

MLHY
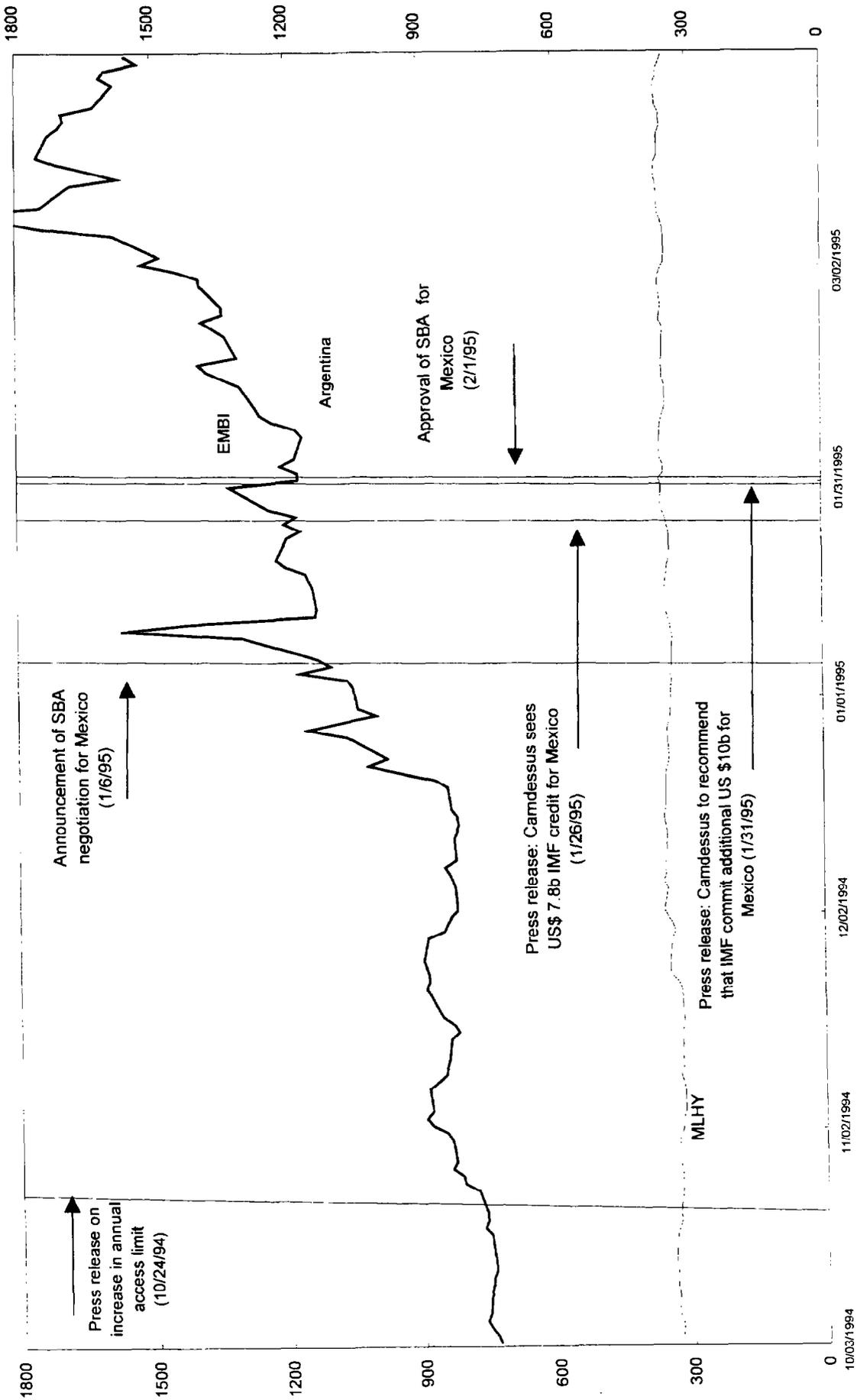
Source: J. P. Morgan

Figure 4. Yield Spreads and IMF-Asia Events
April 1997 - March 1998

Announcement of SBA negotiation for Thailand
(8/5/97) 2/

Approval of SBA for Thailand
(8/20/97)

Announcement of SBA negotiation for Indonesia
(10/8/97) 4/

Approval of SBA for Indonesia
(11/5/97)

Announcement of SBA negotiation for Korea 3/
(11/21/97)

Approval of SBA for Korea
(12/4/97)

EMBI +

EMBI

MLHY

04/01/1997　05/01/1997　06/01/1997　07/01/1997　08/01/1997　09/01/1997　10/01/1997　11/01/1997　12/01/1997　01/01/1998　02/01/1998　03/01/1998

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Source: J. P. Morgan.

Figure 5. Yield Spreads and Steps Toward IMF Quota Increase
July 1997 - March 1999

Press release: general increase in quotas (9/21/97)

Press release: approval of Supplemental Reserve Facility (12/17/97)

Press release: IMF Board submits resolution on quota increase (12/23/97)

Press release: IMF Governors propose quota increase (2/6/98)

U.S. Congressional committee allocates only 1/5 of requested amount for IMF (7/15/98)

U.S. ratifies quota increase (10/21/98)

Press release: quota increase has taken effect (1/22/99)

EMBI +

No Russia

EMBI

MLHY

06/02/1997   08/02/1997   10/02/1997   12/02/1997   02/02/1998   04/02/1998   06/02/1998   08/02/1998   10/02/1998   12/02/1998   02/02/1999

Source: J. P. Morgan.

