DISCUSSION PAPER SERIES

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ABSTRACT

Access to Finance among Small and Medium-Sized Enterprises and Job Creation in Africa[1]

In the past decade inclusive growth, that is job-rich growth, has topped the policy agenda in developing countries. This paper investigates how the access to finance affects employment in small and medium-sized enterprises (SMEs) in Sub-Saharan Africa. It first presents a model where firm creation requires entrepreneurial search and paying the start-up costs, while the firm's size in terms of employment depends on the access to credit. Under the financial market imperfections, access to credit can be a binding constraint on firm entry and employment even when the banks have sufficient liquidity. Using an impact evaluation-based approach on firm-level data from 42 African countries, we show that SMEs with access to formal financing create more jobs than firms without access, with employment in firms having access to more affordable and larger loans growing the fastest. The impact of access to finance is stronger for firms in manufacturing than in services, pointing to sectoral targeting of finance as a possible policy supporting industrialization.

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1. Introduction

Employment is a key channel through which growth translates into poverty reduction. However, many developing countries, including in Africa, have grown rapidly over the past decades without a substantial reduction in poverty. Recent analysis suggests that the poverty rate in African countries is expected to decline only to about 25% by 2030 while in the other regions of the world it will drop to less than 3% (Bicaba et al., 2017; Beegle and Christiansen, 2019). Among the factors holding back poverty reduction is the lack of access to finance for small and medium-sized enterprises (SMEs), which are among the largest contributors to job creation in developing countries (Blancher, 2019; Ghassibe et al., 2019). A report from the International Financial Corporation (2017) estimated that in developing countries, more than 40% of SMEs have at least partially constrained access to external finance, while about 20% face heavy constraints.

Policymakers and researchers have recognized that financial inclusion is a key dimension as well as a strong driver of inclusive growth. Access to financial services could also boost employability and women labor participation by providing them with the means to invest in education and training (Asongu and Odhiambo, 2018; Asongu et al, 2020). Beck et al (2005) showed that relaxing financial constraints positively impacts SMEs' employment growth. This effect is larger the smaller the firm, the more labor-intensive its production structure, and the larger its inherent need to finance working capital (Dao and Liu, 2017). However, the access to credit for new firms in Africa is limited by weak property rights, gaps in financial auditing as well as by the lack of financial skills among entrepreneurs. Several studies also underscored that small firms, which consistently report higher growth obstacles than medium-sized or large firms, are financially more constrained than larger ones and less likely to access the formal finance.

Although highly relevant, the literature so far has focused mostly on a large set of developing and emerging market economies which may differ markedly in their specificities of the labor market and access to finance by SMEs. In contrast, this study focuses on Africa, which is the poorest region in the world and the most excluded in terms of access to finance partly due to the underdevelopment of its financial system. In addition, the widespread informality in the labor market induces a low level of permanent jobs. Not distinguishing between permanent and non-permanent jobs could lead to the overestimation of the impact of access to finance on employment.

Another feature of African countries is the lack of collateral due to issues related to land ownership and leasing. The lack of collateral worsens financial exclusion and pushes SMEs to resort to the informal finance (credit from suppliers, advances from customers or friends and relatives).

This paper contributes to closing the knowledge gap on linkages between the access to finance and job-rich growth in Africa. Specific questions that the paper seeks to answer are: (i) Does access to finance impede the creation of new firms and the number of jobs that these firms generate? (ii) Are there sectoral differences in the impact of the access to finance on firm creation and employment? Towards this goal the paper examines these two dimensions of inclusive growth – financial inclusion and job creation – both theoretically, in a search model and empirically, by investigating the impact of access to finance on job creation in SMEs.[2] The focus is on privately-

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[2] Given the high prevalence of extreme poverty in Africa, we focus mostly on inclusive growth that is absolute pro-poor, that is, brings about reduction in absolute poverty. In the policy recommendations in the concluding section,

owned SMEs, which are the most financially excluded even though they are a key generator of employment. The question is highly relevant as evidence suggests that up to one third of private firms in Africa report limited access to finance as a major constraint, while the private sector generates estimated 90% of jobs on the continent (McKinsey & Company, 2012). In addition, the paper provides a granular analysis of the impact of access to finance on job creation while distinguishing between the formal and non-formal sources of finance as well as accounting for the size and maturity of the loan, and the collateral. Another contribution of the paper is that it examines sectoral differences, in particular between manufacturing and services, in the impact of access to finance and job creation in Africa.

With exception of Aghion et al. (2007), the literature on the SME access to finance is by and large empirical.[3] In contrast, this paper first presents a model where firm creation depends on matching potential entrepreneurs with productive opportunities and overcoming start-up costs, while the jobs generated by the firm hinge on the availability of capital and hence the access to credit. Limited access to credit due to the lack of collateral hampers capital accumulation especially among nascent entrepreneurs in African countries, where financial frictions stem, broadly, from weak legal frameworks and limited transparency in financial accounting. The analysis shows that the constrained access to credit and hence to investment capital, which can emerge even when the financial sector has liquidity, is a binding impediment to entrepreneurship.

The model is tested on a sample of firm-level data from 42 African countries during the 2006 – 2009 period, utilizing a research design based on propensity scores-matching. The matching techniques are increasingly utilized in assessing the impact of an exposure to a specific situation or to an experiment (called the "*treatment*" in the impact evaluation literature) on a selected outcome variable. The results indicate that access to financial services (loan financing) positively affects growth in the number of firms' permanent employees. Specifically, larger loans as well as loans with smaller collateral size and longer maturities are associated with a stronger and more significant impact on employment. Moreover, the empirical analysis shows that access to finance has a greater impact on firms in the manufacturing sector than those in services.

The paper is organized as follows. After this introduction, the next section provides a review of the literature, with a focus on the determinants of entrepreneurship and the impact of institutional and policy reforms on entrepreneurship. Section 3 presents the theoretical model that underpins the empirical analysis. Section 4 contains the empirical analysis and the regression results, while Section 5 summarizes the findings and discusses policy implications.

2. A review of the literature

This paper builds on the literature on the role of policies in promoting productive entrepreneurship. Baumol (1990) underscored that the extent of entrepreneurship across societies is mostly given. Policies should thus encourage potential entrepreneurs to enter highly productive rather than less productive or even destructive activities. Policymakers thus strive to overcome both financial and non-financial constraints, which have impeded productive entrepreneurship across Africa and

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we also discuss policies that would lead to relative pro-poor growth, that is, bring about reduction in inequality. These definitions of inclusive growth are provided in, for example, Asongu and Nwachukwu (2017).

