Risk-Bearing by the State: When is it Good Public Policy?

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Abstract

The global financial crisis brought government guarantees to the forefront of the debate. Based on a review of frictions that hinder financial contracting, this paper concludes that the common justifications for government guarantees—i.e., principal-agent frictions or un-internalized externalities in an environment of risk neutrality—are flawed. Even where risk is purely idiosyncratic—and thus diversifiable in principle—government guarantees (typically granted via development banks/agencies) can be justified if private lenders are risk averse and because of the state's comparative advantage over markets in resolving the collective action frictions that hinder risk spreading. To exploit this advantage while keeping moral hazard in check, however, development banks/agencies have to price their guarantees fairly, crowd in the private sector, and reduce their excessive risk aversion. The latter requires overcoming agency frictions between managers and owner (the state), which would entail a significant reshaping of development banks' mandates, governance, and risk management systems.

Keywords: credit default guarantees, credit default insurance, risk premia, risk aversion, public guarantees, public risk absorption, Arrow-Lind theorem, development banks

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1. Introduction

The global financial crisis has brought public financial risk-bearing to the forefront. Governments came to the rescue of troubled financial markets and institutions through large risk-absorption-of-last-resort operations involving outright asset purchases, capital injections and a relaxation of collateral requirements for liquidity support. Some governments also absorbed large losses from the risk positions they had implicitly taken through their developmental commitments prior to the crisis. This was the case in particular of the US government, which found itself in the obligation to absorb the losses of Fannie Mae and Freddie Mac, the two large government-sponsored mortgage companies. In developing countries, this has reawakened contentious issues one thought had been finally settled. These countries had in effect been moving away from public sector risk-bearing through the privatization of first-tier public banks and a refocusing of development banks towards second-tier lending and catalytic supports. However, development banks are now asking themselves whether they should grow bigger even in the good times, so as to play a more forceful role in the bad times.

In this context, interest in credit guarantee programs has surged. The expansion of such programs is viewed by some as a desirable middle ground to expand the risk-bearing role of the state while limiting the distortions resulting from its direct intervention in financial activities. However, the recent US experience has also been a useful reminder that public guarantees can be quite costly, in terms of both their fiscal implications and their impact on financial development and stability.

The concerns derived from the fiscal costs of government guarantees are compounded by the fact that the conceptual foundations of these programs are quite shaky. Often, the need for state guarantees is justified by the existence of such market failures as credit rationing or uninternalized externalities.² However, once a sufficiently broad welfare criterion is adopted (one that fully internalizes the fiscal cost of the guarantees and the way it is allocated among taxpayers), it becomes unclear why state guarantees are an adequate policy response to market failures and, more specifically, why a guarantee provided by the government can succeed in improving the equilibrium where markets failed. If guarantees are called for, why can't private market participants fill up the gap? Similar questions seem to apply to nearly all forms of public financial risk bearing, including loans.

Despite the worldwide popularity of public sector credit guarantees,³ which are typically granted via national and multilateral development agencies and banks, the theoretical literature has devoted rather scant attention to the issue. As argued in this paper, Arrow and Lind (AL, 1970) remains as the most fundamental and enduring rationale for public sector guarantees, which hinges on risk aversion and the government's superior capacity to spread risk across space

² See, for instance, Jaffee and Russell (1976), Stiglitz and Weiss (1981), Mankiw (1986), Smith and Stutzer (1989), Bernanke and Gertler (1990), Innes (1991), Benavente et al. (2006), and Arping et al. (2008). As discussed below, the papers that analyze government guarantees in a general equilibrium setting typically have focused on adverse selections problems and unanimously conclude that these problems do not justify guarantees (see Greenwald and Stiglitz, 1986; Gale, 1990; Williamson, 1994; Lacker, 1994; and Li, 1998).

³ As documented, for instance, in Honohan (2008) and Beck et al (2008).

and time. Curiously, however, this seminal paper has been mostly ignored in the more applied work on public guarantees.

This paper contributes to the policy debate by setting the underpinnings of credit guarantees on a sounder theoretical footing. Following the conceptual framework developed in de la Torre and Ize (2010, 2011), it analyzes the foundations of public risk-bearing by examining the interactions between risk aversion and two types of market frictions, agency (bilateral) frictions, on the one hand, and collective (multilateral) frictions, on the other. The analysis is restricted to the case of idiosyncratic risk, where a rationale in favor of government guarantees is more difficult to establish because idiosyncratic risk is, in principle, diversifiable.⁴ However, this restriction hardly reduces the relevance of the analysis. In effect, many of the most popular government-supported guarantee programs concern idiosyncratic risk, including those for student loans, SME finance, and long-term housing and infrastructure finance.

The paper reaches three main conclusions. First, risk aversion is essential to explain the emergence of private guarantees in the marketplace as well as to make a case in favor of unsubsidized government guarantees.⁵ In the absence of risk aversion among lenders, it is highly unlikely that fairly priced state guarantees can be justified based on traditional agency failures (such as adverse selection, moral hazard or lack of pledgeable collateral, which ration creditworthy borrowers or projects out of the credit circuit) or collective action failures (such as un-internalized externalities, coordination failures, and free-rider problems, which drive a wedge between the private and social interests). Agency failures alone justify neither guarantees nor subsidies; externalities alone can justify targeted subsidies but not fairly priced guarantees.

Second, the state can spread idiosyncratic risk more broadly than markets by coordinating and pooling atomistic agents that would otherwise not organize themselves, including to solve agency frictions. The need to solve principal-agent frictions lead to risk concentration (reflecting the need for sufficient “skin in the game” to align incentives) and thus get in the way of risk spreading. State guarantees may have an edge over private guarantees not because the state can better resolve agency frictions (the state probably faces a handicap in this regard) but because it can better resolve the collective action frictions that get in the way of risk spreading. Thus, public guarantees may be justified, at least on a transitory basis, when financial systems are not sufficiently developed to distribute risk finely enough. However, to keep monitoring incentives alive (and thus moral hazard in check) while spreading risk, the government should price its guarantees fairly (so as to cover expected losses), share risk with the private sector, and aim at

⁴ The case for government intervention through guarantees or insurance is arguably much easier to make with respect to aggregate or systemic risk that cannot be diversified away by markets. We have argued elsewhere (Anginer, de la Torre, and Ize, 2011) that public guarantees can be effective in the case of aggregate (non-diversifiable) risk, even if all agents are risk neutral and there are no agency frictions. In effect, individuals faced with aggregate risk and constrained by bargaining costs can fail to coordinate so as to behave in a way that is consistent with their collective interest. By eliminating worst-case losses from private decisions and coordinating individuals around expected (average) losses, state guarantees can function as a coordination device, much as deposit guarantees and lender-of-last-resort facilities can eliminate self-fulfilling bank runs. See for instance Caballero and Krishnamurthy (2008) and Caballero and Kurlat (2009) on the role of public guarantees under systemic risk and uncertainty.

⁵ We use the terms “unsubsidized” and “fairly priced” guarantees indistinguishably, to refer to guarantees whose price covers expected losses.

crowding in (rather than crowding out) private guarantors. Indeed, the comparative advantages of the state in resolving collective action frictions and of markets in resolving agency frictions suggest that the state and markets should naturally complement, rather than substitute for, or compete with, each other.

