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We first introduce state intervention through the loan guarantee and show that, not surprisingly, it increases the number of entrepreneurs receiving a loan. However, after modeling business development services provided by the microfinance institution, we show that the government loan guarantee can have a counterproductive effect by reducing the number of entrepreneurs benefiting from such services. We therefore analyze an alternative policy: the subsidization of business development services by the State. We then provide a condition under which - for fixed government expenditures - such subsidies are more effective (in terms of outreach) than loan guarantees.

JEL Classifications: G14, G21, G38, D45, D82

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Abstract

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1 Introduction

In this paper we examine the role of government intervention on microcredit market in developed countries. Contrarily to the extensively studied case of developing countries, microcredit in developed countries mostly takes the form of individual loans (as opposed to group - or peer - loans) and often benefits from state intervention through direct subsidies or loan guarantee. This intervention seems to be mainly due to the positive effect of microcredit on employment and poverty alleviation through self employment and entrepreneurship. Facilitating the access to microcredit in turn benefits the state by reducing other social expenses. In this paper we analyze various forms of public subsidies and attempt to compare them.

Microcredit is generally defined as a small loan to individuals in poverty designed to encourage entrepreneurship or access to employment. Micro-borrowers often lack collateral. They rarely have steady employment and their credit history can hardly be verified. More generally, these individuals cannot meet the minimum requirements to access the traditional credit market, and microcredit is often considered to be a solution to exclusion from the traditional banking system and, consequently, to credit rationing.

Microcredit is a relatively new device in developed countries. According to the academic literature, state intervention via loan guaranties (as opposed to direct subsidies) is considered to be the most efficient measure in dealing with credit rationing. By participating in this specific market, government impacts the number of both *pure rationed* borrowers (who don't receive credit despite sharing the same characteristics with accepted borrowers and willing to pay a higher interest rate) and *redlined* borrowers (who don't receive credit at any interest rate because their projects don't generate a high enough return to the lender)[1]. In the case of small-business lending, microfinance institutions (MFIs thereafter) in developed countries are strongly involved in business development services (or entrepreneurial training more generally). These entail devices offered in addition to loans that aim at increasing the chances for the project to succeed. These devices mostly consist in training programs, for example, in accounting or management. In this paper we shed light on the impact of state intervention on business development services.

To do so, we base our work on Tirole's model of credit rationing in which borrowers are heterogeneous according to their project return and can enhance the probability of project success by exerting a costly and unobservable effort (see Tirole (2005)). To adjust to the case of microcredit,

[1] For detailed definitions of different types of credit rationing see Jaffee and Stiglitz (1990) pp. 847–849.

we model borrowers without any initial capital endowment and "banks" that lend without collateral requirements.

In this basic setting, we first introduce state intervention through the loan guarantee (which is common in microcredit in developed countries). We allow the state to pay back to the lending institution a proportion of the capital lost if the entrepreneur's project fails. Not surprisingly, we find that whatever the size of the guarantee, such a policy increases the number of entrepreneurs that receive a loan by widening the range of project returns optimally financed by the bank.

The key contribution of our work consists in analyzing how the loan guarantee interacts with business development services (or training more generally), another key feature of microcredit targeting small businesses in developed countries. To develop the analysis, we allow MFIs to invest in a device that increases the probability of project's success. In the absence of the state guarantee, business development services crowd-in a number of the excluded borrowers if and only if the relative gain generated by this measure is lower than its relative cost. However, when both business development services and the state guarantee are modeled, the loan guarantee can have a "perverse" effect, since it can reduce the incentive for the MFIs to provide business development services. In particular, assuming that project returns are uniformly distributed among borrowers, we show that the number of additional borrowers financed thanks to business development services is larger when state doesn't guarantee loans. The intuition behind this result is that, from the point of view of the MFI, the loan guarantee decreases the expected return on business development services.

Such a counterproductive effect leads us to model an alternative policy that would consist in subsidizing business development services. To fairly compare both policies, we analyze under what circumstances a government with a fixed budget would prefer to use it to subsidize business development services (BDS thereafter) rather than to guarantee loans. We provide a condition under which subsidizing BDS in turn brings better results (in terms of outreach) than the loan guarantee.

