CREDIT CONSTRAINTS AND PRODUCTIVE ENTREPRENEURSHIP IN AFRICA[1]

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Abstract

Limited access of entrepreneurs to credit constrains the creation of new private firms as well as growth of the existing ones in developing countries world-wide. In Africa, the SME's access to credit is particularly limited due to unclear property rights and the lack of assets that can be used as collateral. This paper presents a model where firm creation and growth hinge on matching searching entrepreneurs with technologies and on acquired capital. The shortage of collateral creates a binding credit constraint on SMEs borrowing and hence private sector development, even though the banking sectors have ample liquidity, as is the case in many SSA countries. Empirical testing of the model shows that policies aimed at easing the binding credit constraints (e.g., the depth of credit information and the strength of legal rights pertaining to collateral and bankruptcy) would stimulate productive entrepreneurship in Africa.

Key words: credit constraints; productive entrepreneurship; policies
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1. Introduction

While African countries have recently recorded remarkable performance in terms of growth, even during the global financial crisis, they still lag behind in their ability to compete in the globalized world. A key reason is the continued predominance of low-productivity activities in their economic systems. As history from regions that have achieved rapid economic growth has shown, the transition towards activities with higher value added content requires the emergence of productive entrepreneurship, which is nurtured not only by market dynamics but also by targeted policies. In particular, the development of productive entrepreneurship requires strategies to facilitate access to investment capital and trade credit for new enterprises. While entrepreneurs everywhere cite limited availability of finance as a major obstacle to their activities, this constraint is especially binding in Africa. According to the World Bank's Enterprise Surveys, in last several years about 45 percent of firms in Sub-Saharan Africa (SSA) identified access to finance as a key obstacle to their business, relative to 13 percent in OECD countries. Access to credit in SSA is constrained by, among others, distortions in the financial markets, especially high collateral requirements and poorly designed and enforced property rights.

This paper utilizes a theoretical framework where firm creation and growth hinge on matching the searching entrepreneurs with production technologies and access to credit. Limited credit due to the lack of collateral slows the creation of new private businesses as well as growth of the existing ones. The model is applied to Africa where financial frictions are due to the limited collateral and a weak legal framework. The issue is particularly relevant for Africa's small and medium enterprises (SMEs) since such imperfections in financial markets impact disproportionally this group. The model generates two empirically important results. First, access to investment capital arises as a binding constraint to entrepreneurship, and this constraint prevails even in the presence of excess liquidity in the banking sector. A key factor to access to credit is the shortage of collateralizable assets. Second, legal rights and informational depth in credit markets are shown to support entrepreneurship.

The model is tested using data for a sample of 20 African countries over the period 2005-09. We use as proxy for entrepreneurship a measure of 'new business density', proxied by the new business registration per one thousand people aged 15-64 (from the World Bank's Doing Business database). The results of the empirical analysis shed light on

possible policy interventions that may help alleviate credit constraints and encourage entrepreneurship as an integral part of a national private sector development strategy.

The remainder of the paper proceeds as follows. After this introduction, the next section provides a review of the theoretical and empirical literature, with a focus on the determinants of entrepreneurship and the impact of institutional and policy reforms on entrepreneurship. The third section presents the theoretical model that underlies the empirical analysis. Section 4 presents the empirical analysis and discusses the regression results. Section 5 summarizes the findings and discusses policy implications and possible policy interventions that may help address the constraints to entrepreneurship with a focus on the access to credit.

2. Overview of the literature

2.1 Theoretical literature

Given the high persistence of unemployment, working poverty, underemployment and vulnerable employment in Africa, policy makers have put increasing emphasis on supporting productive entrepreneurship and small and medium enterprises (SMEs) to achieve high growth with job creation. This focus is driven by recognition that while 'necessity' entrepreneurship is abundant in Africa, the potential of an 'opportunity' or productive entrepreneurship has been mostly untapped. The unutilized potential impedes Africa's development, as the opportunity entrepreneurship is found to have a significant positive effect on development, while the necessity one has almost none (Acs and Varga, 2005).

This paper focuses on creation and growth of productive firms. As Baumol (1990) underscored, while the extent of entrepreneurship across societies is mostly given, policies can have a major impact on whether potential entrepreneurs enter into highly productive activities, less productive ones or even destructive ones. One of the objectives of such policies is to overcome both financial and non-financial (regulatory) constraints, which have been recognized to impede productive entrepreneurship across developing countries. Brixiova (2010) developed a model of non-financial constraints to firm creation in Africa's low income countries, including skill shortages of potential workers and entrepreneurs.

In Africa, financial constraints to entrepreneurship are particularly severe because of unclear property rights and difficulties to use land as collateral. To reflect this fact, the framework below is a simplified version of Brixiova and Kiyotaki (1997) who model how credit constraints slow new private firms in transition economies. In turn, they build on Kiyotaki and Moore (1997) on the role of credit constraints in economies where the productive asset can be also used as collateral and entrepreneurs can withdraw their human capital from their projects.[2] More recently, Aghion, Fally and Scarpetta (2007) examined both the impact of private credit availability and stock market capitalization on firm entry and growth in advanced and emerging market economies. While advancing both theoretical and empirical literature, such framework is not directly applicable to most African countries where stock markets and more broadly non-bank financial institutions are either missing or underdeveloped.

2.2 Empirical literature

The empirical literature that is relevant to the issues we examine in this paper relates to two areas: the literature on the determinants of entrepreneurship—in particular the role of credit and liquidity—and empirical studies on policy and institutional reforms and their impact on entrepreneurship.[3] While many studies focus on the individual characteristics of the potential or existing entrepreneur, the studies that are relevant to our work are the ones focusing on country-level features, particularly laws and policies that influence access to credit.

Concerning the first strand of the literature, we will only review recent empirical work that focuses on the role of finance and credit. Joseph Schumpeter emphasized the important role that the financial system can play in promoting growth (see for example, King and Levine, 1993). Many studies have examined the role of finance and have found a positive link between finance and growth or development (King and Levine 1993; Levine, 1997; Rajan and Zingales, 1998; Beck and Demirgüç-Kunt, 2008). However, In the case of African countries, some studies have found that the link between financial development and growth is not robust (see, for example, Baliamoune-Lutz and Ndikumana, 2007; and Baliamoune-Lutz, 2011). Similarly, numerous early studies on

[2] In Kiyotaki and Moore (1997), the durable assets in the economy (e.g. land) have a dual nature – they serve as collateral and can be used as input in production. A decrease in asset prices thus lowers the value of collateral and investment in the credit-constrained sector. Hart and Moore (1994) show formally how the possibility of default puts a limit on the amount of borrowing that entrepreneurs can undertake for even highly profitable projects.

[3] For a recent review of literature on the links between entrepreneurship, reforms, and development (growth), see Baliamoune-Lutz (2010).

liquidity constraints emphasized the role of wealth in enabling the creation and growth of firms (e.g., Evans and Leighton, 1989; Gentry and Hubbard, 2000). However, subsequent work casts doubt on the conclusions in these studies—that this is evidence of liquidity constraint—(see, for example, Hurst and Lusardi, 2004 and 2008; and Moore, 2004).

Many empirical studies looked at the issue of credit constraints and entrepreneurship by examining the effects of finance on entrepreneurship or growth—with the assumption that finance affects growth via its influence on entrepreneurship. Numerous other studies examined the effects of finance by studying the role of legal institutions in easing financial constraints and promoting efficient credit markets. For example, Djankov et al. (2007) use cross-country data (from 129 countries) on legal creditor rights and public and private credit registries and examine the determinants of private credit. The authors find that "both creditor protection through the legal system and information sharing institutions are associated with higher ratios of private credit to GDP, but that the former is relatively more important in the richer countries." In addition, Djankov et al. find that an improvement in creditor rights and information sharing is followed by an increase in credit. The roles of information sharing and creditor (and borrower) legal rights are of particular relevance to the present study.

The impact of information sharing on easing liquidity constraints has been examined in the empirical literature by a small (but growing) body of research. Some studies have found that information sharing facilitates access to credit (Jappelli and Pagano, 2002; Djankov et al., 2007; Brown et al., 2009).[4] On the other hand, Negrin (2001) shows that wider information sharing led to less access to bank credit for small and medium-sized firms in Mexico. Similarly, using data on US firms, Doblas-Madrid and Minetti (2009) find that information sharing is associated with creditors granting smaller loans and demanding more guarantees. Brown and Zehnder (2007) study how information sharing between lenders affects borrowers' repayment behavior and conclude that, because borrowers anticipate that a good credit record improves their access to credit, information sharing leads to a rise in repayment rates. Thus, the empirical results on the impact of information sharing are rather mixed.

