Country Insurance*

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Comments Welcome.

Abstract

To understand the consequences of the presence of international safety nets on the government's incentives to undertake reforms, we model IFIs´ interventions as country insurance policies. We find that country insurance (especially when made contingent on negative external shocks) is more likely to foster reforms in crisis-prone volatile economies. The consequences of country insurance on reform incentives, however, hinge on the nature of the reforms being considered: "buffering" reforms aimed at mitigating the cost of crises will be partially substituted for by insurance, and may be ultimately discouraged; by contrast, "enhancing" reforms that pay off more generously in the absence of a crisis will instead be promoted.

Keywords: Bailouts, Moral Hazard, Insurance Effect, International Lender of Last Resort, Financial Crises

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1 Introduction

The recent wave of financial crises has challenged the role of International Financial Institutions' (IFIs) as crisis managers. IFIs' rescue packages have faced criticism for different, and often opposite reasons. While antiglobalizers accuse IFIs of providing distressed countries with insufficient resources to protect the poor, free-marketers blame the same IFIs for undermining market discipline through their excessive *largesse*. While difficult to reconcile ideologically, these views can be encompassed in a framework that trades off current economic and social costs (*real hazard*) and future costs in terms of excessive risk taking or insufficient reform (*moral hazard).* Evaluating the role of the IFIs and its moral hazard consequences, however, requires a clear understanding of how international safety nets influence emerging markets' incentives to undertake politically costly reforms that may, in turn, affect their financial vulnerability in the future. This paper puts forward a stylized analytic framework to identify these effects, and assess its implications.

As Haldane and Taylor [2003] clearly point out, "IMF facilities can usefully be considered as a kind of insurance policy. [...] Liquidity crises represent a *real hazard* that such insurance can help mitigate. In this role, IMF insurance is clearly welfare enhancing. As with any insurance policy, however [...] mitigating the real hazard of crisis might at the same time aggravate the *moral hazard* of distorted incentives" (p.122). The question of whether such moral-hazard costs are so large that "the IMF might consider changing its name to IMH– the Institute for Moral Hazard" (Barro [1998]) or so small that "Argentina's difficulty in obtaining IMF lending has to do with an overstating of the problem of moral hazard" (Griffith-Jones [2003]) is an empirical one that, while already the subject of a growing literature, remains elusive.

Zhang [1999] studies the emerging market bond spreads before and after the Mexican bailout, and finds no evidence of moral hazard. Lane and Philips [2000] look at how emerging market bond spreads, between 1995 and 1999, reacted to a number of IMF-related news and only find two (out of 22) episodes in which interest rate spread behavior was consistent with the moral hazard hypothesis. One of these two episodes is the increase in emerging market spreads in the aftermath of the Russian 1998 default. This event is carefully analyzed by Dell'Ariccia et al. [2002] who estimate a structural model for emerging market bond spread and show, consistently with the moral hazard hypothesis, that the failed Russian bailout increased spread levels, their sensitivity to fundamentals, and their cross-country dispersion.

Even if one accepts that international safety nets may create investor moral hazard, this does not imply, as often suggested, that such moral hazard is at the expenses of global taxpayers. Indeed, Jeanne and Zettelmeyer [2001] provide evidence that the IMF repayment record is very good [1] so that official crisis lending de facto involves virtually no cost to the rest of the world. If this is the case, from a social planner's perspective (alternatively, for the country as

[1] They estimate in 5 percent the upper bound for the default rate.

a whole) rescue packages should not be considered as state-contingent transfers (as in a standard insurance policy) but rather as state-contingent loans, closer to a textbook lender of last resort with limited moral hazard consequences.

However, as the borrower is ultimately the government, bailouts can still introduce an agency problem between a borrowing government that does not fully internalizes the future repayment of the bailout, and the domestic taxpayers who ultimately foot the bill. Thus, even in the absence of a subsidy component, one could point at a *government moral hazard*, namely, "a discrepancy between the policymaker's objective and the domestic taxpayers' long-term interests," (Jeanne and Zettelmeyer, 2001). In this case, inasmuch as only a fraction of the bailout cost is paid during his period in office, bailouts preserve their insurance nature from the government's standpoint.

With this focus on government moral hazard as a starting point, this paper provides a stylized analytical framework that sheds light on the incentive trade-offs associated with the presence of an international safety net or country insurance scheme. More precisely, we identify the implications of country insurance on different types of reforms, under different assumptions regarding the sources of financial fragility underlying a crisis. Opting for a parsimonious framework allows us to encompass a number of situations and channels (some, but not all of them, addressed by the existing literature) through which country insurance can indeed enhance the returns on reform effort and reinforce reform incentives, despite the presence of moral-hazard.

We find that country insurance may strengthen the incentives to invest in reforms whenever their payoffs are negatively correlated with the probability of a crisis. Specifically, if the political returns on reforms that enhance productivity and economic growth in the long run can be eroded by episodes of financial distress driven by largely exogenous shocks, a high probability of facing these shocks would tilt the government's decision in favor of inefficient policies with more immediate returns. Insurance, by reducing the incidence of these shocks, restores reform incentives. Not surprisingly, then, we find that insurance is more likely to stimulate reform in crisis-prone volatile economies.

On the other hand, a crisis implies a political cost to the government both indirectly through their deleterious consequences on the real economy and directly through the probability of being voted out of office as a result. Then, as long as reforms play a role in preventing financial crises or mitigating their effects, insurance would relax the discipline induced by these costs. Ultimately, we find that this moral hazard effect may offset the beneficial impact of insurance if the political costs of a crisis could be made sufficiently large.

Our analysis also highlights the importance of the nature of reforms under consideration (and, specifically, of the correlation of reform payoffs and the macroeconomic context) when assessing the consequences of country insurance. In particular, "buffering" reforms that tend to reduce the real impact of adverse shocks and, as a result, pay off relatively more in the event of a crisis are likely to benefit less (and, in the limit, to be discouraged) by insurance, as the latter partially substitutes for the former. By contrast, country insurance would be particularly conducive to "enhancing" reforms that pay off more handsomely in

tranquil times.