We now provide an overview of the existing literature with reference to this paper. As we have already mentioned, microcredit provides a solution to the borrowers who are excluded from the traditional credit market. In academic literature these individuals are denoted as either "rationed" or "redlined" borrowers (see e.g. Stiglitz and Weiss (1981) or Jaffee and Stiglitz (1990)). Stiglitz and Weiss (1981) show in particular that, for a given interest rate, there exists a critical value of return below which the bank doesn't finance the project. One of the aims of our paper is to analyze how such a threshold evolves depending on state intervention in the case of microcredit (i.e. of uncollateralized loans). Note that we don't model explicitly "small" loans which is unarguably an

important characteristic of microcredit. Therefore, our model can be understood as a model of social banking (microfinance institutions being a particular example of social banks). However, by modeling other important aspects of microfinance as the lack of collateral requirements, the presence of the loan guarantees and business development services, we will proceed in the following by attributing our model to the microfinance field.

Our paper is not the first to study the effect of the loan guarantee. Craig et al. (2007) analyze empirically the case of Small Business Administration, a program providing small firm loan guarantees in the USA, and find a positive and significant link between the level of SBA lending and local economic growth. In a subsequent paper, Craig et al. (2008) find a positive link between the average annual level of employment in the local market and SBA lending. These papers present a rationale for government intervention in small firm lending in general, but especially in microcredit lending that directly promotes self-employment and small start-ups.

The importance of government intervention in credit rationing is also highlighted in the case of France in a paper by Aubier and Cherbonnier (2007). They show evidence that credit rationing was significant during the 2001-2004 period for small and medium-sized enterprises. Facilitating access to microcredit then benefited the state by reducing other expenses (unemployment benefits, etc.). Similarly, Emran et al. (2007) analyze how microcredit market interacts with labour market in a macroeconomic model. In the present paper we disregard the interactions with other markets and focus on partial equilibrium on the (micro)credit market. More precisely, we don't study the financial efficiency of public intervention and exogenously assume that the state's objective is to increase the outreach, that is to crowd-in more entrepreneurs.

Regarding the comparison of various policies on the credit market, Gale (1990) analyzes the effects of federal policies on credit allocation and economic efficiency in a model with asymmetric information. He argues that the loan guarantee is more efficient than pure direct lending programs and pure interest subsidy as it operates through raising the return to the bank. Adding business development services to the analysis, we enrich this discussion by challenging his result regarding indirect subsidies. More precisely, we show that the loan guarantee might be less efficient than some indirect subsidies that can impact the (expected) return to the bank.

The relationship between microcredit and subsidies is historical. Grameen Bank, for example, has constantly benefited from subsidies despite reporting profits (see Morduch (1999))[2]. Moreover,

[2]Cull et al. (2007) confirm the existence of MFIs having achieved the "ultimate promise of microfinance" (i.e. self-sustainability and large outreach to the poor). However, according to this study such MFIs are mainly exceptions.

subsidized programs seem to perform better (than unsubsidized ones) in outreaching the poorest borrowers (see Morduch (2000)). Unsubsidized MFIs seem to sacrifice one dimension of their social performance either by setting higher interest rates, targeting richer clients or decreasing the share of female borrowers (see D'Espallier et al. (2013)).

Still, the academic literature on microfinance subsidization remains relatively scarce, mainly due to difficulties in obtaining high quality data. One exception is Hudon and Traca (2011) who find that subsidies generally increase the efficiency of MFIs. This may be related to the concept of "smart subsides" defined by Armendariz and Morduch (2010, pp. 333) as "carefully designed interventions that seek to minimize distortions, mistargeting and inefficiencies while maximizing social benefits". Mieno and Kai (2012) also advocate the use of such subsidies. They find that subsidies received at the early stage reduce the cost pressure for star-up MFIs and therefore allow them to achieve economies of scale. Finally, Armendariz et al. (2011) argue that subsidization is efficient as long as there is no uncertainty regarding the timing or the amount of subsidies.