Figure 6. Yield Spreads and IMF-Russia Events, April 1998 - March 1999

Press release: Russian authorities and IMF reach understandings (6/11/98)

Press release: IMF Board to consider substantial increase in financing to Russia (7/13/98)

Press release: IMF approves augmentation of Russia arrangement (7/20/98)

Russia shifts course (8/17/98)

U.S. ratifies quota increase (10/21/98)

EMBI +

EMBI

No Russia

MLHY

04/01/1998 05/01/1998 06/01/1998 07/01/1998 08/01/1998 09/01/1998 10/01/1998 11/01/1998 12/01/1998 01/01/1999 02/01/1999 03/01/1999

Source: J. P. Morgan.

to note that spreads on bonds of several Asian emerging markets were apparently uninfluenced by events in Mexico: they did not widen when Mexico began to run into financial difficulties, and they did not narrow when Fund support for Mexico was approved—nor at the time of announcements preceding this approval. These observations suggest that most investors did not view the Mexican program as having much relevance to the credit-worthiness of the Asian tigers.

22.   Similarly, one can ask whether the Fund's approval of large financial **arrangements with Thailand, Indonesia, and Korea in 1997** created moral hazard (Figure 4 and Table 1). We consider 6 announcements associated with these programs. The first three announcements, which occurred before the October 1997 onset of general crisis, were not associated with any significant change in spreads. The fourth announcement was associated with some increase in spreads, contrary to the moral hazard hypothesis. Although the last two announcements considered, both related to Korea, were accompanied by declines in the EMBI spread, these may not have been meaningful, since they were quite small even compared to the standard deviation of very short-term changes in the EMBI. Thus the evidence fails to support the notion that the Fund's involvement in Asia gave fresh reassurance to investors in emerging markets in general.

23.   In principle, an **increase in the Fund's access limits** might increase moral hazard, *if* it were associated with a market perception of increased availability of Fund resources. We therefore consider the October 1994 increase in the annual access limit, from 68 to 100 percent of a member's quota.[15] Although experience suggests that this limit is not closely tied to the size of individual arrangements (see Section IV), the increase in the limit nevertheless might have signaled an openness to lending in greater amounts. In the event, movements in the EMBI do not support the moral hazard hypothesis; if anything, spreads rose when this access limit was raised (Figure 3 and Table 1).

24.   Another development in the IMF's policy on members' access to its resources was the December 1997 **introduction of the Supplemental Reserve Facility**, which conceivably could have been interpreted by markets as regularizing "exceptional" access, in excess of the usual limits.[16] (On the other hand, this new facility introduced a substantially higher interest rate to be paid to the Fund; ceterus paribus, this reduction in the subsidy element in the IMF's crisis lending would tend to reduce the payout to private creditors.) Again, movements in bond spreads around this event also fail to support the moral hazard hypothesis.

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[15]The 1992 *reduction* in annual access limits to 68 percent of quota was combined with an increase in quotas and had little effect on most members' access limits expressed in SDRs.

[16]On the other hand, this new facility introduced a substantially higher interest rate; ceterus paribus, this change would be contrary to the interests of private creditors.

Table 1.   Movements in Bond Spreads and IMF-related "News", 1995-1999

Event / News Item	Bond Index	Window	Window length, in business days	In Basis Points	Change in Bond Spread — As Ratio to Standard Deviation — 200 day subsample	Full Sample	In Expected Direction?
Limit on Access Raised t=October 24, 1994							
	EMBI	t-1 to t+1	2	49	0.7	1.0	
	EMBI	t-2 to t+1	3	49	0.6	0.8	
	EMBI	t-4 to t+1	5	58	0.6	0.8	
	EMBI	t-9 to t+1	10	60	0.5	0.6	
Mexico SBA negotiations announced t=January 6, 1995							
	EMBI	t-1 to t+1	2	199	2.6 *	4.0 *	
	EMBI	t-2 to t+1	3	128	1.4	2.2 *	
	EMBI	t-4 to t+1	5	249	2.3 *	3.4 *	
	EMBI	t-9 to t+1	10	235	1.7	2.3 *	
Camdessus sees US$7.8b credit for Mexico t=January 26, 1995							
	EMBI	t-1 to t+1	2	33	0.4	0.7	
	EMBI	t-2 to t+1	3	69	0.8	1.2	
	EMBI	t-4 to t+1	5	15	0.1	0.2	
	EMBI	t-9 to t+1	10	105	0.8	1.0	
Camdessus to recommend US$10b more for Mexico t=January 31, 1995							
	EMBI	t-1 to t+1	2	-151	-1.9 *	-3.1 *	Yes
	EMBI	t-2 to t+1	3	-63	-0.7	-1.1	Yes
	EMBI	t-4 to t+1	5	-30	-0.3	-0.4	Yes
	EMBI	t-9 to t+1	10	17	0.1	0.2	
Approval of Mexico SBA t=February 1, 1995							
	EMBI	t-1 to t+1	2	37	0.5	0.8	
	EMBI	t-2 to t+1	3	-114	-1.2	-1.9 *	Yes
	EMBI	t-4 to t+1	5	33	0.3	0.4	
	EMBI	t-9 to t+1	10	10	0.1	0.1	
Announcement of SBA negotation for Thailand t=August 5, 1997							
	EMBI	t-1 to t+1	2	-15	-0.5	-0.3	Yes
	EMBI	t-2 to t+1	3	-14	-0.4	-0.2	Yes
	EMBI	t-4 to t+1	5	-12	-0.2	-0.2	Yes
	EMBI	t-9 to t+1	10	-33	-0.5	-0.3	Yes