[3] The exceptions include Baliamoune-Lutz et al. (2011), Grimm et al. (2012), Fowowe (2017), Quartey et al. (2017).

emerging market countries (Baliamoune-Lutz et al., 2011). However, productive SMEs in the formal sector in African countries have been hampered by numerous non-financial constraints, including low revenue collection and the lack of social protection, as highlighted in Auriol (2014) or by the lack of skills (Brixiová, 2010).[4]

SME financing has attracted considerable attention from policymakers, researchers and development partners (Stein et al., 2010; Beck and Demirguc-Kunt, 2006; Jacob, 2017; Fowowe, 2017; Quartey et al., 2017; Dao and Liu, 2017; Asongu and Odhiambo, 2018; Asongu et al, 2020). Within the literature on the constraints to productive entrepreneurship, this paper builds on the stream emphasizing the limited access to credit due to either functioning of commercial banks, institutional imperfections or entrepreneurs themselves. The topic has been widely covered for the advanced economies. Several reports on UK SMEs have emphasized the lack of competition in the supply of banking services to SMEs (Cruickshank, 2000; Independent Commission on Banking, 2011). Siedchlag et al. (2014) and European Commission (2014) documented that small and young firms in the EU have more difficulty than other firms to obtain bank credit, even if their financial performance is the same, pointing to inefficiencies in the market for bank credit. The limited access to credit hampers firms' long-term performance. Utilizing an SME panel for 12 European countries during 2014 – 2016, Gomez (2018) showed negative effects of credit constraints on fixed asset investments, and a subdued impact on firm growth and working capital.[5]

The literature has extensively discussed the links between entrepreneurship and small firms' growth constraints and their limited access to financial services. Beck et al. (2005) examined the impact of financial constraints on SMEs' growth and found that financial obstacles are significantly and negatively linked to firms' growth rate, with the smallest firms being consistently the most adversely affected. Evidence has also shown that small firms consistently report higher growth obstacles than medium-size or large firms (Schiffer and Weder, 2001; Beck et al., 2005; Beck and Demirguc-Kunt, 2006). Berger and Udell (1998) and Galindo and Schantiarelli (2003) have shown that both in developing and advanced countries, small firms have a more limited access to finance and are more growth-constrained than their large firms counterparts. Using firm-level survey data, Ayyagari, Demirguc-Kunt, and Maksimovic (2008a) and Ayyagari, Demirguc-Kunt, and Maksimovic (2008b) found that access to finance is firmly linked to the performance of firms. They also evidenced that entities with access to formal financing grow faster than those with access to alternative sources of financing. This evidence is supported by other studies that show that financially-included firms tend to have a more efficient allocation of their asset portfolio (Claessens and Laeven, 2004; Ayyagari, Demirguc-Kunt, and Maksimovic, 2007). In the same vein, Beck et al. (2005) provided evidence that higher obstacles faced by smaller firms translate into a slower growth, with small firms' financing obstacles having almost twice the impact on their annual growth as compared with large firms.

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[4] Auriol (2014) showed that a low level of taxation and the lack of social protection that ensues have damaging consequences on the development of the formal sector, and thus limit firm growth. The low level of tax collection can incentivize the government to limit competition in the formal private sector, creating rents that can be appropriated through entry fees and profit taxes. Moreover, because of the lack of social protection, the local entrepreneurs in the formal sector have the social obligation to subsidize their family including through employment, making their firms less efficient than those of outsiders and ultimately discouraging local entrepreneurship.

[5] Grimm et al (2012) analyzed capital stocks of SME in low-income countries and found that entrepreneurs' risk attitudes impact the stock levels, in addition to credit constraints.

In the past decade, several studies on credit constraints in emerging market countries have been published, with several linking credit constraints with firm creation and performance. Aghion et al. (2007) showed theoretically and empirically – analyzing data from 16 industrialized and emerging economies – that access to finance matters most for the entry of small firms and helps new firms expand if successful. Fowowe (2017), who examined the impact of access to finance with firm-level data in 30 African countries drawing on subjective measures of financing access, found that financing is key for firm growth. Quartey et al. (2017) found that SMEs' access to finance in the West African sub-region is strongly impacted by factors such as firm size, ownership, strength of legal rights and depth of credit information, firm's export orientation and managerial experience. Formality was also found to impact strongly access to credit by SMEs.

Fraser et al. (2015) emphasize that research on entrepreneurial financing needs to go beyond the traditional supply-side bottlenecks and examine the role of entrepreneurial cognition, motivation, stage of the firm life-cycle and ownership type in the firms' access to finance and performance. Similarly to Aghion et al. (2007), this paper examines the effects of credit constraints on the entry of new firms and the expansion of successful businesses. However, we focus on a sample of 42 African countries, in contrast to16 industrial and emerging market countries covered in their study. In African countries, financial constraints to entrepreneurship are amplified by unclear property rights and restrictions on using assets such as land as collateral. To reflect these constraints, the framework presented below shows how credit constraints slow down private sector development.

3. The model

The model builds on Brixiová and Kiyotaki (1997), Aghion et al. (2007), and Baliamoune-Lutz et al. (2011). The key differences of the framework in this paper are (i) a greater emphasis on the financial sector imperfections, including the lack of savings opportunities and (ii) the focus of the analysis on the link between the credit constraints and firm job creation and size. The emphasis on the links between credit constraints and the firm size in terms of employment also distinguished this framework from that of Aghion et al. (2007), where the authors do not explicitly model employment dynamics. Finally, while our model is micro-based and underpins the empirical testing at the firm level, it also allows aggregation and hence has macroeconomic implications in terms of the aggregate output, employment, labor productivity and inequality in income.

Our model is relevant especially for low-income African countries where the productive private sector has been emerging often amid an underdeveloped financial sector, in particular the weak enforcement laws, which contribute to high collateral requirements. At the same time, long-term tangible assets that could serve as collateral are limited, in part due to unclear property rights. By reflecting these facts, the framework below is consistent with a situation in many transition and African countries where the financial sectors are dominated by banks and binding credit constraints co-exist with excess liquidity (Brixiová and Kiyotaki, 1997, Baliamoune-Lutz et al., 2011, Beck et al., 2011).

