

A Theory of International Crisis Lending and IMF Conditionality*

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Abstract

We present a framework that clarifies the financial role of the IMF, the rationale for conditionality, and the conditions under which IMF-induced moral hazard can arise. In the model, traditional conditionality commits country authorities to undertake crisis resolution efforts, facilitating the return of private capital, and ensuring repayment to the IMF. Nonetheless, moral hazard can arise if there are crisis externalities across countries (contagion) or if country authorities discount crisis costs too much relative to the national social optimum, or both. Moral hazard can be avoided by making IMF lending conditional on crisis prevention efforts—“ex ante” conditionality.

1 Introduction

Over the last ten years, the IMF’s crisis lending policies have been at the center of debates on IMF reform. Some have questioned the objectives of IMF crisis lending, while others have been concerned with the “moral hazard” that such lending may generate, as well as the nature and extent of IMF conditionality. Protagonists in such debates often fail to reach consensus at least in part because they have different implicit models in mind, or use the same term, such as moral hazard, to mean different things. It does not help, from that point of view, that there is no theoretical framework able to encompass the wide range of arguments that are made about IMF crisis lending and conditionality.

The purpose of this paper is to propose such a framework, and then to study the implied mapping from assumptions to policy implications. The questions that this framework will help to address include: Should the IMF act as a lender of last resort that lends exclusively to “illiquid but solvent” countries? Does official crisis lending generate moral hazard and, if so, through which channels? What should be the main purpose of conditionality? Should it be to minimize the welfare cost of crises, to ensure that the IMF’s loans get repaid, or to ensure that foreign investors are repaid? Should conditionality be applied only *ex post*, accompanying IMF assistance in the event of crisis, or also *ex ante*, as a way of pre-qualifying countries that would be eligible for crisis loans?

The theoretical framework in this paper is based on the assumption that the IMF has a role to play in crises, because it is more effective than uncoordinated private investors in eliciting policy adjustments from crisis countries. As shown in more detail in the next section of this paper, the IMF achieved this ability over time by developing a “lending technology” based on tranching, close monitoring, and conditionality. Although this view of the IMF is not new—it is consistent with Tirole’s (2002) view of the IMF as “delegated monitor”¹ and with Khan and Sharma’s (2003) analysis of IMF conditionality as a form of collateral—this paper represents, to our knowledge, the first

¹The IMF acts as a delegated monitor for the creditors *ex post* (in a crisis), which benefits the debtor country *ex ante* (when the borrowing takes place): “the IMF’s role is to substitute for the missing contracts between the sovereign and individual foreign investors and thereby to help the host country benefit fully from its capital account liberalization. Accordingly, the IMF should act as a delegated monitor and a trustee for foreign interests precisely to facilitate the country’s favorable access to foreign borrowing.” (Tirole, 2003)

attempt to model this view of the IMF’s role and draw its implications based on a rigorous welfare analysis.²

The main conclusions are as follows. First, if the IMF’s purpose is to undertake crisis lending and not international transfers, it follows that it should lend only to solvent countries. However, the prescription of lending only to “illiquid but solvent” countries is simplistic, not so much because this difference may not be perfectly observable (as is often argued), but because the perception of solvency is determined by expectations about future policies, which themselves are endogenous to the intervention of the IMF. The relevant question for a given crisis country is whether it is conditionally solvent, in the sense that the IMF can help to re-establish solvency through instruments in its toolbox—in particular, conditional tranching.

As regards moral hazard and conditionality, two questions are crucial:

- Is IMF ex post conditionality effective in re-establishing solvency?
- Are the objectives of *domestic* policymakers consistent with the maximization of global welfare? This will not be the case, for example, if policies or policy-related economic outcomes in one country impose a negative externality on other countries; or if the objectives of domestic policymakers do not fully coincide with domestic welfare maximization for political economy reasons.

We find that if the answer to both questions is positive, countries are likely to “produce” the optimal degree of crisis prevention effort, IMF lending does not generate moral hazard, and there is no reason to extend conditionality beyond measures that are required to reestablish solvency after a crisis. If, on the other hand, the answer to one (or both) of the above questions is negative, then countries are likely to produce a sub-optimal level of crisis prevention effort, IMF lending will create some moral hazard, and there may be a good case for mitigating this moral hazard through ex ante conditionality (or pre-qualification).

Our own reading of the evidence is that IMF lending to emerging market countries—which has always been repaid in full—does not involve substantial transfers,³ but that the answer to the second question may well be negative in

²See Federico (2001) for an earlier paper that models both ex post and ex ante conditionality within one framework. Ex ante conditionality has also been modeled by Jeanne and Zettelmeyer (2001) and Weithöner (2006), and is implicit in the analysis of Gale and Vives (2002).

³See Jeanne and Zettelmeyer (2001) and Zettelmeyer and Joshi (2005) for details. Note

some cases. In our baseline model, we analyze one reason why this may be the case, which is closely linked to the historical motives behind the creation of the IMF: cross-country externalities arising from the international spillovers of countries. In an extension, we analyze a second possible reason, namely, a standard political economy distortion, which implies that policymakers discount the future at an excessively high rate. We show that either of these distortions can lead countries to invest insufficiently in crisis prevention, and analyze the implications for the optimal design of conditionality associated with crisis lending.

In the sections that follow, we first sketch the historical context of the debate to which this paper speaks. We then briefly describe the academic literature on the themes of this paper—the rationale for IMF lending, the role of IMF conditionality, and the potential for IMF-induced moral hazard—focusing on theoretical work in this area. We next present our baseline model, which rationalizes the lending role of the IMF as it exists as present, shows how this role can potentially be welfare reducing in the presence of crisis spillovers across countries, and develops a solution to this problem (namely, to apply conditionality *ex ante*). In an extension, we show that similar welfare problems can arise in the presence of domestic political economy distortions rather than cross-country externalities, and that it leads to the same solution.

2 History

IMF conditionality developed gradually. From 1947 until the mid-1950s, the Fund allowed members to borrow without explicit conditions. A country requesting an IMF loan would make the case that it needed IMF resources consistent with the purposes of the Fund—namely, to give the country the “opportunity to correct a maladjustment in the balance of payments without resorting to measures destructive of national or international prosperity”—and the Fund would let it draw based on the merits of that case.⁴

that IMF lending to poor countries has been different in this regard, involving both heavily subsidized interest rates, and eventual debt relief. This has not been the case for middle income countries.

⁴Article I (v) of the IMF’s Articles of Agreement. The evolution of IMF lending practices in the 1950s and early 1960s is described, in order of increasing detail, in Fleming (1964), Spitzer (1969), and Horsefield (1969). Boughton (2001, Chapter 13) provides a brief summary.

The idea to commit members to policy actions coincided with the creation, in 1952, of a new instrument, the “Stand-By Arrangement,” which provided countries with a time window over which they could draw from the Fund without having to make a new request. Initially, Stand-By Arrangements were granted for only six months, “as some Executive Directors had expressed the view that it would not be possible to foresee conditions in a member country for more than six months, and it was therefore inadvisable for the Fund to commit itself for a longer period” (Spitzer, 1969, p. 470). However, in 1954, Peru asked for a one year stand by arrangement. This was granted with the provision that Peru’s right to draw could be interrupted if the IMF felt that “developments had occurred that would no longer justify the belief that [Peru’s] Exchange Stabilization Program could be made effective.”⁵

“Prior notice” clauses of this type, which gave the Fund the option to effectively rescind Stand-By Arrangements if it disagreed with member policies during the period of the arrangement, were incorporated in more than 30 Stand-Bys in the 1954-1960 period; in one case—Bolivia in 1958—the clause was in fact used. However, these clauses remained controversial because they gave the Fund discretion on the issue of whether a country had deviated sufficiently from its original policy intention to justify “prior notice”. Beginning in the late 1950s, the prior notice clause was replaced by explicit (and typically quantitative) fiscal and monetary “performance criteria” which set a verifiable standard for when an arrangement could be discontinued. In other words, the policy effort that the IMF expected countries to exert in order to be able to draw from the Fund was explicitly written into the arrangement. Several other elements that came to characterize Stand-By Arrangements were added by the early 1960s, including: periodic reviews of the agreed performance criteria by the IMF staff; “phased” drawings following these reviews; and guidelines for “waiving” performance criteria in the event of unforeseen shocks, and for negotiating new arrangements.

The result was a unique institutional apparatus—no analogous private sector framework for setting and monitoring lending conditions has ever developed—for minimizing the debtor moral hazard problem inherent in the relationship between the IMF and its borrowers.⁶ While countries could of

⁵1954 Stand-By Arrangement with Peru, paragraph 7, quoted in Spitzer (1969), p. 478.