Table 1. Movements in Bond Spreads and IMF-related "News", 1995-1999

Event / News Item	Bond Index	Window	Window length, in business days	Change in Bond Spread			In Expected Direction?
				In Basis Points	As Ratio to Standard Deviation		
					200 day subsample	Full Sample	
SBA Approval for Thailand t=August 20, 1997							
	EMBI	t-1 to t+1	2	-1	0.0	0.0	Yes
	EMBI	t-2 to t+1	3	-9	-0.2	-0.2	Yes
	EMBI	t-4 to t+1	5	9	0.2	0.1	
	EMBI	t-9 to t+1	10	9	0.1	0.1	
PR: general increase in quotas t=September 21, 1997							
	EMBI	t-1 to t+1	2	-4	-0.1	-0.1	Yes
	EMBI	t-2 to t+1	3	-3	-0.1	-0.1	Yes
	EMBI	t-4 to t+1	5	-6	-0.1	-0.1	Yes
	EMBI	t-9 to t+1	10	-8	-0.1	-0.1	Yes
Announcement of SBA negotation for Indonesia t=October 8, 1997							
	EMBI	t-1 to t+1	2	10	0.3	0.2	
	EMBI	t-2 to t+1	3	7	0.2	0.1	
	EMBI	t-4 to t+1	5	0	0.0	0.0	
	EMBI	t-9 to t+1	10	-10	-0.2	-0.1	
Approval of SBA for Indonesia t=November 5, 1997							
	EMBI	t-1 to t+1	2	61	2.1 *	1.2	
	EMBI	t-2 to t+1	3	10	0.3	0.2	
	EMBI	t-4 to t+1	5	-73	-1.5	-1.0	Yes
	EMBI	t-9 to t+1	10	200	3.0 *	2.0 *	
Announcement of Korea SBA negotation t=November 21, 1997							
	EMBI	t-1 to t+1	2	-1	0.0	0.0	Yes
	EMBI	t-2 to t+1	3	-21	-0.6	-0.4	Yes
	EMBI	t-4 to t+1	5	-46	-0.9	-0.6	Yes
	EMBI	t-9 to t+1	10	-53	-0.8	-0.5	Yes
Approval of SBA for Korea t=December 4, 1997							
	EMBI	t-1 to t+1	2	-32	-1.1	-0.6	Yes
	EMBI	t-2 to t+1	3	-28	-0.7	-0.5	Yes
	EMBI	t-4 to t+1	5	-68	-1.4	-0.9	Yes
	EMBI	t-9 to t+1	10	-69	-1.0	-0.7	Yes

Table 1.   Movements in Bond Spreads and IMF-related "News", 1995-1999

Event / News Item	Bond Index	Window	Window length, in business days	In Basis Points	As Ratio to Standard Deviation 200 day subsample	Full Sample	In Expected Direction?
SRF approved t=December 17, 1997							
	EMBI	t-1 to t+1	2	20	0.7	0.4	
	EMBI	t-2 to t+1	3	7	0.2	0.1	
	EMBI	t-4 to t+1	5	-13	-0.3	-0.2	Yes
	EMBI	t-9 to t+1	10	71	1.1	0.7	
IMF Board submits resolution on quota increase t=December 23, 1997							
	EMBI	t-1 to t+1	2	-31	-1.1	-0.6	Yes
	EMBI	t-2 to t+1	3	-34	-0.9	-0.6	Yes
	EMBI	t-4 to t+1	5	11	0.2	0.1	
	EMBI	t-9 to t+1	10	-4	-0.1	0.0	Yes
IMF Governors Propose Quota Increase t=February 6, 1998							
	EMBI	t-1 to t+1	2	-6	-0.2	-0.1	Yes
	EMBI	t-2 to t+1	3	-13	-0.3	-0.2	Yes
	EMBI	t-4 to t+1	5	-15	-0.3	-0.2	Yes
	EMBI	t-9 to t+1	10	-67	-1.0	-0.7	Yes
Russian authorities and IMF Reach Understandings t=June 11, 1998							
	EMBI+	t-1 to t+1	2	4	0.1	0.1	
	EMBI+	t-2 to t+1	3	12	0.2	0.2	
	EMBI+	t-4 to t+1	5	27	0.3	0.4	
	EMBI+	t-9 to t+1	10	-20	-0.1	-0.2	Yes
IMF to consider substantial increase in finanancing to Russia t=July 13, 1998							
	EMBI+	t-1 to t+1	2	-45	-0.7	-0.9	Yes
	EMBI+	t-2 to t+1	3	-73	-0.9	-1.2	Yes
	EMBI+	t-4 to t+1	5	-77	-0.8	-1.0	Yes
	EMBI+	t-9 to t+1	10	-60	-0.4	-0.6	Yes
U.S. Congressional Committee allocates only 1/5th of request for IMF t=July 15, 1998							
	EMBI+	t-1 to t+1	2	12	0.2	0.2	Yes
	EMBI+	t-2 to t+1	3	-12	-0.2	-0.2	
	EMBI+	t-4 to t+1	5	51	0.5	0.7	Yes
	EMBI+	t-9 to t+1	10	80	0.5	0.8	Yes

Table 1.   Movements in Bond Spreads and IMF-related "News", 1995-1999

Event / News Item	Bond Index	Window	Window length, in business days	Change in Bond Spread In Basis Points	As Ratio to Standard Deviation 200 day subsample	As Ratio to Standard Deviation Full Sample	In Expected Direction?
IMF approves augmentation of Russian arrangement							
t=July 20, 1998							
	EMBI+	t-1 to t+1	2	-5	-0.1	-0.1	Yes
	EMBI+	t-2 to t+1	3	-11	-0.1	-0.2	Yes
	EMBI+	t-4 to t+1	5	-5	0.0	-0.1	Yes
	EMBI+	t-9 to t+1	10	-82	-0.5	-0.8	Yes
Russia Announces Default, other measures							
t= August 17, 1998							
	EMBI+	t-1 to t+1	2	103	1.5	2.1 *	Yes
	EMBI+	t-2 to t+1	3	87	1.1	1.5	Yes
	EMBI+	t-4 to t+1	5	50	0.5	0.7	Yes
	EMBI+	t-9 to t+1	10	249	1.6	2.5 *	Yes
forward windows:							
	EMBI+	t-1 to t+1	2	103	1.5	2.1 *	Yes
	EMBI+	t-1 to t+2	3	148	1.8	2.5 *	Yes
	EMBI+	t-1 to t+4	5	469	4.6 *	6.4 *	Yes
	EMBI+	t-1 to t+9	10	691	4.5 *	6.8 *	Yes
U.S. Ratifies Quota Increase							
t=October 21, 1998							
	EMBI+	t-1 to t+1	2	0	0.0	0.0	
	EMBI+	t-2 to t+1	3	-44	-0.5	-0.7	Yes
	EMBI+	t-4 to t+1	5	-93	-0.8	-1.3	Yes
	EMBI+	t-9 to t+1	10	-203	-1.2	-2.0 *	Yes
Quota Increase Announcement							
t=January 22, 1999							
	EMBI+	t-1 to t+1	2	69	1.1	1.4	
	EMBI+	t-2 to t+1	3	174	2.3 *	2.9 *	
	EMBI+	t-4 to t+1	5	87	0.9	1.2	
	EMBI+	t-9 to t+1	10	210	1.8	2.1 *	

Sources: J.P. Morgan; and Bloomberg.