Empirical research focusing on the protection of lenders and borrowers tries to investigate whether better legal rights increase access to credit. Some of these studies view this as the mechanism through which legal rights influence growth. Levine (1998) finds that countries that have rigorous contract enforcement, and where legal systems

[4] See also the survey by Japppelli and Pagano (2000).

effectively protect the rights of creditors, have better developed banks. Demirgüç-Kunt and Maksimovic (1998) find that the proportion of firms that use long-term external financing is larger in countries which have efficient legal systems. Since long-term external finance is often necessary for long-term investment, credit constraints for entrepreneurs planning to undertake long-term projects that may have important positive growth effects may be greater in countries with inefficient legal systems. Furthermore, the authors find that "government subsidies to industry do not increase the proportion of firms relying on external financing." Using data from 49 countries and controlling for legal origin, La Porta et al. (1998) report "that common-law countries generally have the strongest, and French civil-law countries the weakest, legal protections of investors, with German- and Scandinavian-civil-law countries located in the middle."

Qian and Strahan (2005) show that strong creditor protection is associated with more concentrated ownership of loans, lower interest rates, and longer maturities. Furthermore, they find that the effect of creditor rights on loans depends on borrower characteristics such as the size and tangibility of assets. The authors also find that foreign banks "appear especially sensitive to the legal and institutional environment, with their ownership declining relative to domestic banks as creditor protection falls." This last result is particularly relevant to African countries that rely on the presence of foreign banks. Finally, Haselmann et al. (2010) use data from 12 transition countries and examine the impact of legal change on the lending behavior of banks. The authors find that the supply of bank credit increased after a legal change. The authors also find that changes in collateral law are more important than changes in bankruptcy law for increases in bank lending. They attribute this finding to the different functions of collateral and bankruptcy law.

Studies focusing exclusively on African countries find strong evidence of credit constraints and their impact on investment and use of technology. Simtowe et al. (2009) examine the effect of credit constraint on the adoption of hybrid maize by households in rural regions in Malawi and find that credit constraints have a negative and significant impact on the amount of land allocated to hybrid maize. Dercon and Christiaensen (2010) use panel data from Ethiopia and study the use of technology in agriculture. They find that, in addition to the ex-ante credit constraints, the possibly low consumption outcomes when harvests fail discourage the application of fertilizer. The authors note that "[t]he lack of insurance or alternative means of keeping consumption smooth leaves some trapped in low return, lower risk agriculture, one of the mechanisms through which poverty perpetuates itself in agrarian settings."

Related to the use of collateral, in a recent study Fenske (2011) examines land tenure and investment incentives in West Africa. He finds that whereas the link between tenure and investment is significant for fallow and tree planting, it is less robust for the use of labor and other inputs (e.g., manure and chemical fertilizer). Likewise, Brasselle et al. (2002) fail to find a systematic influence of land tenure security on investment in Burkina Faso. These results seem to suggest that land tenure may not ease credit constraints as land in African countries may not serve as sufficiently adequate collateral.

The second line of empirical research focuses on the effects of policy and institutional reforms on the creation and growth of entrepreneurial activity. This line of research is more recent and less extensive than the body of empirical work discussed above. Most of the studies have examined the effects of taxation and tax reforms, and focused primarily on OECD countries and in many cases using micro-level (firm-level or individual) data. For example, using micro data for the period 1983-1994, Schuetze (2000) explores the trends in male self-employment in Canada and the United States. The author finds that higher income tax and unemployment rates are positively associated with an increase in the rates of self-employment. Using US data from tax returns between 1985 and 1988, Carroll et al. (2001) conclude that a reduction in the marginal tax rate from 50% to 33% would result in an increase in revenues of about 28%. Gentry and Hubbard (2005) examine the effects of tax policy on self-employment and conclude that the level of the marginal tax rate and the progressivity of the tax have a negative influence on entrepreneurship. Bruce and Mohsin (2006) find that reducing the capital-gains tax rate by 1 percentage point is associated with an increase from 0.11 to 0.15 percentage points in self-employment rates in the United States. Cullen and Gordon (2007) use US data and explore the impact of the tax system on the entrepreneurial risk-taking. The authors report that the effect of taxes depends on the type of tax. For example, a deduction of business losses on personal income-tax return would lead to an increase in entrepreneurial risk-taking by 50% to 100%, while a reduction (across income brackets) in personal tax rates by five percentage points, would lead to a decline in entrepreneurial risk-taking by about 40%. Hansson (2010) reports a negative relationship between taxes and self-employment in Sweden.

However, a limited number of studies have focused on other (than taxation) reforms. Using establishment-level data from the manufacturing sector, Gaston and Werner (2002) explore the effects of financial liberalization on fixed investment in Mexico, focusing on the role of real estate as collateral. They find that financial constraints were reduced for

the smallest firms, but not for larger ones, and given that banks relied on collateral in their lending decision, the importance of having real estate rose.

Iyigun and Rodrik (2005) present a theoretical model where investment decisions and policy outcomes are subject to uncertainty and examine the growth effects of the interaction between institutional and policy reform and entrepreneurship. Their model shows that institutional reform has a negative growth effect in settings where entrepreneurial activity is vibrant but has positive impact where entrepreneurial activity is weak. The authors then conclude that 'policy tinkering' would work better in environments where the level of entrepreneurship is strong. On the other hand, 'institutional reform' would be more successful where the level of entrepreneurship is weak. They then assess the empirical relevance of their model using cross-sectional data and the ratio of self-employed to total non-agricultural employment as an indicator of entrepreneurship. They find that the relationship between institutional reform and entrepreneurship is negative and statistically significant, and interpret this result as empirical evidence in support of their theoretical proposition.

Baliamoune-Lutz (2007) empirically tests the Iyigun-Rodrik model using data from a large group of developed and developing countries and exploring the effects of institutional and policy reforms on the effectiveness of entrepreneurship in contributing to development. The author finds that the effect of policy reform (trade reforms, proxied by openness to trade) is negative when entrepreneurial activity is weak and positive when it is vibrant, while the effects of institutional reform (measured by the International Country Risk Guide composite index) is positive when the level of entrepreneurship is low and negative when it is high.

Finally, Baliamoune-Lutz (2010) focuses only on developing countries and uses panel data for the period 1990-2002 and Arellano -Bond GMM estimations to explore the impact of institutional and policy reforms on the growth effects of entrepreneurship. She obtains empirical evidence suggesting that the interplay of trade reform and entrepreneurship has a negative impact on growth, whereas the interplay of financial sector reform and entrepreneurship has a non-linear effect on growth.[5] On the other hand, the author finds that the joint effect (on growth) of institutional reform (the International Country Risk Guide composite index) and entrepreneurship is not significant.

[5] This seems to be consistent with Claessens and Perotti (2007) who conclude that financial liberalization with the view to increase access "may in practice increase fragility and inequality, and lead to political backlash against reforms," in the absence of strong oversight institutions.

3. The Model

This section presents a model of constraints to entrepreneurship with a focus on tight credit policies, especially the lack of collateral among new firms. The model is a streamlined version of Brixiova and Kiyotaki (1997). By emphasizing the lack of collateral, the framework below is suitable for most African countries where the financial sectors are dominated by banks and binding credit constraints co-exist with excess liquidity.

The population is normalized to one and consists of infinitely-lived entrepreneurs – dynasties[6] – and workers, with population shares μ and $1-\mu$, respectively. All agents are endowed with one unit of time every period and have risk neutral preferences in consumption of a single good, *c.* When starting their search, entrepreneurs are endowed with networth $a_0 > 0$. The entrepreneur searches for a business opportunity; the search costs her $d(x) = x^2 / 2\gamma$ units of the consumption good per unit of time; $\gamma > 0$ is the parameter of search efficiency. In turn, she finds the opportunity according to a Poisson process with the arrival rate of x. She produces output (y) in the formal sector with labor (n), productivity (z) and capital (k) according to the production function:

$$y = \frac{1}{1-\alpha}(zk)^{\alpha} n^{1-\alpha} \qquad (1)$$

The output can be used either for investment or consumption. Capital is entrepreneur-specific though, implying that once the entrepreneur invests in capital, she is the only one who can use the accumulated stock until she retires and passes it on her successor. Due to imperfections in legal frameworks and property rights in Africa, the outside value of the accumulated capital is lower than it is worth to the entrepreneur. Put differently, in case of default, lenders can recover only $(1-\theta)$ portion of the accumulated capital. The lenders thus limit the loan to the entrepreneur, b, to the recoverable value of her capital, that is: [7]

$$b \le (1-\theta)k \qquad (2)$$

[6] That is when she retires, she passes accumulated capital on her successor.

[7] Value of θ depends on both the specificity of the capital and strength of the legal framework, including the bankruptcy law. Renting the capital is not an option as the rental market is mostly absent in Africa.

The entrepreneur finances capital (k) from both borrowing (b) and her own networth (a), which she accumulates according to:

$$\dot{a} = yn - wn - rb - c \qquad (3)$$

where w is the wage rate and r is the real interest rate on debt, which in equilibrium equals the rate of time preference (below) and time *t* is suppressed.

Private firms are destroyed at exogenously given rate $\delta > r$. The exiting entrepreneur consumes all her accumulated networth except a_0 which she passes on her successor, derives utility $a - a_0$, and dies immediately after. The successor searches for another business opportunity, with the initial networth a_0.