⁶There are, however, predecessors to IMF conditionality in the context of official lending, particularly lending by the League of Nations: see Khan and Sharma (2003) for an overview.

course promise policy effort, draw once, and go “off track,” they could not draw again without either meeting the agreed performance criteria or renegotiating, which required convincing the Fund that the new program was more credible than the previous one. Although the ultimate effect of IMF programs on economic outcomes has been controversial,⁷ the fact that agreed performance criteria have generally had a commitment effect on country policies is not. The implementation of conditionality is not always complete and sometimes takes longer than originally planned, which may result in “recidivism” in IMF programs (Bird et al., 2004; Joyce, 2004). However, the available empirical evidence suggests that IMF conditionality is by and large implemented.⁸ Furthermore, the fact that the IMF has generally been repaid in full constitutes prima facie evidence that IMF conditionality was effective by the standards of its original purpose, namely, to restore the solvency of borrowers and to safeguard Fund resources.⁹

In contrast, IMF conditionality was not designed to minimize moral hazard with respect to third parties, such as other countries, private creditors, or, in borrowing countries with less-than-benevolent governments, the citizens of those countries. In principle, such moral hazard problems could occur when crises induced by poor policies have external effects through trade or financial linkages, or redistributive effects. In the context of the IMF of the 1950s and 1960s, however, these effects were arguably a lesser concern, for two reasons. First, the behavior of countries was constrained by other commitments associated with IMF membership—not to interfere with current payments, and not to adjust exchange rate parities except with the permission of the Fund—which were also viewed as the main channels for externalities on other members. Second, Fund-supported arrangements were meant to address flow imbalances prior to a currency crisis or devaluation. In this sense, all IMF lending was intended to be pre-crisis lending (although this was not always the case in practice). Successful adjustment in the context of a Fund supported program meant preventing a crisis, and, therefore,

⁷See Conway (1994) or the survey by Haque and Khan (1998).

⁸For example, a recent review of IMF conditionality over 2002-11 reports that 74 percent of the structural conditions associated with IMF programs were met on the initially scheduled date, and that one half of the remaining 16 percent were met on a rescheduled date (IMF, 2011, table 5).

⁹The main exception is subsidized lending to low income countries, which was ultimately forgiven in many cases following the “highly indebted poor countries” (HIPC) and “multilateral debt relief” (MDRI) initiatives of the last decade (IMF, 2007).

its unpleasant effects on third parties.

This changed with the demise of the Bretton Woods system of fixed parities and the sharp rise of capital flows to developing countries. For the most part, the IMF code of conduct that constrained member policies in the original Articles of Agreement broke down, or became much more difficult to enforce. Moreover, IMF lending from this point on often occurred in the aftermath of currency, debt, or banking crises, and hence arguably affected incentives vis-à-vis parties that were not part of its “contract” with the country. By the early 1980s, critics of the Fund were charging that, by making it less painful for countries to reschedule their debts to the private sector, the Fund “encourages both further threats of default and further bank lending to borrowers which have proved themselves to be not creditworthy” (Vaubel, 1983). Some of the same critics also proposed a solution, namely, to apply conditionality ex ante rather than ex post, excluding countries with poor macroeconomic policies from access to IMF lending in the event of a crisis (Vaubel 1988). This idea remained unexploited, however, and IMF conditionality continued to focus on policy actions ex post, reflecting the prevailing view that IMF lending with ex post conditionality was unlikely to distort country incentives.¹⁰

Following the large crises of the 1990s, concerns that IMF “bailouts” could be a cause of moral hazard became more acute, both inside and outside the IMF. Critics such as Harvard University’s Robert Barro argued that “the IMF doesn’t put out fires, it starts them,” and that it had better change its name to “IMH—the Institute for Moral Hazard.”¹¹ At the same time, the question whether the IMF should require countries to meet ex ante conditions

¹⁰Polak (1991), p. 54, writes: “Ex ante conditionality would be unlikely to work. It seems too much to hope that a government interested primarily in its own survival would be held back from unwise policies by the mere knowledge that the IMF would not stand ready to mitigate the severity of the eventual adjustment crisis.” Implicit in this sentence is the view that traditional IMF lending was not a cause of unwise policies to begin with. In the context of the 1980s reschedulings, this is indeed a plausible view, since the interest subsidy implicit in IMF lending was “modest” (Polak, p. 55), and it was hard to argue that the IMF was facilitating redistribution from bank creditors to countries.

¹¹Barro (1998). See also Calomiris (1998a); Council on Foreign Relations (1999); Mussa (1999, 2004); International Financial Institutions Advisory Commission (2000); and Eichengreen (2000). An extensive empirical literature on moral hazard ensued, see for example Brealey and Kaplanis (2004); or Dell’Ariccia, Schnabel, and Zettelmeyer (2006). Kim (2007) presents a calibrated model to gauge the potential moral hazard effect due the expected subsidy embodied in IMF loans (resulting from the riskiness of IMF lending).

for drawing on its resources (at least for large scale drawings) became the subject of a wider debate.¹² After much discussion, in 1999 the IMF created a new facility, the “Contingent Credit Line” (CCL) reserved for members with strong policies, without however spelling out specific ex ante conditions, and without changing the access rules for existing IMF facilities. In the event, the CCL did not attract any borrowers, and was allowed to lapse in 2003.

The global financial crisis, and the fact that in the Fall of 2008 many emerging market countries relied on swap lines with the US Federal Reserve and the European Central Bank rather than the IMF to obtain liquidity, led to a new impetus to reform IMF facilities and make them more quickly accessible to countries with sound fundamentals.¹³ In March 2009 the IMF launched the Flexible Credit Line (FCL) and in August 2010, the Precautionary Credit Line (PCL). Countries with very strong economic fundamentals and policy track records can apply for the FCL when faced with potential or actual balance of payments pressures, giving them the flexibility to draw on the credit line at any time within a pre-specified period. The qualification criteria for the FCL include a favorable assessment of the country’s policies according to the IMF Article 4 consultations as well as nine macroeconomic criteria. To date, three countries, Colombia, Mexico, and Poland, have used the FCL. The PCL is meant for countries whose fundamentals are not quite as good as for the FCL. It combines a qualification process (similar to that for the FCL but with a lower bar) with focused ex-post conditionality aimed at addressing the remaining moderate vulnerabilities identified during qualification. The PCL has not attracted any borrower, perhaps in part because the signal sent by a prequalification is not as valuable as with the FCL.

¹²Calomiris (1998b), Council on Foreign Relations (1999), International Financial Institutions Advisory Commission (2000), Jeanne and Zettelmeyer (2001; 2005a,b), Kenen (2001), Cohen and Portes (2004), Cordella and Levy Yeyati (2006) and Ostry and Zettelmeyer (2005).

¹³Ostry and Zettelmeyer (2005) had earlier made a case for the use of ex ante conditionality in all Fund lending. The idea in their paper was to use the IMF’s surveillance process to rate all member countries. They argued that this would improve incentives not just by encouraging good policies but also by limiting the flow of private capital to countries where it is unlikely to be used in socially beneficial ways.

3 Literature

There appear to be four main strands of theoretical models that try to make sense of the IMF's role.¹⁴ First, a small set of papers, including Chami, Sharma, and Shim (2004) and Weithöner (2006), model the IMF as a risk-sharing arrangement among countries. Private capital markets play no role in these models; instead, the IMF is interpreted as a contract and/or a fund providing loans or transfers to members hit by adverse shocks (possibly, as in Chami, Sharma and Shim, 2004, with a specialized monitoring structure). Moral hazard in these models can arise through two channels: first, as in any model involving transfers or loans, through a potential or actual subsidy to the borrower or recipient. Second, and more interestingly, by aggravating an existing externality across countries. In Weithöner (2006), there are crisis spillovers across countries. This gives rise to moral hazard, as the level of crisis prevention effort that each country exercises is too low from a social point of view. The presence of an IMF safety net can aggravate this problem, by making crises less painful individually (of course, it could also mitigate the problem if it mitigates contagion, see Clark and Huang, 2001). The potential solution to this problem is *ex ante* conditionality, i.e., conditioning the amount of IMF lending on the crisis prevention effort that countries exercise.

Second, there is a group of papers—motivated mainly by the IMF's role in the large crises of the 1990s—in which the IMF solves a pure coordination problem in international lending. Some are based on the traditional approach of modeling of coordination failures in terms of multiple equilibria (Sachs, 1984, 1995; Zettelmeyer, 2000; Jeanne and Wyplosz, 2003; Jeanne and Zettelmeyer, 2005a). Cordella and Levy Yeyati (2006) discuss *ex ante* conditionality in the context of a new IMF facility to deal with self-fulfilling liquidity crises. In more recent models, this modeling strategy is replaced by the “global games” approach, in which there is a unique equilibrium which

¹⁴What follows does not pretend to be a complete survey of models involving the IMF. It leaves out, in particular, a literature on IMF conditionality focused on conflicts of interest between the IMF and the borrowing country and on program compliance (see White and Morrissey, 1997; Killick, 1998; Drazen, 2002, and Joyce, 2006). Similarly, it ignores papers on whether conditionality should be outcome-based rather than policy-based (Ivanova, 2006); and how streamlined conditionality should be (Erbas, 2003). The focus here is on models that rationalize the IMF's role in terms of correcting particular market or policy failures.

may or may not involve a run on reserves, and in which the probability of a run depends on the available liquidity (Morris and Shin, 2006; Corsetti, Guimarães and Roubini, 2006; Kim, 2006, 2007). It is possible to introduce an effort variable in those models and study the impact of IMF lending on policy incentives. For example, Corsetti, Guimarães and Roubini (2006) show that the effect of IMF lending on policy effort is ambiguous: on the one hand, there is the standard debtor moral hazard effect driven by a potential transfer from the creditor to the debtor, but on the other, countries may actually want to exercise higher effort if the presence of IMF lending if their efforts are more likely to succeed in averting a crisis (see also Penalver, 2004). But these models ignore IMF conditionality, and the coordination problem that the IMF solves could arguably be solved by any large lender, and even by mechanisms that involve no lending at all.¹⁵ Hence, while these models give a nice interpretation to why IMF lending can help in a crisis, they do not provide a very tight justification for the existence of the IMF.