Third, the state's comparative advantage in spreading risk should in principle allow it to take on riskier projects than the markets—i.e., to move the risk frontier out further than markets, where risk distributions are flatter or have fatter tails. This does not generally happen in practice, however. In the past, public-sector bankers were often driven by populist policies to ignore risks and dole out generous subsidies disguised within loans or guarantees, which led to recurrent losses.⁶ Instead, in more recent times, it is typically the case that public bankers stay well within the risk frontier and compete with private bankers in relatively low risk-high return activities. Such risk aversion arises from shareholder-manager agency frictions that increase with the level of risk. The more risk a public banker takes, the more difficult it becomes for the shareholder/evaluator (ultimately, the taxpayer) to sort out whether the losses he incurred were due to bad luck or poor risk management. This is compounded by the fact that the shareholder/evaluator tends to penalize mistakes much more intensively than to reward successes. Hence, unless clear mandates, suitable governance frameworks, effective risk management systems, and appropriate impact evaluation programs are established, public-sector (development) bankers' natural risk aversion (born from a legitimate concern with being dismissed or penalized) is likely to severely limit the scope for welfare-enhancing, unsubsidized risk-absorption by the state. This invites a major rethinking and reformulation of the mandate, transparency, governance, and risk-management capabilities of public development banks.

The rest of this paper is organized as follows. Section 2 deals with the case of risk neutrality. Section 3 combines risk aversion with borrower-lender agency frictions and collective action frictions that limit market participation and, hence, risk spreading. Section 4 adds shareholder-manager agency frictions for public-sector bankers. Section 5 concludes by discussing some policy implications.

2. The case of risk neutrality

Consider first the case where lenders are risk neutral, and assume for now that there are principal-agent frictions (associated with information asymmetry and enforcement costs) but no collective action frictions (associated with un-internalized externalities, coordination failures, or free rider problems). As is well known, the agency problems of asymmetric information or collateral constraints in credit markets can lead to socially inefficient outcomes, even if lenders are risk neutral.⁷ Whether fairly priced government guarantees are an appropriate policy response is not obvious, however. Most of the literature that finds that asymmetric information can justify

⁶ See for instance Dinc (2005).

⁷ For example, Jaffee and Russell (1976) and Stiglitz and Weiss (1981) demonstrate that asymmetric information can lead to adverse selection as higher interest rates attract riskier borrowers, which can result in under-lending as lenders may ration credit to a level that is below the socially desirable one. Over-lending can also occur: when projects that would be equally profitable if successful have different success probabilities, low interest rates can induce borrowing under low success probabilities, even though their expected returns are below the social rate of return. See De Meza and Webb (1987; 1999); and Beck and de la Torre (2006).

state credit guarantees uses a partial equilibrium framework that does not consider the welfare effects of the taxes needed to finance the guarantees. Instead, the literature that uses a general equilibrium framework and applies an appropriately stringent welfare criterion (requiring revenue neutrality *and* taking into account the distributional implications of the taxes levied to finance the state guarantees) systematically concludes that, in the absence of risk aversion, state guarantees cannot improve the market outcome, except if the state has an informational or enforcement advantage over the private sector, which is, in general, hard to argue.⁸

To help understand what is at stake, consider the student loan model of Mankiw (1986), which focuses on adverse selection in a risk-neutral world. Students' honesty varies over the population. However, the lender knows less than the borrowing student; specifically, he knows the mean of the distribution but not each student's characteristics. Moreover, reflecting enforcement and informational frictions, the lender cannot force repayment and must thus raise the interest rate on all loans to cover the expected losses on the unpaid loans. But, by raising the price of all loans the lender gives rise to adverse selection where the pool of borrowers tilts in favor of the dishonest (those who do not intend to repay) who thus prevent the honest (those committed to repaying) from borrowing. In the final market equilibrium, because it would have been socially desirable for more honest students to borrow, society is worse off.

What can policy do about this? To answer this question, notice first that, in the absence of risk aversion, an unsubsidized guarantee (that is, a guarantee priced to cover expected losses) has no impact. While it reduces risk, this is of no consequence to a risk-neutral lender that is focused only on expected losses and does not care about their variance. Unless the guarantor has an informational or enforcement advantage, he would charge a price for the guarantee that matches the cost of the loan-loss provisions that the lender would have to incur anyway in the absence of the guarantee. Thus, a guarantor that offers credit risk protection at a fair price and does so by pooling and diversifying risk adds no value and, hence, will not improve the equilibrium.

Instead, to induce lenders to lend to more students, the price of the government-supplied credit guarantee would have to fall below the cost of the expected loan losses. In turn, this can happen under two very different circumstances. First, the government guarantor may enjoy a comparative advantage over the lenders in dealing with agency frictions. He may, for instance, know more about the characteristics of debtors than the private lender or may have a contract enforcement privilege that the private lender does not. As a result, the government guarantor can reduce his expected losses below those expected by the lender, thereby charging an unsubsidized price for the guarantee that is attractive to the lender. While there may be some exceptional cases

⁸ The partial equilibrium literature that does not require revenue neutrality finds that state guarantees can improve things by increasing credit (e.g., Mankiw 1986; Smith and Stutzer 1989; Innes 1991; Benavente, Galetovic, and Sanhuenza 2006; Arping, Loranth, and Morrison 2010). The literature that takes a general equilibrium view (and hence imposes revenue neutrality) can be classified into two groups. The first group uses a Kaldor-Hicks welfare criterion that simply looks at the total size of the pie but not at its distribution across the population. With such a criterion, some papers predict that state guarantees can lead to an improved equilibrium (e.g., Ordoover and Weiss 1981; Bernanke and Gertler 1990; Innes 1992; and Athreya, Tam, and Young 2010). However, others do not (e.g., Li 1998; Gale 1990; Williamson 1994). The second group of papers incorporates the welfare impacts of tax redistribution. The papers in this latter group (for instance, Greenwald and Stiglitz 1986; Lacker 1994) uniformly conclude that, without an informational advantage and the ability to cross-subsidize, it is not possible for state guarantees to produce a Pareto improvement.

where these conditions obtain,⁹ the generality of the argument is certainly unconvincing in a world where private creditors have a natural interest in constantly improving their screening ability and the rule of law applies to states as well as to citizens. Indeed, governments' key responsibility is to improve the informational and contractual environment and make available to the private sector any specific (and reasonable) informational privilege or preferential loan collection capacity they may enjoy.¹⁰ In particular, markets should fully benefit from a well-functioning judiciary that makes available to all whatever enforcement advantage the state may have.

Second, the government guarantor may intentionally subsidize the price of the guarantee¹¹. For example, should the state provide a fully subsidized credit guarantee (a 100 percent default guarantee with a price equal to zero), the lender would save the cost of loan-loss provisions and would thereby be induced to lend to all students at the risk-free interest rate. From a partial equilibrium viewpoint (absent a requirement of revenue neutrality), the subsidized guarantee would therefore allow the social optimum to be reached. However, from a more stringent (and generally warranted) welfare perspective, the financing of the guarantee and the distribution of tax payments across the student population also matter. On the one hand, taxing all students equally would make the non-defaulting ones worse off because they would end up paying for the defaulting students.¹² On the other hand, taxing only the defaulting students would lead to a Pareto improvement. But the optimality of the guarantee in this latter case would have nothing to do with risk. Instead it would hinge exclusively on *assuming that, through discriminate taxation, the state benefits from a de facto informational or enforcement advantage*. As noted, however, it is difficult to build a convincing argument based on such an assumption.

Let us now complicate the setting by adding collective action frictions that manifest themselves in the form of *social* externalities—for example, positive externalities to lending that are not internalized by the private lender.¹³ Suppose lending to some targeted students (say, the

⁹ For instance, international development banks may arguably have a superior knowledge of policies and bureaucratic processes in the debtor governments compared to private lenders, which may justify development loans priced without a risk premium or fairly priced guarantees by these development banks.