More generally, academic literature on microcredit design mainly revolves around developing countries where peer lending was – until recently – both the norm and the explanation for the success of microcredit.[3] Townsend (2003), however, questions this idea and argues that the choice between individual and group lending is not simple. Particularly, group-lending prevalence depends on the economy-wide average wealth: richer economies should experience less group lending. This analysis might explain why individual lending is prevalent in developed countries and provides a rationale for individual lending model in our framework.

The originality of our work lies mostly in the modeling of business development services (i.e. training of the entrepreneurs by the MFI) that complements microcredit as a tool of financing excluded individuals. Non-financial services provided by MFIs are termed "Microfinance-Plus" in Lensink and Mersland (2009). These kinds of programs are very popular in developed countries where they generally take the form of entrepreneurial training. In developing economies, however, this "plus" services often take the form of social trainings, including health or educational services.

Several papers empirically assess the impact of these types of non-financial services. One example is Karlan and Valvidia (2011) who study training programs in Peru using randomized control trials and show that they have little effect for borrowers in this context. Another example is Lensink et al. (2011) who use data for MFIs in 61 countries. They show that MFIs providing both finance

[3] The key role of peer-lending in explaining high repayment rates in micro-credit in developing countries has been recently challenged by Giné and Karlan (2009).

and business development services have similar performance as MFIs providing no "plus" services. However MFIs with social services do significantly better in terms of outreach.[4]

The rest of the paper is structured as follows. In the next section we lay out the basic model and analyze the "laissez faire" benchmark. We then introduce successively the state guarantee (section 3) and business development services (section 4). After having shown the that state guarantee can have a counterproductive effect on business development services, we analyze the alternative policy of business development services subsidization in section 5. Section 6 concludes and presents some possible extensions and limitations of the model.

2 The model

Our modeling is based on the classical corporate finance model (see e.g. Tirole (2005)). It consists of a continuum of risk neutral entrepreneurs[5], each endowed with a project that needs a financing D (identical for all agents). Each project can either succeed and generate a return of ρD or fail and give zero return (the invested capital is then lost). The return on investment (ρ) is assumed to be heterogeneous among agents (and distributed on $\left[\underline{\rho}, \overline{\rho}\right]$). To increase the probability of success, an entrepreneur must exert a costly effort (unobserved by the MFI). For simplicity, we assume that there are only two possible levels of effort, high (the entrepreneur behaves) and low (the entrepreneur misbehaves). The probability of success with high effort ($\overline{p}$) is higher than the probability of success with low effort ($\underline{p}$): $\overline{p} > \underline{p}$. However, if an entrepreneur chooses to exert a low effort, he receives a private benefit, ψ. If the entrepreneur behaves he receives no private benefit.

The principal (an MFI, or more generally a social bank) then chooses the projects she invests in (that is the borrowers she lends D to) and sets the interest rate (r). We assume that the expected profit of the MFI has to be nil for each contract. This reflects both the guiding principle of MFIs and the increasing competition on the microcredit market (see Cull et al. (2011)).

The moral hazard issue comes from the unobservability of entrepreneurs' effort by the MFI. For an entrepreneur to exert high effort, the interest rate has to be incentive compatible. The zero expected profit condition together with the incentive compatibility constraint will therefore give the minimum project return threshold to receive financing and the interest rate.

In contrast to Tirole (2005), we assume that entrepreneurs have no capital to invest in their project. This difference allows our model to capture the specific feature of the microcredit market where

[4] For detailed examples of MFIs providing (themselves or not) non-financial services see Dunford (2001).

[5] Risk aversion won't impact our result, as there are no first derivative effects.

borrowers often lack collateral.