Third, there is a new and growing literature that focuses on the role of the IMF in correcting information and incentive problems in international capital markets (Marchesi and Thomas, 1999; Federico, 2001; Clark and Huang, 2001; Tirole, 2002, Penalver, 2004; Jeanne and Zettelmeyer, 2005b; de Resende, 2007; Sandri, 2015). Some of these papers are motivated by crisis lending; others focus on the interactions of country policies, private financing, and the IMF in normal, that is non-crisis, times. The IMF's ability to impose conditionality and/or monitor the country is critical in these papers. In Marchesi and Thomas (1999), IMF-supported programs serve as screening devices; governments that pursue strong reforms ask for Fund conditionality as a way of credibly signaling their credentials. In several other papers, IMF conditionality acts as a commitment device: by committing the country to a higher policy effort, or more generally to actions that preserve creditor interests, the IMF catalyzes foreign capital flows and ultimately raises domestic consumption. In effect, the IMF acts as a substitute for a more complete contract between investors and the borrowing country. Tirole (2002) also discusses the complementarity between ex post conditionality and ex ante pre-qualification.

Finally, there is a literature, with contributions from both economists and political scientists, on the potential role of the IMF in mitigating domestic

¹⁵See, in particular, Miller and Zhang (2000) and Haldane and Kruger (2001), who propose payments standstills to resolve creditor coordination failures.

policy failures (Drazen, 2002, and Mayer and Mourmouras, 2002, 2005). The premise of these papers is that economic policies are determined not by a welfare maximizing government but by a domestic political economy equilibrium, and that the presence of the IMF—both through the assistance it offers, and through IMF conditionality—may change the equilibrium and enhance domestic “ownership” of IMF conditionality. Specifically, the presence of the Fund might strengthen the hand of a reformer in the face of domestic political opposition. This could happen because it changes the welfare of a reformist government, by tying the government’s hands and hence strengthening its bargaining power, or because it affects the welfare of opposition groups directly.

The model presented in this paper straddles all four strands of this literature. As in Tirole (2002) and some of the related literature, conditionality endows the IMF with a better technology, relative to the private sector, for extracting policy effort from countries in crisis. This enables it to lend in situations when the private sector cannot, which mitigates the cost of crises.¹⁶ As a result, countries may have an incentive to reduce crisis prevention effort (as in Corsetti, Guimarães and Roubini, 2006, the direction of this effect is ambiguous in general, because higher crisis prevention effort also has the effect of reducing crisis mitigation effort). In itself, this is not necessarily welfare reducing, because it could just be an efficient response to the presence of the IMF safety net. However, in the presence of additional distortions—either externalities across countries, as emphasized out by Weithöner (2006), or a domestic political economy failures, as emphasized by Jeanne and Zettelmeyer (2005b)—IMF crisis lending can indeed be welfare reducing if it leads to a reduction in crisis prevention effort. As we show, this may call for conditionality *ex ante* rather than just *ex post*.

¹⁶Hence, unlike in the literature described as the “second strand” in the discussion above, the rationale for IMF lending is not primarily that it is a large lender relative to the private sector. This said, our model could also be extended, with relatively little change, to encompass this aspect, by introducing the possibility of self-fulfilling runs. This would not change the main conclusions.

4 A Model of the IMF

4.1 Setup

We consider a large number (continuum) of small open emerging market economies, indexed by $i \in [0, 1]$. There are three periods: $t = 0, 1, 2$. In each country, the domestic private sector finances an investment by borrowing abroad in period 0. Simultaneously the domestic government implements a “crisis-prevention effort” which determines the country’s vulnerability to a crisis in period 1. The investment pays off in period 2. Period 1 sees the arrival of some news on the future productivity of the investment. Depending on the news it is possible or not for the domestic private sector to roll over its external debt. We will make assumptions such that if the news is bad, the external debt is not rolled over and the investment is liquidated. A possibility for the government to improve the situation by exercising a “crisis-resolution” effort in period 1 will be introduced later.

There is one homogeneous good, which is invested and consumed. The economy is populated by a representative agent who invests k_i in period 0 in the hope of receiving an output $y_i = \theta_i k_i$ in period 2. The representative agent has no wealth to finance the investment, and must borrow k_i from foreign lenders at interest rate r_i . Foreign lenders grant one-period loans only, so $k_i(1 + r_i)$ must be rolled over in period 1 with a new loan.¹⁷ If foreign lenders do not roll over their loans, the investment is liquidated in period 1 and yields no output in period 2, $y_i = 0$. We denote by r'_i the interest rate at which debt is rolled over between period 1 and period 2. Both r_i and r'_i will be endogenous to the equilibrium of the debt market. The international debt market is perfectly competitive and foreign investors request a zero expected return on their lending.

In period 1 the foreign investors receive a signal about the level of the period-2 return on the investment. For simplicity, we assume that the signal is binomial: the news is good or bad. If the news is good, $y_i = \theta_i k_i$ with probability 1. If the news is bad, then the investment will give a zero return ($y_i = 0$) with probability $\pi > 0$, and a high return $y_i = \theta_i k_i$ with probability $1 - \pi$. In both cases there are the returns assuming that the investment is not liquidated in period 1.

If period-2 output is higher than the private sector’s debt, $y_i \geq k_i(1 +$

¹⁷The short maturity of the loan can be endogenized as the solution to an incentive problem (see Jeanne, 2009).

$r_i)(1 + r'_i)$, the loans are fully repaid and the representative entrepreneur consumes the output net of the debt repayment.¹⁸ By contrast if $y_i < k_i(1 + r_i)(1 + r'_i)$ the private sector defaults, foreign creditors collect the output y and the representative resident consumes nothing.

We now make some assumptions that ensure that investors roll over their loans in period 1 if and only if the news is good. First, we assume $(1 - \pi)\theta_i < 1$. This implies that conditional on bad news the representative resident is insolvent in period 1 because the expected gross return per unit of capital is less than the debt repayment. We assume that foreign lenders are atomistic and can liquidate the investment with a sequential service constraint like in the Diamond-Dybvig model of banking (Diamond and Dybvig, 1983). In this case, foreign creditors do not roll over their loans in period 1 if the representative resident is insolvent (conditional on all the other creditors rolling over, an atomistic foreign creditor is strictly better off asking for an immediate repayment). In equilibrium, thus, all the creditors run and the investment is fully liquidated.

By contrast, in the event of good news, foreign lenders are ready to roll over their loans at a zero interest rate provided that $\theta_i > 1 + r_i$. We assume parameter values such that this condition is satisfied in equilibrium. There is thus a perfect correspondence between bad news about domestic productivity and an external debt roll-over crisis.¹⁹ An external debt roll-over crisis is also a financial crisis and a real crisis (since it leads to the liquidation of domestic capital and reduces the country's output). In the following we call this equilibrium outcome a crisis for short.

In period 0 the government implements a "crisis-prevention effort" which determines the country's vulnerability to a crisis in period 1. Examples of crisis-prevention policies in the real world include maintaining an adequate buffer stock of international reserves, maintaining safe balance sheets in the private sector through financial regulation, and keeping space for a fiscal stimulus through prudent fiscal policy.²⁰ For simplicity the crisis-prevention

¹⁸We look at private debt and abstract from the willingness-to-repay problem that is the object of much of the literature on sovereign debt. We assume that the domestic government does not attempt to raise domestic welfare by expropriating foreign creditors.

¹⁹The model also has equilibria with self-fulfilling crises, like the Diamond-Dybvig model of banks, but we leave this possibility aside in the following.

²⁰The criteria used by the IMF to assess a country's qualification for an FCL arrangement include: a sustainable external position; a relatively comfortable reserve position; sound public finances; low and stable inflation; a sound financial system and effective financial

effort is represented in the model by one variable, denoted by $e_{i,0}$. It is a continuous variable that takes values in the interval $[\underline{e}, \bar{e}]$.

