Public Development Banks: who to target and how?*

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1 Introduction

The intervention of Public Development Banks (PDBs) in the provision of credit to businesses is a pervasive feature of all types of economies. Over 250 such institutions around the globe either directly provide credit to businesses or extend lines of credit to commercial banks who use them to, in turn, give credit to firms. Many provide public guarantees to facilitate access to commercial credit.

The use of such widespread practices is, somehwat surprisingly, not clearly grounded on theory. While it is common wisdom that credit markets are plagued with imprefections that public intervention could alleviate, it is not clear which market failures play a bigger role in preventing efficient credit allocation, or which particular PDB activities are best suited to deal with each of those failures.

Most existing conceptions relate to credit underprovision for businesses with specific weaknesses: those that are risky because they are small or inexperienced, or because they cannot post collateral; those with a limited credit history; those with low present value, but which could generate externalities on other firms or sectors.[1] Consistent with these conceptions, many PDBs offer specialized credit for SMEs or young firms (Figure 1). Still, even if there are theories

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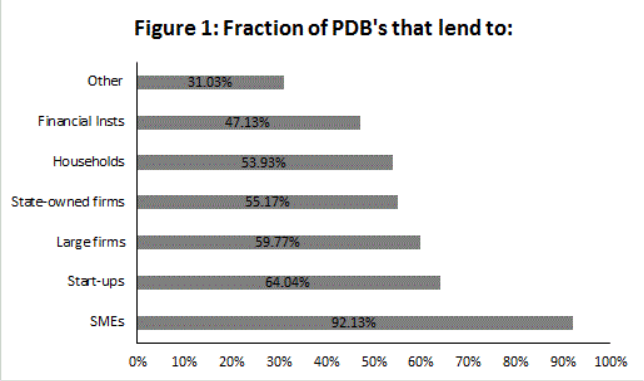
[1] This focus has been present not only in practice, but also in theory. There are models of credit failures that focus on firms with a limited credit history (Diamond, 1991); lack of collateral (Holmstrom and Tirole, 1997, Ruckes, 2004); risky (Bolton and Freixas, 2000). And, there are theories of PDBs intervention to address the credit underprovision for firms facing moral hazard (Arping et al., 2010); or those with negatiev present value but that generate externalities (Hainz and Hakenes, 2012).

indeed suggesting that these firms could be rationed out of credit, the merits of alternative mechanisms of public intervention to address these failures are not well known. And, it is not clear that these, relatively weak firms, are the only plausible or best possible targets of PDB activity.



In our paper "Public Development Banks and Credit Market Imperfections", we put forward an alternative vision for the role of PDBs, and, within that context, explore the merits of different public intervetions. In particular, we explore an alternative source for credit underprovision: the inability of banks to fully internalize the benefits of the projects they might finance. In that context, we provide an analysis of alternative forms of PDB intervention: what types of firms should be optimally targeted; whether direct credit provision by the PDB or an intervention that boosts private credit are optimal; whether to incentivize private credit via the provision of public guarantees or subsidies to credit.

The key inefficiency undelying our approach is intuitive, yet usually allien to the discussion of PDB activity. From a society point of view, it is optimal to provide credit to all projects with expected benefits that exceed the costs banks face to determine those benefits (screening costs). But, banks provide credit only to the point where their own benefits are not exceeded by those screening costs. Since the benefits of the project are not fully internalized by banks, there are projects with positive benefits for society that end up rationed out of credit, and therefore not executed.

This particular market failure affects more starkly projects with higher value, because it is those projects that render particularly high benefits not appropriated by the bank. The policy implication contrasts with usual conceptions: relatively high value projects, as opposed to firms with little credit history or low collateral, should be targeted by PDB interventions. And, this focus is particularly valuable, as the projects that end up not executed because of this

failure are precisely those with highest social value.

The objective of our research is to evaluate the potential effectiveness of different instruments to deal with the welfare costs of the credit market failure previously mentioned. We also compare the relative merits of an arrangement where the PDB directly provides credit to firms, versus one in which it intervenes to stimulate private lending. Whether one or the other approach is optimal depends, in turn, on the returns and risk profiles of the projects that can benefit from the public policy. This has implications for the optimal targeting of government programs, which we also explore.