Moreover, in line with Tirole (2005), we assume that the projects are only viable when the entrepreneur behaves, meaning that (i) the Net Present Value (NPV) in this case is positive i.e. $\overline{p}\rho > 1\ \forall\rho$, or $\overline{p}\underline{\rho} > 1$ and (ii) the NPV of the projects is negative if the borrower misbehaves, meaning that $\underline{p}\rho < 1 - \frac{\psi}{D}\ \forall\rho$ or $\underline{p}\overline{\rho} < 1 - \frac{\psi}{D}$.[6]

Let us first solve the model under "laissez-faire", that is without state intervention. The entrepreneur receives the total return of the project net of the capital due to the bank. He receives $\rho D - (1+r)\,D$ if the project succeeds and zero if it fails. We assume that $\rho > 1 + r$. Therefore, the entrepreneur will face the following incentive compatibility constraint:

$$\overline{p}\,[\rho D - (1+r)D] \geq \underline{p}\,[\rho D - (1+r)D] + \psi \tag{1}$$

This amounts, for a given interest rate, to the minimum return for which the borrower exerts high effort:

$$\rho_{\min} = \frac{\psi}{D\Delta p} + (1+r) \tag{2}$$

where $\Delta p = \overline{p} - \underline{p}$.

Moreover, when borrowers exert high effort the expected profit of the MFI writes (note that it is independent of project return):

$$E\,(\pi) = \overline{p}\,(1+r)\,D - D \tag{3}$$

and the zero profit condition gives:

$$\overline{r} = \frac{1-\overline{p}}{\overline{p}} \tag{4}$$

Introducing the latter expression for the interest rate in (2), we find that the bank will invest in all the projects generating a return higher or equal to the threshold $\rho_{\min}$:

$$\rho_{\min} = \frac{\psi}{D\Delta p} + \frac{1}{\overline{p}} \tag{5}$$

Up to now, our modeling of microcredit was limited to a classic loan without collateral. However, at least two other major aspects are key to microcredit in developed countries: state intervention (mostly through the loan guarantee) and business development services. Let us successively include these two patterns starting with the loan guarantee.

[6] We keep these assumptions on the viability of the project for the rest on this paper. The presentation of the conditions on NPV changes when the loan guarantee and BDS are introduced. Because of their limited interest we don't present them for each model. Note that they don't alter our results.

3 The introduction of the loan guarantee

The loan guarantee is an essential tool for the expanding microcredit market in developed countries.[7] By lowering the risk taken by the MFI, such a policy aims at crowding in a part of the initially excluded borrowers.

In accordance with real world experience (see previous footnote), we assume that state guarantees a proportion $\gamma < 1$ of the loan outstanding if the project fails. As it only impacts the consequence of project failure for the MFI, it changes neither borrowers' return nor their incentive compatibility constraints. However, the zero expected profit condition then becomes:

$$E(\pi) = \overline{p}(1 + r_\gamma) D + (1 - \overline{p}) \gamma D - D = 0 \tag{6}$$

leading to an interest rate equal to:

$$r_\gamma = \frac{1 - \overline{p}}{\overline{p}} (1 - \gamma) \tag{7}$$

which is, not surprisingly, lower than the benchmark interest rate. We thus end up (using (2)) with

$$\rho_{\gamma\,\min} = \frac{\psi}{D\Delta p} + \frac{1 - \gamma(1 - \overline{p})}{\overline{p}} \tag{8}$$

where $\rho_{\gamma\,\min}$ represents the minimum return a project should generate to get financed by the MFI, in presence of the state guarantee.

Therefore, as expected, the minimum project productivity threshold required for financing decreases thanks to the loan guarantee ($\rho_{\gamma\,\min} < \rho_{\min}$). The intuition behind this result is simple: the interest rate that represents an "insurance" for the bank against high-risk agents. With the loan guarantee, the government will bear a part of this costly "insurance". The bank will provide microcredits at a lower interest rate. Hence, a larger part of the entrepreneurs will optimally exert high effort and a larger part of the project will be financed. Thus, state guarantees reduce credit rationing and can therefore allow the state to save on other social expenses, such as unemployment benefits.[8] It is important to emphasize that we don't investigate the financial efficiency of a loan guarantee

[7] For example, in France, several public organisms guarantee capital in case of loss: the "Fonds de Cohésion Sociale" or Caritas (50% of the outstanding principal and unpaid interest) for consumer loans (that aim at financing goods that contribute to job seeking, such as cars, computers, business suits, etc...) and "France Active Garantie" (70% of the outstanding principal) for self employment or small business loans. These guarantees are free from the MFI's point of view. More recently the European Commission and the European Investment Bank started providing up to 75% guarantee for microcredits in the European Union through the European Progress Microfinance Facility.