The probability of bad news as of period 0 is denoted by p_i . We assume that p_i depends on two factors: the domestic crisis-prevention effort, and the occurrence of crises abroad. The greater the fraction of economies that develop a crisis in period 1, the higher the probability that the news will be bad and hence that there will be a crisis at home. For analytical tractability, we assume that this negative externality affect the probability of bad news in an additive and linear fashion:

$$p_i = p(e_{i,0}) + \lambda n,$$

where n denotes the fraction of economies with a crisis and the function $p(\cdot)$ is decreasing and convex and satisfies $p(0) + \lambda \leq 1$. Hence, parameter λ captures the strength of “systemic contagion” in this model.

The welfare of the representative resident is given by,

$$U_{i,t} = E_{i,t}(c_i) - f(k_i) - g(e_{i,0})k_i, \quad (1)$$

where c_i is the period-2 consumption of the representative resident in country i , $f(k_i)$ is a non-pecuniary cost of operating the capital, and $g(e_{i,0})k_i$ is the cost of the crisis-prevention effort. The marginal cost of operating capital is increasing with the level of capital (function $f(\cdot)$ is increasing and convex). We assume that the effort cost function $g(\cdot)$ is increasing and convex too.

The spending that may be required by the policy effort is not financed by borrowing from foreign lenders (i.e., the cost $g(e)k$ is not financed by external borrowing in the way that k is). The effort cost could be interpreted for example as the distortionary cost of taxing residents. It is mainly for convenience that we assume that the policy effort is not financed by borrowing from foreign lenders. Otherwise the effort cost would be affected by the agency cost of external finance, which would complicate the analysis without affecting the thrust of our results.

In sum, the sequence of events and decisions is as follows: at $t = 0$, $e_{i,0}$ and k_i are set simultaneously (respectively, by the domestic government and by the representative resident). At $t = 1$ foreign creditors liquidate the investment in the event of bad news, and roll over their loans if news are good. At $t = 2$ production and consumption take place.

sector supervision.

The level of domestic policy effort is set by the government in period 0. The government maximizes:

$$V = \beta E_{i,0}(c_i) - f(k_i) - g(e_{i,0})k_i. \quad (2)$$

That is, the government's objective function in period 0 is identical to the welfare of the representative resident in that period, except for the presence of the discount factor β . This discount factor captures in a simple way the existence of domestic political economy distortions that may lead the domestic government to put too little weight on future welfare. If there is no domestic policy distortion, the government's objective coincides with domestic welfare: $\beta = 1$. However, if $\beta < 1$, then the government discounts the future at a higher rate than the representative resident. This could be, for example, because the incumbent policymaker's objective puts a higher weight on domestic welfare when she is in power and could lose power with a certain probability, as in the political economy literature on public spending (Alesina and Tabellini, 1990).

We have set up the model in a way that includes two potential distortions which, as we will show, will generate inefficiently low crisis prevention in equilibrium. When $\beta < 1$, crises will have a larger cost on domestic social welfare than reflected in the government's objective function. And when $\lambda > 0$, crises will have a larger cost on global social welfare than is taken into account by each individual government. As we will show, the consequences of these two distortions for the role of the IMF, and in particular for the way in which IMF conditionality should be optimally structured, is very similar. To simplify the exposition, we develop our basic model focusing on just one of these distortions—namely, crisis spillovers on other countries—and then study the effect of the domestic political distortion in an extension. That is, in the remainder of this section, we assume that $\lambda \geq 0$ while $\beta = 1$. This order of discussion is justified by the fact that the main historic motivation for the IMF was the notion that country policies—in particular, trade and exchange rate policies—have spillovers on other countries. The notion that the IMF attempts to correct domestic policy failures regardless of whether or not country policies have spillovers on other countries is more controversial, though it plays a role both in the literature and (arguably) in practice. As noted in section 3, there is a large literature emphasizing that the IMF might help countries in implementing desirable reforms by influencing the internal conflicts of interests impeding reform implementation.

4.2 Equilibrium Under Laissez-Faire

In our baseline model, all countries are identical, and we focus on symmetric equilibria. This allows us to omit country subscripts in what follows in order to alleviate the notations.

Ignoring the liquidation value that investors receive in the bad news case (assumed to be very small), the lenders' participation constraint implies

$$(1 - p)(1 + r) = 1.$$

Using the fact that expected consumption is equal to expected output net of investment and that $y = 0$ in a crisis, the government's objective function can then be written:

$$\begin{aligned} U_0 &= [1 - p(e_0) - \lambda E(n)] \theta k - k - f(k) - g(e_0)k, \\ &= k [(\theta - 1) - L(e_0)] - f(k), \end{aligned}$$

where $L(e_0)$, the net cost of the effort per unit of capital is given by

$$L(e_0) \equiv [p(e_0) + \lambda E(n)] \theta + g(e_0). \quad (3)$$

The second term in this expression denotes the direct cost of effort, while the first term, which is declining in e_0 , denotes the expected utility loss of a government associated with a crisis. Maximizing U over e_0 is equivalent to minimizing $L(e_0)$. Note that this problem is independent of both k and $\lambda E(n)$, since this enters the crisis probability additively, and is taken as given by the government.

Conditional on $e_0^{lf} = \arg \min L(e_0)$, private lenders lend in period 0 at the interest rate that sets their expected return to zero, given that they are repaid with probability $p(e_0^{lf})$,

$$r^{lf} = \frac{1}{1 - p(e_0^{lf})} - 1,$$

(where the liquidation value received by investors in a crisis is again ignored for simplicity). The lenders then roll over their loans at zero interest rate in period 1 if they receive good news, and liquidate the investment if there is bad news.

The domestic private sector sets k so as to maximize:

$$U_0^{lf} = k \left[\theta - 1 - L(e_0^{lf}) \right] - f(k).$$

Finally, in equilibrium, $E(n) = n = p = p(e_0^{lf}) + \lambda n$, implying $n^{lf} = \frac{p(e_0^{lf})}{1 - \lambda}$. The denominator $1 - \lambda$ reflects the multiplier effect caused by international spillovers.

The following proposition compares the laissez-faire equilibrium with the constrained first best in which the level of crisis-prevention effort is chosen by a global planner who is still subject to the constraint that the investment is liquidated in the event of bad news.

Proposition 1 *In laissez-faire equilibrium, if crises have international spillovers ($\lambda > 0$) then crisis prevention effort e_0 is inefficiently low and the number of crises n is inefficiently high. The larger the spillover parameter λ , the larger is the discrepancy between the constrained first-best and laissez-faire values of e_0 and n . As a result, the interest rate at which the domestic private sector can borrow from abroad is above its first-best level, and capital inflows are below their first-best level.*

Proof. The laissez-faire level of effort is obtained by minimizing $L(e_0) \equiv [p(e_0) + \lambda E(n)]\theta + g(e_0)$, taking $E(n)$ as given. This leads to the first order condition:

$$p'(e_0^{lf})\theta + g'(e_0^{lf}) = 0.$$

In contrast, the first best level of effort is determined internalizing the effect of effort on the aggregate crisis risk, that is, $e_0^* \equiv \arg \min \tilde{L}(e_0)$ where $\tilde{L}(e_0)$ is defined as:

$$\tilde{L}(e_0) \equiv \left\{ p(e_0) + \lambda \frac{p(e_0)}{1 - \lambda} \right\} \theta + g(e_0) = \frac{p(e_0)}{1 - \lambda} \theta + g(e_0). \quad (4)$$

The first order condition is:

$$p'(e_0^{fb}) \frac{\theta}{1 - \lambda} + g'(e_0^{fb}) = 0.$$

Comparing the two first-order conditions, $e_0^{lf} < e_0^{fb}$ follows from the fact that $p'(\cdot) < 0$ and $g'(\cdot) > 0$, and the convexity of $p(\cdot)$ and $g(\cdot)$. Since

$n = p(e_0)/(1 - \lambda)$ and $r = 1/(1 - p(e_0)) - 1$, this implies that crises are too frequent under laissez-faire, and the interest rate too high, relative to the first best. These effects are larger the higher λ . Finally, note that $L(e_0^{lf}) > L(e_0^{fb})$. The fact that laissez-faire capital inflows are below the first-best level then follows from the first-order condition for the domestic private sector, $f'(k) = \theta - 1 - L(e_0)$. ■

4.3 Equilibrium with IMF Crisis Lending

We now introduce the following assumption: conditional on bad news the government can make a “crisis-resolution effort” in period 1, with the effect of raising productivity to θ with certainty. The crisis-resolution effort can be interpreted as an exchange rate or fiscal adjustment or any policy reform that offsets the impact of a negative shock on the domestic economy.

We assume, for technical convenience, that the crisis-resolution effort is discrete. The dummy variable for the effort will be denoted by e_1 (equal to 1 if the effort is made, and to 0 otherwise). Importantly, the government can implement the crisis-resolution effort only *after* foreign investors decide to roll over their loans or not in period 1, and it cannot commit to the effort at the time that foreign investor take that decision.

Domestic welfare is now given by:

$$U_t = E_t (c - f(k) - g(e_0)k - e_1 h(e_0)k),$$

where $h(e_0)k$ is the cost of the crisis-resolution effort. We assume that $h(\cdot)$ is decreasing, that is, good pre-crisis policies not only reduce the probability of a crisis but also reduce the cost of resolving the crisis, if it occurs.