After analyzing these aspects, we combine our core model with others more aligned with the traditional view that it is some specific weakness of firms that leaves them rationed out of credit. In particular, we add the possibilities that credit underprovision affects firms faced with moral hazard; those with insufficient collateral; or those facing a context of liquidity or solvency restrictions for the financial market. We then examine how adding those dimensions modifies our core messages.

2 Basic set-up

Any banking model is based on a financial market imperfection that justifies the role of banks, and our model is no exception. Still, because our objective is to understand the supplementary role PDBs may have, we are interested in financial market imperfections that may cause some firms to be rationed. We therefore justify banks because of their ex ante monitoring capability, that is, their skill in screening firms through the extraction of a signal that is correlated with the firm's probability to repay a loan. As it is natural to assume that screening is costly, (as in Ruckes, 2004), and that a higher accuracy in the signal will come at a higher cost, the information banks acquire is not perfect and, in equilibrium, some firms with a positive net present value project will not be able to fund it.

This core inefficiency (namely imperfect screening) implies in equilibrium there will be *a fringe of unsatisfied borrowers,* even if banks are perfectly capitalized and are not liquidity squeezed, because some good firms will be credit rationed. Such rationing possibly justifies some type of public intervention.

2.1 The key inefficiency

The starting point of out analysis, as already mentioned, is inefficiently low level of screening. The reason for such underprovision of screening is that banks do not take into account the positive externality they create when they facilitate firms' access to credit and the potential profits firms may rip. In other words, banks consider exclusively the downside risk and never the upside gains because these belong to the firm. It would be only in the case where the bank owns the firm or extracts the totality of the rents associated to a firm's project that the efficient level of screening would be reached. Because banks cannot appropriate

the whole net present value of firms' projects, an issue that is unrelated to the type of contract between banks and firms, (e.g. debt or equity) credit is underprovided, and this underprovision is more severe for types of firms where the firms' rents are larger.

As a consequence, the role of the PDB will be to increase the probability firms with positive net present value are granted credit. This could be done directly, by the PDB investing in the screening technology and granting credit to firms or indirectly, with the PDB channeling funds to banks and using conditionality to incentivize banks to screen more.

To begin with, we examine the problem of a PDB that directly lends to firms, that we consider as a benchmark. We then turn to the second best problem where the government cannot efficiently lend directly to firms, but is able to act as a principal and design mechanisms to support access to credit by subsidizing banks and firms activities.

In our framework, the benefits of structuring a PDB that lends directly to firms comes from the fact that its profits will finance the cost of subsidizing the screening activity. Because taxation is distortionary, this ability to fund stimulus to credit without resorting to taxation is valuable. Still, the drawback of direct lending is the possibility of less efficient lending by the government compared to private banks. We model this possibility as a "political economy drift", that is, the maximization of an objective function different from social welfare. Such a departure from the maximization of net output net of the cost of subsidies is to be considered because of its potential lack of independence from politicians, because of imperfect corporate governance, limits to the remuneration policy and other characteristics of many public banks that may lead to a higher screening cost. Critics of public development banks (PDBs) worry that lending by these institutions may end up being inefficiently allocated due to political or institutional constraints. An abundant body of empirical evidence points at cases where this allocation seems to follow political considerations rather than seeking to maximize efficiency. Direct lending by PDBs has been found to increase in election years, and to be targeted to politically valuable costumers or regions, especially in election years (Carvalho, 2014; Cole, 2009; Dinc, 2005; Khwaje and Mian, 2005; Lazzarini et al, 2014; Sapienza, 2004).

Notice the question of whether PDB lending is a substitute or a complement of commercial banks' activity only makes sense when referring to direct lending, as credit guarantees or intermediated lending will only complement banking activity. In our framework, the answer to this question is straightforward: when it comes to direct lending, the activity of the PDB is a substitute and directly competes with commercial bank lending in so far as it lends at subsidized rates to firms that generate a sufficiently high pledgeable cash flow.