The economy is populated by large number of infinitely lived entrepreneurs and workers with the population normalized to one. The population shares for entrepreneurs and workers are μ and $1-\mu$, respectively. Entrepreneurs are of two types, ϕ and $1-\phi$: ϕ is the share of those endowed with high levels of net worth (a_h) and $(1-\phi)$ is the share of entrepreneurs with low levels of net worth

(a_l), where $a_h > a_l > 0$. The net worth, a_i, $i=h, l,$ is entrepreneur-specific and constant as entrepreneurs consume their profits each period, reflecting limited savings and investment options for SMEs in Sub-Saharan Africa. Both entrepreneurs and workers have risk neutral preferences in consumption, c. For workers the consumption in each period depends on the wage, w, when they work for firms in the formal sector or on income b from self-employment in the informal sector.[6] For entrepreneurs it depends on the profit from running a firm, π, which is fully consumed each period or on the income, ω, from self-employment in the informal sector.

The entrepreneurs of type $i=h, l$ search for a business opportunity at cost $d(x_i) = x_i^2/2\gamma$ units of the consumption good per unit of time, where $\gamma > 0$ is the parameter of search efficiency. The entrepreneur of type i then finds a business opportunity according to a Poisson process with the arrival rate of x_i and produces output y_i in the formal sector with labor n_i, business capital z and physical capital k_i according to the following production function:

$$y_i = \frac{1}{1-\alpha}(zk_i)^\alpha (n_i)^{1-\alpha} \tag{1}$$

where α, $0 < \alpha < 1$, is the share of the total capital in the output. The gross profit Π_i of an entrepreneur i with net worth a_i who employs capital k_i and labor n_i can be expressed as:

$$\Pi_i = max_n(y_i - wn_i) = R(K)k_i \tag{2}$$

where $K = \int_0^\mu k_i \, di$ is the aggregate capital and $R(K) = \frac{\alpha}{1-\alpha} zw^{-1(1-\alpha)/\alpha}$ is the rate of return on investment for an individual entrepreneur; it is decreasing in the aggregate capital stock.[7] If the rate of return on capital exceeds the real interest rate, $R(K) > r$, the entrepreneurs who find a business opportunity will borrow up to their credit limits and use their entire net worth as collateral.

The entrepreneurs finance their project from own resources (net worth) and by borrowing, using the net worth as collateral. However, the output can be used only for consumption and the capital (including the net worth) is entrepreneur-specific. This implies that without the entrepreneur's specific know-how, the liquidation value of the net worth for outsiders is smaller than for the entrepreneur. Hence in the event of the entrepreneur' s default on borrowing, the lenders can recover only θ proportion of the value of the net worth[8] and restrict lending to an entrepreneur i, b_i, to the amount not exceeding this collateral value of the entrepreneur's net worth, a_i:

$$b_i \leq \theta a_i \qquad i = h, l \tag{3}$$

[6] The workers are working either in the formal private sector (in firms created by the entrepreneurs) or in the informal sector, which we interpret as household production. In either activity, they receive wage w.

[7] Note that entrepreneurs and workers take w and r as given, and hence entrepreneurs adjust their capital/labor ratio until w $= (zk_i)^\alpha (n_i)^{-\alpha}$ and $r = \frac{\alpha}{1-\alpha}(zk_i)^{\alpha-1}(n_i)^{1-\alpha}$

8 The value of θ (share that cannot be recovered) depends positively upon the specificity of the capital and negatively on the design and enforcement of private contracts and development of the financial sector.

where $k_i = a_i + b_i$ reflects that the entrepreneur i finances capital (k) from both borrowing (b) and own net worth (a). Entrepreneurs consume their profits, that is: $c = y - wn - rb,$ where c is the private consumption, wn is the wage cost, and r is the real interest rate on debt (which in equilibrium is equal to the rate of time preference).

When $K < \overline{K}$, which is a common situation in developing countries, the rate of return on capital is above the real interest rate on debt, $R(K) > r$. The entrepreneurs thus borrow up to the credit limit for capital investment, i.e. the credit constraint is binding and $b_i = \theta a_i$ and $k_i = (1 + \theta)a_i$ The entire net worth is then spent on the down-payment for capital. From $(1) - (3)$ follows that firm employment rises with borrowing and hence with the net worth:

$$n_i = (zk_i)\ (w)^{-\frac{1}{\alpha}} = z(1 + \theta)a_i(b)^{-\frac{1}{\alpha}} \text{ and } n_i = f(z, a_i, \omega, \theta, \alpha) \tag{4}$$
$$\phantom{n_i = (zk_i)\ (w)^{-\frac{1}{\alpha}} = z(1 + \theta)a_i(b)^{-\frac{1}{\alpha}} \text{ and } n_i = f(} +, +, -, +, +$$

Private firms are destroyed at exogenously given rate $\delta > r$. The exiting entrepreneur i maintains the initial net worth a_i and searches for another business opportunity. Denoting m_p to be the total share of entrepreneurs running firms, n_u the share of the unemployed workers, and n the number of workers per average firm, the labor market equilibrium condition for workers is as follows:

$$1 - \mu = n_u + m_p n = n_u + m_{ph}n_h + m_{pl}n_l \tag{5}$$

where n_i is the employment in firm of type i. Letting m_{ui} be the share of entrepreneurs of type i searching for business opportunities and m_{pi} the share of entrepreneurs of type i running firms, the labor market equilibrium condition for entrepreneurs satisfies:

$$\mu = m_u + m_p = m_{uh} + m_{ph} + m_{ul} + m_{pl} \tag{6}$$

The change in the number of entrepreneurs of type i searching for business opportunities, m_{ui}, is given by the difference between inflows into the pool of searching entrepreneurs, $\delta(\mu\phi_i - m_{ui}) = \delta m_{pi}$ and the exits from it, $x_i m_{ui}$, where $\phi_h = \phi$ and $\phi_l = 1 - \phi$. From (6), $\dot{m}_{pi} = -\dot{m}_{ui}$, with the initial number of private firms of both types set as $m_{pl0} = \overline{m_l},$ and $m_{ph0} = \overline{m_h}$:

$$\dot{m}_{pi} = x_i m_{ui} - \delta m_{pi} = x_i m_{ui} - \delta(\mu\phi_i - m_{ui}) \qquad i = h, l \tag{7}$$

In the steady state, $m_{ui} = \frac{\mu\phi_i}{x_i + \delta}$, where $m_{uh} = \frac{\phi\mu}{x_h + \delta}$ and $m_{ul} = \frac{(1 - \phi)\mu}{x_l + \delta}$.