¹⁰ This reasoning applies regardless of whether the original agency problem is one of adverse selection, as in the Mankiw model, or one of enforcement. Suppose, for example, that students cannot obtain a loan not because lenders cannot distinguish well between the honest and dishonest students but because they lack good collateral and hence cannot credibly commit to repaying the loan. Viable student borrowers without collateral would be excluded from the loan market, resulting again in a socially inefficient equilibrium. By replacing the missing collateral, it is often argued, a state guarantee could bring such borrowers back into the market. The problem with this argument is that, absent any change in the students' own "skin in the game," they confront the same commitment-to-repay problem independently of the guarantee. Thus, unless the guarantee is fairly priced (so as to cover the expected loan losses and other costs) the loan default losses would simply be shifted to the state (the guarantor). But if the guarantee is fairly priced, risk-neutral lenders would not pay for it because, by definition, they care only about expected losses and not about the variance of such losses. Thus, unless the state has an enforcement advantage vis-à-vis private lenders—which, as we already argued, is hard to justify—there is no case for a state guarantee.

¹¹ The literature generally concludes that, in the absence of information asymmetries, any credit policy, including guarantees, is ineffective in improving the equilibrium outcome unless subsidized (see Penner and Silber, 1973; and Lombra and Wasylenko, 1984).

¹² A mathematical proof using the assumption in Mankiw (1986) is available from the authors upon request.

¹³ Notice that in the Mankiw model the dishonest inflict negative *informational* externalities on the honest. However, barring differential taxation or enforcement capacity, there is no way for the state to internalize such

ones studying to become primary school teachers) has positive social externalities (e.g., a good basic education enhances the earning potential from college education in all fields of study). The market outcome would be inefficient even if private lenders could solve agency problems and properly identify all the creditworthy students. Private lenders, by pricing all loans uniformly, would fail to lend sufficiently to students planning to be primary school teachers because their earnings prospects are mediocre, even though those students can contribute the most to other students' earnings. Nor would students be able, in the presence of collective action frictions, to coordinate their actions to ensure a socially beneficial outcome. This is a clear case of *collective action* failure.

The state can resolve this externalities-driven market failure by coordinating lenders through a subsidized loan guarantee, targeted to the students planning to be primary school teachers. However, while such a guarantee would expand targeted lending, it is not the best policy intervention. Instead, a straight interest rate subsidy program would be preferable because it would preserve lenders' incentives to appropriately screen potential borrowers and monitor their performance.¹⁴ Thus, externalities can justify a tax and subsidy policy but not public guarantees.

The discussion in this section can be summarized as follows. In a world of risk neutral lenders, agency frictions alone do not justify guarantees under a general equilibrium viewpoint that uses an appropriately restrictive welfare criterion. While market outcomes of credit rationing may be inefficient, a state that does not know more or enforce better than the private sector is unlikely to improve these outcomes via fairly priced credit guarantees. Principals and agents want the same thing that society wants, namely, to overcome agency frictions and engage in mutually beneficial financial contracts. Hence, the only legitimate role left for the state is to improve the informational and enforcement environment so that markets can operate better. When collective action frictions—in the form of social externalities—are added in, the case for direct state intervention becomes clearer, but hardly in the form of credit guarantees. Instead, externalities justify state interventions in the form of well-targeted tax and subsidy programs.

3. Adding lenders' risk aversion

Let us now add lender risk aversion. Arrow and Lind (AL 1970) remains the most fundamental and enduring conceptual framework for understanding the role of the state in bearing risk when there is risk aversion. AL first show that, when risk is spread out in small amounts over large numbers of investors, capital can be priced at risk-neutral prices. They then argue that the state's inter-temporal tax and borrowing capacity gives it a unique ability to spread

externalities. *This is because there is no collective action failure.* Even if bargaining were costless, it would not pay for the honest to buy out the dishonest. The honest would have to make a transfer payment to the dishonest that exactly matches the tax payments that would be required to cover a subsidized state guarantee or an interest rate subsidy.

¹⁴ In fact, a direct subsidy to the wages of primary school teachers would probably be even more effective. Note in this regard, however, that it is significantly more difficult to design optimal subsidies where externalities and asymmetric information coexist (see Stiglitz, Vallejo and Park, 1993; Calomiris and Himmelberg, 1993; and Bhattacharya, 1997).

risk across large populations. Thus, state guarantees (as opposed to subsidies or loans) are naturally called for to reduce the cost of risk bearing and encourage private investment.

Curiously, the literature on credit guarantees has mostly ignored the AL perspective. Moreover, in the scant literature on this subject, a dominant theme is a rebuttal of the proposition that there is anything unique in the state's capacity to spread risk. For example, Klein (1996) argues that if the state's advantage did not lie purely in its coercive taxation powers (that is, its capacity to oblige taxpayers to bear unwanted risk through the tax system), then markets would be able to spread risk just as efficiently. But as AL themselves suggest, it may not be possible for the private sector to be completely risk-neutral, even when risk is spread through broad ownership. Since the controlling shareholders of a firm need to hold large blocks of stock and since such holdings are likely to constitute a significant portion of their wealth, the costs of risk bearing are not negligible and the firm should behave as a risk averter. Thus, although AL hints at the existence of a link between risk aversion and agency problems (adequate monitoring implies large-stake exposures), they do not develop it, nor has the literature picked up on that theme.

To help analyze whether there is indeed something unique about the state's risk-bearing capacity, we introduce risk aversion into the well-known monitoring model of Calomiris and Kahn (1991). There are three periods. In period one, entrepreneurs-bankers invest in projects that will yield X in period three with probability p , and 0 with probability $1-p$. The project is productive, so that $pX > 1$, and its maximum size is one. In period two, an imperfect signal $m \in [0,1]$ is obtained on the project's failure probability, such that if the signal indicates failure, failure will actually occur with probability m . Based on this signal, projects can be terminated in period two, yielding a liquidation value $L < 1$ (if a project is liquidated in period three, its liquidation value is zero). Monitoring is costly and better monitoring provides a better signal.

Bankers are risk-neutral but are funded by an infinite population of ex ante identical risk-averse investors. Ex post, however, the investor population separates into two groups. Some investors (the "wholesalers") choose to invest big in the project (have "skin in the game") and monitor, under the expectation that monitoring will allow them to exit early in the case of a bad project and thereby recoup their investment. The lumpiness of wholesalers' investment, which is needed to make monitoring cost effective, prevents them from diversifying, making them risk averse. The other investors (the "depositors") choose to fully diversify by limiting their investment to an atomistic amount. Because of this, and assuming projects' probability of success is not systemically correlated across projects nor to investors' income, the "depositors" remain de facto risk-neutral.

Having skin in the game raises the cost of wholesale funds, which may result in insufficient monitoring. A risk-neutral guarantor buying the risk that is concentrated in wholesalers and spreading it by reselling it in small amounts to depositors can therefore improve in principle the market equilibrium. The risk transfer takes the form of bonds whose pay off is contingent on the project's failure. In keeping with the binomial structure of the model, we assume that partial guarantees cover uncertain full repayments (with probability $\nu \in [0,1]$) rather than certain partial repayments. Guarantees are priced fairly.