25. We consider next news about **changes in the size of the Fund's total resources**. If lenders see the availability of Fund credit as influencing their repayment prospects, spreads on debt to emerging markets ought to have narrowed in response to news that the Fund would seek an increase in its members' quotas. News of this sort came in IMF press releases on September 21 and December 23 of 1997, and on February 6, 1998 (see Appendix II for details). Although these decisions could not make ratification of the quota increase by the Fund's member countries a foregone conclusion, each represented clearance of a hurdle and therefore should have increased the perceived probability of an expansion of the Fund's resources. Their announcement, however, were not associated with any significant decline in EMBI spreads (Figure 5 and Table 1). Moreover, the final announcement, on January 22, 1999, that the quota increase had taken effect, was associated with a sizeable increase in spreads.

26. However, one should be cautious in interpreting the failure of market responses to support the notion of Fund-induced moral hazard: it could mean that investors did not consider an increase in the Fund's resources relevant to their own repayment prospects, but it could also mean that investors had largely anticipated the quota increase.[17]

27. It is therefore useful to look more closely within the process of the recent quota increase, focusing on an event that more clearly represented news to markets. Arguably, the highest hurdle in this process was **ratification by the U.S.**, the Fund's largest shareholder, and one whose contribution to the Fund is contingent upon approval by its legislature. The proposed quota increase was in fact controversial in the U.S., and its ratification there seemed uncertain: indeed, in July 1998, a key Congressional committee voted to approve only about one-fifth of the amount requested. Thus the U.S. approval of the full request, in October 1998, may have been the most "newsworthy" event in the process. Moreover, since this approval came at a time when the Fund's liquidity position had become unusually weak, it could have been perceived as pushing back a constraint on future Fund lending that had threatened to become binding in the near future. Figure 5 and Table 1 show that this event was in fact associated with a substantial decline in spreads, particularly some days before.

28. A look at spreads on individual countries' bonds indicates that the EMBI decline reflected a general movement, rather than developments in just one outlier country. For example, while Russia's spread declined far more than the EMBI, excluding Russia from the EMBI still gives a decline nearly as large as that for the total EMBI (Figure 5). Other bonds which showed marked declines in spreads include those of Argentina, Bulgaria, Brazil, Cote d'Ivoire, Croatia, Ecuador, Korea, Nigeria, and Mexico (but not those of Poland, South Africa, or Venezuela).

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[17]Such anticipation seems plausible, given the historical record. Thus the recent quota increase was not out of line with previous increases, nor was the time elapsed since the last quota increase shorter than usual.

29.   Thus bond movements around mid-October 1998 seem consistent with the notion that the potential availability of IMF financing induces some degree of moral hazard. But the evidence is not very solid, since the observed decline in spreads was not unusually large in relation to typical short-run movements (Table 1). Part of the problem here is that news of the U.S. Congress' agreement to full IMF funding was not abrupt, in that indications of a possible agreement began to appear in early October, so that a longer window may be needed to pick up the full effect of the news. The problem then is to disentangle this effect from that of other, concurrent events—in particular, the (surprise) interest rate cut announced by the U.S. Federal Reserve on October 15, 1998, which may have signaled the Fed's readiness to ease monetary policy to avert a collapse in emerging markets.

30.   All the events discussed above had the potential to signal to markets that the Fund's disbursement policies were becoming more liberal—and potentially providing greater assurance to investors. With one exception, these events were not associated with a significant narrowing of emerging market yield spreads.

31.   To round out this analysis, it is also relevant to consider an event that might have sent a disquieting signal to investors, Russia's devaluation and effective partial default on domestic government debt in August 1998. Certainly, there were many signs of trouble in Russia before August, and investors surely assigned some non-zero probability to a scenario similar to what actually transpired—but there can be little doubt that the Russian default was news to the market. Indeed, prior to the Russian crisis, some investors had talked glibly of a "moral hazard play," which was precisely designed to exploit Russia's perceived too-big-to-fail status. Just two months earlier, in June 1998, the Fund released a scheduled disbursement to Russia and also signaled a possible augmentation of its planned lending; in July, the IMF Board approved such an augmentation. At the time, some observers actually cited these disbursements as evidence of a too-big-to-fail doctrine.[18] But the events of August 1998 contradicted any expectation that further IMF loans would arrive as necessary to keep Russia afloat.

32.   The "news" in this case was not any particular IMF action, but the realization of the *absence* of IMF action that might have allowed Russia to avoid the measures announced on August 17, and thereafter the absence of any quick scramble on the part of the IMF to inject new financing. In light of this, we also consider movements in bond spreads in short windows following August 17 (Table 1).

33.   In fact, while two announcements concerning the IMF and Russia in June and July 1998 seemed not to influence bond markets, spreads generally did increase dramatically

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[18]For example, a July 18, 1998 editorial of *The Economist* argued that Russia could be the "clearest case of [moral hazard] so far. Foreign money did indeed pour into Moscow largely because Russia was judged 'too important to fail.' This judgment has been proved right."

around the time of Russia's announcements of August 17, 1998 (Figure 6 and Table 1), especially in the days immediately following. Of course, part of the EMBI spread jump reflected its Russian component, but the large increase was general (see Figure 6).