Omitting the time subscripts and denoting V_i as a present discounted value of an entrepreneur of type i (that is an entrepreneur with net worth of value a_i) searching for a business opportunity and J_i as an entrepreneur of type i, that is an entrepreneur running a firm with net worth a_i, respectively. The corresponding Bellman equations are:

$$rV_i = \omega + max_x\{-x_i^2/2\gamma + x_i\ [J_i - V_i]\} + \dot{V}_i \qquad\qquad i = h, l \tag{8}$$

$$rJ_i = \pi_i + \delta(V_i - J_i) + \dot{J}_i \qquad\qquad\qquad i = h, l \qquad\qquad (9)$$

where r is the discount rate. Equation (8) states that a searching entrepreneur i receives the income from self-employment, b, finances cost of search of $x_i^2/2\gamma$ and expects to open a firm at rate x_i , where $\dot{V}_i$ denotes change in V_i over time, $i=h, l$. Put differently, (9) states that the return from searching for a business opportunity equals the expected return from running a business with the net worth a_i net of search costs. Equation (8) states that an entrepreneur of type i running a firm receives profit π_i and expects the firm to exit at rate δ. Again, $\dot{J}_i$ denotes change in J_i over time, $i=h, l$. The utility- maximizing search intensity x_i, which equates the marginal cost of search with the expected marginal benefit, is derived from differentiating equation (7) and given by:

$$x_i = \gamma(J_i - V_i) \qquad\qquad\qquad\qquad i = h, l \qquad\qquad (10)$$

Defining the shadow value of the business opportunity of an entrepreneur with net worth a_i as $= \lambda_i = (J_i - V_i)$, i.e., the difference between the present discounted value of running a firm and searching for a business opportunity, equation (9) can be written as $x_i/\gamma = \lambda_i$. The equilibrium conditions can then be described as:

$$\dot{\lambda}_i = (\gamma/2)\lambda_i{}^2 + (r + \delta)\lambda_i - (\pi_i - b) \qquad\qquad i = h, l \qquad\qquad (11)$$

$$\dot{m}_{pi} = \gamma\lambda_i\,(\mu\phi_i - m_{pi}) - \delta m_{pi} \qquad\qquad i = h, l \qquad\qquad (12)$$

where $m_{pl0} = \overline{m_l}$, and $m_{ph0} = \overline{m_h}$, . In the steady state, $\dot{\lambda}_i = \dot{m}_{pl} = 0$. The binding credit constraint implies that in equilibrium the number of entrepreneurs running firms is limited, i.e. lower than in a situation without such constraint, where the aggregate capital would be K^*:

$$\frac{\delta\gamma\hat{\lambda}\mu}{\delta+\hat{\lambda}}k_0 < (\delta - r)\bar{K} \Leftrightarrow R(K^*) > r \qquad\qquad\qquad (13)$$

where $\bar{K}$ is such that $R(K)=r$. The credit constraint stems from the lack of collateral/net worth or from low θ (the share of entrepreneurs' net worth that can be pledged as collateral) or both.

From the profit maximization it also follows that $\pi_h = ra_h > ra_l = \pi_l$. From (8 - 12) it follows that in equilibrium, searching entrepreneurs with higher net worth search more intensively for business opportunities, as they expect higher profits. Hence a larger share of entrepreneurs with high net worth run firms in the formal sector than is the case of entrepreneurs with low net worth. Moreover, the poverty and the underdeveloped financial markets, which limit opportunities for savings and investment, make entrepreneurs consume their entire profit each period and prevent them to increase their net worth. In turn, the low net worth creates barriers to the entrepreneurs´ access to credit and their starting of more profitable and larger firms in the formal private sector.

The above analysis shows a positive link between the rate of firm creation and job creation on one hand and access to credit on the other hand. The latter is measured both by the private sector credit to GDP ratio and banking sector liquidity at the aggregate level and by evidence and perceptions of credit constraints at the firm level. It also shows a positive link between firm creation, its productivity and the business environment, especially the ability of lenders to recover loans.

4. Empirical Analysis

i. Data and Research Design

This section tests the findings of the theoretical model. It uses firm-level data on 14,047 SMEs in 42 African countries. The main data sources are the World Bank's Enterprise Surveys (WBES) between 2006 and 2009. Small and medium-sized enterprises are defined as firms having a maximum number of 99 employees.[9]

Table 4 (Appendix A) describes the data and reports the composition of the sample. The statistics indicate that while SMEs included in the sample employ on average 17 people permanently, they lose on average 15 jobs over the 3-year period prior to the survey. It also appears that only few of them have access to loans from the financial sector (9%) relative to the access to overdraft facilities (26%). This confirms that SMEs tend to have less loans relative to overdrafts. The summary statistics also provide clear evidence that the firms in the sample are financially constrained on average, with relatively limited loan size (USD 1.8 million), high collateral value (135% of the loan size) and short maturities (7.4 months). Clear-cut evidence is also provided in Appendix D that restricted access to financial services hampers both firms' employment growth and sales performance (*i.e.* firms with access to a line of credit from a financial institutions tend to have higher turnovers and are also on a positive growth trend with regard to their size).
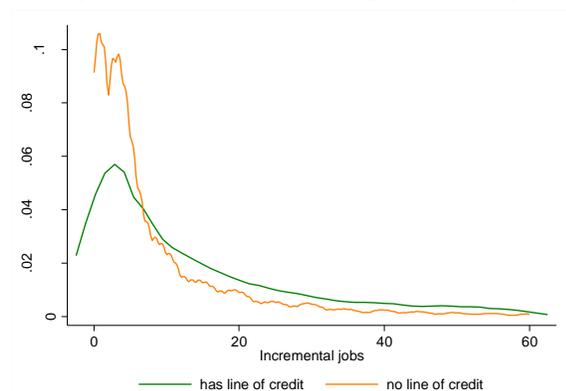
The objective of the research is to evaluate the impact of *access to financial services (loan facilities)* on employment growth using impact evaluation-based techniques. To this end, "having a line of credit or loan from a financial institution" for a specific firm will be considered as the *treatment*. Firms that have secured such facilities will be referred to as the *treated* group, and the remaining (*i.e.* those with no access to financial sector loan financing) as the *control* group. Out of the restricted WBES African sample considered in the research, 2,594 firms are reported to have a line of credit or a loan from a financial institution (and will therefore referred to as the *treated* group) against 11,453 firms with no access to credit facilities (referred to as the *control* group).