[8] According to Brabant et al. (2009), it is cheaper – in the case of France – to subsidize microcredit than to pay welfare benefits to micro-borrowers.

program. Total gains from successful microcredit cannot indeed be easily identified as it may lead to lower unemployment benefits, better education for children or better health for example. Obviously, there is a range of non-appropriable benefits ignored by the single market approach that should be taken into account. However, the cost-benefit analysis is beyond the scope of this paper.[9]

4 Modeling Business Development Services (BDS)

As we have already noted, business development services is another key feature of small business microfinance in developed economies. MFIs often provide services that aim at increasing the probability of entrepreneurs' projects to succeed (for example accounting or management trainings that help micro-borrowers to run their business).

We model business development services as an action provided by the MFI (at fix cost K) that increases by an amount ϵ the probability of entrepreneur's project to succeed. For the sake of simplicity, we assume that this incremental probability doesn't depend on entrepreneur's effort (of course one can imagine mechanisms that make the two efforts – by the borrowers and the MFI – complementary or substitute efforts). If the MFI provides BDS, the probability of success with high and low effort writes respectively:

$$\overline{p}(\lambda) = \overline{p} + \varepsilon \text{ and } \underline{p}(\lambda) = \underline{p} + \varepsilon$$

The independence of the increase in the probability of success thanks to BDS from borrower's effort simplifies the model a lot. It implies that entrepreneur's behavior doesn't depend on the choice of MFI to provide BDS (it doesn't change Δp). Therefore, the incentive compatibility constraint in the presence of BDS remains the same (inequality (1)) and the minimum project return compatible with effort is still defined by equation (2).

4.1 In the laissez-faire case

Let us assume for now that the lending institution bears the cost of the business development services, K (independent form the project productivity ρ). In case it provides BDS, the expected profit of the MFI is:

$$E(\pi) = (\overline{p} + \varepsilon)(1 + r_\lambda) D - D - K = 0 \tag{9}$$

[9]Such an analysis would still be very difficult to implement, as noted in Armendariz and Morduch (2010).

and the equilibrium interest rate charged to clients receiving BDS is:

$$r_\lambda = \frac{1-(\overline{p}+\varepsilon)}{\overline{p}+\varepsilon} + \frac{K}{(\overline{p}+\varepsilon)\,D} \tag{10}$$

Note that it is not obvious to compare the equilibrium interest rate in presence of BDS and the benchmark interest rate in (4).

Finally, using (2) and (10), we find the minimum return required by the MFI when it engages in BDS:

$$\rho_{\lambda\,\min} = \frac{\psi}{D\Delta p} + \frac{1}{\overline{p}+\varepsilon} + \frac{K}{(\overline{p}+\varepsilon)\,D} \tag{11}$$

Proposition 1. *The availability of business development services will increase the outreach of borrowers ($\rho_{\min} > \rho_{\lambda\,\min}$) if and only if*

$$\frac{\varepsilon}{\overline{p}} > \frac{K}{D} \tag{12}$$

that is if and only if the relative gain in probability of success generated by business development services exceeds its relative cost.

If the latter condition is not satisfied, i.e. if $\rho_{\min} < \rho_{\lambda\,\min}$, no BDS will be provided as it will not crowd-in any additional borrowers. On the contrary, if $\rho_{\min} > \rho_{\lambda\,\min}$, all the entrepreneurs with projects generating a return belonging to the interval $[\rho_{\lambda\,\min}, \rho_{\min}]$ will be financed and will receive BDS.

4.2 In the presence of the state guarantee

Let us now study how business development services interact with the state guarantee. This seems to be a promising analysis as intuition suggests that state intervention might lower the incentive for the MFI to provide such services.