In addition to the formal sector, output can be produced in the informal sector according to
$Y_u = 1/(1-\alpha) Z_u{}^{\alpha} N_u^{1-\alpha}$, where Z_u is productivity and N_u is the informal sector employment. Denoting m_p to be the share of operating private firms, the following labor market equilibrium condition for workers needs to hold:

$$1 - \mu = N_u + m_p n \qquad (4)$$

Letting m_u be the share of entrepreneurs searching for business opportunities and m_p the share of entrepreneurs running firms, the equilibrium conditions for entrepreneurs satisfy:

$$\mu = m_u + m_p \qquad (5)$$

The change in the number of entrepreneurs searching for business opportunities, $\dot{m}_u$, is given by the difference between inflows into the pool of searching entrepreneurs, $\delta(\mu - m_u) = \delta m_p$ and the exits from it, $x m_u$. From (5), $\dot{m}_p = -\dot{m}_u$, with m_{p0} set to 0. Hence in (6) the number of searching entrepreneurs rises when the inflow into the searching pool (δm_p) exceeds the outflow due to firm creation ($x m_u$).

$$\dot{m}_u = \delta(\mu - m_u) - x m_u \qquad (6)$$

Taking wages and interest rates as given, *the equilibrium* for this economy is characterized by (i) entrepreneur's choice of search effort, labor, capital, debt, and savings that maximize the expected discounted utility; (ii) worker's choice of allocation of labor and consumption; (iii) products and debt markets that clear and (iv) labor markets that satisfy conditions (4)-(6).

The equilibrium wage rate rises in the aggregate capital stock (K), and is determined as follows:

$$w = \frac{zK}{1-\mu} \equiv w(K) \tag{7}$$

where $K = \int_0^{\mu} k_i di$, with k_i being individual capital of an entrepreneur i.

With the constant return-to-scale production function and output price normalized to 1, profits are zero in equilibrium, that is $1/(1-\alpha)(zk)^{\alpha} n^{1-\alpha} = w(K)n + R(K)k$, where $R(K)$ is the return on capital. Substituting for w(K) from (7) yields:

$$R(K) = \frac{\alpha}{1-\alpha} z w(K)^{-(1-\alpha)/\alpha} \tag{8}$$

When $K < \overline{K}$, the rate of return on capital is above the real interest rate on debt, $R(K) > r$ and the entrepreneur borrows up to the credit limit for capital investment, i.e. the credit constraint is binding and $b = (1-\theta)k$. The entire net worth is spent on the down-payment for capital: $a = k\theta$. The return on net worth exceeds the real interest (r) by the leverage $(1/\theta)$ times the difference between the return on capital that the entrepreneur owns and interest rate she pays for borrowing.

Suppressing the time subscripts and denoting J^u and $J(a)$ as a present discounted value of an entrepreneur searching for a business opportunity and an entrepreneur running a private firm with net worth a, respectively, the corresponding Bellman equations are:

$$rJ^u = \max_x \left\{ \frac{-x^2}{2\gamma} + x\left[J(a_0) - J^u\right] \right\} \tag{9}$$

$$rJ(a) = \delta\left[a - a_0 + (J^u - J(a))\right] + \frac{\partial J}{\partial a}\dot{a} \qquad (10)$$

where (9) states that the return from searching for a business opportunity equals the net expected return from running a business with the net worth a_0. According to (10), return on running a firm consists of gains from accumulating net worth and expected utility of consumption at the time of exiting from the labor force and net expected gain from search.[8]

To solve for the steady state equilibrium, equation (10) can be re-written as follows, given the linearity of the utility function and the accumulation rule (3):

$$J(a) = J(a_0) + \beta(a - a_0) \qquad (11)$$

$$rJ(a_0) = \beta\dot{a}_0 + \delta(J^u - J(a_0)) \qquad (12)$$

$$\dot{\beta} = (\delta - \frac{R(K) - r}{\theta})\beta - \delta \qquad (13)$$

where β denotes the marginal value of net worth of an entrepreneur running a business ($\partial J / \partial a$). Defining the shadow value of the business opportunity as $\lambda = J(a_0) - J^u$, i.e. the difference between the present discounted value of an entrepreneur running a firm with a net worth a_0 and the entrepreneur searching for a business opportunity, marginal cost of search equals marginal benefit: $x / \gamma = \lambda$ and:

$$\dot{\lambda} = \gamma\lambda^2 / 2 + (r + \delta)\lambda - \beta a_0 \qquad (14)$$

$$\dot{m}_p = \gamma\lambda(\mu - m_p) - \delta m_p \qquad (15)$$

$$\dot{K} \le (r + \frac{R(K) - r}{\theta})K + \dot{m}_p \frac{a_0}{\theta} - \delta K \qquad (16)$$

[8] The expected utility of consumption, $\frac{\partial J}{\partial a}\dot{a}$, consists of the marginal value of networth of an entrepreneur running a business and the change in net worth over time.

The steady state equilibrium is described by (13) – (16), where $\dot{\beta} = \dot{\lambda} = \dot{m}_p = \dot{K} = 0$. Moreover, the binding credit constraint implies that in equilibrium the number of entrepreneurs is limited (i.e. lower than in a situation without the binding credit constraint) .[9]: $\frac{\delta\gamma\hat{\lambda}\mu}{\delta+\hat{\lambda}}k_0 < (\delta - r)\overline{K} \Leftrightarrow R(K^*) > r$, where $\overline{K}$ solves $R(K) = r$ and $\hat{\lambda}$ solves $\gamma\lambda^2/2 + (r+\delta)\lambda = rk_0$. This credit constraint, which is binding even in the presence of adequate liquidity, $\overline{K}$, stems from the lack of collateral/net worth a_0.

The theoretical model we develop in this paper has at least two important empirical implications. First, the model suggests a positive relationship between entrepreneurship and measures of access to credit, notably banking sector development, liquidity, and informational depth of credit markets. Secondly, the model suggests a positive relationship between entrepreneurship and lender and borrower legal rights.

4. Empirical analysis

4.1 Variables and methodology

We assess the empirical relevance of our model in two ways. First, we examine graphically the association between variables of interest, which we define below. Second, we estimate, using regression models, the relationship between firm startups, indicators of financial development and liquidity in the banking sector, and indicators of the quality of laws and information governing collateral assets. The estimation equation is specified as follows:

$$ENT_{i,t} = \alpha_0 + \alpha_1 LAW_{i,t} + \alpha_2 CREDIT_{i,t} + \alpha_3 LIQ_{i,t} + \beta' Z + \varepsilon_{i,t} \quad (17)$$

Where *ENT* (entrepreneurship), is proxied by 'new business density', which is measured by new business registrations per 1,000 people aged 15-64 from Doing Business database (World Bank database on line). New businesses registered are the number of new limited liability corporations registered in the calendar year.

The right-hand side (RHS) of equation (17) includes three main indicators of access to credit and collateral. The first is the strength of legal rights index (*LAW*), which

[9] The reverse also holds: when the number of entrepreneurs is limited to the below their optimal level, the credit constraint is binding ($R(K^*) > r$.

"measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending" (World Bank *Doing Business* database online). This index is measured on a 0-to-10 scale, with higher scores indicating that collateral and bankruptcy laws are better designed to expand access to credit. The second variable is the depth of credit information index (*CREDIT*), which "measures rules and practices affecting the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau" (World Bank *Doing Business* database online). This index is measured on a 0-to-6 scale, with higher scores indicating stronger depth of credit information. The third indicator is bank liquid reserves to bank assets ratio (*LIQ*).[10] The Z vector includes additional control variables. These are domestic credit to private sector (% of GDP), per-capita income (in log) and, in some estimations, 'public credit registry coverage (% of adults)' and broad money. In the robustness checks, we also control for the cost of business start-up procedures (% of GNI per capita), and for human capital (results associated with human capital are omitted due to consistent lack of statistical significance). All variables are from the World Bank databases online (*World Development Indicators* and *Doing Business*). For the countries in our sample, data on the dependent variable are available only for the period 2004-2009, while data on the strength of legal rights and depth of credit information are available only since 2005. This implies that we can only include data (when available) for the period 2005-2009 (5 years). We have an unbalanced panel and the sample includes 20 countries. The sample is reduced to 11 countries when we control for the effect of bank liquid reserves due to lack of data on this variable in the other nine countries.

The empirical analysis is implemented using pooled-panel and random-effects generalized least squares (GLS) estimations. Table 1 shows correlations among relevant variables. The estimation results are presented in Tables 2 and 3.

4.2 Graphical examination[11]

Figure 1 portrays the (fitted) relationship between new business density and the strength of legal rights. Our theoretical model suggests that we should find a positive relationship between the two. Figure one, however shows that the relationship has an inverted-U form; it is initially positive then turns negative after the index reaches a value of about 6. Given that in our sample most countries (14 out of 20 countries in the large sample), have

[10] An important constraint to credit supply in most African banking sectors is the shortage of long-term loanable funds. Unfortunately it is difficult to get good data on this, but it is important to acknowledge this issue.