A common problem encountered in the investigation of the causal impact of access to finance on outcome variables is that loan facilities for enterprises may not be randomly awarded, as the decisions to apply for such facilities are taken individually by entrepreneurs and may be correlated with a set of firm characteristics that also affects the outcome variable (employment growth in this case), leading to the so-called *self-selection* problem. This problem makes that simply comparing the sample employment growth means of the *treatment* group with that of the *control* group would lead to biased estimates of the treatment effect. Figure 1 provides non-clear-cut statistical evidence about the impact of access to loan financing on job creation, based on the Africa-restricted WBES

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[9] Some caveats apply for the World Bank's Enterprise Surveys data, including that informal firms (which represent a substantial proportion of SME in Africa) and firms in sectors except manufacturing and services are not covered.

sample. The figure shows that firms having a line of credit with a financial institution are more likely to grow their number of employees more than firms that do not have such financing, only above a certain threshold of incremental jobs created. This lack of clear evidence may be the result of a selection bias, as only firms that need to growth their size above a certain level and that have specific characteristics, may be getting loans from the financial sector.

Figure 1: Kernel density plots of employment growth ("treated" and "non-treated" firms)

Source: Author, from the World Bank Enterprises Survey data covering 14,047 small and medium firms in 42 African countries.

Propensity scores-matching (developed in Rosenbaum and Rubin, 1983) allows carefully addressing the issue of *self-selection* by pairing the "treated" firms with the "non-treated" firms that have similar observed characteristics, so that the difference between the employment growth (the incremental jobs created) of a treated firm and that of a matched counterfactual is solely attributable to the treatment. Also, to avoid dealing with a high number of firm characteristics variables, the technique allows matching firms on the basis of their propensity scores alone (defined as the probability of getting a loan from a financial institution conditional to these characteristics) rather than relying on large sets of observables.

As a first step, we use a probit regression model to calculate firms' propensity for receiving a loan from a financial institution. Following Rosenbaum and Rubin, (1983), the propensity score is:

$$p(L) = P(L = 1 \mid X) = E(L|X) \tag{14}$$

where, *p(L)* is the propensity to receive the loan; *L is a dummy* indicating whether a firm has or do not have a loan; X is a multidimensional vector of covariates including the size, the age of the firm, the volume of turnover, the ownership structure and the legal status[10]. Subsequently, the propensity scores and the predicted probability of the treatment are estimated with the following model:

$$L_\gamma = \delta + \vartheta X_\gamma + \mu_\gamma \tag{15}$$

where γ stands for firms. After computing the predicted probability, we estimate the difference in employment growth between the two groups (which can be reasonably attributed to the access to credit facilities).

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[10] Please refer to table 4 in annex A for a more detailed description of the data.

Of interest is also the comparison of growth in the number of permanent employees of firms not currently benefitting from a loan from the formal financial sector and the growth in the number of such employees in firms that are benefitting from such a financing. Given that only one of these outcomes can be observed for each firm in the sample, we estimate the average treatment effect on the treated (ATT)[11], which is the difference in employment growth between firms that are effectively getting a loan from a financial institution and those with the same estimated probability of getting such a loan. The ATT can be written as follows:

$$ATT = E[Y(1) - Y(0) \mid L = 1] = E[Y(1)|L = 1] - E[Y(0)|L = 1] \qquad (16)$$

Where Y(1) and Y(0) are the employment growth for "treated" and "untreated" firms respectively.

ii.   Baseline Findings

The propensity scores are estimated using a probit regression model where the dependent variable is the dummy variable taking the value of "1" if the firm has a line of credit or a loan from a financial institution, and the value of "0" otherwise. Consistently with Beck, Demirgüç-Kunt and Singer (2013), we include the size of the company (proxied by the total number of permanent and full-time employees) as a control, the expectation being that larger firms are more likely to get financing from a financial institution. We also include the age of the company and the ownership nationality and expect age to be positively correlated with the probability of getting a loan from a financial institution. In line with Asiedu and al. (2013), we also control for firms' legal status of which the categories are: publicly listed company, privately held, limited liability company, sole proprietorship, partnership, and limited partnership. Finally, the set of regressors includes the volume of turnover to control for the firms' financial performance, which we expect to be positively related to the likelihood of getting a line of credit from the formal financial sector.

Table 1 presents the results. These tend to confirm some of our main expectations[12]. Similarly to Beck, Demirgüç-Kunt and Singer (2013), the number of employees and the age of the firm consistently, significantly and positively enter in the regression. Older companies and those with a higher number of employees are more likely to have a loan with a financial institution. Columns 1-4 present various settings where we successively add in the model the turnover, the legal status and the ownership nationality. Unexpectedly yet, these never reach significance.

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[11] We have made use of the psmatch2 command in Stata, which allowed us to implement a variety of propensity score matching methods including the one-to-one matching, the nearest neighbor matching, the radius matching, the kernel matching and the local linear regression matching. All regressions were made without assuming that the conditional expectations have any particular functional form. Section (ii) provides more detailed information on the covariates included in the probit-based estimation of the propensity scores.

[12] We confirmed the balancing property of the propensity scores (*i.e.* ensuring that firms with the same propensity score have the same distribution of observable covariates independent of treatment status). Results are available upon request.

Table 1: Probit estimates of the propensity scores (dependent variable is a dummy variable taking the value of "1" if the company has a loan with a financial institution and "0" otherwise)

Controls	(1)	(2)	(3)	(4)
Employees	.0103***(.00094)	.0102***(.0009)	.01064***(.01064)	.0106***(.001)
Age	.0087***(.0013)	.0088***(.0013)	.00892***(.0014)	.0093***(.0014)
Turnover		2.81e-06(.000025)	2.68e-06(.000025)	2.31e-06(.000025)
Legal status			-.019(.024)	-.020(.0250)
Ownership nat.				.085(.060)
Intercept	-1.68***(.030)	-1.69***(.030)	-1.64***(.079)	-1.81***(.137)
Obs	9057	9025	8959	8818
Pseudo R2	0.0356	0.0353	0.0369	0.0374

Heteroskedaticity-robust standard errors in parentheses.