When the state guarantees a proportion γ of the loan, the zero profit condition of an MFI providing BDS writes:

$$E(\pi) = (\overline{p}+\varepsilon)(1+r_{\gamma\lambda})\,D + (1-(\overline{p}+\varepsilon))\,\gamma D - D - K = 0 \tag{13}$$

implying:

$$r_{\gamma\lambda} = \frac{1-(\overline{p}+\varepsilon)}{\overline{p}+\varepsilon}(1-\gamma) + \frac{K}{(\overline{p}+\varepsilon)\,D} \tag{14}$$

While it is easily noticeably that $r_{\gamma\lambda} < r_\lambda$ (the state guarantee decreases the interest rate), the comparison of $r_{\gamma\lambda}$ with r_γ is not trivial. Put differently, as in the previous section, depending on

their cost, business development services may increase the interest rate.

Once again, our simplifications ensure that borrowers' behavior is not impacted by BDS. Therefore, using equation (2), we obtain the minimum return required by the bank in the presence of both business development services and the state guarantee:

$$\rho_{\gamma\lambda\,\min} = \frac{\psi}{D\Delta p} + \frac{1-\gamma\left(1-\left(\overline{p}+\varepsilon\right)\right)}{\overline{p}+\varepsilon} + \frac{K}{\left(\overline{p}+\varepsilon\right)D} \tag{15}$$

We therefore have $\rho_{\gamma\lambda\,\min} < \rho_{\lambda\,\min}$ and obviously, in the presence of BDS, the state guarantee increases the range of financed borrowers. However, it is not clear whether BDS are effectively used in the presence of the state guarantee (that is if $\rho_{\gamma\lambda\,\min} < \rho_{\gamma\,\min}$). Proposition 2 provides a condition under which BDS crowd-in additional borrowers when loans are guaranteed.

Proposition 2. *In the presence of the state guarantee, the provision of BDS by the MFI will lead to a higher outreach in terms of the number of financed entrepreneurs (that is we will have $\rho_{\gamma\lambda\,\min} < \rho_{\gamma\,\min}$) if and only if*

$$\frac{\varepsilon}{\overline{p}} > \frac{K}{\left(1-\gamma\right)D} \tag{16}$$

Comparing Proposition 1 and Proposition 2, it appears that condition (12) is weaker than condition (16). This might indicate that BDS crowd-in less borrowers when the state guarantees loans. This is for example the case when $\frac{K}{D} < \frac{\varepsilon}{\overline{p}} < \frac{K}{(1-\gamma)D}$ as then no borrowers are crowed-in in the presence of the state guarantee thanks to BDS, contrarily to what would happen without public intervention. Whether this is also the case when BDS are effectively used in both cases (that is when $\frac{\varepsilon}{\overline{p}} > \frac{K}{(1-\gamma)D}$) depends on the distribution of project returns among the potential borrowers. Business development services then crowd-in borrowers with project returns in between $\rho_{\lambda\,\min}$ and $\rho_{\min}$ in the absence of public intervention; and in between $\rho_{\gamma\lambda\,\min}$ and $\rho_{\gamma\,\min}$ if the state guarantees a part of loans.

In the simple case of a uniform distribution of returns, less borrowers will be financed thanks to BDS in the presence of the state guarantee if $\rho_{\gamma\,\min} - \rho_{\gamma\lambda\,\min} < \rho_{\min} - \rho_{\lambda\,\min}$. As we have

$$\rho_{\gamma\,\min} - \rho_{\gamma\lambda\,\min} = \frac{\varepsilon D\left(1-\gamma\right) - K\overline{p}}{\overline{p}\left(\overline{p}+\varepsilon\right)D}$$

and

$$\rho_{\min} - \rho_{\lambda\,\min} = \frac{\varepsilon D - K\overline{p}}{\overline{p}\left(\overline{p}+\varepsilon\right)D}.$$

next Proposition holds.

Proposition 3. *If the distribution of the project returns is uniform, the number of additional entrepreneurs financed thanks to business development services is larger without the state guarantee.*

This result comes from the fact that the return to the bank from BDS in the presence of the state guarantee writes:

$$\varepsilon D[(1+r)-\gamma]$$

and is therefore decreasing in γ.