[11] See also the graphs in Appendix A

values less than 6, this suggests that strengthening legal rights in credit markets would have a positive impact. Figure 2 shows the association between the depth of credit information and new business density. Again, the relationship seems to be nonlinear and the graph suggests diminishing returns to improvements in the depth of credit information, although the correlation appears weak.

In addition, we use data from the World Bank's Enterprise database on a large group of African countries (not all in our sample)[12] on loans requiring collateral, value of collateral needed for a loan, and the % of firms identifying access to finance as a major constraint.
In Figures 3 and 4, we show the association (fitted values) of new business density with loans requiring collateral (percent of the loan amount) and the value of collateral needed for a loan (% of the loan amount), respectively. There is a clear negative association of new business density with the % of loans requiring collateral and with the value of the collateral (% of the loan amount). This seems to be confirmed by the relationship portrayed in Figure 5. There is a positive association between 'access to finance being a major constraint' and the value of collateral need for a loan (% of the loan amount).

4.3 Estimation results

Table 1 presents the coefficients of correlation among relevant variables. The correlations of new business density with the ratio of self-employed (in total employed), the cost of business startup, and bank liquid reserves-to-bank assets ratio are negative and statistically significant. The correlation of new business density with income, the ratio of broad money, and the ratio of credit to the private sector is positive and statistically significant. On the other hand, there is no significant correlation between new business density and the strength of legal rights or the depth of credit information. Interestingly, in all the cases where the coefficients are statistically significant, the coefficients related to correlations of self-employed with the other variables have opposite signs relative to the coefficients related to correlation between new business density and the other variables. This seems to suggest that self-employment and new business density behave in completely different ways and could be affected by different factors. The two main indicators of the quality of credit markets (strength of legal rights and the depth of credit information) do not have significant positive correlation with new business density or the ratio of self-employed.

[12] We could not use data from this database for our estimations since the countries in our sample did not have values for these variables which would have severely limited the number of observations.

Table 2 reports the results from OLS estimations on pooled-panel data. We note that income and the strength of legal rights have positive and statistically significant coefficients and these results are robust. On the other hand, the coefficient on the variable 'depth of credit information' is negative and statistically significant in three estimations (columns 2-4) and positive but nonsignificant in three other estimations (columns 5-7). Interestingly, the indicators of liquidity and financial market development either have a negative coefficient (bank liquid reserves to bank assets ratio (%) in columns 3-5), or are statistically nonsignificant (broad money and credit to the private sector in columns 6 and 7, respectively). In columns 5-7, we investigate the presence of non-linearity of the relationship between new business density and the strength of legal rights and the depth of credit information. The results indicate the relationship between new business density and the strength of legal rights has an inverted-U shape.

Next, we perform random effects GLS estimations and report the results in Table 3.[13] Again, the results show that there is strong evidence that new business density is positively associated with per-capita income. On the other hand, the relationship of new business density with the strength of legal rights and the depth of credit information has an inverted-U shape. This seems to suggest that returns or gains from reforms are high at low levels of "quality"/development of institutions, and lower at higher levels of institutional sophistication/development. It supports investments in reforms for less developed countries where institutions are disproportionately weak.

As an additional robustness check, we also control for the cost of business startup. However, this variable turns out to be statistically nonsignificant. As noted earlier, in other estimations (not shown but results may be requested from the authors), we control for the role of primary and secondary school enrolments (proxies for human capital) but these variables were statistically nonsignificant.

Using the results in Table 3, we find that the turning point for the strength of legal rights occurs where the index has a value in the range 6.0-6.9, whereas the turning point for the depth of credit information is when the index has a value of about 2.75. In our sample, only three countries; Kenya, south Africa, and Tunisia had values for the depth of credit information higher than 3. Four countries—Kenya, Nigeria, South Africa and Zambia —

[13] In contrast to the OLS method, the GLS estimation technique eliminates the correlation over time.

have values for the index of the strength of legal rights greater than 7. Thus, the majority (at least 75%) of the countries are at or below the turning point and should still see a positive link between entrepreneurship (measured by new business density) and improvements in the strength of legal rights and the depth of credit information. Put differently, entrepreneurs in African countries where a binding credit constraint exists in spite of the availability (excess) of liquidity and where the quality of the strength of legal rights (protection of lender and borrower rights) and the depth of credit information is poor, would benefit significantly from improvements in these legal rights and the depth of credit information,.

5. Summary and policy implications

In this paper, we proposed a theoretical model for African credit markets where entrepreneurship, or more specifically the creation and growth of private firms, hinge on matching potential entrepreneurs with productive technologies and on access to capital. The implications of the model are tested empirically using a sample of 20 African countries over the period 2005-09. Two estimation techniques are used: the pooled-panel data regressions and random-effects GLS estimations. We use new business registrations per one thousand people aged 15-64 as proxy for entrepreneurship.

A first result of the empirical analysis is that the quality of legal rights has a positive impact on 'new business' density, our proxy for entrepreneurship. More interestingly, the relationship is shown to be non-linear, depicting an inverted-U shape. The estimated coefficients suggest a turning point of the index of the quality of legal rights in the range of 6-6.9 (on a range of 0-10). Only four countries in the sample have an index above 7. This suggests that the majority of African countries would benefit from policies leading to improvements in the quality of legal rights as this will promote entrepreneurship.

Secondly, we find an inverted-U shaped relationship between new business density and the depth of credit information. The turning point of the index of the depth of credit market information is about 2.75. Only three countries have an index above 3. This again suggests that African countries can gain substantially from policy interventions aimed at developing information on borrowers and creditors, as this would facilitate identification of profitable activities and increase access to credit for new entrepreneurs.

The results in this study provide pertinent policy insights for the agenda of promoting productive entrepreneurship in Africa. This naturally is no easy task. Yet, it must be a

central component of a national strategy for achieving growth that is strong, sustained and shared.[14] This in turn is a key prerequisite for prosperity on the continent in terms of economic wellbeing as well as social and political stability. Indeed as the recent developments in North Africa[15] and the unfolding events in other parts of the continent demonstrate, the failure to build a national economy that provides expectations and opportunities for social and economic upward mobility for the majority of the population – and the educated youth in particular – has dire consequences on national political stability. Given the very high rates of youth unemployment across Africa, it is likely that regimes will continue to face strong pressure from the tide of the youth that feels disenfranchised due to lack of employment opportunities. It has also become clear that government sectors are not able to absorb the growing labor supply on the continent. Besides attracting FDI, the attention then must turn to strategies for supporting productive entrepreneurship as a way of building a national economy that is sustainable and able to compete in the regional and global context.

Obviously, supporting productive entrepreneurship requires a wide range of policy interventions aimed at alleviating underlying economy-specific constraints. The evidence in this paper points to two key areas policy interventions that have potentially high impact on entrepreneurship, namely: promoting access to credit, and improving the business environment especially in the area of design and enforcement of legal rights.

This study particularly stresses the problem of access to credit arising from the inability of potential entrepreneurs to meet the collateral requirements imposed by financial institutions. In the case of African banking systems, the problem is not so much that of lack of resources per se, but rather weak legal systems that prevent lenders to recover fully the pledged collateral. This suggests that in addition to interventions aimed at containing the cost of credit, policy interventions must also focus on strengthening legal systems alongside alleviating the quantitative barriers to access to credit.

This paper suggests that emphasis should be on three interventions: (1) design and enforcement of legal rights especially targeting collateralizable assets; (2) fostering competition in the banking sector, both in terms of ownership of banks and access to credit; (3) developing and strengthening institutions and mechanisms for access to creditor and borrower information. It is particularly important to design and enforce

[14] For a discussion of the arguments for and elements of the agenda for strong, sustained, and shared growth in Africa, see, among others: Kasekende, Brixiova, and Ndikumana (2010); AfDB, UNECA, and AU (2010).
[15] See AfDB (2011) for an analysis of the factors that led to the political crisis in Tunisia.

property rights that enable entrepreneurs to utilize their physical assets, such as land, to secure bank loans. In most African countries, this is still not possible as households do not have formal titles to their land.

Despite some progress made in liberalizing financial systems in Africa, there is still a long way to go to achieve efficiency in the sector. A key constraint is the lack of competition. While government direct control and ownership of financial institutions have declined substantially, indirect control on credit allocation is still prevalent. This results in allocational inefficiencies of loanable funds: bank credit is allocated to politically connected individuals and bank insiders at relatively low interest rates, some of which finances unproductive activities.[16] Increasing competition and reducing political influence on the functioning of financial institutions are key prerequisites to promoting access to credit as a means of supporting entrepreneurship.

The setting up and strengthening of credit bureaus and associated institutions that collect information on creditors and borrowers constitutes a key element of a national strategy for promoting productive entrepreneurship. The gains arise both through the reduction of perceived credit risk, which increases access to credit, as well as through the provision of market signals on the profitability of various investment activities in the economy. This in turn encourages entrepreneurship and enhances efficiency in the allocation of investment capital across activities. The potentially high social returns to investments in setting up these institutions justify the scaling up of budgetary and aid allocations to support this policy initiative as part of the broader agenda for promoting private sector development in the continent.