34. One way to interpret this evidence is that the lack of new support from the IMF (and other official sources) to Russia in August 1998 provided something of a disquieting lesson to bond markets, and thereby *reduced* moral hazard. In turn, this would imply that there had existed some degree of IMF-induced moral hazard in the first place. However, some part of the observed increase in bond spreads outside Russia may be attributable, at least in part, to various channels of contagion, or to a "wake-up" call that this event sent to investors regarding the riskiness of sovereign debt, rather than specifically a decline of moral hazard associated with the IMF.

35. What can be concluded from the evidence in this section? Certainly, the most extreme form of moral hazard—in which investors believe they have a full IMF guarantee—can be ruled out, even for countries of "too big to fail" size. Evidence on the *degree* of moral hazard cannot be as clear-cut, but when some key implications of the moral hazard story are checked against the data, they fail to materialize: no smoking gun has been found. We would emphasize in particular that the evidence does not support the notion that IMF actions since the Mexican crisis have brought on a new era of much greater moral hazard. At the same time, market reactions at the time of the U.S. Congressional approval of the IMF quota increase and of the Russian default, are consistent with the moral hazard story, although in both of these instances the effect on IMF induced moral hazard are difficult to disentangle from other turbulent financial market events of that period.

IV. IS IMF LENDING LARGE ENOUGH TO CREATE SERIOUS MORAL HAZARD?

36. With a view to further exploring the results in the previous section, it is useful to consider possible reasons why investors may not perceive the IMF as guaranteeing their investments. This may be for either or both of two reasons: they may be uncertain of whether IMF financial assistance will arrive; they may believe that such assistance may not be large enough to protect their positions; or both. This section will thus examine whether the *scale* of the Fund's financial support was sufficient to cover a substantial proportion of their exposures, supposing that all of this support were used for that purpose.[19]

37. In assessing the likely scale of future Fund support, private investors might take note of the Fund's formal limits on a member country's "access" to its resources, which are public information. A look at the record, however, suggests that these limits by themselves may not

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[19] More rigorously, some recent theoretical work, notably, Zettelmeyer (1999) and Jeanne and Wyplosz (2000) raises the possibility that under certain conditions, so-called "partial bailouts" may be ineffective or even counterproductive. A similar analysis may be found in Nunnenkamp (1999) who draws much the same conclusions.

be very useful in gauging expectations. In most Fund-supported programs, the scale of access is well below what would be allowed under these limits.[20] In some exceptional cases, however, approved access can go well beyond these limits; it is these cases that have been at the center of recent controversy. Moreover, in some cases the Fund has also worked to assemble support packages from other official sources, going well beyond its own financing.

38.   In the large majority of stand-by and extended arrangements, annualized access to Fund resources is relatively small: for example, in 1997, most stand-by arrangements had access in the range of ½ to 1 percent of GDP. Considering typical ratios of external debt to GDP, it is difficult to see how access on this scale could lead private creditors to believe that the Fund guarantees their investments. Alternatively, one might make a flow-based comparison, considering the share of approved Fund financing in a member's projected "gross financing need" (GFN).[21] In stand-by arrangements over the past several years, this share has averaged about 12 percent; this figure would be even smaller if GFN included amortization of short-term debt. These figures suggest that typical Fund *financial* support is simply not on a large enough scale to imply a guarantee of debt service.

39.   Granted that Fund support is usually rather small, investors might still feel protected if they believed that unusually large disbursements would be made as needed to guarantee their interests. Would the record support such a belief? In 1995–98, the Fund approved five arrangements in which exceptional circumstances were invoked to exceed its usual access limits by a substantial margin.[22] Table 2 puts announced Fund support in these cases in perspective, against a range of indicators.

40.   Thus, even in cases in which access to Fund resources has been exceptionally large in terms of quota, it still is small relative to GDP.[23] Access commitments are also small in relation to the outstanding stock of external debt. Finally, such unusual access is still only a

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[20]Since the mid-1980s, for example, the average access approved in Fund arrangements has tended to be only about one-half of the amount allowed under the limit on annual access in effect at the time.

[21]As projected when arrangements are approved. GFN is defined as the sum of the current account deficit excluding grants, amortization of maturities in excess of one year, and any targeted reduction in arrears or buildup in reserves. (Amortization of short-term debt is excluded from GFN only because it is extremely difficult to project.)

[22]In a few other cases, previously existing Fund arrangements were augmented by amounts which could take a member's outstanding access above the usual limit of 300 percent of quota.

[23]For comparison, Korea's access of 5 percent of GDP is substantially less than the foreign exchange generated by its current account in 1998 alone (a surplus of 12 ½ percent of GDP).

Table 2. Arrangements Approved with Access Beyond the Fund's Usual Limits, 1993-98

(In percent)

| | GDP | Approved Fund Financing as Share of | | GFN *plus* stock of short-term debt |
		External debt 1/	GFN (excludes amortization of short-term debt) 2/	
Mexico, 1995	6	13	39	16
Indonesia, 1997	5	7	22	13
Korea, 1997	5	12	32	12
Thailand, 1997	3	5	10	5
Brazil, 1998	2	9	8	7

Source: IMF staff estimates and projections and *International Financial Statistics*.

1/ Estimated stock of external debt of all maturities, both public and private, prior to approval of Fund arrangement (December 1994 for Mexico, June 1997 for Indonesia, September 1997 for Korea, December 1996 for Thailand, and December 1997 for Brazil).