3 Intermediated lending and the PDB

An alternative to direct lending by the PDB is public lending intermediated by a private financial institution. The benefit of indirect lending is that it limits

the political drift that may be inherent to direct lending. There are several reasons why this is so:

- Lending occurs only if the banks deem it profitable.
- Firms are selected by banks, not by the PDB.
- The lending or credit guarantees programs do not target specific firms but specific industries or firm characteristics.

Intermediated lending may be subsidized, or not, depending on the conditions banks and firms face. In particular, the optimal intermediated lending may depend on banks' liquidity or capital shortages in case of liquidity and solvency crises. As we shall see, these different contexts have different implications regarding the optimality of subsidizing lending by the PDB.

Assuming away constraints on banks' ability to lend, we consider the second best allocation and show that it requires to set a subsidy to bank lending that is increasing in the externality associated with banks screening. Our approach allow us to specify the characteristics of the subsidy and shows that:

- It concerns only industries characterized by imperfect screening that will cause credit rationing. This will occur in industries where the banks have low expected margins;
- it is decreasing in the cost associated with using fiscal resources; and
- it is decreasing with the convexity of the screening cost function that reduces the impact of the subsidy on the screening level.

Our approach allows us to determine the type of industry that should benefit from the public support offered by the PDB. These industries are characterized by high firm profitability and high probability of success, but not enough to secure a perfect screening.

3.1 Implementation

To begin with, notice that a pure subsidy to a bank, unconditional on its lending operations, would have no effect on the screening level. It would simply generate a rent for banks. A simple way to effectively incentivize credit is to give the bank access to funding at a lower rate.[2] In fact, this is a common practice: a line of credit at a rate below the market is accessible to the bank conditional on their granting credit to some industry at a pre-specified rate.

Alternatively a policy of credit guarantees will also allow to reach the second best allocation. A credit guarantees policy will be defined by a payment to the bank in case the borrowing firm defaults. Because the effect of such policy is to increase the expected value from lending, it ends up being equivalent to a

[2] For a given interest rate to the firm. The subsection "Competition" below discusses the case where the final interest rate is endogenous.

subsidized line of credit. There is a percentage of credit guarantees that allows to implement the required subsidy.[3]

There is, nevertheless an important caveat in the use of credit guarantees that does not affect the use of a subsidized line of credit. An excessively large credit guarantee may lead banks to stop screening, as even bad firms will become sufficiently profitable. When this is the case, the PDB has to fine tune the level of credit guarantees and the amount of subsidized loans so that the effect of the subsidy is to increase the level of screening.

4 Additional issues

4.1 Moral hazard

A second type of financial market imperfection we consider occurs because of the existence of moral hazard at the firm level. If the firm probability of success depends upon the effort it exerts and the effort depends upon its expected profits, a number of firms will be denied credit because they cannot credibly commit to exert a sufficiently high level of effort that would make a bank break even on its loan operation.

Firms' moral hazard will affect those that have a low profitability in case of success, as this will lead the firm to implement a low level of effort. Because this is expected by banks, a layer of firms with relatively low upside value will be rationed out of credit because of moral hazard.

The market allocation can be improved by providing a performance premium for firms for whom moral hazard is binding. The reason why this premium is effective is straightforward. Consider the marginal firm that is just indifferent between implementing the high or the low effort project. A firm that is slightly more risky will prefer to implement the bad project and, under rational expectations will not have access to credit. A very small performance premium (i.e. a subsidy if the project succeeds) will then lead the firm to chose the good project, which implies it will be financed and, therefore will produce high benefits.

As in the case of banks, an unconditional subsidy would not be effective: it is the fact that the premium is conditional on success that realigns the firms' incentives to exert effort. Because the moral hazard issue is unrelated to the screening underprovision discussed above, the performance premium can be simply added to the credit subsidy previously discussed, so that both market failures are addressed by a single instrument. In particular, the performance premium can be implemented through a reduction of the predetermined rate on the intermediated loan. In the case of a credit guarantee, it has to be made conditional on a similarly reduced rate being offered to the targeted industry.