Taking a broader view, since new and upcoming entrepreneurs are viewed as highly risky by banks; they are unlikely to secure the needed capital to support their investment needs. It is not in the banks' best interest to lend to such borrowers given the high risk and also because they have alternative, less risky activities to lend to. Given the high social returns to supporting entrepreneurship, the costs associated with the risk inherent to lending to new productive activities should be spread across the society. This could be done through the design of loan guarantee schemes, with explicit and detailed provisions to ensure that the loans supported by the schemes are directly financing new investments and trade activities. This may require, among others, tracking mechanisms to minimize the risk of

[16] In a detailed case study on the financial sector in Burundi, Nkurunziza, Ndikumana and Nyamoya (2011) provide evidence on inefficiencies in the allocation of resources that are driven by political interference in the management of the financial institutions.

diversion of the resources into speculative activities. We leave this interesting topic for further research.

To sum up, the analysis and results in this study suggest that while African economies may be lagging behind in terms of innovation and entrepreneurship, this may be alleviated by targeted policy interventions that promote improvements in the legal rights and the depth of credit market information as these will increase access to credit.

References

Acs, Z. J. and Varga, A. (2005). "Entrepreneurship, Agglomeration and Technological Change." *Small Business Economics*, 24 (3): 323–334.

AfDB (2011) "The Revolution in Tunisia: Economic challenges and prospects." Economic Brief, March 11. http://www.afdb.org/en/news-and-events/article/tunisian-revolution-afdb-brief-on-economic-outlook-7904/

AfDB, UNECA, and African Union (2010). "Achieving strong, sustained and shared growth in Africa in the post-crisis global economy." Prepared for and presented at the 2010 KOAFEC Ministerial Conference, Seoul, Korea, September 14-17 2010. http://www.afdb.org/en/knowledge/publications/policy-briefs/

Aghion, P., T. Fally and S. Scarpetta (2007). "Credit constraints as a barrier to the entry and post-entry growth of firms." IZA Discussion Paper No. 3237, December 2007

Baliamoune-Lutz, M. (2011). "Financial development and income in African countries." Forthcoming, *Contemporary Economic Policy.*

Baliamoune-Lutz. M. (2010). "Policy reform and entrepreneurship in developing countries." Chapter 9 in Naudé, W.A. ed., *Entrepreneurship in Economic Development*. Palgrave Macmillan.

Baliamoune-Lutz, M. (2007). "Entrepreneurship, reforms, and development: Empirical evidence." Working Paper No. 38/2007, *International Centre for Economic Research* (ICER), Italy.

Baliamoune-Lutz, M., and L. Ndikumana (2007). "The Growth effects of openness to trade and the role of institutions: New evidence from African countries." Policy Paper 6. Boston: Institute for Economic Development, Department of Economics, Boston: Boston University.

Baumol, W. J. (1990). "Entrepreneurship: Productive, unproductive and destructive." *Journal of Political Economy*, 98 (5): 893-921.

Beck, T. and A. Demirgüç-Kunt (2008). "Access to finance: An unfinished agenda." *The World Bank Economic Review*, 22(3): 383-396.

Brasselle, A.S., F. Gaspart, and J-P. Platteau (2002). "Land tenure security and investment incentives: puzzling evidence from Burkina Faso." *Journal of Development Economics*, 67: 373–418

Brixiova, Z. (2010). "Unlocking productive entrepreneurship in Africa's least developed countries." *African Development Review*, 22 (3):440–451.

Brixiova, Z. and N. Kiyotaki (1997). "Private sector development in transition economies." *Carnegie-Rochester Conference Proceedings on Public Policy*.

Brown, M, T Jappelli, and M Pagano (2009). "Information sharing and credit Market performance: Firm-level evidence from transition countries." *Journal of Financial Intermediation* 18: 151-172.

Bruce, D., and M. Mohsin (2006). "Tax policy and entrepreneurship: New time series evidence." *Small Business Economics,* 16, 409–425.

Brown, M. and C. Zehnder (2007). "Credit reporting, relationship banking, and loan repayment*." Journal of Money, Credit and Banking*, 39 (8): 1883 – 1918.

Carroll, R., D. Holtz-Eakin, M. Rider, M., and H. S. Rosen (2001). "Personal income taxes and the growth of small firms." In *Tax Policy and the Economy, Vol. 15*, edited by James Poterba, 121–47. Cambridge, MA: MIT Press.

Claessens, S. and E. Perotti (2008). "Finance and inequality: Channels and evidence." *Journal of Comparative Economics,* 35(4):748-773.

Cullen, J. and R. Gordon (2007). "Taxes and entrepreneurial risk-taking: Theory and evidence for the US." *Journal of Public Economics*, 91, 1479–1505.

Demirgüç-Kunt, A. and V. Maksimovic (1998). "Law, finance and firm growth." *Journal of Finance*, 53(6): 2107–37, 1998.

Dercon, S. and L. Christiaensen (2010). "Consumption risk, technology adoption and poverty traps: Evidence from Ethiopia." *Journal of Development Economics*, forthcoming.

Djankov, S., C. McLiesh and A. Shleifer (2007). Private credit in 129 countries *Journal of Financial Economics*, 2(84): 299-329.

Doblas-Madrid, A and R Minetti (2009). "Sharing information in the credit market: Contract Level Evidence from U.S. Firms.". Working Paper, Michigan State University

Evans, D. and L. Leighton (1989). "Some empirical aspects of entrepreneurship." *American Economic Review,* 79: 519-535.

Fenske, J. (2011). "Land tenure and investment incentives: Evidence from West Africa." *Journal of Development Economics,* 95: 137–156

Gaston R. G. and A. M. Werner (2002). "Financial liberalization, credit constraints, and collateral: investment in the Mexican manufacturing sector." *Journal of Development Economics*, 67: 1–27.

Gentry, W. M., and R. G. Hubbard (2000). "Tax policy and entrepreneurial entry." *American Economic Review* 90, 2: 283–87.

Gentry, W. M., and R. G. Hubbard (2005). " 'Success taxes', entrepreneurial entry and innovation." In: Jaffe, Adam B., Josh Lerner and Scott Stern (eds.) *Innovation Policy and the Economy* - Volume 5, NBER and MIT Press.

Hansson, Å. (2010, forthcoming). "Tax policy and entrepreneurship: empirical evidence from Sweden." *Small Business Economics*, DOI: 10.1007/s11187-010-9282-7.

Hart, O. and J. Moore (1994). "A Theory of debt based on the inalienability of human capital." *Quarterly Journal of Economics*, 109: 841–79.

Haselmann, R., K. Pistor and V. Vig (2010). "How law affects lending." *Review of Financial Studies* 23(2): 549-580.

Hurst, E. and A. Lusardi (2004) "Liquidity constraints, household wealth and entrepreneurship" *Journal of Political Economy*, 112(2): 319-347.

Hurst, E. and A. Lusardi (2008). "Liquidity constraints and entrepreneurship: household wealth, parental wealth, and the transition in and out of entrepreneurship," in *Overcoming Barriers to Entrepreneurship in the United States*, ed. Diana Furchtogott-Roth, Lexington Books.

Iyigun, M. and Rodrik, D. (2005). "On the efficacy of reforms: Policy tinkering, institutional change, and entrepreneurship." In *Institutions and Growth*, T. Eicher and C. G. Penalosa, eds., MIT Press.

Jappelli, T and M Pagano (2002). "Information sharing, lending and defaults: Cross-country evidence." *Journal of Banking and Finance,* 26: 2017-2045.

Jappelli, T and M Pagano (2000). "Information sharing in credit markets: A survey". CSEF Working Paper 36.

Kasekende, L.; Brixiova, Z. and Ndikumana, L. (2010). "Africa: Africa's countercyclical response to the crisis." *Journal of Globalization and Development*, Vol. 1 (1), Art. 16.

King, R. and R. Levine (1993). "Finance and growth: Schumpeter might be right." *Quarterly Journal of Economics,* 108 (3): 717–37.

Kiyotaki, N. and J. Moore (1997). "Credit cycles." *Journal of Political Economy*, 105: 211-248.

La Porta, R, F. Lopez-de-Silanes, A. Shleifer, and R. Vishny (1998). "Law and finance." *Journal of Political Economy,* 106 (6): 1113–55.

Levine, R. (1997). "Financial Development and Economic Growth: Views and Agenda." *Journal of Economic Literature,* 35 (2): 688–726.

Levine, R. (1998). "The Legal Environment, Banks, and Long-Run Economic Growth." *Journal of Money, Credit, and Banking,* 30 (3): 596–613.

Moore, K. (2004). "Do liquidity constraints matter for new entrepreneurs? Finance and Economics Discussion Series, paper N0. 42. The Federal Reserve Board.

Nkurunziza, J.D., L. Ndikumana, and P. Nyamoya (2011). **"**The Financial system in Burundi: An investigation of its efficiency in resource mobilization and allocation." Forthcoming, NBER Working Paper. Prepared for the NBER African Success Stories Project (http://www.nber.org/AfricanSuccesses/projects.html).