Subsequently, the estimated propensity scores were utilized to match firms that have a financing from the financing sector with those that don't have such a financing, using five commonly used matching methods: the one-to-one matching, the nearest neighbor matching, the radius matching, the kernel matching and the local linear regression matching. The nearest neighbor matching consists in matching each treated firm with N control firms (non-treated) that have the closest propensity scores (nearest neighbors). For N=1, the method is equivalent to the one-to-one matching. We apply the method with replacement to allow control firms to be matched for more than one treated firm, reducing the bias in the determination of the average treatment effects on the treated (Frisco and al., 2007). To minimize the risk of getting poor matches, the caliper and radius matching are used to impose a maximum propensity score distance (called caliper). In caliper matching, control and treated firms are paired considering both the propensity range and the proximity in the propensity scores. The radius matching method goes a step further and matches treated firms with all neighbors firms within a given caliper. The Kernel and local liner regression matching methods allow matching all treated firms with a weighted mean of control firm, with weights inversely based on the distance between their propensity scores and those of the control firms. The local linear matching includes a linear term in the weighting function. To check for the quality of the various matching methods and also validate the common support assumption (good overlap in the distribution of propensity scores for the treated and control firms), we plot in figure 2 (appendix C) the resulting balance between the two groups of firms. The figure illustrates that the overlapping seems to be substantial enough to support the common support assumption.

The baseline results of the matching analysis are summarized in Table 2a. Columns 1, 2-4, 5-7, 8 and 9 display the propensity score matching results using the one-to-one, nearest-neighbor, radius, kernel and local linear regression matching methods respectively. Columns 2-4 test the sensitivity of the results to the number of neighbor controls with whom treated firms are paired with, while columns 5-6 do so with respect to different calipers (0.1, 0.05 and 0.01). All specifications report a positive and significant ATT of access to financial services on employment growth, though with different magnitudes. While the estimated ATT coefficients range from 0.93 to 0.97 for the one-to-one and nearest-neighbor methods, they vary from 11.8 to 17.4 for the radius, kernel and local

linear regression techniques. This suggests that a loan from a financial institution leads to an increase in the number of permanent employees in similar units.

Table 2a: Impact of access to financial services on firms' growth: baseline estimates

	One-to-one matching	Nearest-neighbor			Radius matching			Kernel matching	Local liner regression matching
		k=1	k=2	k=3	r=0.1	r=0.05	r=0.01		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average Treatment Effects on the Treated (ATT)	.937***	.9370***	1.128***	.972***	17.484**	12.986**	11.854**	13.183**	14.126**
	(.030)	(.0306)	(.204)	(.020)	(8.949)	(7.124)	(5.877)	(6.880)	(7.31)
Obs (Treated)	667	667	667	667	667	667	667	667	667
Obs (Control)	6640	6640	6640	6640	6640	6640	6640	6640	6640

Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.

Table 2b: Impact of access to informal sources of financial services on firms' growth: baseline estimates

	One-to-one matching	Nearest-neighbor			Radius matching			Kernel matching	Local liner regression matching
		k=1	k=2	k=3	r=0.1	r=0.05	r=0.01		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average Treatment Effects on the Treated (ATT)	4.99	4.96	.31	-1.12	13.37	4.72	4.93	5.49	4.45
	(5.84)	(5.9)	(3.46)	(3.07)	(10.03)	(5.62)	(5.12)	(7.71)	(6.57)
Obs (Treated)	250	250	250	250	250	250	250	250	250
Obs (Control)	6,931	6,931	6,931	6,931	6,931	6,931	6,931	6,931	6,931

Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.
Note: (access to informal finance is proxied by a dummy variable taking the value of "1" if over last fiscal year, the company purchased any fixed asset or financed working capital using either credit from suppliers, advances from customers or loans from money lenders, friends or relatives while not having any access to formal finance).

iii.   Testing for Heterogeneities in the Impact

The robustness of the baseline average treatment effects w.r.t. the measure of access to financial services is tested. Various measures of financial access have indeed been used in the literature and have yielded different results. Following Love and Peria (2015), we use as an alternative proxy of access to financial services, a dummy variable that is equal to "1" if the firm has an overdraft facility at the time of the survey and "0" otherwise. Overdrafts tend to be a more popular type of financing than loan for firms in Africa; this is illustrated by the summary statistics provided in Table 4, which indicate that 26.1% of firms in the sample report having an overdraft facility against only 9% of them that have a loan from a financial institution. Yet, surprisingly, access to this source of financing does not appear to favor growth in employment. In all the specifications reported in Table 5, the ATT are negative and large in magnitude, but never enter significantly in the regressions. This could be explained by the fact that though overdrafts are perceived as a

simpler form of access to formal finance relative to loans, they are typically associated with more limited ceilings, translating into a limited impact on firm performance and growth.

These findings are corroborated by the results summarized in Table 6 where we test whether loan size matter in explaining the impact of financial access on employment growth[13]. For this undertaking, the sample is split around the three quartiles of the distribution of the size of the loans received by firms. Results indicate that the ATT is only positive and significant for the two last specifications (third and fourth quartiles), with coefficients of 13.2 and 13.3 respectively.

In Tables 7 and 8, results show the extent to which loans conditions matter in explaining the impact of access to financial services on job creation. We focus on the relative size of the collateral and the loan maturity. Several studies have indeed emphasized the importance of access to convenient and affordable financial services for firms and have emphasized collateral requirements as a key factor hampering firms' growth in Africa (Beck and al, 2011). In table 7, we test whether the ATT of the access to formal loan-based financing varies along the distribution of the loan collateral size. We apply a similar sample decomposition than in table 6. Collateral size is expressed as a share of the total value of the loan. As expected, results only report positive and significant ATT for the first two sub-samples, with estimated coefficients of 20.5 and 18.9 respectively. This suggests that lower collateral values are associated higher and more significant impact of access to loan financing on employment growth. Results summarized in Table 8 further indicate that the longer maturity of loans are associated with a higher impact on employment growth. More specifically, having a loan from a financial institution increases the number of permanent employees by 13.4 for the upper distribution of the loan maturity (above the median value).