However, guarantors face three types of costs. First, since monitoring is costly, the guarantee undermines wholesalers' incentives to monitor the entrepreneur and his project. This is the standard moral hazard problem of insurance markets. To avoid distorting wholesalers' monitoring incentives, the guarantor can monitor wholesalers and adjust the premium of the guarantee according to how well they perform their monitoring. However, this monitoring of the monitor also has a cost. Second, the guarantor's capacity to resell risk to depositors depends on his capacity to convince them that he is doing a good job at monitoring wholesalers and, hence, is offering depositors a fair deal. To certify the good quality of the bonds they sell to the public, guarantors must therefore hire another, credible monitor (say, a rating agency), which implies another monitoring cost. Third, in order to pulverize the risk, guarantors need to have a sufficiently broad clientele of depositors. However, depositors' participation may be limited due to un-internalized externalities (i.e., a failure to take into account the social benefits of their participation) and other frictions, including collective cognition frictions (i.e., the cost associated with becoming aware of the deal and understanding it).¹⁵ To overcome such frictions, guarantors must therefore incur a marketing cost aimed at promoting participation.

The possible states of the world are thus as follows:

- With probability p , the project succeeds, yielding X .
- With probability $(1 - p)m$ the project fails; however, given that a correct failure signal has been received, the project is terminated early and yields L ; wholesalers get their claims back; depositors get the remainder.
- With probability $(1 - p)(1 - m)v$ the project goes on and fails; depositors lose their investment but wholesalers recoup it through the guarantee.
- With probability $(1 - p)(1 - m)(1 - v)$ the project goes on, fails and everybody loses his investment (the guarantee is not activated)

If δ is wholesalers' probability of getting their full return, it follows that:

$$1 - \delta = (1 - p)(1 - m)(1 - v) \quad (1)$$

And the variance of the underlying binomial distribution, σ , equals:

$$\sigma = \delta(1 - \delta) \quad (2)$$

Through competitive bidding, wholesalers and depositors determine the wholesale and deposit interest rates (R^W and R^D respectively) on the amounts of wholesale and retail funding (W and D respectively) that are set by the banker. Bidding eliminates excess returns over the safe

¹⁵ Participation externalities occur when the gains in participating in an activity depend on the number of other agents participating as well (see Diamond, 1982; and Pagano, 1989). By hindering coordination, participation frictions prevent agents from internalizing such externalities.

rate of return, which for simplicity is assumed to be zero.¹⁶ For notational convenience, we define $s = R^W W$ as wholesalers' total claims on the project, including interest payments.

Thus, wholesalers choose the amount of monitoring m , the rate of return on wholesale funding, R^W , and the extent of the guarantee, v , to maximize a mean-variance utility:

$$\text{Max}_{m,v,R^W} \{U^W\} = [p + (1-p)m + (1-p)(1-m)v]s - W - \frac{a}{2}m^2 - \frac{\varepsilon\sigma}{2}s^2 - Y = 0 \quad (3)$$

In this expression, a measures the cost that wholesalers' incur in monitoring bankers, ε is the degree of wholesaler risk aversion, Y the premium on the guarantee, and σ the variance of project outcomes, i.e., a measure of risk. As in any insurance contract, there is moral hazard. Wholesalers have an incentive to shirk, which depends on the extent to which the guarantee's price internalizes "deviant behavior". Because it is costly for the guarantor to fully discriminate between wholesalers, he sets his fees partly on a collective basis and partly on an individual basis. While he does charge for all bad behavior collectively, he can do it only to a limited extent on an individual basis. Thus, each wholesaler only internalizes a fraction μm ($\mu \in [0,1]$) of the cost of the guarantee, taking the rest, $(1-\mu)\hat{m}$, where $\hat{m}$ is collective monitoring, as given. Thus, from the individual wholesaler point of view, the premium he is charged is:

$$Y = (1-p)vs[\mu(1-m) + (1-\mu)(1-\hat{m})] + \frac{b}{2}\mu^2 + c + d \quad (4)$$

where $\frac{b}{2}\mu^2$ is the cost to the guarantor of monitoring wholesalers (which is assumed to increase quadratically with the extent of internalization, which in turn reflects the quality of the monitoring), c is the monitoring fee charged by the rating agency and d is the guarantor's marketing cost.

Replacing (4) in (3):

$$\begin{aligned} & \text{Max}_{m,v,R^W} \{U^W\} \\ & = [p + (1-p)m + (1-p)(1-\mu)(\hat{m}-m)v]s - W - \frac{a}{2}m^2 - \frac{b}{2}\mu^2 - \frac{\varepsilon\sigma}{2}s^2 - c - d = 0 \end{aligned} \quad (5)$$

Thus, the guarantee has two impacts. It reduces σ (check (1) and (2)), hence the risk premium, which is good. But, unless there is full internalization ($\mu = 1$), it also affects m , hence undermining monitoring incentives, which is bad.

Since guarantors are risk neutral and the guarantee market is fully competitive, guarantors set μ so as to minimize the premium on the guarantee, which through market arbitrage

¹⁶ Arbitrage ensures that all retailers' investments remain atomistic. Any retailer wishing to invest more will require to be compensated with a risk premium. However, since the number of retailers is very large, the atomistic retailers will bid the interest rate on retail funds down, pushing the larger retailers out of the market.

will equal its expected cost. Since from their perspective $m = \hat{m}$, this amounts to setting Y in (4) such that:

$$\text{Min}_{\mu}\{Y\} = (1-p)(1-m)vs + \frac{b}{2}\mu^2 + c + d \quad (6)$$

Because they are fully diversified, depositors behave as if they were risk-neutral; hence they maximize:¹⁷

$$\text{Max}_R E\{U^D\} = (pR^D - 1)D + (1-p)m[L(D+W) - s] = 0 \quad (7)$$

Bankers, who are also risk neutral, maximize their expected profits, which, to ensure participation, must remain positive:

$$\text{Max}_{W,D} E\{U^B\} = p[D(X - R^D) + W(X - R^W)] \geq 0 \quad (8)$$

They internalize the participation constraints of wholesalers and depositors when setting W and D . Hence, pDR^D and pWR^W can be replaced in (8) using their values extracted from (5) and (7), which gives:

$$\begin{aligned} \text{Max}_{W,D} E\{U^B\} \\ = [pX - 1 + (1-p)mL](D+W) + (1-p)(\hat{m} - m)(1-\mu)vs - \frac{a}{2}m^2 - \frac{b}{2}\mu^2 - \frac{\varepsilon\sigma}{2}s^2 - d \geq 0 \end{aligned} \quad (9)$$

Maximizing (9) with respect to W and D is equivalent to maximizing with respect to $D + W$ (the total size of the investment) and s (the composition of the funding). In turn, as $pX > 1$, it is obvious that bankers should choose the maximum size of the investment; hence:

$$D + W = 1 \quad (10)$$

Since risk averse wholesalers and risk neutral depositors just meet their participation constraints (they have zero excess returns), finding the guarantee that maximizes social welfare is equivalent to maximizing bankers profits while taking into account that guarantees are priced fairly (i.e., removing moral hazard):

$$\text{Max}_{W,D} E\{U^B\} = [pX - 1 + (1-p)mL - 1] - \left(\frac{a}{2}m^2 + \frac{b}{2}\mu^2 + c\right) - d - \frac{\varepsilon\sigma}{2}s^2 \geq 0 \quad (11)$$

Notice that there are four groups of terms on the right hand side of this expression. Hence, searching for the social optimum is equivalent to maximizing the total size of the surplus

¹⁷ Since the risk coverage instruments are priced fairly, they do not appear in depositors' utility.