Negrin, J. L. (2001). "Credit information sharing mechanisms in Mexico: Evaluation, perspectives, and effects on firms' access to bank credit." Center for Research on Economic Development and Policy Reform, Working Paper No. 114.

Parker, S. C. (2009). "*The Economics of Entrepreneurship*." Cambridge University Press.

Qian, J. and P. E. Strahan (2005). "How laws and institutions shape financial contracts: The case of bank loans." NBER Working Papers with number 11052.

Rajan, R. and L. Zingales (1998). "Financial dependence and growth." *American Economic Review*, 88 (3): 559–86.

Schuetze, H. J. (2000). "Taxes, economic conditions and recent trends in male self–employment: A Canada–U.S. comparison." *Labour Economics,* (7)5: 507–44.

Simtowe, F., M. Zeller, and A. Diagne (2009). "The impact of credit constraints on the adoption of hybrid maize in Malawi." *Review of Agricultural and Environmental Studies*, 90 (1): 5-22.

Stein, P., T. Goland and R. Schiff (2010). *Two Trillion and Still Counting: Assessing the Credit Gap for Micro, Small and Medium-Size Enterprises in the Developing World*, McKinsey&Company and IFC: Washington, DC.

Figure 1. Strength of legal rights and entrepreneurship

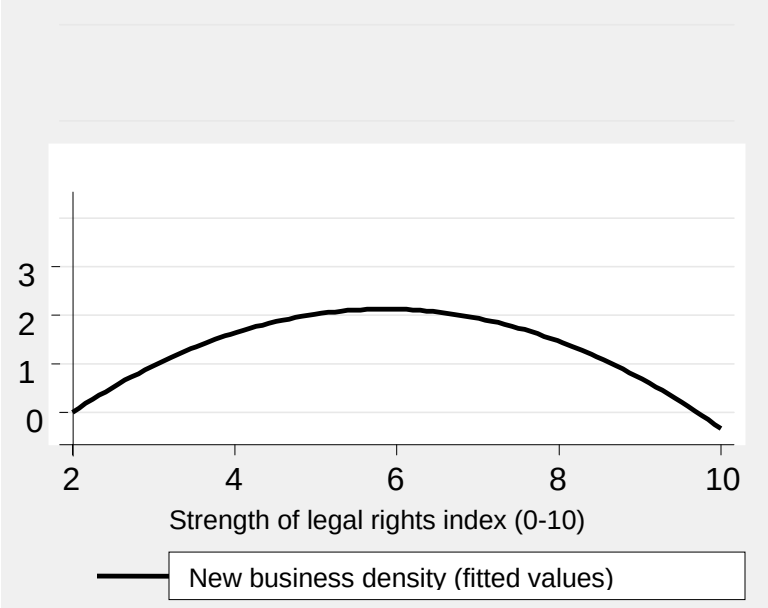


Figure 2. Depth of credit information and entrepreneurship

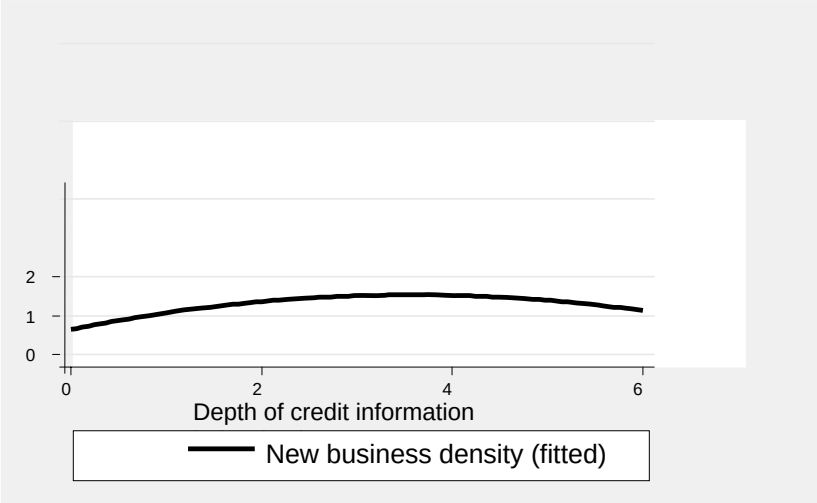


Figure 3. Loans requiring collateral (%) and new business density

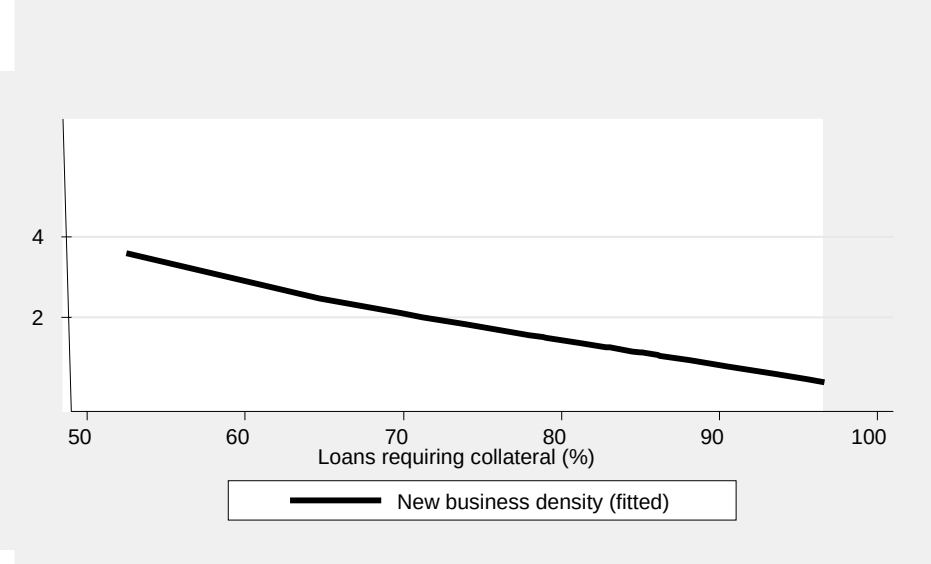


Figure 4. Value of collateral and new business density

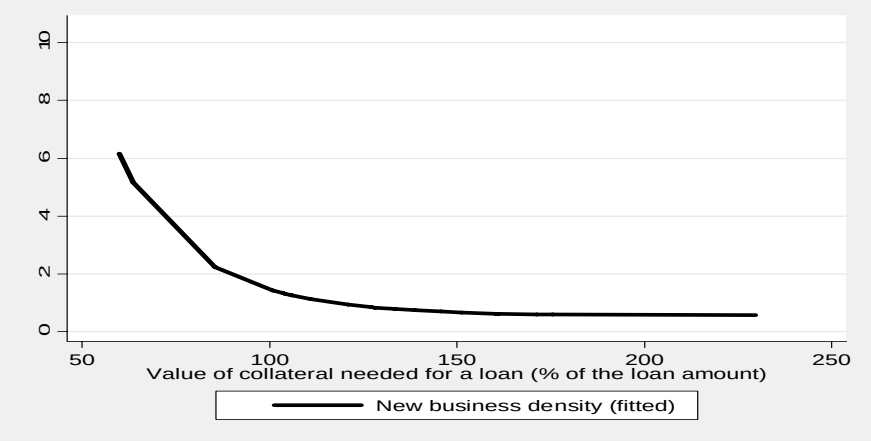


Figure 5. Value of collateral and finance as a major constraint

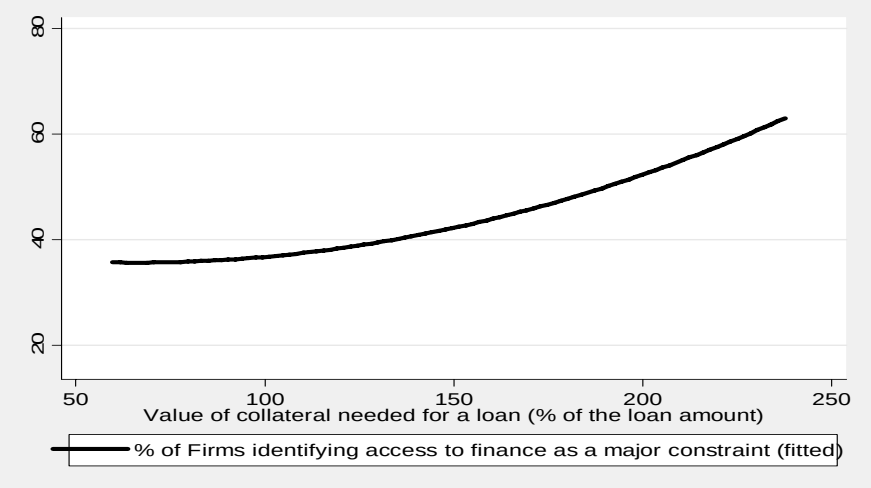


Table1
Correlations

	New business density	*Self-employed*	*Cost of business start-up procedures (% of*	*income*	*bank liquid reserves to bank assets*	*broad money (% GDP)*	*credit to private sector (% GDP)*	*strength of legal rights*
Self-employed	-0.542 [0.01]							
Cost of business start-up procedures (% of GNI per capita)	-0.319 [0.00]	0.686 [0.00]						
income	0.595 [0.00]	-0.827 [0.00]	-0.631 [0.00]					
bank liquid reserves to bank assets ratio (%)	-0.334 [0.00]	0.145 [0.42]	-0.283 [0.00]	0.313 [0.00]				
broad money (% GDP)	0.441 [0.00]	-0.515 [0.00]	-0.415 [0.00]	0.594 [0.00]	-0.013 [0.88]			
credit to private sector (% GDP)	0.343 [0.00]	-0.552 [0.00]	-0.359 [0.00]	0.554 [0.00]	-0.338 [0.00]	0.710 [0.00]		
strength of legal rights	0.037 [0.72]	0.235 [0.48]	-0.202 [0.01]	0.057 [0.59]	-0.172 [0.15]	0.146 [0.13]	0.188 [0.05]	
depth of credit information	0.117 [0.27]	-0.437 [0.17]	-0.346 [0.00]	0.613 [0.00]	0.186 [0.12]	0.411 [0.00]	0.616 [0.00]	0.116 [0.17]

P-values are in brackets.