In the last step, differences between economic sectors are examined w.r.t. their varied potentials for job creation. To test for this imapct, the ATT on two sub-samples of firms were estimated: those engaged in the manufacturing sector and those in the service sector. Results reported in the table 3 below (columns 1 and 2) interestingly show that while the average treatment effect on the treated is positive and significant for both specifications, access to loan financing for manufacturing firms is associated with a significantly higher impact on employment growth. This suggests that financially-included small manufacturing firms tend to create more jobs than their counterpart in the service sector (25.9 new jobs for the former against 1.03 new jobs for the later).

Table 3: Impact of access to financial services on firm growth: do sectors matter?

	Manufacturing	*Services*
	(1)	*(2)*
Average Treatment Effects on the Treated (ATT)	25.91**	1.039***
	(12.76)	(.243)
Obs (Treated)	306	260
Obs (Control)	3024	2958

Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.

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[13] Nearest-neighbor matching method (with k=2) is used in all sensitivity analysis.

5. Conclusion and policy recommendations

This paper explores the impact of access to finance on employment growth in Africa's SMEs. Towards this goal, it presents a model, applicable to African countries, where the firm creation requires search for productive business opportunities, while the firm size in terms of employment hinges on access to credit. The model showed that in the absence of assets that can serve as collateral and given other financial market imperfections, access to credit constrains SME entry and job creation.

The implications of the model were empirically tested using a sample firm level-data of 42 African countries over the 2006-2009 period to explore the impact of access to finance on employment growth. The paper makes an important contribution to the literature on SME financing by being one of the first to study empirically the causal impact of access to finance for small and medium enterprises on growth in their employment, while carefully addressing the issue of self-selection. The results show that access to loan financing positively affects the growth in the number of permanent employees. Applying sample decompositions by loan characteristics reveals some heterogeneity in the impact where larger loans and loans associated with smaller collateral size and longer maturities are associated with a stronger and more significant impact on employment. Interestingly, when applying economic sector-based decomposition, access to finance has a stronger impact on firms in the manufacturing sector relative to those in services. The findings in this paper also suggest that beyond the access, the affordability of finance is key for employment growth. The results are also of particular relevance to the Sustainable Development Goals (SDGs) which were launched by the United Nations in 2015 and which emphasize the need to support labor-intensive sectors (SDG 8.2), increase small-scale enterprises' access to affordable credit in support of decent job creation and entrepreneurship (SDG 8.3 and 9.3). Several recent studies have discussed the critical contribution of SMEs to the SDGs, as these firms are major creators of jobs and represent an overwhelming majority of economic activity in developing countries. The stronger impact of access to finance on jobs in manufacturing than in services suggests that sectoral targeting of finance is a possible policy tool to support industrialization.

Supporting SMEs requires policies aimed at alleviating structural constraints. The analysis in this paper shows that the lack of liquidity is not the key constraint in SME's access to finance in Africa, but it is rather the availability of assets that can be used as collateral and the difficulty of recovering it after default. SMEs can thus have limited access to finance even when the banks have sufficient liquidity, as the experiences from recent easing of monetary policy in number of African countries have also shown. Hence in addition to macroeconomic measures that lower the systemic risk and the cost of borrowing, policy interventions need to focus on removing structural bottlenecks to credit supply, such as establishing accurate valuation of assets and strengthening of the property rights. The latter would both broaden the scope of assets that can be used as collateral (e.g. land) and help ease their recovery in the case of loan default. The government interventions in the form of partial credit guarantees that would lower the risk to lenders from defaults on loans could be particularly effective.

The paper leaves several important issues for further study. In particular, future research could investigate further (i) the transmission mechanism from the access to finance to job creation, (ii) the heterogeneity in the results based on a more granular sectoral decomposition, (iii) the

sensitivity of the results to the extension of the sample to both formal and informal firms, and (iv) the sensitivity of the findings to the gender and the age of the owner/manager. The last item, focused on disadvantaged groups, is especially important for generating policies for inclusive growth. Another area of interest is to examine if and to what extent have the mobile money and other technological advances in finance improved the SME access to finance overall and for specific sectors and groups. Finally, given that the COVID-19 crisis has disproportionally impacted SMEs, examining the role of the access to credit and insurance for the recovery of the SME sector and the overall economy and drawing lessons could be relevant.

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Appendix A: data description

Table 4: variables definitions and summary statistics

Variable	Description	Sample mean	Standard deviation	Obs
	Outcome variable			
Employees (growth)	*Growth in the total number of permanent, full-time employees over the last three fiscal years*	-15.36	1487.79	7636
	Treatment variables			
Loan	Dummy variable taking the value of "1" if the company has a line of credit or a loan from a financial institution and "0" otherwise.	.09	.287	9349
Overdraft	Dummy variable taking the value of "1" if the company has an overdraft facility and "0" otherwise.	.261	.439	9306
	Independent variables			
Employees	Total number of permanent, full-time employees over the last fiscal year	16.85	17.31	9297
Age	Age of the company at the time of the survey	13.03	23.88	9251
Turnover	Annual volume of turnover in USD equivalent (million)	6.539	398.47	9323
Legal status	Categorical variable with the following values and categories: 1 (publicly listed company), 2 (privately held, limited liability company), 3 (sole proprietorship), 4 (partnership), 5 (limited partnership), 6 (other).	2.87	.852	9330
Ownership nat.	Dummy variable taking the value of "1" if the firm is more than 50% by private foreign individuals, companies or organizations, and taking the value of "0" if the firm is more than 50% own by private domestic individuals, companies, organizations or firms, or government/state.	0.87	.32	9274
Loan size	Value of the most recent line of credit approved (USD million)	1.88	27.42	540
Collateral size	Value of the collateral of the most recent line of credit approved expressed as a percentage of the total loan value.	134.58	125.80	543
Loan maturity	Maturity (in months) of the most recent line of credit approved	7.43	27.56	2434

Appendix B: Regressions results

Table 5: Impact of access to financial services on firm growth: sensitivities to different proxies of access to finance (dependent variable is a dummy variable taking the value of "1" if the company currently has an overdraft facility and "0" otherwise)

	One-to-one matching	Nearest-neighbor			Radius matching			Kernel matching	Local liner regression matching
		k=1	k=2	k=3	r=0.1	r=0.05	r=0.01		
Average Treatment Effects on the Treated (ATT)	-68.20	-68.20	-68.40	-68.487	-68.506	-68.513	-68.754	-68.532	-68.443
	(158.04)	(158.04)	(157.86)	(157.816)	(157.64)	(157.63)	(157.65)	(157.63)	(157.63)
Obs (Treated)	1894	1894	1894	1894	1893	1893	1890	1893	1894
Obs (Control)	5384	5384	5384	5384	5384	5384	5384	5384	5384

Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.