2/ Based on ex ante estimates of gross financing need over the entire period of the arrangement. During a program's first year, the Fund's share of GFN may be higher, particularly in multi-year arrangements with front-loaded access (e.g., for Korea, the estimated first year ratio was 51 percent; in Thailand, it was 31 percent; and in Brazil it was 17 percent).

fraction of GFN, even though GFN excludes amortization of short-term debt (a prominent issue in several of these programs). Adding to GFN the stock of short-term debt, the Fund's contribution looks yet smaller. These figures do not, of course, contradict the fact that the Fund's support would have enabled the countries to cover their maturing debts for some finite period; in particular, in some recent programs there has been a perception that financing was intended to be large enough to be able to cover short-term debt for some set period of time. The fact that the level of Fund support was pre-announced and limited, however, implies that creditors would still need to worry about whether they might be too far back in the queue.

41.   Table 2 refers only to IMF funds, whereas the total "package" of official financing, including that assembled from other official sources, was about twice as large as the Fund's own support for Indonesia, Korea, and Brazil, and about four times as large for Thailand. But adjusting the ratios in Table 2 for this would not alter the basic conclusion. Moreover, there are other factors that suggest these members may overstate the guarantee provided by Fund-supported financing packages. Such numbers refer to initial commitments, and investors cannot take full disbursement of these amounts as a given: as noted earlier, IMF and other official support is usually phased over time and contingent on the program remaining on track. In some cases, promised bilateral financing has turned out not to materialize.[24] Finally, official disbursements to a country's central bank will not necessarily reassure investors that specific borrowers within the country will be able to service their debts (since some borrowers may nevertheless not have adequate resources to purchase the necessary foreign exchange).

42.   In conclusion, while in cases of exceptional access it is easier to see that the Fund's financial support could play an important direct role, these exceptional disbursements still fall short of suggesting a Fund guarantee of debt service. Thus, even in such exceptional cases, the Fund's support (even including other official funds mobilized) is not on a sufficient scale to constitute a full bailout of private investors.

V. Conclusions

43.   It is quite plausible, *a priori*, that the potential availability of IMF financing induces some degree of moral hazard. To the extent that Fund-supported programs seek to contain the total economic costs of financial crises, moral hazard—an increased willingness of creditors and debtors to court risks of such crises—is probably an unavoidable consequence. In recent years, and in particular following the IMF response to the Mexican crisis of 1994–95, concern about IMF-induced moral hazard has become much more prominent. However, some of the discussion seems to reflect confusion about the meaning of moral hazard.

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[24]Notably, in connection with the IMF-supported programs for Indonesia and Korea in 1998, bilateral financing was promised in the form of a "Second Line of Defense" which was however, never disbursed. See Lane et al. 1999.

Moreover, most of this discussion has been speculative, with very little effort to quantify the problem.

44.   Rather than a matter of presence or absence, the interesting question about moral hazard is one of degree. The most extreme hypothesis—that investors perceive a full guarantee from the Fund—can certainly be dismissed on the most basic evidence, even in the case of "too big too fail" candidates. Beyond this, this study shows that in the vast majority of instances, events that would plausibly have sent signals to markets regarding the availability and magnitude of IMF financing did not have the effects predicted under the hypothesis that moral hazard is important. Of course, the results reported here are not conclusive, and there is scope for more empirical work on the question. Any such work will have to grapple with certain aspects of moral hazard that make it inherently difficult to measure: moral hazard is a probabilistic concept, centered on forward-looking behavior and therefore hinging on beliefs and expectations.

45.   The results in this paper, therefore suggest that the role of moral hazard in recent crises may have been seriously overstated by some observers. These results do not, however, contradict the need to take moral hazard into consideration in discussing possible reforms of the IMF, and especially the magnitude and form of its lending. It remains worthwhile to consider ways that IMF-induced moral hazard could be contained. More generally, it is essential to consider the effects of both the availability of IMF lending and the design of IMF-supported programs on the incentives faced by both governments and creditors, to help ensure that the goals of these programs are achieved.

Preferential Treatment of Creditors

This appendix examines the case in which a particular group of creditors get off "scot free" in the event of default. It shows that under some conditions, such preferential treatment has no effect on average borrowing costs.

In this simple model, suppose that there are two kinds of debt, D_B, D_L, bearing interest rates r_B, r_L, respectively. For concreteness, we may refer to these as bonds and loans, although the argument being made is more general. The debtor is assumed to have resources Y (whose realized value is uncertain) which can be used to service debt. Debt is serviced fully except in the event of default, so the total amount of repayment is

$$\min \{D_B (1 + r_B) + D_L (1 + r_L), Y\} \tag{1}$$

Default occurs if $D_B (1 + r_B) + D_L (1 + r_L) > Y$.

Suppose that the following rule is adopted in the event of default: define a payout rate $\theta_B(Y)$ on D_B, to bond-creditors, such that

$$\theta_B(Y) = \begin{cases} 1 & \text{if } D_B(1+r_B)+D_L(1+r_L) < Y \\ \theta_B^1 & \text{if } \theta_B^1 D_B(1+r_B) < Y < D_B(1+r_B)+D_L(1+r_L) \\ Y/D_B(1+r_B) & \text{if } \theta_B^1 D_B(1+r_B) > Y \end{cases} \tag{2}$$

$$\theta_L(Y) = \begin{cases} 1 & \text{if } D_B(1+r_B)+D_L(1+r_L) < Y \\ (Y-\theta_B^1 D_B(1+r_B))/D_L(1+r_L) & \text{if } \theta_B^1 D_B(1+r_B) < Y < D_B(1+r_B)+D_L((1+r_L) \\ 0 & \text{if } \theta_B^1 D_B(1+r_B) > Y \end{cases} \tag{3}$$

i.e., the loan-creditor is the residual creditor (or claimant).

Then suppose that bond-holders get off "scot free" in the event of default, i.e., $\theta_B^1 = 1$.