In the last part of the paper, we extend our analysis to address two additional channels recently proposed in the literature through which country insurance may strengthen reform incentives: i) an increase in the continuation value of the policymaker (which, in turn, increases his incentives to avoid a crisis), and ii) a reduction of the incidence of self-fulfilling crises unrelated with reform effort (which strengthen the link between the policymaker's decisions and the final outcome).

The first channel builds on Cordella and Levy Yeyati [2003], who, in a banking model, showed that a central bank that commits to bailout insolvent institutions in times of adverse macroeconomic conditions creates a risk-reducing "value effect" that lessens both the frequency of bankruptcies *and* overall bank risk. The second channel has been recently discussed by Corsetti et al. [2003] and Morris and Shin [2003]. The first paper develops a model in which international liquidity support can either generate debtor moral hazard or, by reducing liquidation costs in the event of a run, create the incentives for a government to implement costly reforms. The second paper shows that if currency crises are triggered by a coordination failure among creditors, international bailouts sometime enhance the incentives for governments to take preventive actions, as IMF's decisions are strategic complements with the adjustment effort of the country, and the roll-over decisions of the private sector creditors.

In this paper, we show that the introduction of a dynamic value effect reinforces the case for contingent country insurance, the more so the longer the effective planning horizon of the policy maker. Similarly, we find that the presence of self-fulfilling liquidity runs provides an additional rationale in favor of insurance, this time by reducing the incidence of exogenous events on the probability of facing a crisis that erodes reform payoffs and undermines reform incentives.

The plan of the paper is as follows. The next section presents the model and derives the main analytical results. Section 3 discusses more in depth the implications of the nature of reforms, as well as the more practical questions of implementability and the scope for using crisis costs as an alternative incentive mechanism. The final part of the section presents extensions that examine the role of the value effect and the presence of self-fulfilling crises. Finally, section 4 extracts some policy implications and concludes.

2 The Model

To discuss the different effects that a country insurance policy may have on policymakers' incentives to undertake reforms, consider the following stylized framework. At the beginning of the period, the government inherits a fixed amount of debt and decides on its policy stance. The policy choice is characterized by the amount of reform effort the government is willing to undertake. A reformist attitude (high effort) increases the probability of avoiding a crisis in the long run, but at the same time, it reduces the government's ability to reap immediate political returns (which may include political patronage or fund

diversion). After the policy choice is made, an exogenous state of nature is revealed. In the absence of insurance, the probability of being unable to repay creditors at the end of the period (henceforth, a "crisis") is a function of macroeconomic fundamentals, and of the reform effort previously undertaken.[2]

We assume that, unlike the returns from short-run policies, returns from reform take time to materialize and depend on the evolution of the macroeconomic context.[3] In addition, to capture the fact that the effective cost of a crisis influences reform incentives (alternatively, the moral hazard problem associated with insurance), we assume that the implementation of reforms reduce the likelihood of crisis episodes. Finally, we assume that a crisis event have specific real effects (which reflect in a political cost to the government) beyond and above of those related with macroeconomic fundamentals, due to the cost associated with the debt default and its resolution.

Within this framework, we define the insurance contract as a policy that stipulates the conditions under which an "insurer" provides the funds needed to repay lenders in the event of a crisis. We consider two extremely simple contracts: one that insures the borrower against insolvency whenever it occurs, and one that does it only in bad states of nature.[4] Note that an insurance contract can, in principle, be written as a function of realized reform effort. In practice, however, the measurement and verifiability of reform is bound to be contestable, to an extent that may prevent the enforcement of the contract. To capture this limitation, we assume that reform effort is not verifiable and thus cannot be used to condition the provision of insurance.

Under either insurance scheme, the country faces three possible scenarios: solvency, associated with benign macroeconomic fundamentals (which we henceforth denote as "tranquil" times); insolvency, associated with adverse macroeconomic fundamentals, where default is avoided through the activation of the insurance policy (which we denote as "turbulent" times), and insolvency followed by default (a "crisis"). The distinction between the last two scenarios reflects the fact that, while insurance may save the country the additional costs of default, it does not fully eliminate the real consequences of a bad state of nature.

More formally, we assume that, in the absence of insurance, a crisis happens with probability $\pi = 1 - s_J e$, where $e \in [0, 1]$ denotes the government's reform effort, associated with a quadratic opportunity cost $c(e) = e^2$ that represents the forgone returns from alternative short-run policies. The stochastic variable

[2] The fact that we rule out partial repayment is just for the sake of simplicity and does not affect our main results.

[3] There are a number of ways in which reforms may increase the government's utility, including through a raise in productivity (if the country's income is an argument of the government's objetive function) or through an improvement of the efficiency of tax collection (if the government's income, and its allocation, is an argument of the government objetctive function). The way in which the political returns of reforms differ according to the country's macroeconomic and financial context will depend on the nature of the reform. We will come back to this issue later on.

[4] In the context of our model, it is easy to show that all feasible contract are strictly dominated by at least one of there two extreme alternatives.

s_j, $j = B, G$, reflects an observable exogenous state of nature, where subscripts B, and G denote "good" and "bad" states, so that $s_B < s_G < 1$. In this simple set-up, for a given level of effort, the probability of a crisis is higher in bad states; for a given state, a crisis is more likely when reform effort has been low. For expositional simplicity, we further assume that $\Pr(s_B) = \Pr(s_G) = \frac{1}{2}$, and that $s_B = \gamma - \alpha$; $s_G = \gamma + \alpha$. These two assumptions imply that the probability of a crisis is given by $\pi = 1 - \gamma e$. From now on, we refer to γ as the expected state of nature and to α as exogenous volatility.

As noted, we assume that reforms generate "returns" to the government. We let such returns be equal to $\mu \leq 1$ in tranquil times, to β in turbulent times, and to λ in crisis periods. In order to rule out the trivial cases in which country insurance is either always or never optimal, we work under the assumption that $\mu \geq \beta \geq \lambda$. Finally we assume that the occurrence of a crisis entails an additional fixed cost to the government equal to C.