Assuming that foreign investors roll over their loans conditional on the crisis-resolution effort, the total output benefit of exercising the effort is $[\theta - (1 - \pi)\theta]k = \pi\theta k$. We assume that the crisis-resolution effort is always efficient in the sense that this output benefit exceeds the cost of the effort regardless of the quality of pre-crisis policies:

$$h(\underline{e}) < \pi\theta.$$

However, this does not mean that the government will necessarily want to undertake the effort, because it appropriates only a share of the output benefit: at most $[(\theta - 1) - (1 - \pi)(\theta - 1)]k = \pi(\theta - 1)k$. The rest of the benefit

goes to the investors—this is the classic debt overhang problem. In the following, we assume that this share is never large enough to make the crisis resolution effort worthwhile for the government:

$$h(\bar{e}) > \pi(\theta - 1).$$

Together, these assumptions lead to a time consistency problem. The government would like investors to roll over their loans in order to avoid liquidation. If the government undertakes the crisis-resolution effort, rolling over would in fact make sense for investors, since they could expect repayment with certainty. But once investors have rolled over, the government has no incentive to implement the effort. Absent a device for committing the government, private creditors hence do not roll over their claims in equilibrium (just like in the equilibrium of the previous section, in which no crisis resolution technology existed).

This is where the IMF comes in. Unlike private creditors, we assume that the IMF has the ability to elicit the crisis-resolution effort from the government through its conditionality. This assumption is important since it justifies the IMF's existence in terms of a market failure and determines the scope of its intervention. Unlike much of the literature on IMF crisis lending, we assume that the comparative advantage of the IMF is not size per se, but the fact that it can lend in period 1 conditional on the domestic crisis-resolution effort, whereas private creditors cannot. The IMF might have a better ability than a large number of uncoordinated creditors to determine the set of conditions required to restore solvency and to monitor their implementation.²¹ This advantage of the IMF in imposing conditionality could be due to the IMF's expertise in monitoring country policies (perhaps as a result of spillovers from its surveillance functions) or due to the fact that it is viewed as having greater political legitimacy than private creditors.

A comparative advantage of the IMF relative to ad-hoc crisis lending arrangements is that it is a long-lived institution. This helps the IMF to maintain consistency and discipline in the exercise of conditionality through a reputational mechanism. This point is explicitly modeled in the appendix, where

²¹From this point of view, the IMF would solve a coordination problem, although not the same one as in models of self-fulfilling liquidity crises. As a historical matter, there have been rare attempts by banks to set and implement conditionality, but they have generally not been successful (see, for example, Rieffel, 2003, on conditional lending by a group of banks to Peru during Peru's 1976-78 balance of payments crisis).

we present an extension of the baseline model with conditional tranching by the IMF. The IMF lends in two tranches "inside" period 1 and the IMF commits to grant the second tranche only if the country has implemented the crisis-resolution effort. Furthermore time is infinite and there is a repeated interaction between the IMF and borrowing countries. The IMF's commitment to deny the second tranche of lending is credible because a deviation has bad consequences for welfare in the long run.²²

For simplicity we abstract from this reputational mechanism in the baseline model and in the following simply assume that the IMF can lend conditionally on the crisis-prevention effort. The IMF's ability to lend conditionally on the crisis resolution effort—which we interpret as traditional ex post conditionality—implies that it can lend at a zero interest rate ($r' = 0$). The country accepts the IMF's offer provided that the government's net gain from avoiding the liquidation is larger than the cost of the effort:

$$\theta - (1 + r) \geq h(e_0).$$

If the condition is satisfied, it is in the government's interest to accept the IMF's conditional lending offer and exercise the crisis resolution effort, even when it would not have wanted to exercise this effort following a private sector rollover. The reason is that the alternative to accepting the IMF's offer is receiving nothing, while in the case of the private sector rollover the government could still hope to receive $\theta - (1 + r)$ with probability $1 - \pi$. IMF conditionality enhances the country's incentives to make the crisis-resolution effort.

Conditionality hence makes it possible for the IMF to intervene without compromising the resources it received from its members (the traditional justification for the development of IMF conditionality). The model also offers an interpretation of why the IMF can lend to crisis countries at a much lower interest rate than the private sector, without losing money over time. Because of IMF conditionality, that lending is essentially risk-free.

We assume that the IMF is benevolent and maximizes global welfare.²³

²²Although the setup is relatively similar, the results are different from Marchesi and Sabani (2007) because we assume that there is no informational asymmetry between the IMF and the rest of the world. In Marchesi and Sabani (2007) the IMF's desire to preserve its reputation as a good monitor may distort its lending decisions towards laxity.

²³Thus we abstract from agency problems that may arise at the level of the IMF. Some authors, such as Barro and Lee (2005), have argued that the lending decisions of the IMF are influenced by the geopolitical interests of its major shareholders.

Thus the IMF will offer conditional lending to any country that receives a bad signal in period 1 since avoiding a liquidation raises the welfare of both the debtor country and its creditors.

If the IMF is expected to rescue the country in the event of a crisis, private creditors lend at a zero interest rate in period 0 so that the condition above becomes:

$$\theta - 1 > h(e_0). \tag{5}$$

Note that this condition might be violated for low levels of the crisis-prevention effort. Thus in equilibrium the IMF might not grant crisis lending to countries with bad pre-crisis policies because traditional ex post conditionality does not work in those countries. Indeed, in practice, the IMF often emphasizes that a country’s pre-crisis policy “track record” may matter for the decision to lend, because it makes the country’s post-crisis policy promises more or less credible. However, this is quite different from a stronger and more explicit form of ex ante conditionality—one that involves a commitment to make countries’ access to IMF loans depend on crisis-prevention effort—to which we will return later in this paper.

The results of this section can be summarized in the following proposition:

Proposition 2 *Assume that the IMF can lend to crisis countries conditional on a crisis-resolution effort, whereas private creditors cannot. Then the IMF conditionally lends to all crisis countries that do not have an excessively low level of crisis-prevention effort.*

Proof. See discussion above. ■

4.4 Moral Hazard in the Presence of IMF Crisis Lending

We now study the effect of IMF crisis lending on the government’s crisis prevention effort e_0 , and welfare. As emphasized in earlier work (Jeanne and Zettelmeyer, 2005b), the two are not necessarily the same. In particular, we show below that the presence of IMF lending may or may not reduce crisis prevention effort; but even when it does, this will imply a welfare reduction only in the presence of sufficiently large systemic contagion, λ .

4.4.1 Crisis prevention effort

For simplicity, we assume that all countries satisfy condition (5), and so accept an IMF program in a crisis. The government's objective function is now,

$$U_0^{imf} = [1 - p(e_0) - \lambda E(n)] \theta k + [p(e_0) + \lambda E(n)] [\theta k - h(e_0)k] - k - f(k) - g(e_0)k.$$

Compared to the laissez-faire case, there is a new term in the objective function, $[p(e_0) + \lambda E(n)] (\theta k - h(e_0)k)$. This reflects the fact that even if there is a crisis, productivity remains high because the representative consumer pays a cost $h(e_0)k$ in period 1. U_0^{imf} can be rewritten as:

$$U_0^{imf} = k [\theta - 1 - L^{imf}(e_0)] - f(k),$$

where

$$L^{imf}(e_0) \equiv [p(e_0) + \lambda E(n)] h(e_0) + g(e_0). \quad (6)$$

Note the difference between this expression and that for the laissez-faire counterpart, L . The cost of a crisis is no longer the cost of liquidating the investment, θ , but the cost of the crisis-resolution effort, $h(e_0)$, which is lower. The level of crisis prevention effort is given by $e_0^{imf} = \arg \min L^{imf}(e_0)$, taking $E(n)$ as given. The first-order condition of the government's problem is:

$$\left[p(e_0^{imf}) + \lambda E(n) \right] h'(e_0^{imf}) + p'(e_0^{imf}) h(e_0^{imf}) + g'(e_0^{imf}) = 0.$$

Using the fact that $E[n] = n^{imf} = p(e_0^{imf})/(1 - \lambda)$, this gives

$$\frac{p(e_0^{imf})}{1 - \lambda} h'(e_0^{imf}) + p'(e_0^{imf}) h(e_0^{imf}) + g'(e_0^{imf}) = 0.$$

To see the impact of the IMF on the effort level, we need to compare this condition to the analogous first-order condition under laissez-faire:

$$p'(e_0^{lf}) \theta + g'(e_0^{lf}) = 0.$$

First, assume that the cost of the crisis-resolution effort does not depend on the quality of pre-crisis policies ($h' = 0$). Then the first-order condition is

the same with the IMF as under laissez-faire except that θ is replaced by $h(e_0^{imf}) < \theta$. Thus the marginal benefit of e_0 is lower with the IMF, implying $e_0^{imf} < e_0^{lf}$. This is sometimes referred to as the “country moral hazard” effect of IMF lending: because the IMF reduces the cost of the crisis, the country undertakes a smaller crisis-prevention effort.