Table 2
Pooled-data estimates

	Dependent variable: New business density						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
income (log)	0.681*** (0.24)	1.017*** (0.33)	1.889*** (0.58)	2.661*** (0.58)	2.24*** (0.48)	1.28*** (0.27)	1.17*** (0.70)
strength of legal rights	0.135*** (0.05)	0.132** (0.05)	0.271** (0.10)	0.286** (0.12)	3.65*** (1.06)	1.76** (0.85)	1.62** (0.77)
public credit registry coverage (% of adults)	0.196*** (0.09)	0.178* (0.09)	0.153 (0.13)				
depth of credit information		-0.414** (0.18)	-0.680*** (0.24)	-0.495*** (0.17)	1.441 (1.01)	0.463 (0.73)	0.623 (0.74)
bank liquid reserves to bank assets ratio (%)			-2.449* (1.28)	-4.750*** (1.39)	-3.891*** (0.96)		
strength of legal rights_squared					-0.264*** (0.07)	-0.133** (0.06)	-0.123** (0.06)
depth of credit information_squared					-0.354 (0.21)	-0.174 (0.135)	-0.271 (0.162)
broad money (% of GDP)						-0.010 (0.11)	
credit to private sector (% of GDP)							0.021 (0.013)
No. of obs.	74	74	42	42	42	73	73
Fstat	8.15	9.69	3.85	7.88	6.27	6.04	5.54
R-squared	0.50	0.57	0.65	0.61	0.72	0.50	0.53

Robust standard errors are in parentheses.
* indicates significance at 0.10 ** indicates significance at 0.05 and *** indicates significance at 0.01.

Table 3
Random-effects GLS estimates

	Dependent variable: New business density			
	(1)	(2)	(3)	(4)
income (log)	2.153***	0.978**	2.388***	1.003**
	(0.64)	(0.41)	(0.74)	(0.43)
strength of legal rights	3.82***	1.78*	3.89***	1.78*
	(1.44)	(0.95)	(1.5)	(0.96)
depth of credit information	0.993***	0.495***	0.959***	0.493***
	(0.19)	(0.15)	(0.20)	(0.16)
bank liquid reserves to bank assets ratio (%)	-1.162***		-1.07*	
	(0.58)		(0.59)	
strength of legal rights_squared	-0.278**	-0.148*	-0.280**	-0.148*
	(0.11)	(0.08)	(0.12)	(0.08)
depth of credit information_squared	-0.186***	-0.089**	-0.175***	-0.089**
	(0.04)	(0.04)	(0.04)	(0.03)
credit to private sector (% of GDP)		0.009		0.009
		(0.01)		(0.009)
Cost of business start-up procedures (% of GNI per capita)			0.003	0.0003
			(0.004)	(0.001)
No. of obs.	42	73	42	73
Wald chi2	53.58	30.59	53.02	30.20
Prob > chi2	(0.00)	(0.00)	(0.00)	(0.00)
R-squared				
Within	0.60	0.26	0.60	0.26
Between	0.63	0.44	0.65	0.44
Overall	0.65	0.43	0.67	0.43

Robust standard errors are in parentheses.
* indicates significance at 0.10 ** indicates significance at 0.05 and *** indicates significance at 0.01.

Appendix A

Figure A1

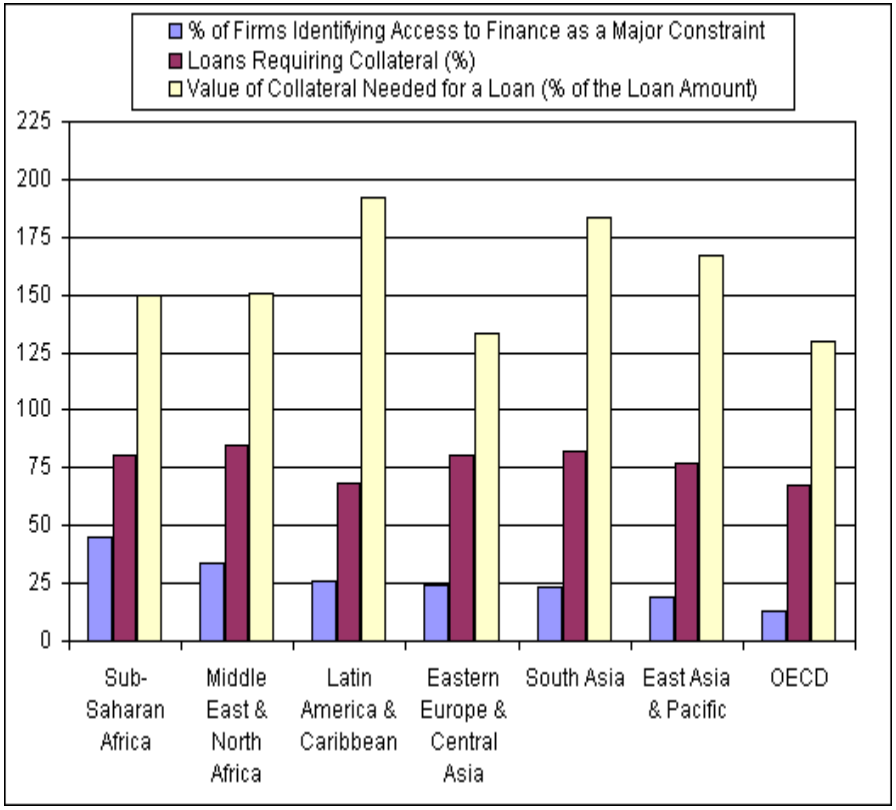
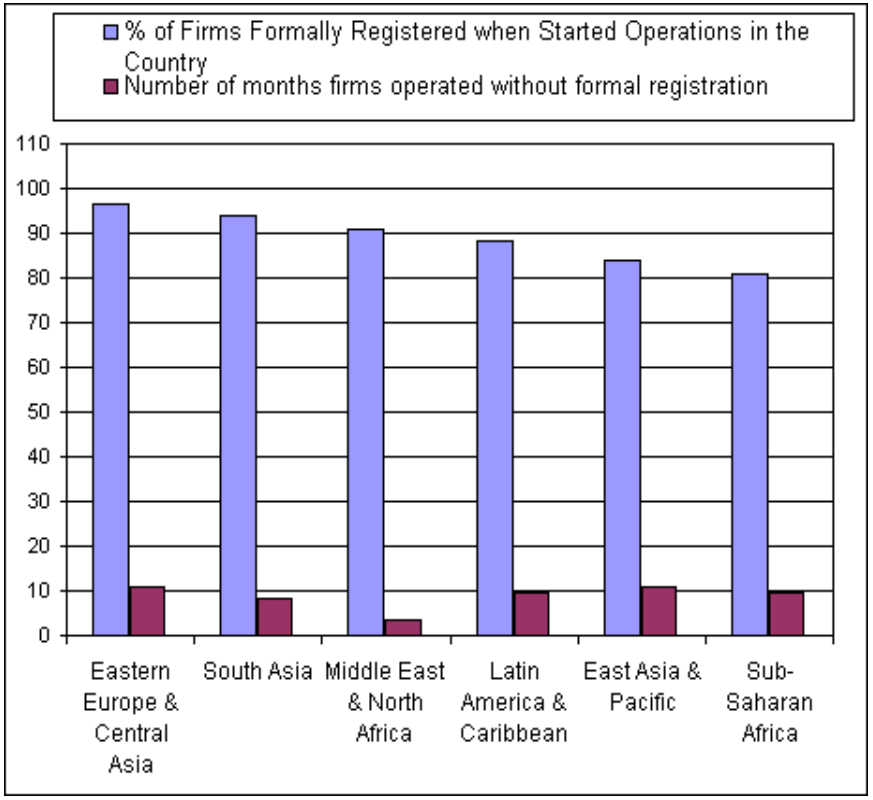