The return to the loan-holder is then

$$\min \{ (1 + r_L) D_L , Y - (1 + r_S) D_S \} \tag{4}$$

Now assume for simplicity that there are two states of the world, 0 and 1, characterized by levels of resources Y_0, Y_1. Assume also that default occurs in only one of those states, 0

In the bad state, 0,

$$(1 + r_L) D_L + (1 + r_B) D_B > Y_0 \tag{5a}$$
$$(1 + r_S) D_S < Y_0$$

while in the good state,

$$(1 + r_L) D_L + (1 + r_B) D_B < Y_1 \tag{5b}$$

Assume that the bad state occurs with probability φ, i.e.

$$P_r(Y = Y_0) = \varphi \tag{6}$$

Then the expected total return on loans is $(1 - \varphi)(1 + r_L) + \varphi [Y_0 - (1 + r_B) D_B] / D_L$ (7)

while the expected total return on bonds is $(1 + r_B)$, reflecting the assumption that bonds are a risk free asset.

Assuming that the lender is risk-neutral and can choose either to hold bonds or extend loans, the following arbitrage condition holds ex ante, equalizing expected returns on the two instruments:

$$(1 - \varphi)(1 + r_L) + (\varphi [Y_0 - (1 + r_B) D_B])/D_L = 1 + r_B \tag{8}$$

Then this implies that

$$(1 + r_L) = [1/(1-\varphi)] (1 + r_B) - [\varphi/(1-\varphi)] ([Y_0 - (1 + r_B) D_B])/D_L \tag{9}$$

Note that the rates are equalized only when the probability of the bad state is zero; otherwise, r_L exceeds r_B, but (risk-neutral) investors are indifferent between bonds and loans.

Then consider the expected total debt service cost to the borrower:

$$EC = \varphi Y_0 + (1-\varphi) \{(1 + r_L) D_L + (1 + r_B) D_B\} \tag{10}$$

Substituting from (9) in (10) and simplifying,

$$EC = (1 + r_B) (D_L + D_B) \tag{11}$$

Thus, the borrower cannot alter total expected borrowing costs by changing the composition of debt between the two categories:

$$\frac{dEC}{dD_B}\Big|_{dD_L=-dD_B} = 0 \tag{12}$$

That is, provided that creditors are free to choose which form of debt to hold, the debtors cannot alter their expected borrowing costs by altering the composition of debt between the two forms (although they can of course alter the distribution of those costs between good and bad states). The fact that r_B is less than r_L, in particular, does not provide an incentive for a borrower to use more bond, and less loan, finance. Nor does the fact that bond holders get off "scot free" in the event of default make bonds more attractive to investors. This result is analogous to the Modigliani-Miller theorem (albeit exposited is a simplified setting).

Next, one may consider the case in which the holders of asset B (say bondholders) are "bailed in", i.e., $\theta^1_B < 1$. Then (assuming also that there is a safe rate of return, $\bar{r}$), the arbitrage condition presented above as (8) becomes

$$(1-\varphi)(1 + r_L) + \{\varphi [Y_0 - \theta^1_B (1 + r_B) D_B]\}/D_L \tag{8'}$$

$$= (1 + \bar{r})$$

$$= (1 - \varphi)(1 + r_B) + \varphi \theta^1_B (1 + r_B)$$

Then, the expected total cost of debt service is

$$EC = (1 - \varphi)[(1 + r_L) D_L + (1 + r_B) D_B] + \varphi Y_0 \tag{10'}$$

$$= (1 - \varphi + \varphi \theta^1_B)(1 + r_B)(D_L + D_B)$$

Thus, substituting again from (8') and simplifying,

$$EC = (1-\phi+\phi \theta^1_B)(D_L+D_B)(1+\bar{r})/(1-\phi+\phi\theta^1_B) \tag{11'}$$

$$EC = (1+\bar{r})(D_L+D_B)$$

So, as before, $\dfrac{dEC}{dD_B}\Big|_{dD_L=-dD_B} = 0$ (12')

Therefore, "bailing in" the previously exempt category of creditors has no effect on the borrower's expected costs: what the borrower gains through lower payments to the bond-holders in the bad state is compensated for by higher payouts to the other creditors in the bad state (as well as by higher interest payments to bondholders and lower interest payments to lenders in the good state). The result is a lower interest rate for loans, r_L, and a higher interest rate for bonds, r_B, with no effect on average borrowing costs since $\bar{r}$ in case II equals R_B from Case I where D_B was risk-free. As a result, changing the treatment of different types of debt in such a way as to "bail in" previously exempt creditors has no effect on borrowers' incentives to borrow in different forms—and therefore, assuming that (risk-neutral) creditors choose the composition of their portfolios to maximize expected return, no effect on the composition of debt.

"News" Relevant to Possible Fund-Induced Moral Hazard

I. IMF Involvement in Mexico, 1995

1/3/95   IMF Management Welcomes Mexico's Comprehensive Economic Program
An Exchange Stabilization Fund of US$18 billion has been established.... IMF management believes that [economic policies] are appropriate... These policies could provide a solid basis for discussion on an agreement that could be supported by the use of IMF resources..." (NB/95/2)

1/6/95   IMF to start negotiations with **Mexico** next week on stand-by credit
(source: NB/95/3)

1/26/95   Camdessus Sees US$7.8 Billion IMF Credit for **Mexico** (source: NB/95/4)

1/31/95   Camdessus to Recommend that IMF Commit an Additional $10 billion for **Mexico**, Raising its Total Commitment to $17.8 billion (source: NB/95/5)

2/1/95   IMF Approves US$17.8 billion Stand-by Credit for **Mexico**
(Press Release 95/10)

II. IMF Involvement in Thailand, 1997

7/2/97   IMF Welcomes **Thailand's** Exchange Rate Action.
Fischer said: "The Thai authorities have requested technical assistance from the IMF for the effective implementation of these measures, and the IMF will be responding rapidly to these requests." (source: NB/97/12)

8/5/97   Camdessus Welcomes **Thailand's** Policy Package.
Camdessus said: "An IMF team is in Bangkok assessing this package and working with authorities to develop it into a multi-year adjustment program that could be supported by IMF resources. I expect that work will be completed expeditiously..." (source: NB/97/16)