The assumption that, in the event of insolvency, reform payoffs are higher if the country is insured captures the effort-increasing effect (the "carrot") of the insurance policy. The rewards of reform declines both with deteriorating fundamentals and with the unraveling of a debt crisis. Insurance cannot eliminate the former, but helps avoid the latter.[5] This effect is counterbalanced by the standard moral hazard effect introduced by the insurance policy which, in our framework, is associated with the elimination of the cost of the crisis, C, in those states in which the insurance is activated.[6]

The problem of the government in absence of insurance (denoted by the subscript NI) is given by

$$\underset{e}{Max} U_{NI} = \gamma\mu e^2 + (1 - \gamma e)(\lambda e - C) - e^2, \tag{1}$$

from which we have that[7]

$$e^*_{NI} = \frac{\lambda + \gamma C}{2(1 - \gamma(\mu - \lambda))}. \tag{2}$$

As expected, the optimal level of effort is a positive function of the cost of a crisis ($\frac{\partial e^*_{NI}}{\partial C} > 0$), and of the quality of macroeconomic fundamental ($\frac{\partial e^*_{NI}}{\partial \gamma} > 0$). It also increases with the reform payoff in tranquil times[8] ($\frac{\partial e^*_{NI}}{\partial \mu} > 0$). The reform payoff during a crisis, λ, has, however, an ambiguous effect on

[5] A natural way to interpret this assumption is to think of $\beta - \lambda$ as the result of a lower cost of capital under unfavorable macroeconomic conditions when the country's repayment capacity is preserved (at least partially) by the insurance policy.

[6] In its simplicity, our model seems to rule out the possibility of moral hazard in absence of insurance. However, moral hazard would be present whenever the the benefits and costs of reform for the government differ from those for its constituency. Trivially, as the cost of the crisis born by the government declines (as C approaches zero), the policymaker will be increasingly prone to reduce effort.

[7] All results mentioned in the text are formally derived in the Appendix.

[8] Since we normalized reform payoffs in tranquil times to unity, the increase in refoirm payoff in turbulent and crisis are always to be understood as changes relative to tranquil times.

policymakers' willingness to undertake reforms. A higher value of λ, by reducing the loss associated with defaults, raises the payoff of reforms. However, it also weakens the incentives to reduce the probability of a crisis. In the Appendix, we show that the first effect dominates the second when the cost of the crises are low enough, that is in situations in which the disciplinary effect of crises is necessarily limited.

The introduction of a blanket insurance policy that guarantees creditors whenever the country becomes insolvent (a case denoted by the subscript BI) modifies the problem to:

$$\underset{e}{Max} U_{BI} = \gamma\mu e^2 + (1 - \gamma e)\beta e - e^2, \tag{3}$$

from which we have that

$$e^*_{BI} = \frac{\beta}{2(1 - \gamma(\mu - \beta))}. \tag{4}$$

Again, reform effort increases with the quality of macroeconomic fundamentals ($\frac{\partial e^*_{BI}}{\partial \gamma} > 0$), with the reform payoffs in tranquil ($\frac{\partial e^*_{BI}}{\partial \mu} > 0$) and turbulent times ($\frac{\partial e^*_{BI}}{\partial \beta} > 0$). Of course, under such policy, the disciplinary effect of the crisis is deemed to play no role.

Finally, we study the effects of a conditional insurance policy (denoted by the subscript CI), that is of a creditors' guarantee that is activated exclusively in bad times ($s = s_B$). The government's problem can now be rewritten as:

$$\underset{e}{Max} U_{CI} = \gamma\mu e^2 + \frac{1}{2}(1 - (\gamma - \alpha)e)\beta e + \frac{1}{2}(1 - (\gamma + \alpha)e)(\lambda e - C) - e^2, \tag{5}$$

from which we have that

$$e^*_{CI} = \frac{\beta + \lambda + C(\alpha + \gamma)}{4(1 - \mu\gamma) - 2\alpha(\beta - \lambda) + 2\gamma(\beta + \lambda)}. \tag{6}$$

As before, the optimal level of reform effort is a positive function of the cost of a crisis ($\frac{\partial e^*_{CI}}{\partial C} > 0$), and of the expected state of nature ($\frac{\partial e^*_{CI}}{\partial \gamma} > 0$). It also increases with the reform payoff in tranquil times ($\frac{\partial e^*_{CI}}{\partial \mu} > 0$). The reform payoffs in turbulent (β) and in crisis times (λ) have, however, an ambiguous effect on policymakers' willingness to undertake reforms. As in the case of the blanket insurance, the reform payoff during a crisis, λ, has a positive effect on policymakers' willingness to undertake reforms only when the costs of the crisis are low enough. The same is true for the reform payoffs in turbulent times. It is only when the disciplinary effects of the crisis are limited that the insurance effect of the safety net provided by the insurance in crisis times dominates the moral hazard effect of such policy.

We are now in a position to compare the reform effort in the three different scenarios discussed above, and see under which conditions country insurance schemes foster or hinder reform effort.

Result 1 *:*
(i) If the crisis costs are very low ($C < C_1 \equiv \frac{(\beta-\lambda)(1-\mu\gamma-\alpha\beta)}{(\gamma+\alpha)(1-(\mu-\beta)\gamma)}$), the reform effort is highest under a blanket insurance, and lowest under the no insurance regime ($e_{BI} > e_{CI} > e_{NI}$);
(ii) If the crisis costs are low ($C_1 < C < C_2 \equiv \frac{(\beta-\lambda)(1-\mu\gamma)}{\gamma(1-(\mu-\beta)\gamma)}$), the reform effort is highest under conditional insurance and lowest under no insurance ($e_{CI} > e_{NI} > e_{BI}$);
(iii) If the crisis costs are high ($C_2 < C < C_3 \equiv \frac{(\beta-\lambda)(1-\mu\gamma+\alpha\lambda)}{(\gamma-\alpha)(1-(\mu-\beta)\gamma)}$), the reform effort is highest under conditional insurance, and lowest under blanket insurance ($e_{CI} > e_{BI} > e_{NI}$);
(iv) If the crisis costs are very high ($C > C_3$), the reform effort is highest under no insurance, and lowest under a blanket insurance ($e_{NI} > e_{CI} > e_{BI}$).