pie, as determined by the total expected excess returns of the project, $pX - 1 + (1 - p)mL - 1$, minus the *sum of monitoring costs* along the entire monitoring pyramid $\left(\frac{a}{2}m^2 + \frac{b}{2}\mu^2 + c\right)$, the *participation costs*, d , and the deadweight cost of risk-taking, $\frac{\varepsilon\sigma}{2}s^2$. It follows from this expression that the socially optimal level of monitoring is obtained by differentiating the right hand side of (11) with respect to m :

$$m^* = \frac{(1-p)L}{a} \quad (12)$$

On the other hand, the market-determined level of monitoring is obtained by deriving the first order conditions with respect to s , m , v and μ . Maximizing (9) with respect to s gives:

$$\left[(1-p)(L - (1-\mu)vs) - am - \frac{\varepsilon s^2}{2} \frac{\partial \sigma}{\partial m} \right] \frac{\partial m}{\partial s} = \varepsilon \sigma s \quad (13)$$

The first order condition of (5) with respect to m yields:

$$am = (1-p)[1 - (1-\mu)v]s - \frac{\varepsilon s^2}{2} \frac{\partial \sigma}{\partial m} \quad (14)$$

Using (13), (14) can therefore be rewritten as:

$$(1-p)(L - s) \frac{\partial m}{\partial s} = \varepsilon \sigma s \quad (15)$$

$$\text{From which: } s = \frac{L}{1 + \varepsilon \sigma / [(1-p) \partial m / \partial s]} \quad (16)$$

On the other hand, obtaining m from (14) using (1) and (2):

$$m = \frac{(1-p)[1 - (1-\mu)v]s + \varepsilon s^2(1-p)(1-v)[(1 - (1-p)(1-v))]}{a - \varepsilon s^2(1-p)^2(1-v)^2} \quad (17)$$

The first order condition of (6) can be written:

$$b\mu = (1-p)vs \frac{\partial m}{\partial \mu} \quad (18)$$

Or, using (17):

$$\mu = \frac{(1-p)^2 v^2 s^2}{ab - b\epsilon s^2 (1-p)^2 (1-v)^2} \quad (19)$$

Finally, the first order condition of (5) with respect to v is:

$$b\mu \frac{\partial \mu}{\partial v} + \frac{\epsilon s^2}{2} \frac{\partial \sigma \mu}{\partial v} = 0 \quad (20)$$

Or, using (19), (1) and (2), and after some algebraic manipulations:

$$\mu v \frac{\epsilon(2\delta - 1)(1-m)}{4(1-p)} \frac{[a - \epsilon s^2 (1-p)^2 (1-v)^2]^2}{a + \epsilon s^2 (1-p)^2 (1-v)v} = 0 \quad (21)$$

Consider first the case where wholesalers are risk neutral ($\epsilon = 0$). From (19) and (21), it can be readily inferred that $\mu = v = 0$, that is, no guarantees are demanded. It therefore follows from (16) that $s = L$ (wholesalers take the largest position that can be recovered in the liquidation), and from (17) that $m = \frac{(1-p)L}{a}$. Hence, the market-determined level of monitoring coincides with the socially optimal level of monitoring. This is the Calomiris-Khan classical result.¹⁸

The intuition behind this result is straightforward. By appropriating the proceeds from the liquidations, risk neutral wholesalers fully internalize the social benefits of their monitoring. At the same time, they do not need to be paid a risk premium to bear the risk associated with holding sufficiently large stakes in the project (sufficient skin in the game) to warrant incurring the monitoring costs. Since it is not socially costly for these wholesalers to retain large stakes, bankers can therefore contract enough wholesale funding to allow wholesalers to fully recoup the cost of the socially optimal level of monitoring. An efficient equilibrium is thus obtained where monitoring costs can be absorbed *without having to spread any risk*. Hence, fairly priced (unsubsidized) guarantees add no value.

But suppose now that wholesalers are risk-averse ($\epsilon > 0$). Consider in this case under which conditions the market solution leads to full internalization of the moral hazard associated with the guarantee ($\mu \geq 1$). From (19), this condition can be written:

$$ab \leq (1-p)^2 s^2 [v^2 + b\epsilon(1-v)^2] \quad (22)$$

¹⁸ However, Huang and Ratnovsky (2011) challenge this result by showing that in the presence of noisy public information, wholesalers may have an incentive to free ride on this information and run early when needed rather than to monitor.

If internalization is complete, wholesalers will always prefer a full guarantee to a partial guarantee since the former eliminates the risk premium term in (5) but results in the same monitoring costs. Using (15) and (16), a full guarantee ($v = 1$) then implies:

$$\begin{aligned} s &= L \\ m &= \frac{(1-p)L}{a} \end{aligned} \quad (23)$$

Thus, as in the case of the market solution without risk aversion, the full guarantee-full internalization solution with risk aversion replicates the socially optimal solution: risk is fully spread-out. However, for risk to be fully spreadable, a number of conditions need to be met. Notice first that (22) reduces to:

$$(ab)^{\frac{1}{2}} \leq (1-p)L \quad (24)$$

This is a straightforward cost-benefit condition: the (geometric) average of the monitoring costs incurred by wholesalers and guarantors should be lower than the maximum possible benefit of monitoring, which equals the full expected value of the liquidations.

At the same time, given that the direct monitoring costs, a , should be sufficiently high to justify imperfect monitoring ($m < 1$), it follows from (23) and (24) that the full internalization-full guarantee equilibrium should also be such that:

$$b < (1-p)L < a \quad (25)$$

This is an efficiency condition: the cost for the guarantors of monitoring wholesalers, b , should be lower than wholesalers' cost of monitoring bankers, a . Hence, there should be "efficiency gains" as one goes up the monitoring pyramid.

Finally, using (23), the participation constraint for bankers can be written:

$$c + \frac{b}{2} + d \leq (pX - 1) + \frac{(1-p)^2 L^2}{2a} \quad (26)$$

This is a broad economic feasibility condition in dispersing the risk. The sum of the guarantor's monitoring cost associated with a full guarantee, $b/2$, plus the rating agency's monitoring cost, c , plus the guarantor's marketing cost, d , must be more than covered by the expected surplus value of the project, $pX - 1$, plus the expected liquidation value for the optimal level of wholesaler monitoring, which is itself a declining function of the wholesalers' monitoring cost, a . In other words, for risk to be spreadable, the total costs of distribution and monitoring (both direct and indirect) must be sufficiently low.

There is therefore, on the one hand, a basic correspondence between the market's capacity to spread risk and its capacity to limit monitoring costs through an effective monitoring pyramid (which includes rating agencies and other market analysts). There is, on the other hand,

also a correspondence between the market's capacity to spread risk and its capacity to limit distribution and marketing costs through a sufficiently well-developed financial system (which includes deep capital markets and an efficient, multi-layered intermediation chain of banks, institutional investors, brokers, dealers, and other specialized financial institutions). Indeed, in a well-developed financial system, the guarantor would not have to deal directly with depositors. Instead, an additional layer of agents—the asset managers (mutual funds, pension funds, hedge funds and the like)—would pool retail investors for the guarantor, thereby reducing the costs of participation. Thus, the market's risk-spreading capacity is fundamentally a function of the reduction in information and participation frictions that are at the heart of financial development.

At the same time, a good argument can be made that private guarantors should generally be better able to deal with informational and other agency frictions than public guarantors. Thus, in a well-developed financial system where participation and other collective frictions are not significant, the comparative advantage of markets in dealing with agency frictions should dominate the state's comparative advantage in dealing with collective failures. Private guarantors should thus naturally emerge, leaving no role for public guarantees. The only remaining role for the state in these circumstances is to strengthen the enabling environment so as to help alleviate the informational (or enforcement) frictions that hinder risk spreading. In particular, the state may need to help close the monitoring pyramid through the provision of official oversight over the rating agencies (a public good). Indeed, as amply demonstrated in the global crisis, with collective action frictions, the necessary arrangements to monitor rating agencies are unlikely to spring up by themselves.