8/7/97   IMF Calls Tokyo Meeting to Discuss **Thai** Financing Package

8/20/97   IMF Approves Stand-by Credit for **Thailand**

III. IMF Involvement in Indonesia, 1997-99

10/8/97 Camdessus Announces IMF Support for **Indonesia's** Economic Program
Camdessus said: "The Indonesian government has announced measures... It has also indicated that it will be seeking financial support for an economic program from the IMF, the World Bank, and the ...(ADB). We welcome this announcement... Two IMF teams will arrive in Jakarta this week to begin discussions on an IMF-supported economic program... (NB/97/19)

10/31/97 Camdessus Commends **Indonesian** Actions
"On November 5... I will be asking the Executive Board to approve Indonesia's request for a three-year stand-by arrangement in the amount of about US$10 billion

11/5/97 IMF Approves Stand-by Credit for **Indonesia**

1/15/98 Statement by the Managing Director on the IMF Program with **Indonesia**
"...I am pleased today to announce that... Indonesia and the IMF have reached agreement on a much strengthened and reinforced economic program."

07/15/98 IMF Completes Review and **Increases Financing** of **Indonesia's** Economic Program

03/25/99 IMF Completes Review, **Augments** the Program by US$41 Billion and Approves US$460 Million Credit Tranche for **Indonesia**

IV. IMF Involvement in Korea, 1997-98

11/21/97 Camdessus Welcomes **Korea's** Request for IMF Assistance.
"Michel Camdessus said today following the Korean authorities' announcement that they have asked the IMF for assistance: 'I welcome today's announcement... and I have already assured the Korean authorities of our full support. [Measures announced two days ago, together with others] ...would provide a sound basis... that could be supported by the IMF and the international community... An IMF mission will arrive in Seoul next week to begin discussions... (source: NB/97/25)

12/3/97 Camdessus Welcomes Conclusion of Talks with **Korea** on IMF Program.
Camdessus: "I am pleased to announce... concluded discussions in Seoul today on a strong economic program... I will be asking the IMF's Executive Board to support the program with a three-year stand-by credit in the amount of SDR 15.5 billion... (source: NB/97/27)

12/4/97 IMF Approves SDR 15.5 Billion Stand-by Credit for **Korea**
Camdessus said: "An IMF team is in Bangkok assessing this package and working with authorities to develop it into a multi-year adjustment program that could be supported by IMF resources. I expect that work will be completed expeditiously..." (source: NB/97/16)

12/24/97 Korea Strengthens Economic Program; IMF to Activate Additional Financial Support. "...Camdessus has indicated his intention to recommend to the Executive Board of the IMF a **significant acceleration of the resources** available to Korea under the existing stand-by credit... The total amount of resources available under the three-year arrangement and the SRF will not change." (source: NB/97/32).

IMF Involvement in Russia, 1998

6/11/98 Russian Authorities and IMF Reach Understandings...
"Provided that actions... are taken as expected, it is foreseen that the IMF's Executive Board will meet on June 18 to consider completing the seventh quarterly review... [which would] immediately make available... US$670 million... If it is judged appropriate and necessary, **additional financial assistance could be made available** in the context of further policy measures..."

07/13/98 Camdessus says IMF Board to Consider Strengthened Reform Program Supported by Substantial Increase in Financing for **Russia**

07/20/98 IMF Approves Augmentation of **Russia** Extended Arrangement and Credit under CCFF; Activates GAB (Press Release No. 98/31)
NB, on schedule of drawings: Relative to the envisaged schedule of disbursements announced on July 13, the first disbursement has been **reduced** by SDR 600 million... This amount... is expected to be made available provided that certain measures are... implemented..."

08/17/98 Camdessus Comments on **Russian** Actions
"...the Russian government has announced a set of measures... including a change in exchange rate policy, restructuring of government debt, and a temporary restriction on capital payments abroad. These measures and their potential impact will immediately be analyzed by...the IMF..."

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VI. Events Related to Size of IMF Financial Resources

1/23/95   IMF Board of Governors Vote to Complete 10th **Quota Review** (leaving quotas unchanged)

09/21/97   Communiqué of the Interim Committee (remarks on **quotas**)
   "The Committee welcomed the agreement reached by the Executive Board on both the size of the increase in quotas... and on the method to be used to distribute the overall increase in quotas..."

12/23/97   IMF Board Submits Resolution to Governors for 45 Percent **Quota Increase** (Press Release No. 97/63)   "The Governors are asked to vote on the proposed Resolution, without meeting, by January 30, 1998. The adoption of the Resolution requires a majority of 85 percent of the total voting power of the IMF's membership."

02/06/98   Board of Governors Approves IMF **Quota Increase** (Press Release No. 98/2)
   "The Board of Governors... has adopted a Resolution proposing an increase of 45 percent in the total IMF quotas..."

10/18/98   U.S. Congress Ratifies Increased U.S. Quota

01/22/99   IMF **Quota Increase** Enters into Effect (Press Release No. 99/4)
   "Today, the [IMF] determined that members having more than 85 percent of the total of Fund quota have consented to increase in their quotas... This meets the participation requirement for the quota increase to enter into effect... For individual quota increases to become effective, each member that has already consented must pay the increase... within 30 days from today."

VII. Events Related to IMF's Policy on Members' Access to its Resources

10/24/94   IMF Increases **Annual Lending Limit**   (Press Release 94/74)
   "The increase... is intended to provide confidence to member countries with potentially large financing needs that the IMF will be able to respond... on an appropriate scale..."

12/17/97   IMF Approves **Supplemental Reserve Facility** [Press Release 97/59]

VIII. Events Related to Arrangements to Borrow

1/27/97   Camdessus Welcomes IMF Executive Board's Adoption of a Decision
on **New Arrangements to Borrow**

11/24/97   **General Arrangements to Borrow** Renewed

11/19/98   IMF's **New Arrangements to Borrow** Enter Into Force

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