Second, assume that the quality of pre-crisis policies matters for the size of the post-crisis effort ($h' < 0$). Then the existence of IMF programs increases the marginal benefit of e_0 , leading to an improvement in the quality of domestic policies. This is an “effort substitution” effect: countries implement better policies ex ante to reduce the cost of conditionality ex post in a crisis. This effect is captured by the first term in the first-order condition. As a result, it may be the case that $e_0^{imf} > e_0^{lf}$.

Proposition 3 *The impact of the IMF on the crisis-prevention effort is ambiguous in equilibrium. On the one hand, IMF lending reduces the cost of a crisis and so reduces the incentives to prevent a crisis. On the other hand, the country internalizes the fact that the ex-post crisis resolution effort depends on the level of crisis-prevention effort. If the second effect dominates, IMF lending could induce more crisis prevention.*

Note that the size of the effort substitution effect is growing in the size of the systemic contagion effect λ : the higher λ , the higher the probability of crises for any given e_0 , and hence the higher the incentive to invest in effort e_0 to reduce the cost of conditionality ex post.

Example. Assume $\lambda = 0$ and

$$\begin{aligned} p(e) &= 1 - e, \\ g(e) &= e^2/2\alpha, \\ h(e) &= \theta(1 - e). \end{aligned}$$

Then,

$$\begin{aligned} L(e) &= p(e)\theta + g(e) = (1 - e)\theta + \frac{e^2}{2\alpha}, \\ L^{imf}(e) &= p(e)h(e) + g(e) = \theta(1 - e)^2 + \frac{e^2}{2\alpha}, \end{aligned}$$

which yields

$$e_0^{lf} = \alpha\theta,$$

and

$$e_0^{imf} = \frac{2}{1 + 2\alpha\theta}\alpha\theta = \frac{2}{1 + 2e_0^{lf}}e_0^{lf}.$$

Hence, the expectation of IMF crisis lending induces more crisis prevention effort ($e_0^{imf} > e_0^{lf}$) if and only if $e_0^{lf} = \alpha\theta < 1/2$.

4.4.2 Welfare

To compare welfare under laissez-faire with the IMF, note first that equilibrium welfare can be written as:

$$\max_k \tilde{U}_0(e_0^{lf}, k) \equiv \max_k \left\{ k \left[\theta - 1 - \tilde{L}(e_0^{lf}) \right] - f(k) \right\}, \quad (7)$$

in the regime without the IMF, and similarly as

$$\max_k \tilde{U}_0^{imf}(e_0^{imf}, k) \equiv \max_k \left\{ k \left[\theta - 1 - \tilde{L}^{imf}(e_0^{imf}) \right] - f(k) \right\},$$

in the regime with the IMF, where $\tilde{L}^{imf}(e_0)$ is defined analogously to $\tilde{L}(e_0)$, that is, as the loss function after taking into account the external effects of prevention effort on crises:

$$\tilde{L}^{imf}(e_0) \equiv \frac{p(e_0)}{1 - \lambda} h(e_0) + g(e_0). \quad (8)$$

Comparing (7) and (4.4.2) shows that to compare the two regimes in terms of welfare, it is enough to compare $\tilde{L}(e_0^{lf})$ and $\tilde{L}^{imf}(e_0^{imf})$.

Consider first the case where $\lambda = 0$, i.e., there is no systemic contagion. In this case, we have:

$$\tilde{L}(e_0) = L(e_0) = p(e_0)\theta + g(e_0),$$

and

$$\tilde{L}^{imf}(e_0) = L^{imf}(e_0) = p(e_0)h(e_0) + g(e_0).$$

Since $\theta - 1 > h(e_0)$ by assumption (5), one has $\tilde{L}^{imf}(e_0) < \tilde{L}(e_0)$ for any choice of e_0 . Hence, this is also true for their minima, $L^{imf}(e_0^{imf}) < L^{lf}(e_0^{lf})$, even

though it is possible (as shown in the previous section) that $e_0^{imf} < e_0^{lf}$. In other words, if $\lambda = 0$, the presence of IMF crisis lending always improves welfare, even though it may well lead to lower crisis prevention effort.²⁴ Hence, calling lower crisis prevention effort “moral hazard” in this context is really a misnomer, since the presence of the IMF does not create (or magnify) any distortion. The lower crisis prevention effort is merely an efficient response to a less risky environment. So are lower interest rates (compared to *laissez faire*, the private sector lends at a zero rate, since crises no longer occur) and higher capital flows (k is higher compared to the *laissez faire* equilibrium, since borrowing is cheaper), that are often viewed as indicative of “creditor moral hazard.”

However, the availability of IMF crisis lending could in fact decrease welfare in the presence of systemic contagion. IMF lending could decrease crisis-prevention efforts to an inefficiently low level because individual countries do not take into account the impact of their lower crisis-prevention efforts on the risk of a crisis affecting other countries.²⁵ Consider an example with $p(e) = 1 - e$, $g(e) = \alpha e$, and $h(e_0) = \gamma < \theta - 1$. Because of the linearity of these functions, the equilibrium crisis prevention effort e is then equal to either $\bar{e} = 1$ or $\underline{e} = 0$. More precisely,

$$\begin{aligned} e_0^{lf} &= \arg \min \{(1 - e_0)\theta + \alpha e_0\} = 1 \text{ iff } \alpha < \theta, \\ e_0^{imf} &= \arg \min \{(1 - e_0)\gamma + \alpha e_0\} = 0 \text{ iff } \alpha > \gamma. \end{aligned}$$

Assume that $\gamma < \alpha < \theta$, so that the IMF decreases crisis prevention effort from 1 to 0. Using the assumed functional forms, $\tilde{L}^{imf}(e_0^{imf})$ and $\tilde{L}(e_0^{lf})$ can be written:

$$\tilde{L}^{imf}(e_0^{imf}) = \frac{p(e_0^{imf})}{1 - \lambda} \gamma + g(e_0^{imf}) = \frac{1 - e_0^{imf}}{1 - \lambda} \gamma + \alpha e_0^{imf}$$

²⁴This result has been referred to as the “Mussa Theorem,” after the IMF’s former chief economist, Michael Mussa (see Mussa, 1999, 2004; and Jeanne and Zettelmeyer, 2005b, for a formal statement). In Mussa’s original formulation, emphasis is put on the fact the IMF cannot be a source of moral hazard provided it is always repaid. The latter is assumed in the setup of our model.

²⁵The fact that IMF lending reduces global welfare is not inconsistent with the participation constraint of individual countries. The participation constraint requires that a given country benefits from having an IMF program, taking the actions of other countries as given. In general equilibrium the actions of other countries are not taken as given and global welfare could be reduced if all countries make too little crisis-prevention effort.

and

$$\tilde{L}(e_0^{lf}) = \frac{p(e_0^{lf})}{1-\lambda}\theta + g(e_0^{lf}) = \frac{1-e_0^{lf}}{1-\lambda}\theta + \alpha e_0^{lf}.$$

Hence, $\tilde{L}^{imf}(e_0^{imf}) > \tilde{L}(e_0^{lf})$ if and only if:

$$\frac{1-0}{1-\lambda}\gamma + \alpha \cdot 0 > \frac{1-1}{1-\lambda}\theta + \alpha \cdot 1,$$

that is, if $\lambda > 1 - \gamma/\alpha$. Hence, we have found an example in which the IMF decreases welfare in the presence of contagion effects above a given threshold. Note also that in the case of $\lambda = 0$, the inequality above reduces to $\gamma > \alpha$, in contradiction with the assumed parameter values. This confirms, in the context of this example, that under $\lambda = 0$, $\tilde{L}^{imf}(e_0^{imf}) \leq \tilde{L}(e_0^{lf})$.

We summarize this discussion as follows:

Proposition 4 *With traditional (ex post) conditionality, IMF crisis lending improves welfare if there is no systemic contagion, but may decrease welfare in the presence of sufficiently high levels of systemic contagion.*

Proof. See discussion above. ■

4.5 The Case for ex-ante Conditionality

Proposition 4 shows that in the presence of an additional distortion—here, we emphasize systemic contagion; below, we will show that a similar problem arises with domestic political economy distortions—standard conditional IMF lending could do more harm than good, by discouraging crisis prevention effort. However, there is a straightforward way of dealing with this problem, namely, to apply conditionality to crisis-prevention effort directly. In this section, we show how this “ex-ante conditionality” works, and explore its welfare implications.