Proof: See Appendix

To grasp the intuition of these results, it is best to start by comparing the no-insurance and blanket-insurance cases. First, notice that the main force at works is the interplay between the motivating carrot of the insurance, captured by the difference between the reform payoff in turbulent and crisis times, and the dissuasive stick of crisis costs, which the insurance policy necessarily attenuates. It is not surprising, then, that if the stick is large enough, reform effort will be lower under an unconditional insurance policy. Conversely, a weak stick would imply a weak moral hazard problem as a result of a blanket insurance, which would then provide better incentives for reform.

The moral hazard aspect detracts from the benefits of the blanket insurance when the cost of the crisis increases. This effect can be attenuated by conditioning the insurance policy to the realization of a bad shock. The reason this might be "incentive compatible" is well-known in principal agent models.[9] Indeed, a state contingent insurance increases the value of effort in those states in which a failure is most likely to be the consequence of external circumstances (a bad shock) and preserves the stick in those states in which a failure is most likely to be associated with insufficient reform. In terms of the previous trade-off, this contingent policy entails both a smaller carrot (since it is now available only in the event of a bad shock) and a weaker stick (effective only if the country becomes insolvent under good macroeconomic conditions). However, the first effect is proportionally smaller than the second one, improving upon a blanket insurance as the moral hazard gains importance ($C > C_1$) and leading to more reform than in the no-insurance case as long as moral hazard does not become an overwhelming concern ($C < C_3$).

A clearer intuition of the conditioning mechanism can be obtained with the help of a limiting example in which a bad shock causes insolvency with certainty

[9] The classical reference is Hölmstrom (1988). In our set-up, the probability that the crisis is caused by policymakers' lack of reform effort is proportional to the value of the the macroeconomic conditions s_j. This implies that reform effort satisfies Milgrom's (1988) monotone likelihood ratio property, and ensures that the "optimal" insurance policy is, loosely speaking, monotonic in s_j.

($\alpha = \gamma$ so that $s_B = 0$). Substituting these values in the first order conditions of the maximization problem, it is immediate to verify that the difference in the marginal utility of reform effort in the contingent insurance and the no insurance scenario ($\frac{\partial U_{CI}}{\partial e} - \frac{\partial U_{NI}}{\partial e}$) is simply given by $\frac{(\beta-\lambda)}{2}$. In this case, the only effect of the introduction of insurance is a higher return on reform contingent on a bad shock. The moral hazard component, on the other hand, disappears, since the incidence of reform on the probability of insolvency under adverse macroeconomic conditions is, in this extreme situation, inexistent.

The above example suggests that the effectiveness of country insurance contracts in fostering reforms depends not only on the reform payoffs in the different scenarios, but also on the expected state of nature and its volatility. More precisely, if the appeal of a country insurance is measured in its ability to foster reform effort :

Result 2 *:*
(i) The higher the probability of a crisis for a given level of reform (the lower γ), the stronger the case for insurance;
(ii) The higher the exogenous volatility (α), the stronger the case for contingent insurance;

Proof: See Appendix

These results shed some light on the characteristics that would make a country a natural candidates for the insurance policy we suggest: a crisis-prone volatile economy. Indeed, in the presence of a good and stable exogenous context that reduces the probability of a crisis, expected reform payoffs are already high, and likely to be undermined by the moral hazard component of the insurance policy. By contrast, when the expected returns on reform are reduced by adverse or highly unpredictable exogenous context, country insurance may offset this effect strengthening the incentives to reform and outweighting moral hazard considerations. Then, it is not surprising that high exogenous volatility reinforces the case for conditional insurance. Under such policy, the insurance is in place only in those states in which moral hazard effects are necessarily subdued, while in those states world in which moral hazard should be a concern, the disciplining effect of the cost of a crisis is preserved.

3 Discussion

The simplified model presented above highlights the main trade-offs underscoring much of the discussion on international bailouts, particularly, their effect on borrowers' moral hazard and on their incentives to undertake reforms. In this section, we specialize the analysis to better illuminate its policy implications. First, we look in more detail into how the link between insurance and incentives relates to the nature of the reform under scrutiny. Next, we raise the critical issue of the insurance contract's implementation costs. Finally, we extend the

model to address two additional channels brought up by recent contributions in the bailout literature, to single out the basic ingredients behind them and how they relate to the channel discussed in the previous section.

3.1 Enhancing versus buffering reforms

Following the existing literature, we have used the term reform to denote a diverse set of government policies that tend to enhance long-run productivity and increased the country's resilience in periods of financial distress, at a short-run (political if not economic) cost. These consequences of reforms are captured in our model, respectively, by the level of marginal reform payoffs in each state, and by relative reform payoffs across states.[10]

However, the relative payoffs under different scenarios (and, in turn, the impact of country insurance) are likely to differ substantially according to the specific nature of the reform under consideration. On the one hand, deregulation or government retrenchment that tend to enhance productivity across the board may increase the relative payoff in tranquil times. Thus, for example, privatization of state-owned utilities may raise efficiency under all scenarios, at the cost of increasing the rigidity of utilities prices (and reducing political rents) during turbulent and crisis periods. On the other, prudential reforms that increase capitalization and liquidity ratios of domestic banks may attenuate the impact of an adverse shock and the costs of a crisis, at the expense of wider intermediation margins in tranquil times. Similarly, tax reforms that improve fiscal accounts at the cost of a higher effective tax burden, by making government revenues less procyclical and broadening the scope for countercyclical fiscal policy, are particularly beneficial under adverse macroeconomic conditions.