Instead, in less developed financial systems, the costs of mobilizing the participation that is required to achieve sufficient risk spreading may be too high for private guarantees to be viable. This is precisely the point at which the state can help to complete markets. Because a state guarantor does not have to market the risk (the risk spreading is taken care of through well-established frameworks of taxation and public choice), he may be able to lower the distribution costs sufficiently to resolve the participation failure. Thus, there is a clear infant industry argument for *transitory* state guarantees when financial systems suffer from low participation.

If idiosyncratic risk is fat-tailed, however, state guarantees may also be justified on a more *permanent* basis, because even the developed financial markets may not be able to reach the scale of participation that would be needed to atomize and distribute the risk sufficiently.¹⁹ State guarantees can spread the risk all the more finely because they can do so across currently living taxpayers as well as across generations within a given jurisdiction. Remarkably, even in the case of intergenerational risk spreading, the state has an edge because the political system is

¹⁹ In principle, the AL argument continues to apply: no matter how lumpy the risk, it can still be distributed atomistically, provided there are enough retailers over which the risk can be spread. In AL, the number of retailers can go all the way to infinity. In practice, however, there is an important difference between a large number and an infinite number. Moreover, and perhaps more importantly, participation frictions limit market depth even in well-developed financial systems. Thus, the number of retailers over which risk can be spread, even if large, may not be sufficient. That is why there may be a point at which a permanent public guarantee may be needed, even in mature systems, to bound the risk associated with unpredictable returns or where there is some probability, even if very small, of very large losses. Knightian uncertainty—decision makers cannot determine the probabilities of events (see Epstein, 1999)—is likely to have an effect similar to fat tails. The more uncertain the risk, the more finely it needs to be distributed, which, in principle, makes more of a case for public guarantees.

naturally designed (whether fairly or not) to conduct intergenerational burden sharing, not because it has a better “enforcement capacity”.²⁰ Thus, the state’s advantage derives again from its comparative advantage to address a collective action (participation) friction, rather than an enforcement (agency) friction.

The argument in this section can thus be summarized as follows. Unless risk is properly spread out, risk aversion, combined with agency frictions, introduce a deadweight cost (manifested in the form of a higher-than-necessary risk premium) that constitutes a first source of market inefficiency. A state guarantee may, therefore, be justified as a means to lower the cost of capital by spreading risk more broadly. However, the guarantee introduces moral hazard, a second source of market inefficiency. Hence, to fully spread risk (through one hundred percent guarantees) without weakening effort and monitoring incentives, it is critically important that the monitoring pyramid be sufficiently efficient. If the costs of monitoring the monitor are sufficiently low, the market solution can replicate the optimal solution by replacing a socially costly skin-in-the-game requirement with a more efficient (cheaper) pyramidal market monitoring arrangement that enables greater risk spreading. In a well-developed financial system, the guarantees are likely to be provided more effectively by markets than by the state, especially if the idiosyncratic risk is normally distributed. Instead, in a developing financial system, there is a good argument for involving the state via transitory guarantees because it can pool atomistic investors (or taxpayers) that would otherwise not participate in underwriting the guarantee. Moreover, where idiosyncratic risks are one-time events or fat-tailed, permanent state guarantees may be justified, even in developed financial systems. Taxation should in this context be viewed not as a device to force unwilling taxpayers to share risks (as in Klein 1996), but rather as a simple, built-in coordination mechanism that facilitates the participation of all. In sum, the risk spreading ability of the state and, hence, the rationale for state guarantees ultimately rest on the comparative advantage of the state in resolving collective action frictions, *which is the traditional justification for public goods*.

4. Adding managerial risk aversion

The state’s comparative advantage in risk spreading should naturally become more prominent as the level of risk rises, hence as the risk distribution becomes flatter or its tails become fatter. Thus, one would expect the state’s intervention to add more value (i.e., to have more “additionality”) when the public guarantor takes more risk than the markets and does so without subsidizing risk. The logic of the argument should therefore lead the state to guarantee riskier projects or borrowers than those than markets are willing to finance, and to do so at an actuarially fair price (one that covers expected losses).²¹ In the past, there were many examples of politically-captured public banks, driven by populist policies, which guaranteed or financed unviable but politically important projects at highly subsidized prices. At present, however, reflecting reforms aimed at improving the financial sustainability of public banks, public

²⁰ Indeed, trying to depict the inability of markets to contract across generations from a pure enforcement perspective is rather futile. Since it is not possible to write bilateral contracts with someone unborn, “enforcing” such contracts is meaningless.

²¹ Needless to say, the state should charge a premium that fully offsets the expected losses. Hence, over the longer-term or over a sufficiently large number of borrowers, the law of large numbers should come into play and the state should not make significant losses.

guarantee programs and, more generally, public development banks, are not typically constructed in this way. Instead, they tend to shy away from risk taking. Typical state-sponsored credit guarantee programs target well-defined, recurrent, limited risks instead of insufficiently understood risks or tail risks where the state's comparative advantage in risk bearing and spreading could be, in principle, more fully exploited. Indeed, many development banks proudly emphasize that they carefully screen their guarantees or their borrowers and concentrate on the least risky projects and best-rated borrowers in order to minimize losses. At the same time, development bankers view a steady stream of positive profits as their best measure of stellar performance.

To obtain a glimpse of how the risk aversion of public banks compares with that of private banks, we compare risks, returns and capital stocks for a sample of private commercial banks and public development banks using their Z-score as a proxy for risk aversion (Table 1).²² The Z-score is calculated as the sum of the bank's profitability (the return on assets) and the bank's solvency (the ratio of book equity over total assets), divided by the volatility of returns (the standard deviation of the return on assets). Thus, while the ratio is meant to measure the probability of insolvency of an individual bank at any point in time (the number of standard deviations by which the bank's rate of return can decline in a year before it becomes insolvent), it can also be viewed as revealing the average (ex ante) risk appetite of banks taken as a group. The closer to bankruptcy banks (as a group) are willing to get, the less risk averse they are. Risk aversion depends on the level of capital. For a given level of capital, the Z-score falls as the bank accepts a higher risk-return trade off, much as a Sharpe ratio. But for a given risk-return trade off, the Z-score also falls as the bank's capital declines, because it makes the bank more exposed to the risk of insolvency.²³

Panel A, which reports univariate differences between public development banks and private commercial banks, indicates that development banks have significantly higher Z-scores. In turn, the decomposition of the Z-score suggests that most of this difference comes from development banks being more conservative with the amount of capital they hold against risky projects; they take less risk than what commercial banks would take if they had the same level of capital.²⁴ Panel B, which reports regression results controlling for various bank characteristics as well as country fixed effects, confirms the result.²⁵ Thus, Table 1 does suggest that public bankers are de facto more risk averse than their private counterparts.

²² The sample includes all commercial and development banks in Bankscope during 1996-2010. We exclude countries for which we have information on fewer than 50 bank-year observations, and exclude banks that report information for fewer than five consecutive years. To identify development banks we use the specialty variable in Bankscope and classify a bank as a development bank if it is in the "Specialized Governmental Credit Institution" category. In total, we have over 1,200 banks in 74 countries.

²³ We compute (over five years intervals) the average return on assets (aroa), the standard deviation of return on assets (sigmaroa) and the average equity over total assets (aequity). A similar calculation can be found in Anginer, Demircuc-Kunt and Zhu (2012).