[3] An alternative way to view a credit guarantee is to analyze it as a credit default swap that is offered by the PDB at a subsidized price.

4.2 Collateral

Our framework can also be combined with one where firms may post collateral, but some have low value of collateralizable assets. The possibility that such firms are rationed out of credit, opening the door for interventions that target those firms, has been previously discussed. If, rather than in isolation, collateral is considered jointly with the possibility of screening by banks, then lack of collateral is not a sufficient justification for a public intervention. Positive value firms lacking collateral may still receive credit, if they are screened. An intervention is then necessary only for firms for which the value that the bank can obtain falls short of the screening cost. The optimal credit subsidy in this context is lower than it would be if collateral could not be used, as screening becomes less valuable when banks know that a subset of firms will be able to post collateral. The main insight that high value projects should be targeted with the credit subsidy, however, survives the introduction of collateral into our framework.

4.3 Competition

The number of competing banks has a double effect on the market inefficiency that justifies the role of the PDB, and on the effectiveness of the credit subsidy that we propose to address it. On the bright side, the existence of more banks implies the same firm has the possibility to apply to more banks for a loan. As a consequence, the level of credit rationing decreases. On the negative side, competition erodes banks margins, which in turn reduces banks' incentives to screen the firms. In "Public Development Banks and Credit Market Imperfections", we are able to show that the first effect overtakes the second, so that, overall, competition has a positive impact. Still, there is a second drawback, and that is that enough competition may lead to any subsidy to be passed down to the firms in terms of a lower cost of funds. When this is the case it annihilates the impact of the subsidy.

4.4 Liquidity/solvency restrictions and business cycles

Liquidity and solvency restrictions may be additional reasons for credit underprovision. PDBs may provide credit that alleviates both restrictions, leading to optimally increased credit. The optimal instruments to do this, however, are not identical to those optimally used to alleviate the underprovision due to banks' failure to internalize the upside of projects. In particular, credit subsidies and public credit guarantees are no longer equivalent. Alleviating liquidity restrictions requires injecting ex-ante resources into the system, so credit lines by the PDB are most effective. But, these lines need not be subsidized; with distortions arising from the transfer of resources between the government and the private sector, it is optimal in this context that government loans are offered at competitive rates rather than subsidized ones. In turn, solvency restrictions are best addressed via credit guarantees, as guaranteed loan do not eat up the

banks' solvency limits.

The optimal role of the PDB is likely to switch over the business cycle. While in normal times screening underprovision and moral hazard are likely to dominate, downturns may be times of specially stark liquidity or solvency constraints. It is also likely that during bad times the value of projects is reduced, thus reducing the forgone value of credit underprovision. The implication is that credit subsidies and performance premia should probably be the focus of PDBs in normal times, while the focus in downturns should be in easing liquidity and solvency constraints. During such bad times, offering a combined menu of unsubsidized credit and public guarantees would have the advantage of providing flexibility for banks to choose the option that better fits the constraints they face.

4.5 Information

Our modeling of the role of PDBs in the economy has straightforward implications that are related to their informational requirements. This is so because of the fine tuning required for the selection of industries and the computing of the right subsidy implicit in the credit lines or in the credit guarantees. Namely, in our framework, even if it intervenes through intermediated lending, a PDB has to have access to industry and bank characteristics. The banks' characteristics are required because the screening technology will determine how sensitive banks are to a subsidy. Banks' margins are also relevant because low margins are indicative of a low level of screening. The firms' characteristics are necessary because the existence and amount of subsidies depend upon the expected profitability.

Of course, it would be possible to implement a system of support to firms financing without this information, but this would be comparatively inefficient, with type I and type II errors, as the industries will be identified on the basis of its expected characteristics, not their actual ones.

Because of the importance of information, the existence of credit registries with all bank operations will allow to determine different levels of credit rationing, as well as different levels of bank margins that will be helpful in identifying the industries to be targeted and the level of the subsidy that should be set.

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