Broadly speaking, then, reforms could be defined as "enhancing" or "buffering," according to whether their payoffs are relatively higher or lower in tranquil times (more generally, whether they contribute to enhance the upside or buffer the downside of the distribution of returns across states). In the context of our model, this distinction can be simply captured by the difference in the parameters that determine reform payoffs ($\mu - \lambda$): The more preventive the nature of the reform, the wider this difference.[11] Based on this simple taxonomy, it is easy to show that

Result 3 *The scope for reform-inducing country insurance policies narrows with the buffering nature of reforms.*

[10] Notice that in our analysis, we implicitely assumed that reform precedes the realization of the shock and that the associated reform costs are incurred ex-ante so as to make them state-independent. More in general, these costs may also differ across states, in which case reform payoffs can be thought of as already reflecting these differences.

[11] In addition, some preventive reforms (e.g., higher bank liquidity requirements or social safety nets) may lead directly to a reduction of the deadweight loss of a crisis, C. This case can be readily represented as a change in λ, by replacing the fixed cost of the crisis C with a (slightly) more general $C(e) = C - \theta e$, where a preventive reform may be characterized by $\theta > 0$. In turn, the marginal return on reform in crisis times would now equal $\overline{\lambda} = \lambda + \theta$, reducing the scope for country insurance (since $\frac{\partial C_3}{\partial \lambda} < 0$).

Proof: See Appendix

The intuition behind this result is straightforward. Due to their self-insurance nature, buffering reforms aimed at attenuating the impact of adverse macroeconomic conditions are partial substitutes for the country insurance policies discussed above. As a result, the presence of the latter reduces the need for the former. Conversely, it has often been the case in the past that a devastating financial crisis was the trigger for financial (particularly, prudential) reform. Note, however, that Result 3 does not necessarily imply that country insurance is not warranted even in those cases: unlike enhancing reforms, self-insurance policies of the type previously described may be unnecessarily costly in economic terms relative to a standard insurance contract.

3.2 Is country insurance feasible?

It can be shown that any effort-inducing insurance policy such as those described above will be implementable, in the sense that a government will voluntarily pay up front a fair insurance fee to the insurer if the policy were available.

The first thing to note is that, in equilibrium, the financial costs (per unit of debt) born by the country are the same with or without insurance. A rational risk-neutral lender will set interest rates so that the expected returns to his investment is always equal to the reference risk-free rate. This returns will reflect expected payments by the borrower plus the expected outlays of the insurance policy (in turn, equal to the fair insurance premium), so that the combined expected cost of debt servicing and insurance premium should also be equal to the risk-free rate under any scenario. As a result, the government's decision whether or not to insure hinges on a comparison of the equilibrium values of the objective function in each case. It is then immediate to show that:

Result 4 *A government will always be willing to purchase a reform-inducing country insurance at a fair premium.*

Proof: See Appendix

The previous theoretical argument, while appealing, ignores important practical considerations. First, the size of the stock of net financial liabilities in most emerging economies exceeds the financial capacity and diversification scope of any private agent or consortium of agents. Second, even if a consortium of insurers could credibly provide this contract for smaller economies, it is unlikely that the insured government can prevent the insurer, as sovereign risk mounts, from hedging their growing exposure by shortening the country's debt, feeding back into the crisis dynamics.[12] Finally, the inverse moral hazard problem (specifi-

[12] The same logic applies to currency risk: private insurers may accelerate a currency collapse by short-selling the local currency to hedge their exposure. Note the underlying coordination problem: although insurers are individually aware that by their hedging they increase the probability of a collapse, their negative impact is diluted in the aggregate while the benefits

cally, the lack of mechanisms to ensure the solvency of the insurer) should not be underestimated, particular in an international context.

In light of the difficulties previously mentioned, many observers have suggested that IFIs should play the role of country insurer.[13] While the IFIs are unlikely to overcome the size problem, they are free from inverse moral hazard as well as from the temptation to hedge their exposure. In this regard, our findings strongly qualify the traditional moral hazard criticism that typically falls on IFIs after each financial crisis, showing that a more active (and explicit) role of the IFIs as country insurers may not necessarily lead to a delay in the implementation of pending reforms. Indeed, IFIs are in a privileged position to provide at least partial insurance schemes to the same effect. A note of caution is in order in the case of contingent insurance, particularly since the international constituency of IFIs may weaken their capacity to condition their assistance ex post. However, even in this case, an explicit insurance facility may dominate implicit ones by reducing the IFI's discretionary margin.[14]

3.3 A carrot and stick dilemma

Having shown that, under general conditions, country insurance may indeed be effort-inducing and, if so, implementable, it remains to discuss how this policy fares in terms of other alternatives. In particular, while we assumed so far that the cost of a crisis was exogenously given, it follows from the previous analysis that a trivial alternative way to guarantee that reforms are undertaken consists in raising such cost.

Regarding the latter, one has to bear in mind that the relevant costs are those imposed on the decision maker (in our case, the government) and that political costs, while negatively correlated with the overall macroeconomic situation, may also depend on non-economic factors. For example, a populist government may gain substantial political rents by announcing a default in a context of a recession, offsetting the losses associated with the negative effects of default on economic activity. Timing is naturally also important, particularly when the potential long-run cost of a crisis are compared with the certain short-run cost of the reform effort needed to prevent it. At any rate, the scope for exogenously increasing the pain of a defaulting government is bound to be, in practice, rather limited.

Moreover, from (2) and (4), we know that, in the absence of a blanket guarantee, effort depends directly on the cost of a crisis so that a larger stick,

from hedging accrue entirely to them. Thus, the argument implicitely assumes that no bank will be willing or able to insure a country by itself. See Broda and Levy-Yeyati (2003) for a detailed discussion of the practical obstacles for private country insurance.

[13] Fischer (1999) argues that the IMF has in practice played the role of international lender of last resort (ILLR), and has called for changes in the international financial architecture to acknowledged this function and improve its effectiveness. See also Eichengreen (1999) for a survey.