²⁴ Although there are no significant differences in terms of profitability, the ratio of equity over total assets (aequity) is significantly lower for development banks, which results in development banks having a much lower standard deviation of profitability over equity (sigmaroe). There is not a significant difference in the standard deviation of return on assets (sigmaroa) since commercial banks have significantly higher leverage.

²⁵ We control for time invariant country heterogeneity, and introduce calendar year fixed effects to control for time varying global macro shocks. We also control for: bank size (size), using the natural logarithm of total assets; asset

Insert Table 1 about here

What explains this disconnect between theory and practice? The most likely explanation is an additional key agency friction that has so far been omitted from our analysis, namely, the friction between the bank owner (the state, acting as principal) and the bank manager (acting as agent). Unless appropriate governance and risk-management arrangements are in place that allow the principal to sort things out (more on this in the next section), the more risk the manager takes, the more exposed he becomes to the risk of occasional losses due to bad luck being interpreted as the outcome of bad management. Hence, the higher the risks he takes, the higher the chances of being fired. The shorter the time horizon that the political system uses to evaluate the manager and the more complex the risks involved, the more difficult it becomes to sort out bad from good managers, hence the larger the manager's exposure and the higher his aversion to risk. This is typically compounded by the fact that, in evaluating the performance of development banks, there is a bias in favor of penalizing mistakes compared to rewarding successes. The inadequate governance arrangement of development banks, or the limited capacity of the political system to understand or handle accidental losses, can therefore largely explain public bank managers' low risk appetite.²⁶

Expanding the risk frontier is naturally unpalatable to both development bank managers and politicians insofar as they are held accountable. Indeed, parliaments in many regions of the world have strictly limited risk taking by development banks. At the same time, development bank managers protect their capital because they know that they will live or die with it.²⁷ The constraints that development banks face in terms of avoiding losses often induce them to directly compete with commercial banks well within the risk frontier, rather than—as the risk-aversion rationale would suggest—to complement private activity by providing (fairly priced) insurance closer to the risk frontier.²⁸ For example, state guarantees to SMEs or to target clienteles, such as those reached through low-income housing or student loans programs, look like safe bets when they are well within the risk frontier.²⁹ Why, then, not safely collect the low-hanging fruit instead of shooting for the moon? It is precisely such a reasoning that largely explains the limited

quality (provisions), using loan loss provisions divided by total assets; business model (loans), using net loans divided by assets; revenue composition (nint), using non-interest income divided by total operating income; and funding structure (ndfund), using the share of non-deposit funding in total short-term funds. All variables are from Bankscope (to reduce the influence of outliers, they are winsorized at the 1st and 99th percentiles).

²⁶ The link between managerial risk aversion and governance can be easily visualized in a Bayesian inference setting where the bank manager cannot signal the quality of his risk management to the bank owner.

²⁷ Development banks in Mexico, for instance, are regulated and supervised on par with commercial banks and are required by law to preserve the real value of their capital.

²⁸ The tension between development banks' actual risk aversion, on the one hand, and their social mandate (which pressures them to move into relatively lower return/higher risk activities) can result in an unstable equilibrium that has been dubbed "Sisyphus Syndrome" (de la Torre et al., 2007). Pulling in the opposite direction of the mentioned risk aversion can be a political drive to unduly and imprudently expand lending or credit guarantee programs, in lieu of strengthening the appropriate social protection systems, as a convenient way to relieve some of the build-up political pressures associated with social inequities (Rajan, 2010).

²⁹ Such programs appear to pay for themselves (hence are fiscally safe) when well priced and designed. See Honohan (2008) and Beck, Klapper, and Mendoza (2010).

additionality of most public guarantee programs, i.e., the fact that they tend to substitute rather than crowd in private guarantees.

5. Policy implications

This paper has emphasized three key messages:

- (1) The role of the state in bearing risk reflects its comparative advantage in overcoming collective participation frictions, not agency frictions.
- (2) Without risk aversion, there would be no role for public guarantees (nor, for that matter, for private guarantees).
- (3) In order to shed away their de facto risk aversion and hence exploit more fully their comparative advantage in bearing risk responsibly (hence at unsubsidized prices and without recurrent losses), development banks will most likely need a thorough overhaul of their mandates, governance, and risk management arrangements.

Each of these messages point to a specific set of policy implications. Let us take each of them in turn, starting with the state's comparative advantage in overcoming participation frictions. Instead of justifying government loan and guarantee programs based on goals, policy makers need to focus on *alternative means of achieving these goals*. This involves comparing social costs and benefits across alternative channels of state intervention that may or may not involve risk taking by the government. This in turn opens two broad avenues to explore. The first comprises policy interventions exclusively geared at solving participation frictions—i.e., achieving greater financial inclusion both along the intensive margin (the same players engaged in more transactions) and the extensive margin (the incorporation of new players)—*without dealing directly with risk*. Rising financial inclusion makes it easier for the financial services industry to lower costs, expand market liquidity, and capture other positive spillovers associated with scale and network effects, thereby ultimately helping diversify risk. This can justify a catalytic role for the state in financial development, as well as the state's provision of basic infrastructure such as large-value payments and trading systems or other public goods such as the standardization of contracts.³⁰ Similarly, the creation of mandatory but privately administered pension funds can help promote the development of annuities, which in turn can help develop a market for spreading the risk associated with long-term instruments.

The second avenue deals with risk by *promoting risk-spreading arrangements among private agents*. This can be done through catalytic efforts or compulsory schemes. As an example of the first type, states can promote private sector participation in guarantee schemes, such as mutual guarantee associations funded by small local entrepreneurs, or guarantee schemes structured as joint stock companies with private participation. The experience across the world with such schemes has been generally positive, partly because they promote peer pressure, a purely private form of resolving collective frictions. Indeed, there is some evidence that such associations work best when they remain purely private, as this fully preserves incentives for

³⁰ This can also justify mandated—or gently coerced—participation, as in the case of the payment of state employee wages through accounts in banks that participate in a shared, open-architecture platform for retail payments.

group monitoring and limits moral hazard.³¹ As an example of the second type (compulsory risk-sharing arrangements), the state can mandate the participation in health insurance schemes, as was recently the case in the U.S.

Clearly, the two avenues above should be explored and exploited as a matter of priority. However, they may not suffice, not least because peer pressure or compulsory participation may not work in all cases and all environments. This opens a third avenue, more controversial and thorny, which involves risk absorption and risk spreading by the state, whether through guarantees or long-term loans.³² This is where the second key message of this paper comes into play. By construction, the rationale for such public risk-bearing programs should be tightly anchored on risk measurement, risk aversion, risk premia and differential costs of capital between public and private financial entities. They need to explain, based on risk aversion, and hence on a careful evaluation of risk premia and a comparison of costs of capital, why the state can achieve what markets cannot. And as soon as such cost differentials diminish with financial development, the public guarantee programs should be phased out or divested to the private sector.

The correct pricing of the guarantees, to ensure that they properly reflect expected losses, also deserves more attention than it generally obtains.³³ The fact that private guarantees have not surfaced to replace public guarantees may reflect the existence of complex or hidden risks (fat-tailed or systemic) that free markets cannot handle well and that public guarantors would need to explicitly recognize and take into account. Unless this is done right and state guarantees are reasonably priced, state guarantees will likely end up unduly subsidizing private risk-taking, and this is bound to distort incentives and trigger unpleasant fiscal surprises (as well as political upheavals) once downsides materialize (the recent U.S. experience in the subprime crisis is, of course, the most obvious illustration).