The (optimal) level of crisis prevention effort required by the IMF under “ex-ante conditionality” is set as follows. Let \hat{e}_0 denote the highest level crisis prevention effort that a country is willing to undertake ex ante in exchange for access to IMF lending ex post. This is the highest level of effort satisfying the participation constraint,

$$L^{imf}(e_0) \leq L^{lf}(e_0^{lf}). \tag{9}$$

Furthermore, let $e_0^{fb,imf}$ denote the first-best level of effort in the presence of IMF lending, taking into account the effect of effort on the total number of crises: $e_0^{fb,imf} \equiv \arg \min \tilde{L}^{imf}(e_0)$, where $\tilde{L}^{imf}(e_0)$ was defined in equation (4). Then, “ex ante conditionality” is a lending policy which requires countries to exercise the effort level e_0^{ea} in exchange for access to IMF crisis lending, where

$$e_0^{ea} \equiv \min(\hat{e}_0, e_0^{fb,imf}).$$

In other words, ex ante conditionality requires countries to undertake either the first-best crisis prevention effort or—if this is not feasible, in the sense that countries prefer to forego the option to borrow from the IMF rather than exercise the first-best policy effort—the highest effort level that countries are willing to undertake in exchange for access to IMF financing in a crisis.

Proposition 5 *If there is a positive level of systemic contagion ($\lambda > 0$), ex-ante conditionality is welfare-enhancing relative to both laissez-faire and IMF lending without ex-ante conditionality. Ex-ante conditionality reduces the probability of a crisis and the cost of ex-post conditionality.*

Proof. The first statement follows from the fact that e_0^{imf} and e_0^{lf} both satisfy the incentive condition (9). Hence, the IMF can achieve, with ex-ante conditionality, a welfare level that is at least as good as without ex-ante conditionality or under laissez-faire. The last statement follows directly from $e_0^{ea} > e_0^{imf}$, which is true because $e_0^{fb,imf} > e_0^{imf}$ and $\hat{e}_0 > e_0^{imf}$ (since e_0^{imf} satisfies the incentive constraint (9)). ■

Ex ante conditionality gives the IMF an additional tool to influence crisis prevention policies. If there is systemic contagion, it is always optimal to use this tool. Furthermore the IMF with optimal ex-ante conditionality can never be worse than laissez-faire because the laissez-faire level of crisis prevention effort belongs to the set of efforts that can be induced by ex-ante conditionality.

5 Discussion and Extensions

5.1 Incomplete Information and Imperfect Commitment by the IMF

In introducing the concept of ex-ante conditionality, we have implicitly assumed (1) that the IMF can commit to the ex ante conditions, so that they are fully credible, and (2) that crisis prevention effort is perfectly observable. What if these assumptions are violated?

If ex-ante conditionality is not fully credible, then countries are likely to undertake less prevention than required by the IMF, on the grounds that a welfare-maximizing IMF will be tempted to rescue them anyway in the event of a crisis—especially if the ex-post safety net provided by the IMF is generous. If this is the case, crisis prevention will be suboptimally low, but it will never be less than in a regime in which there is only ex-post conditionality. The conclusion that the regime with ex-ante conditionality dominates the regime without hence seems robust along this dimension (credibility).

Incomplete information about the prevention effort (or, equivalently, about the effectiveness of policy effort of a certain kind with respect to crisis prevention) creates a trickier problem. In this case, ex ante conditionality would need to be written with respect to a noisy signal of the true crisis prevention effort, either because the effort variable(s) cannot be observed precisely, or because of uncertainty over which policy variables are truly relevant. This could lead both to “Type I errors” (lend to countries that undertook too little effort) and “Type II errors” (deny lending to countries even though they undertook the required effort).

As far as the Type I errors are concerned, ex ante conditionality can never do worse than the regime with ex post conditionality only. However, it might do worse on the grounds that it makes too many Type II errors, i.e., excludes too many “deserving” countries from lending. For any given level of observed effort e_0^{ea} required by ex ante conditionality, there should be a degree of noisiness in the signal such that ex ante conditionality lowers welfare relative to the regime without any ex ante conditionality. At the same time, one would conjecture that this can be addressed by making the ex ante policy sufficiently “permissive” depending on the noisiness of the signal, i.e., by decreasing e_0^{ea} relative to its level under complete information. Only in the limit (that is, for completely uninformative signals) will the optimal ex ante policy coincide with the regime without any ex ante conditionality.

Based on these arguments, some form of ex ante conditionality is likely to be welfare improving even in situations with limited credibility and noisy signals. This said, in the presence of noisy signals (or uncertainty about the “right model” for crisis prevention) the optimal ex ante conditionality would need to be modified relative to the policy defined in the previous section, in the direction of imposing less stringent conditions ex ante.

5.2 Large versus Small Countries

In the baseline model, we have assumed that all countries are “large” in the sense that they impose a crisis externality on others. What happens if this is not the case, in the sense that some countries are so “small” that they do not impose this externality? The answer is that all results of the baseline model go through, except that ex ante conditionality now makes sense only for the “large” countries, since only in these countries crisis prevention effort involves a social cost that is not fully internalized by the government (we maintain the assumption that there are no domestic political distortions for the time being). In contrast, ex post conditionality continues to make sense for all countries, since the rationale for this—providing commitment—had nothing to do with crisis externalities (it would apply even in a one country model).²⁶

5.3 Distortions Related to Domestic Political Economy

We now turn to a possible alternative reason why governments may underinvest in crisis prevention effort, and hence an alternative rationale for ex ante conditionality, namely, a domestic political economy distortion. We foreshadowed this possibility in the setup of our model by allowing the government’s discount factor to be smaller than the social discount factor (perhaps reflecting short political horizons). That is, while the social welfare function of country i is

$$U_{i,t} = E_{i,t}(c_i) - f(k_i) - g(e_{i,0})k_i,$$

while the government maximizes:

²⁶The details of this extension of the model are available upon request to the authors.

$$V_i = \beta_i E_{i,0}(c_i) - f(k_i) - g(e_{i,0})k_i,$$

where β_i , the weight that the government puts on future consumption, could be lower than 1.

In the baseline model, we assumed $\beta_i = 1$ in order to focus on the distortion associated with systemic contagion, $\lambda \geq 0$. We now make the reverse assumption, that is $\beta_i < 1$ and $\lambda = 0$. Consequently, $p_i = p(e_{0,i})$, i.e., the probability of a crisis depends only on the government's own actions and not on that of other governments. For this reason, the cross-country dimension no longer plays a role, and we drop the country subscript i in what follows.

We redefine the four loss functions defined earlier in equations (3)–(8) as follows:

$$\begin{aligned} L(e_0) &= \beta p(e_0)\theta + g(e_0), \\ L^{imf}(e_0) &= \beta p(e_0)h(e_0) + g(e_0), \\ \tilde{L}(e_0) &= p(e_0)\theta + g(e_0), \\ \tilde{L}^{imf}(e_0) &= p(e_0)h(e_0) + g(e_0). \end{aligned}$$

As before, $L(e_0)$ and $L^{imf}(e_0)$ describe the loss associated with crises and crisis prevention effort from the perspective of the government, while $\tilde{L}(e_0)$ and $\tilde{L}^{imf}(e_0)$ describe it from the perspective of a benevolent social planner. The difference is that, before, the distinction between the government and the social planner consisted in that the former did not internalize the contagion externality while the latter did. Now, the distinction consists in the different discount rates of the government and the social planner.

With these redefinitions, the analysis of this version of the model turns out to be almost exactly analogous to the baseline model. Here, we do not go through each step, but merely highlight the main results, and the (few) differences.²⁷

- Under *laissez faire*, the government underinvests in crisis prevention, resulting in crisis risk and country borrowing rates that are too high relative to the first best, and capital flows that are too low, just as in the baseline model (Proposition 1). This is because the government discounts the costs of potential crises, which are in the future, too much relative to the costs of preventing them, which are in the present.

²⁷The details are available upon request to the authors.

- The rationale for standard IMF lending remains unchanged, that is, to provide commitment in the face of a time consistency problem that arises in the context of crisis mitigation, with IMF lending critical to secure that commitment.

- The effects of standard IMF lending on crisis mitigation effort are also unchanged. There continues to be both a “moral hazard” effect (from the fact that crises are less costly than without the IMF) and an effort substitution effect (higher crisis prevention effort means lower crisis mitigation effort). Depending on which effect dominates, crisis prevention effort can go up or down. The only difference is in the way in which the distortion interacts with the effort substitution effect. With a domestic political economy distortion, the relative size of the effort substitution effect is decreasing in the distortion, since the cost of crisis mitigation is discounted more. In contrast, in the model with systemic contagion, a higher contagion parameter tended to increase the probability of a crisis for a given level of effort, and hence the incentive to invest in effort to reduce the cost of crisis mitigation.

- As before, IMF conditionality can be welfare reducing if crisis prevention effort goes down. Whether this is the case or not depends on the size of the political economy distortions. Intuitively, if there is no political economy distortion, then any reduction in prevention effort would just be an efficient response to the safer environment that comes from the presence of the IMF. This would improve welfare. Only in the presence of the distortion will the reduction in effort go beyond what is socially justified. If prevention effort goes down excessively, the detrimental effect on crisis prevention will more than offset the welfare gains that come from better crisis mitigation due to the presence of the IMF.

- When effort is inefficiently low in the presence of IMF crisis mitigation, then ex ante conditionality can be used to raise it and improve welfare, for the same reasons as in the baseline model: namely, because the country is willing to exert extra effort to maintain the option of accessing IMF crisis lending in the event of a crisis.