[14] Ultimately, as suggested by Cordella and Levy Yeyati (2003), inasmuch as political pressures foster indiscriminate bailouts at the expense of conditionality, an explicit acknowledgment appears to be preferable to the customary constructive ambiguity approach.

while leading to deeper reform, would imply a loss for the government (and, presumably, for the country as a whole). It follows that, for any level of reform effort attainable through the provision of country insurance, the stick (more in general, an increase in the cost of a crisis) is dominated by the carrot. This, of course, does not deny the beneficial effect a stick may have on the willingness to reform and the related probability of a crisis. Indeed, the effort associated with a sufficiently large stick ($C > C_3$) cannot be attained by country insurance. However, inasmuch as these costs are, as assumed here, mostly wasted resources, larger sticks, if feasible, would lead to more disciplined, but poorer countries.

3.4 The value effect

In a dynamic model, Cordella and Levy Yeyati (2003) showed how a contingent bailout policy, by decreasing the probability of a crisis, may enhance the expected continuation value of the borrower and, through this channel, the payoff of engaging in safer investment practices. The logic underlying this value effect (the impact of insurance on the value at risk of the insured country or, more precisely, of its government) can be illuminated by extending our static model into a multi-period setup with a similar timing of events. To capture the fact that access to this continuation value is not guaranteed and depends on the occurrence of a shock, assume that the government, which is reelected with a certain probability every non-crisis period, is forced to step down whenever a crisis occurs.[15] The government's problem could then be written in general terms as:

$$\underset{e}{Max} V_j = \frac{U_j}{1 - \delta q_k},$$

where δ represents the combination of the government's discount rate and the probability of reelection, and $k = NI,\ BI,\ CI$, with $q_{NI} = \gamma e$; $q_{BI} = 1$; and $q_{CI} = \frac{1}{2}(1 + (\gamma + \alpha)e)$. In turn, the first order condition would be given by:

$$\frac{\partial V_j}{\partial e} = \frac{1}{1 - \delta q_k}\left(\frac{\partial U_j}{\partial e} + \delta \frac{\partial q_k}{\partial e} V_j\right) = 0.$$

The first thing to note is that, under standard regularity conditions, the value effect strengthens the incentives to reform whenever the second term between brackets is positive, which will be the case as long as the government's probability of survival responds to its own reform effort. By contrast, the value effect disappears under a blanket insurance, since in this case $q_{BI} = 1$ for all levels of effort and, thus, it is independent of the government's actions. It is immediate to verify, then, that the threshold cost of a crisis $\widehat{C}_1$ such as an uncontingent insurance policy increases effort would be smaller in the extended setup: The introduction of a continuation value increases effort under the no-insurance case but not under a blanket insurance, weakening the case for the latter.

[15] The assumption is for expositional simplicity. The argument carries through as long as the probability of reelection declines with a crisis.

More interesting is the case of contingent insurance. The differential impact of the introduction of a continuation value can be gauged simply by signing $\frac{\partial q_{CI}}{\partial e} V_{CI} - \frac{\partial q_{NI}}{\partial e} V_{NI}$, which for any given value of e can be shown to be positive if

$$\delta > 1 - \frac{\alpha}{\gamma}. \tag{7}$$

Thus, if macroeconomic shocks are sufficiently disperse (in particular, if bad shocks are sufficiently extreme), the value effect increases reform incentives under a contingent insurance policy proportionally more than it does in the absence of insurance.[16]

Note that the channel discussed in the first section is complemented by this dynamic value effect. In the first case, insurance increases the marginal payoffs of reform when the country is facing adverse fundamentals. In the second, by reducing the frequency of crises, raises expected political payoffs in the future, strengthening the incentives to reform in order to reduce this frequency even further and enhance the chances to stay in office.

This dynamic value effect is open to several interesting implications. First, as before and for the same reasons, high macroeconomic volatility strengthens the case for contingent country insurance. Second, the condition depends crucially on the parameter δ, which depends positively on the government's discount rate and its probability of reelection. Political aspects that tend to undercut the incumbent's chances to stay in office, as well as the lack of party discipline or a political afterlife that may extends the effective planning horizon of the politician, would weaken the incidence of the value effect.

Interestingly, for any given value of crisis costs C, a contingent insurance contract would increase reform effort and, as a result, would be willingly purchased by high-δ governments and turned down by low-δ ones. Thus, for any given distribution of macroeconomic shocks, a contingent insurance contract could eventually be used as a screening device to separate committed from opportunistic governments.

3.5 Self-fulfilling crises

Our simple model can be easily extended to include this effect by making the probability of a crisis a function of both macroeconomic fundamentals and the propensity to suffer liquidity runs. More precisely, assume that $\pi = 1 - \theta s_j e$, with $\frac{1}{\gamma+\alpha} > \theta_{BI} > \theta_{CI} > \theta_{NI} = 1$, where the parameter θ captures the link between observed fundamentals and the probability of a self-fulfilling crisis under the different scenarios considered here. Underlying this assumption is the view that the prevention of self-fulfilling runs increases the incidence of macroeconomic fundamentals on the probability of facing a crisis. Accordingly, a larger θ

[16] Cordella and Levy Yeyati (2003) find that a bank bailout policy contingent on macroeconomic shocks being below certain threshold reduces banks' risk appetite. One can invert their proposition by saying that the existence of risk-reducing cotingent bailouts requires a positive probability of sufficiently bad shocks. Note the similarity of the result discussed here in a different context.

would reduce the likelihood of a crisis for given fundamentals (alternatively, for a given state of nature and effort level), strengthening the effect of improving fundamentals (and, in particular, increasing reform effort) on the probability of avoiding a crisis.

Note that the presence of self-fulfilling crises adds to the impact of exogenous factors in the probability of a crisis. As a result, it introduces an additional channel through which insurance enhances the marginal returns on reform effort. Then, if insurance was preferred in the absence of self-fulfilling crises, it will be more so in their presence; on the other hand, if no insurance was preferred, then the beneficial effect of insurance on the probability of a self-fulfilling crises will tilt the balance in favor of insurance. As a result, the thresholds above which the moral hazard effect dominates are shifted up.