Table 6: Impact of access to financial services on firm growth: does loan size matter?

	1st quartile	2nd quartile	3rd quartile	4th quartile
Average Treatment Effects on the Treated (ATT)	11.574	9.94	13.22***	13.32**
	(8.61)	(14.6)	(1.76)	(6.45)
Obs (Treated)	120	115	113	108
Obs (Control)	6640	6640	6640	6554

Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.

Table 7: Impact of access to financial services on firm growth: does collateral size matter?

	1st quartile	2nd quartile	3rd quartile	4th quartile
Average Treatment Effects on the Treated (ATT)	20.577***	18.922***	21.68	20.839
	(.563)	(1.312)	(13.49)	(27.99)
Obs (Treated)	117	155	60	110
Obs (Control)	6640	6640	6640	6520

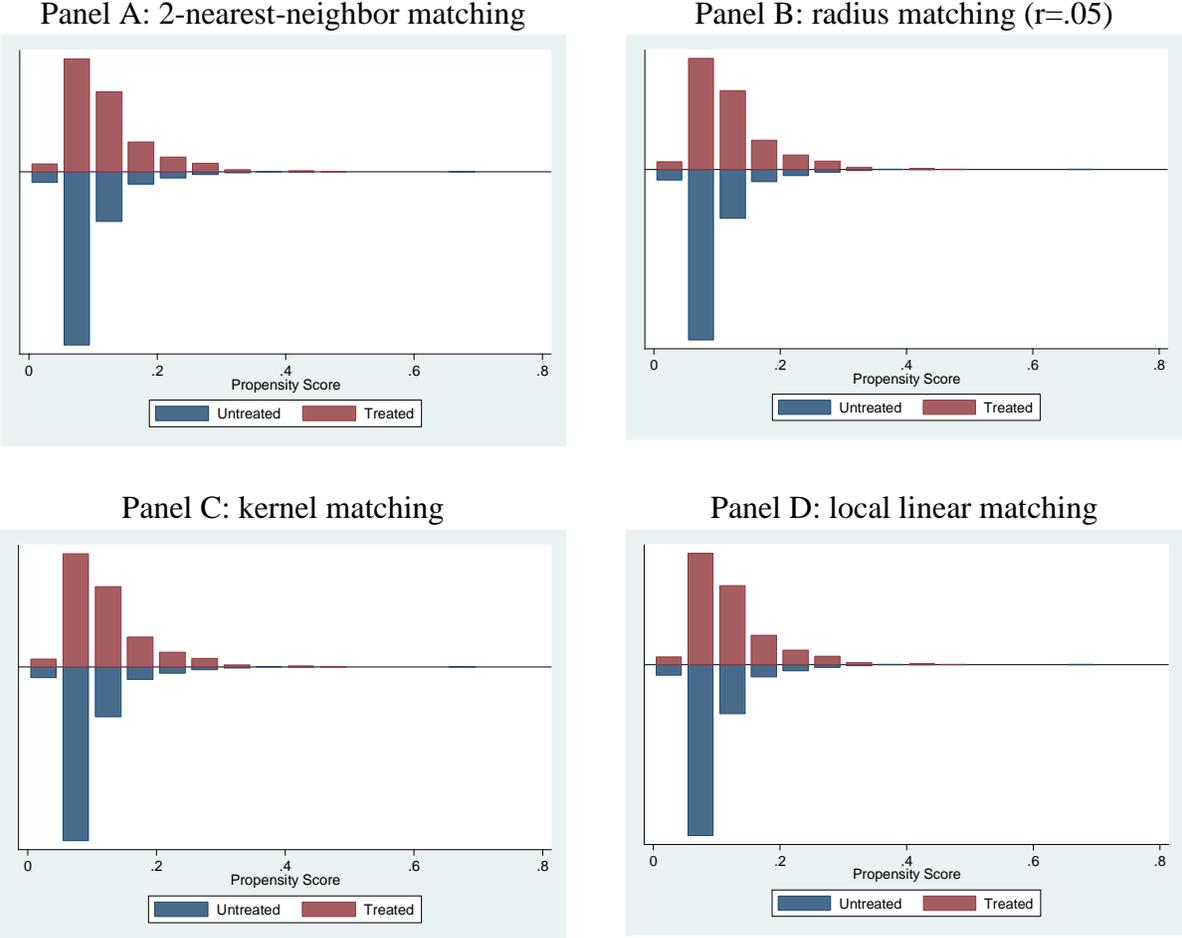Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.

Table 8: Impact of access to financial services on firm growth: does loan maturity matter?

	< Median	> Median
Average Treatment Effects on the Treated (ATT)	21.40	13.40***
	(15.68)	(5.74)
Obs (Treated)	46	503
Obs (Control)	6466	6640

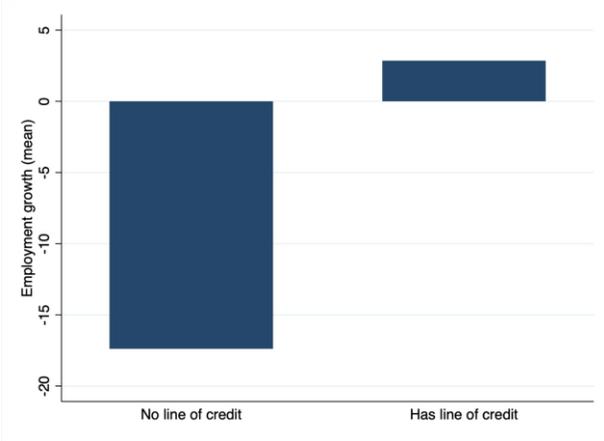Bootstrapped standard errors in parentheses. *,** and *** denotes significance at 10%, 5% and 1% respectively.

Appendix C: Validity tests

Figure 2: propensity scores distribution of treated and non-treated firms

Panel A: 2-nearest-neighbor matching

Panel B: radius matching (r=.05)

Panel C: kernel matching

Panel D: local linear matching

Appendix D: Stylized facts (employment growth and sales performance by status of financial access)

Panel A: employment growth in firms and access to finance

Panel B: Firms' turnover and access to finance