Proposition 3 might however not hold if the distribution of the project returns is not uniform. In particular, if project returns are highly concentrated on the interval $[\rho_{\gamma\,\min}, \rho_{\gamma\lambda\,\min}]$, then a smaller interval would not necessarily result in a smaller number of projects financed.

5 An alternative policy: subsidizing business development services

The possible perverse effect that the state guarantee can have on business development services leads us to analyzing an alternative policy that would consist of subsidizing BDS. To compare this alternative policy with the loan guarantee, we assume that government allocates a fixed budget to its intervention in the microcredit market and has to choose between the two policies. More precisely, we assume that it has a budget G per contract. Without loss of generality we assume that this budget is equal to the cost of business development services, K. Therefore, if the government chooses to subsidize BDS, it bears the total cost of the program. Conversely, if it chooses to subsidize the loans, it pays $G = K$ directly to the MFI in case the project fails.

The aim of this section is to compute the minimum project return required by the MFI if the government subsidizes business development services and to compare it with the one found in the previous section. This would allow us to define the most effective policy when the aim of the government is to increase the outreach of the entrepreneurs (for a fix budget).

The zero profit condition of the MFI when government subsidizes BDS writes:

$$E(\pi) = (\overline{p}+\varepsilon)(1+\widetilde{r}_\lambda)D - D = 0 \tag{17}$$

what gives as interest rate:

$$\widetilde{r}_\lambda = \frac{1-(\overline{p}+\varepsilon)}{\overline{p}+\varepsilon} \tag{18}$$

Using (2), the minimum project productivity threshold is then:

$$\widetilde{\rho}_{\lambda\,\min} = \frac{\psi}{D\Delta p} + \frac{1}{\overline{p}+\varepsilon} \tag{19}$$

that we compare with the minimum project return threshold under the state guarantee (see equation (8)) with $\gamma D = K$:

$$\widetilde{\rho}_{\gamma\,\min} = \frac{\psi}{D\Delta p} + \frac{D - (1-\overline{p})\,K}{\overline{p}D} \tag{20}$$

This leads us to the following proposition:

Proposition 4. *For a fixed public expenditure, subsidizing business development services will crowd-in more borrowers than the loan guarantee if and only if:*

$$\frac{\varepsilon}{\overline{p}} > \frac{(1-\overline{p})\,K}{D - (1-\overline{p})\,K} \tag{21}$$

Therefore, if the aim of the government is to crowd-in more borrowers on the credit market, under condition (21), subsidizing BDS would be more effective than the loan guarantee. These results broaden the results of Gale (1990). Indeed, whereas Gale (1990) states that the loan guarantee is more efficient than any direct subsidy, we show in this paper (using a different kind of model) that this is not necessarily the case for indirect subsidies.

6 Concluding remarks

Microcredit in the developed countries mainly takes the form of individual loans. It is often characterized by two important features which are government support through the loan guarantee and business development services. In this paper, we focus on the interaction between these two key features. Our motivation relies on the intuition that the loan guarantee might impact the MFI's involvement in business development services and probably deteriorate its efficiency in terms of outreach.

By extending Tirole's (2005) model to the microcredit market with the loan guarantee and business development services we prove that the state guarantee can be counterproductive in terms of the number of entrepreneurs financed thanks to business development services (in particular when the distribution of the project returns is uniform). This central finding leads us to studying an alternative solution: the subsidization of business development services and then comparing the two policies in terms of outreach.

One of the limits of our model concerns the interactions of the microcredit market with the missing markets. Indeed, state intervention in the credit market can have interesting implications for the labour market for example (see Emran et al. (2007)). In the present paper we focus on the "pure"

impact of state intervention on the lending behavior of an MFI. The investigation of the financial efficiency of the public intervention is left for further research. This will in particular be needed to explain why the state chooses to participate in the microcredit market. Finally, another potential extension of our model consists in allowing the state to mix the two policies. For example for a fixed level of expenditure, the government might choose to partly subsidize business development services and partly guarantee loans.

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