More formally, it is easy to verify that, in this new context, effort will be higher under a blanket insurance ($e_{BI} > e_{NI}$) whenever

$$C < C_2^S \equiv \frac{(C_2 + \lambda\varphi)}{1 - \gamma\varphi}. \tag{8}$$

where

$$\varphi \equiv \frac{(\theta_{BI} - 1)(\mu - \beta)}{1 - (\mu - \beta)\gamma} > 0,$$

and the superscript S denotes this new scenario in which self-fulfilling crises are possible. Similarly, it can be shown that $e_{CI} > e_{NI}$, whenever

$$C < C_3^S \equiv \frac{(C_3 + \lambda\phi)}{1 - \gamma\phi}, \tag{9}$$

where

$$\phi \equiv \frac{2(\theta_{CI} - 1)}{\theta_{CI}(\gamma - \alpha)(1 - (\mu - \beta)\gamma)} > 0.$$

Conditions (8) and (9) clearly illustrate the way in which insurance can reinforced reform incentives in the presence of self-fulfilling crisis, and how they differ from the channel highlighted in the previous section. By protecting the economy against avoidable liquidity runs that erode reform payoffs, insurance improves expected macroeconomic fundamentals and the marginal return on reform, even if the first channel is absent (i.e., when $\beta - \lambda = 0$). This is because, by lowering the probability of an exogenous crisis, it reinforces the effect of effort on the likelihood of facing tranquil times.

4 Final remarks

This paper presented a simple analytical framework to address the government moral hazard problem associated with country insurance, namely, the impact of insurance on the government's incentives to undertake economic reforms. We identified an important channel through which insurance can foster reform: By reducing the probability that deteriorating fundamentals evolve into a full-blown

crisis, insurance increases the payoffs of reform under adverse macroeconomic conditions, raising their expected returns and tilting the policy decision towards more reform effort. We argued that this channel would tend to be particularly effective in crisis-prone volatile economies, and for enhancing reforms which payoffs are positively correlated with the macroeconomic context. By contrast, buffering reforms that tend to offset the impact of adverse shocks as a way of self-insurance may be partially substituted (and, in the limit, discouraged) by country insurance. It follows that the implications of country insurance (and, more generally, of the presence of international safety nets) on government moral hazard would depend crucially on the nature of the specific policies under consideration.

This channel complements two additional ones that have been discussed in the literature, through which insurance could be made incentive-compatible. On the one hand, a state-contingent insurance, by increasing the continuation value of the government, creates an additional incentive to advance with policies that reduce the vulnerability to macroeconomic shocks. On the other, by averting self-fulfilling liquidity crises, country insurance eliminates an additional exogenous source of fragility that tends to erode expected reform payoffs. In the paper, we addressed these two alternative channels through simple extensions to the basic framework to highlight their distinctive features and their potential complementarities with the one proposed here.

Among the many policy implications that can be derived from this analysis, perhaps the main one relates to the way in which it qualifies the traditional moral hazard concern associated with the role played by IFIs in the management and resolution of crises in developing countries. As the previous discussion suggests, *explicit* insurance-type facilities may strengthen the incentives to proceed with productivity enhancing reforms. Partial schemes of a similar nature as those discussed here include state-contingent credit facilities, or indexed program lending whereby debt payments are positively correlated with the country's current income.[17] Curiously enough, although these two alternatives are essentially identical in terms of their implications for the cash flows of the loan contract, they have been received very differently by the players involved. In particular, while IFIs already offer limited contingent credit lines, they have ruled out the idea of changing the denomination of their lending on prudential grounds.[18]

This paper attempted to illustrate, from a balanced perspective, the conditions under which country insurance may stimulate reform while reducing the pain inflicted to borrowing countries by the stick of crippling financial disarray. Our findings does not necessarily entail an endorsement of the customized and

[17] Indexes suggested in recent proposals include the borrower's GDP (Borensztein and Mauro, [2002]), the local CPI (Eichengreen and Hausmann, [2002]) and the price of a relevant commodity (Caballero et al. [2003], for the particular case of copper-exporting Chile).

[18] Underlying this distinction lies the implicit privileged creditor status enjoyed by the IFIs and the presumption that this ensures full repayment under all circumstances. By contrast, by indexing their lending, the IFIs would be assuming the risk that they currently transfer to residual creditors.

discretionary way in which the IFIs currently assist countries in the event of a crisis. Rather, the paper points at the benefits of fairly-priced country insurance or insurance-type standing facilities that can be factored in by the borrowing government *ex ante*, particularly in those cases in which macroeconomic volatility may devalue the expected rewards of reform effort.

5 Technical Appendix

Differentiating the maximand in (1) with respect to e we have that

$$\frac{\partial U_{NI}}{\partial e} = -2e(1-(\mu-\lambda)\,\gamma) + (\gamma C + \lambda) = 0, \tag{10}$$

from which it follows that (second order conditions are always verified)

$$e^*_{NI} = \frac{\gamma C + \lambda}{2(1-(\mu-\lambda)\,\gamma)}.$$

Differentiating e^*_{NI} with respect to C, γ, λ, we have that:

$$\frac{\partial e^*_{NI}}{\partial C} = \frac{\gamma}{2(1-(\mu-\lambda)\gamma)} > 0; \tag{11}$$

$$\frac{\partial e^*_{NI}}{\partial \gamma} = \frac{C+(\mu-\lambda)\lambda}{2(1-(\mu-\lambda)\gamma)^2} > 0; \tag{12}$$

$$\frac{\partial e^*_{NI}}{\partial \gamma} = \frac{2\gamma(\lambda+C\gamma)}{2(1-(\mu-\lambda)\gamma)^2} > 0; \tag{13}$$

$$\frac{\partial e^*_{NI}}{\partial \lambda} = \frac{1-\gamma\mu-C\gamma^2}{2(1-(\mu-\lambda)\gamma)^2} > 0 \Leftrightarrow C < \frac{1-\gamma\mu}{\gamma^2}. \tag{14}$$