This brings us to the third and last key message, the need to increase the additionality of public guarantees by carefully pushing out the risk frontier, the area where the state's comparative advantage in bearing risk is magnified. As suggested in Section 4, the key line of action to overcoming development banks' aversion to risk is to enhance the political system's capacity to discriminate between bad luck and poor management. This implies a radical reshaping of the mandates, governance arrangements, risk management systems, and monitoring and evaluation procedures of development banks. Making progress on such issues is all the more crucial in view of the fact that political economy constraints (political capture or interference) are likely to be more binding in institutionally less developed economies, which are precisely the ones where governments are likely to have a more important role to play in providing guarantees.

³¹ On the experience of mutual guarantee associations in Europe see Columba, Gambacorta and Mistrulli (2009). Lebanon provides an interesting example of a seemingly successful and profitable guarantee scheme structured as a joint stock company.

³² A long-term finance commitment can be viewed as a funding (liability) guarantee that provides protection against liquidity risk and price volatility, instead of protection against credit default.

³³ This is indeed one of the main conclusions reached in recent reviews of existing public guarantee programs. See Beck, Klapper, and Mendoza (2008) and Arvai, Rocha, and Saadani (2010).

Importantly, development banks' mandate should allow them to take more risk without taking systematic losses, i.e., to function as authentic development banks rather than imperfect replica of private commercial banks. This of course requires that development banks develop their capacity to assess and assume risk, not just their capacity to avoid it. Of course, this is not a trivial proposition, and it is likely to involve at the same time a quantum improvement in development banks' analytical capacity as well as a quantum change in their board's focus of attention. But the more one pushes out the risk frontier, the more difficult it becomes to properly estimate expected losses and sort out the risk premia from the expected losses. This suggests that development banks cannot move too far beyond the risk frontier and should instead increase their risk-taking at the margin (and in the shadow) of markets. For example, when loans are made directly by first-tier public banks, making sure the interest rates on the loans are above market rates can help ensure that public risk bearing does not crowd out private risk bearing.³⁴ At the same time, staying close to the risk frontier should allow development banks to use market signals, thereby facilitating risk discovery, and efficiently share risk, thereby promoting and enhancing longer-term market development.³⁵ Staying close to (and working closely with) markets should also provide the natural guidelines and performance benchmarks that limit the risks of going wild as well as the risks of political and/or bureaucratic capture.

Last but not least, managers of development banks (the agent) will need to do a better job at explaining what they are doing to the political system and society at large (the principal). This requires both accountability and transparency. Development banks need to be more transparent about the risks (hence the possible losses) they are taking and the supporting methodologies and processes they are using to assess and price these risks. In this endeavor, the financial and academic communities should be able to provide an important help in contributing to, validating, and explaining these choices and their associated implications.³⁶ Official supervision also has an essential role to play. Just as for private commercial banks, supervisors should test and certify the quality of risk management. However, development banks' focus on the risk frontier, including more uncertain, less recurrent, and often more complex risk, should naturally be taken into account by supervisors. In addition, risk taking can be bounded in a variety of ways. For example, earmarked capital for specific insurance or countercyclical risk absorption can help development banks assume more risk in a responsible, bounded manner while protecting their capital from depletion.³⁷ The political evaluators of development banks, moreover, should stress the economy-wide costs and benefits of public risk-taking (whether through development banks or special loan and guarantee programs) while encouraging rigorous assessments of its additionality and impact.

³⁴ Some lending and guarantee programs by development banks in high-income countries are structured in this way. The Business Development Bank Canada (BDC) small business loan guarantee program is a prime example. See Beneit, Gutierrez, Homa and Rudolph (2011).

³⁵ One possible approach to facilitate risk discovery is to auction the guarantees according to their coverage or price. This is the approach followed in Chile by FOGAPE. See Benavente, Galetovic and Sanhueza (2006) and de la Torre, Gozzi, and Schmukler (2007c). By setting volumes rather than prices, guarantors can better protect themselves against the risk of major mispricing. At the same time, volumes may be adjusted to meet countercyclical objectives.

³⁶ For example, recurrent assessments by independent evaluation units or occasional, more strategic reviews by blue-ribbon committees should help.

³⁷ Alternatively, to align incentives, development banks can assume a limited part of the risk, the rest being covered by the fiscal authorities through earmarked capital or other means.

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Table 1: Risk Taking by Development Banks

Panel A reports univariate test of means for z-score and its components, the average and the standard deviation of roe for development and commercial banks. To identify development banks we use the specialty variable in Bankscope and classify a banks as a development bank if it in the “Specialized Governmental Credit Institution” category. *zscore* is calculated as the sum of roa and ratio of book equity to total assets, averaged over the past five years, divided by the standard deviation of roa over the past five years. *aroa* is net income divided by total assets, averaged over the past five years. *aequity* is the ratio of book equity to total assets, averaged over the past five years. *sigmaroa* is the standard deviation of roa over the past five years. *aroe* is net income divided by book equity, averaged over the past five years. *sigmaroe* is the standard deviation of roe over the past five years. Panel B reports the regression results of the model $zscore/components_{ijt} = \beta_0 + \Omega \times bank\ controls_{ijt-1} + \beta_1 \times Development\ Bank\ Dummy_{ij} + \lambda_j + \delta_t + \varepsilon_{ijt}$. The dependent variable is zscore and its components described above. Bank controls include *provision*, computed as loan loss provisions divided by net interest income; non-interest income, *nint*, computed as non-interest income divided by total operating income; *loans*, computed as net loans divided by assets, non-deposit funding, computed as non-deposit short term funding divided by the sum of deposits and other short term funding; *size*, computed as log value of total assets in millions of US dollars. All variables are from Bankscope for 1996-2010 and are in US dollars. *Development Bank Dummy* is a dummy variable that takes on a value of one if a bank is classified as “Specialized Governmental Credit Institution” by Bankscope. λ_j and δ_t are country and year fixed effects, respectively. Standard errors are reported in parentheses below their coefficient estimates and adjusted for both heteroskedasticity and within correlation clustered at the country level. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

Panel A: Univariate Results				
	Commercial Banks	Development Banks	Difference	pvalue
zscore	36.574	51.873	15.299	<0.0001
aroa	0.007	0.005	-0.003	0.0982
aequity	0.102	0.128	0.025	<0.0001
sigmaroa	0.015	0.016	0.000	0.8705
aroe	0.105	0.107	-0.002	0.8407
sigmaroe	0.081	0.062	0.019	0.0544

Panel B: Regression Results				
VARIABLES	(1) zscore	(2) aroa	(3) aequity	(4) sigmaroa
size	0.492* (0.281)	-0.000 (0.000)	-0.020*** (0.001)	-0.002*** (0.000)
provision	-6.775*** (0.622)	-0.003** (0.001)	0.001 (0.001)	0.004 (0.002)
nint	1.156** (0.579)	0.000 (0.000)	0.001 (0.001)	-0.001 (0.001)
loans	18.941*** (3.343)	0.012* (0.007)	-0.036*** (0.006)	-0.039*** (0.014)
ndfund	-10.316*** (2.574)	0.014*** (0.004)	0.051*** (0.007)	-0.011 (0.009)
Development Bank Dummy	12.778*** (3.454)	-0.006** (0.003)	0.023*** (0.004)	0.008*** (0.002)
Constant	30.568*** (5.638)	0.003 (0.004)	0.252*** (0.008)	0.048*** (0.008)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	10,066	10,204	10,204	10,204
R-squared	0.100	0.014	0.393	0.010