Finally, note one subtle difference between political economy distortions and cross-country externalities: the former (but not the latter) could potentially be addressed not just through ex ante conditionality on effort, but also by excluding some countries from IMF lending based on country characteristics such as the quality of governance. However, it turns out that this brand

of “selectivity” is dominated, in a welfare sense, by ex ante conditionality as described in this paper, since the latter might induce some poor governance countries to exercise the required prevention effort and hence benefit from access to IMF lending. In contrast, under ex ante conditions focused on the political distortions themselves, those countries would simply be excluded from IMF lending.

6 Conclusion

This paper has attempted to clarify the financial role of the IMF that evolved since the 1950s, characterize the conditions under which this role may distort incentives and give rise to moral hazard, and suggest a reform—namely a greater role of ex ante conditionality in IMF lending operations—which would eliminate this distortion. The main insights are as follows.

First, traditional (ex post) conditionality can be rationalized as the solution to a commitment problem. In a situation in which a country experiences a sudden stop which involves some deterioration in the country’s solvency, crisis resolution will require some policy effort, or “adjustment” in the IMF’s terminology. It will also require liquidity, e.g. a rollover by existing creditors, or new investment. Creditors would in fact roll over, and confidence would return, provided that the government undertakes the policy effort. But once that happens, the government will have an incentive to renege on its adjustment promise. Anticipating that, there is no rollover. IMF conditionality is a device that solves this problem, by committing the government to carry out the effort. The justification for the IMF (in this context) is its institutional capacity to make that commitment stick, through a process of tranching crisis lending and conditionality discussed in Section II. By doing so, the Fund helps to avoid or shorten crises and—subject to a caveat, see below—improves welfare.

Second, IMF lending with ex post conditionality can be a source of moral hazard, but only under specific conditions:

- Consider first its effect on crisis prevention effort on the side of the government. In general, this is ambiguous. On the one hand, IMF lending reduces the cost of a crisis and so reduces prevention incentives. However, countries also understand that the cost of carrying out adjustment in the context of an IMF supported program will be lower the higher the crisis-

prevention effort. If this “effort substitution effect” dominates, IMF lending could induce more crisis prevention.

- Next, suppose that the presence of IMF lending does indeed reduce crisis prevention effort. Does this mean that the IMF is a source of moral hazard? Not necessarily, because the reduction in effort could be an efficient response—one that occurs at no-one’s expense—to a safer international environment. This will be the case, specifically, if IMF lending does not carry a subsidy, if debtor governments maximize domestic welfare, and if there are not crisis or policy externalities across countries. If these conditions are satisfied (or if any violation is small), then IMF crisis lending will be welfare improving, even if it leads to lower crisis prevention effort.

- If, however, there are large crisis externalities across countries, or significant discrepancies between the interests of governments and societies as a whole, then IMF crisis lending could be welfare reducing. In those cases, the government will underinvest in crisis prevention relative to the social optimum, either because it does not internalize the international benefits of crisis prevention, or because it discounts the costs of crisis resolution too much (compared to the social burden).

Third, the paper shows how moral hazard associated with IMF crisis lending can be avoided, namely, by applying conditionality to the country’s crisis prevention effort, i.e. to the quality of economic policies and institutions. Optimal ex ante conditionality involves either asking the country to implement the first best policy effort in the presence of IMF lending (which may be lower than the first best effort without the IMF, given the reduced risk) or, if this is not feasible, the highest policy effort that the country is prepared to exercise in exchange for access to IMF lending in a crisis.

One problem with ex-ante conditionality is related to time consistency. Once a member country has run into trouble, the optimal action going forward will be to allow it to borrow whether or not it has undertaken adequate prevention efforts ex ante. Denying countries which fail to meet ex ante conditions a loan (or at least a high-access loan) would require a high capacity to commit on the side of the IMF. The commitment capacity may be even higher than that needed to make conventional IMF programs work, in which a similar time consistency problem arises when denying new loan tranches to important borrowers who have failed to meet a performance criterion. A governance structure embodying enhanced operational independence

and strengthened medium-run accountability can help to address this time-consistency problem.

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APPENDIX

This appendix presents an extension of the baseline model that explains how IMF conditionality can be implemented in equilibrium through reputational mechanisms. The baseline model is extended to a repeated game between the IMF and the borrowing countries. We assume discrete infinite time $t = 1, 2, \dots$. Each period t is composed of three sub-periods t_0 , t_1 and t_2 that correspond to the three periods of the baseline model. The three-period game described in the baseline model is repeated in each period t of the extended model. In period t_j the government in country i maximizes the country's intertemporal welfare,

$$W_{i,t_j} = U_{i,t_j} + E_{t_j} \left(\sum_{s=1}^{+\infty} \beta^s U_{i,t+s} \right),$$

where U_i is the country's welfare as defined in equation (1). Note that here β denotes the discount rate of the infinitely-lived representative resident in country i rather than the effect of political distortions (it is not the same as β in equation (2)).

The global economy is composed of the borrowing countries and lenders. The welfare of lenders at the beginning of period t (which was left implicit in the presentation of the baseline model) is given by,

$$W_t^\ell = E_t \left[\sum_{s=0}^{+\infty} \beta^s (c_{t+s_0}^\ell + c_{t+s_1}^\ell + c_{t+s_2}^\ell) \right].$$

Lenders receive an exogenous income stream. They use their income to consume, to lend to countries, or to finance the IMF.

The IMF is endowed at the beginning of each period t by lenders. Lenders expect a zero return on their contributions to the IMF and do not contribute to the IMF if they expect a negative return. In any period t the IMF maximizes global welfare $W_t = \int W_{i,t} di + W_t^\ell$.

In order to capture conditional tranching lending, we assume that in any subperiod t_1 the IMF provides a fraction ϕ of its loan before the effort e_1 is produced (at the beginning of t_1), and the rest of the loan after the effort has been observed (at the end of t_1). The IMF commits to provide the remainder of the loan only if the effort is made. If this commitment is credible the

country implements the effort since a failure to do so would lead to a costly liquidation. We look into the conditions under which the IMF's commitment is credible.

We look at equilibria with "trigger strategies" analogous to those that have been used for example in Barro and Gordon (1983) to explain why central banks may be able to implement low inflation for long periods of time in spite of the temptation to engineer an inflationary surprise. In these equilibria the fact that an agent deviates from an agreed-upon rule or behavior makes the other agents believe that the agent will never implement the rule again, a punishment that is described as a "loss of reputation" for the deviating agent.

Here, the IMF maintains a reputation for strictly enforcing conditionality by not granting the second tranche to the countries that have failed to implement the crisis-resolution effort. Deviating from the rule (i.e., giving the second tranche to a country that has failed to make the effort) is tempting in the short run because this saves the deadweight loss of liquidation. However this leads the IMF to lose its reputation. Global investors know that their contribution to the IMF is no longer safe and they no longer finance the IMF. Thus, the IMF is faced with a trade-off between increasing welfare in the short run and decreasing it the long run.²⁸

We maximize the temptation to deviate by assuming that all the countries with IMF programs fail to implement the effort. The condition for punishing deviating countries then becomes

$$p(1 - \pi)\theta k < \frac{\beta}{1 - \beta} \left(U_0^{imf} - U_0^{lf} \right). \quad (10)$$

The left-hand side is the increase in current-period global welfare resulting from IMF forbearance (granting the second tranche in spite of no effort). It is the fraction of countries with bad news, p , times the expected output lost if there is a liquidation, $(1 - \pi)\theta k$. The right-hand side is the global welfare loss from not having a functioning IMF in the subsequent periods.

We assume that the IMF raises the borrowing country's ex-ante welfare, $U_0^{imf} > U_0^{lf}$ (which is the same as raising global welfare since the lenders' welfare is equal to the present discounted value of their exogenous endowments). Then if β is large enough condition (10) implies that the IMF is

²⁸We assume that the IMF maximizes global welfare. If the IMF's objective were instead to ensure its continued existence the incentives to enforce conditionality would be even stronger.

ready to punish deviating countries in order to remain operational in the future. Hence countries implement IMF conditionality in equilibrium if β is large enough. Note that if $\beta = 0$ we are back to the baseline model and the IMF cannot credibly commit to conditionality. The reputational mechanism relies on the IMF being a long-lived institution that cares about global welfare.

The enforcement of conditionality could rely on the reputation of borrowing countries rather than the reputation of the IMF. For example, one could assume that global investors forgive the IMF for making a loss, but impose a rule that the IMF cannot ever lend again to a country that has defaulted on the IMF. The IMF maximizes global welfare subject to that rule. Then a country with an IMF program might produce the effort to keep access to IMF lending in the future. The condition for this is

$$[h(e_0) - \pi(\theta - 1)]k < \frac{\beta}{1 - \beta}\pi \left(U_0^{imf} - U_0^{lf} \right).$$

The right-hand side is the short-run welfare gain from not implementing the crisis-resolution effort. The right-hand side is the welfare loss from losing access to IMF lending in the future (which occurs with probability π , the probability of a default conditional on no effort).