Differentiating the maximand in (3) with respect to e we have that

$$\frac{\partial U_{BI}}{\partial e} = -2e(1-(\mu-\beta)\,\gamma) + \beta = 0, \tag{15}$$

from which it follows that (SOCs are always verified)

$$e^*_{BI} = \frac{\beta}{2(1-(\mu-\beta)\,\gamma)}.$$

Differentiating e^*_{BI} with respect to γ, β, we have that:

$$\frac{\partial e^*_{BI}}{\partial \gamma} = \frac{\beta(\mu-\beta)}{2(1-(1-\beta)\gamma)^2} > 0; \tag{16}$$

$$\frac{\partial e^*_{BI}}{\partial \mu} = \frac{\beta\gamma}{2(1-(\mu-\beta)\gamma)^2} > 0; \tag{17}$$

$$\frac{\partial e^*_{BI}}{\partial \beta} = \frac{1-\mu\gamma}{2(1-(\mu-\beta)\gamma)^2} > 0. \tag{18}$$

Differentiating the maximand in (5) with respect to e, we have that

$$\frac{\partial U_{CI}}{\partial e} = \frac{1}{2}\left(-2e(2(1-\mu\gamma)+\beta(\gamma-\alpha)+\lambda(\gamma+\alpha))+(\beta+\lambda+C(\gamma+\alpha)\right) = 0, \tag{19}$$

from which it follows (SOCs are always verified) that

$$e^*_{CI} = \frac{\beta+\lambda+C(\alpha+\gamma)}{2(2(1-\mu\gamma)+\beta(\gamma-\alpha)+\lambda(\gamma+\alpha))}.$$

Differentiating e^*_{CI} with respect to C, γ, β, λ, we have that:

$$\frac{\partial e^*_{CI}}{\partial C} = \frac{\alpha+\gamma}{2(2(1-\gamma)+\beta(\gamma-\alpha)+\lambda(\gamma+\alpha))} > 0; \tag{20}$$

$$\frac{\partial e^*_{CI}}{\partial \gamma} = \frac{2C(1+\alpha(1-\beta))+(2-\beta-\lambda)(\beta+\lambda)}{2(2(1-\gamma)+\beta(\gamma-\alpha)+\lambda(\gamma+\alpha))^2} > 0; \tag{21}$$

$$\frac{\partial e^*_{CI}}{\partial \mu} = \frac{\gamma(\beta+\lambda+C(\gamma+\alpha))}{2(2(1-\mu\gamma)+\beta(\gamma-\alpha)+\lambda(\gamma+\alpha))^2} > 0; \tag{22}$$

$$\frac{\partial e^*_{CI}}{\partial \beta} = \frac{2(1-\gamma\mu+\alpha\lambda)-C(\gamma^2-\alpha^2)}{2(2(1-\mu\gamma)+\beta(\gamma-\alpha)+\lambda(\gamma+\alpha))^2} > 0 \Leftrightarrow C < \frac{(1-\gamma\mu+\alpha\lambda)}{\gamma^2-\alpha^2}; \tag{23}$$

$$\frac{\partial e^*_{CI}}{\partial \lambda} = \frac{2(1-\gamma\mu-\alpha\beta)-C(\alpha+\gamma)^2}{2(2(1-\gamma)+\gamma(\gamma+\alpha)+\beta(\gamma-\alpha)^2} > 0 \Leftrightarrow C < \frac{(1-\mu\gamma-\alpha\beta)}{(\alpha+\gamma)^2}. \tag{24}$$

Proof of Result 1

By a simple comparison of (2), (4), and (6), it is straightforward to verify that

$$\begin{aligned}
e_{CI} &> e_{BI} \Leftrightarrow C > C_1 \equiv \frac{(\beta-\lambda)(1-\mu\gamma-\alpha\beta)}{(\gamma+\alpha)(1-(\mu-\beta)\gamma)};\\
e_{NI} &> e_{BI} \Leftrightarrow C > C_2 \equiv \frac{(\beta-\lambda)(1-\mu\gamma)}{\gamma(1-(\mu-\beta)\gamma)};\\
e_{NI} &> e_{CI} \Leftrightarrow C > C_3 \equiv \frac{(\beta-\lambda)(1-\mu\gamma+\alpha\lambda)}{(\gamma-\alpha)(1-(\mu-\beta)\gamma)}.
\end{aligned}$$

The fact that $C_3 > C_2 > C_1 > 0$, completes the proof.■

Proof of Result 2

Using Result 1,

(i) It follows from: $\frac{\partial C_3}{\partial \gamma} = -\frac{(\beta-\lambda)(1+\alpha\lambda-\mu\gamma)(1-\alpha\beta+2\beta\gamma-\mu\gamma)}{(\alpha-\gamma)^2(1+\beta\gamma-\mu\gamma)^2} < 0$;

(ii) It follows from: $\frac{\partial C_1}{\partial \alpha} = -\frac{\beta-\lambda}{(\alpha+\gamma)^2} < 0$, and $\frac{\partial C_3}{\partial \alpha} = -\frac{(\beta-\lambda)(1+\gamma\lambda-\mu\gamma)}{(\alpha-\gamma)^2(1+\beta\gamma-\mu\gamma)} > 0$.■

Proof of Result 3

Setting $\mu = \lambda + \varepsilon$, we have that $\frac{\partial C_3}{\partial \varepsilon} = -\frac{\gamma(\beta-\lambda)(\beta\gamma-\alpha\lambda)}{(\gamma-\alpha)(1-\gamma(\lambda\varepsilon-\beta))^2} < 0$.■,

Proof of Result 4

It is enough to show that $U_{BI}(e_{BI}) > U_{NI}(e_{NI})$ for $e_{BI} > e_{NI}$, and $U_{CI}(e) > U_{NI}(e)$ for $e_{CI} > e_{NI}$. This follows from the fact that $U_{BI}(e_{NI}) < U_{NI}(e_{NI})$ and $\left.\frac{\partial U_{BI}(e)}{\partial e}\right|_{e<e_{BI}} > 0$ imply that $U_{BI}(e_{BI}) < U_{NI}(e_{NI})$ for $e_{BI} > e_{NI}$. $U_{CI}(e_{CI}) < U_{NI}(e_{NI})$ for $e_{CI} > e_{NI}$ follows from a similar argument..■

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