Figure A2



Source of data: Enterprise survey, World Bank's Enterprise database (based on various years during 2002-2010)

Figure A3

% of Firms Formally Registered when Started Operations in the Country

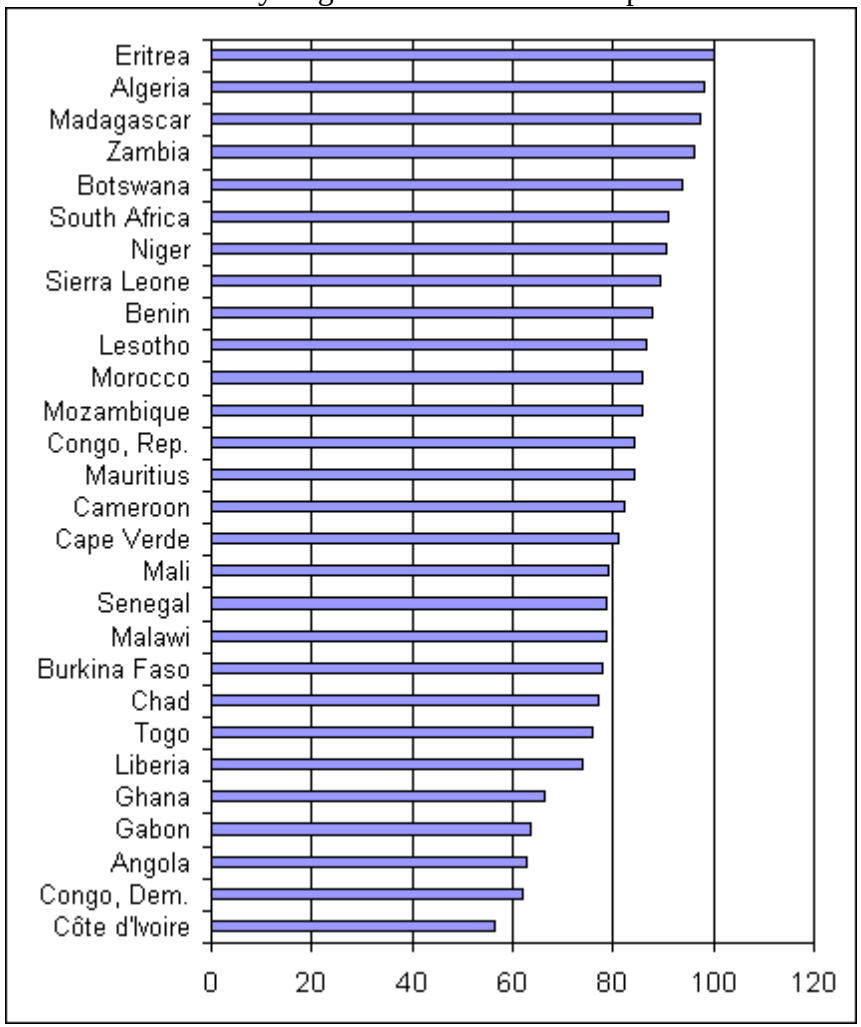
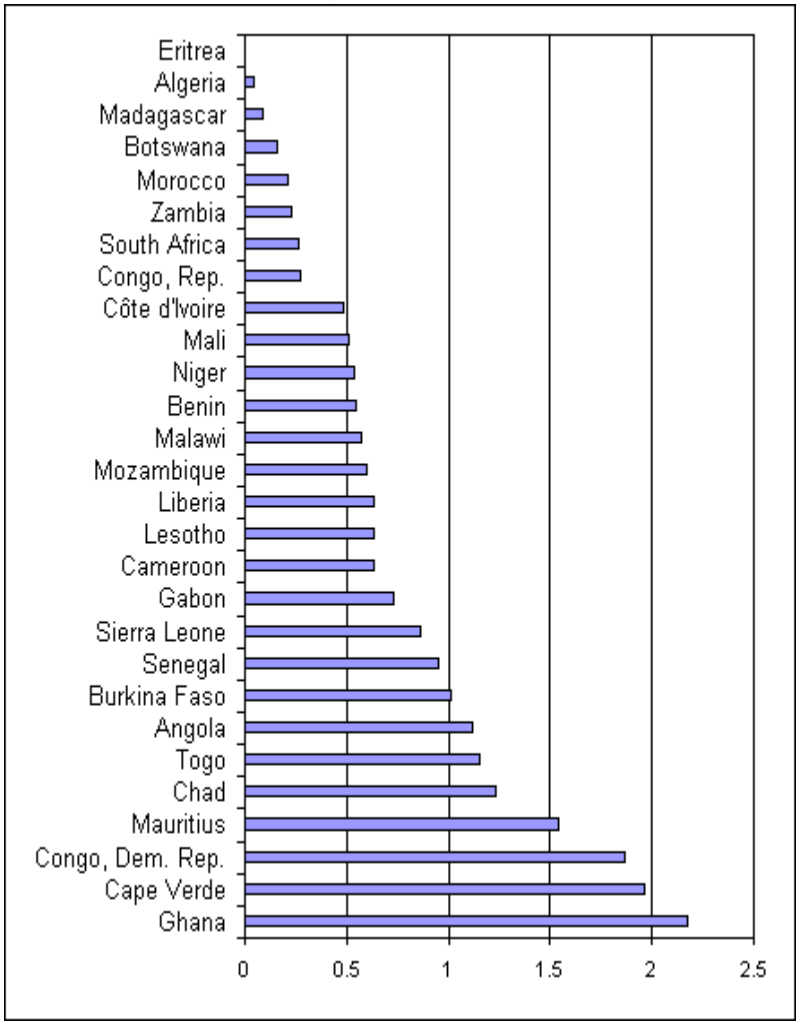


Figure A4

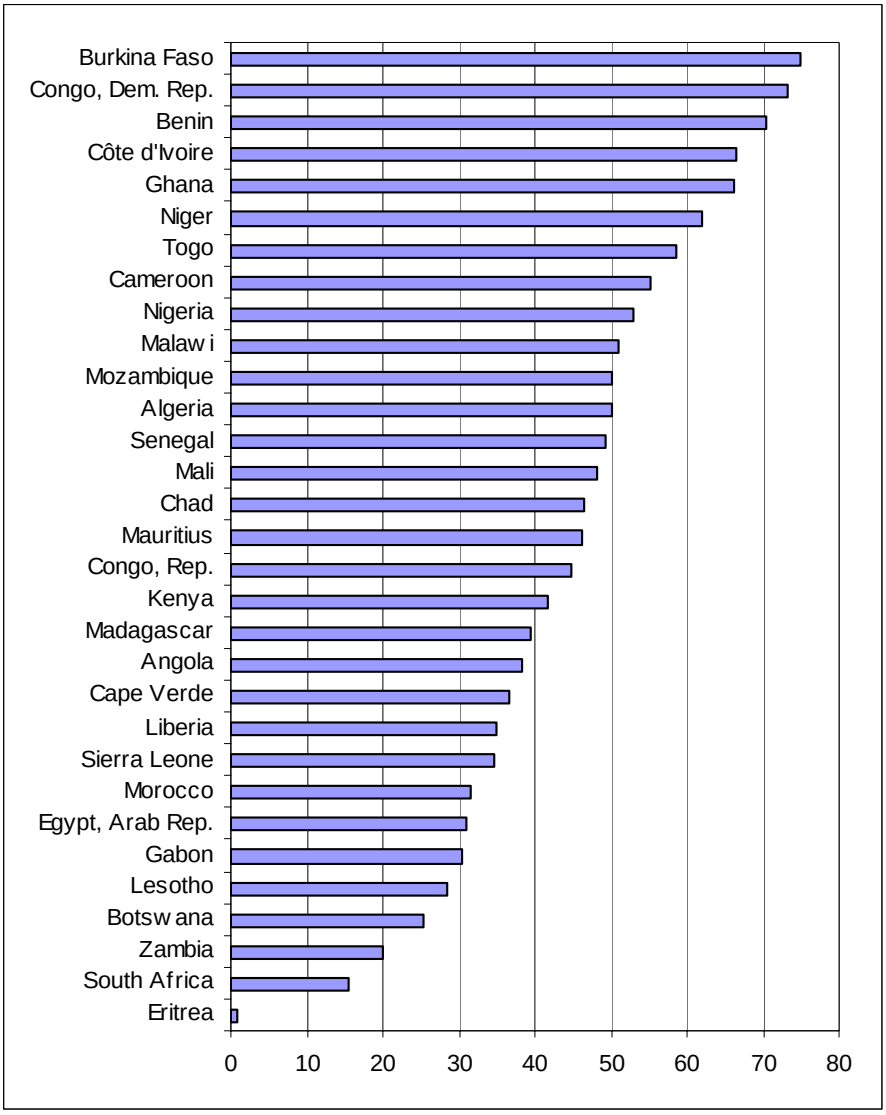
Number of years firms operated without formal



Source of data: Enterprise survey, World Bank's Enterprise database (based on various years during 2007-2010)

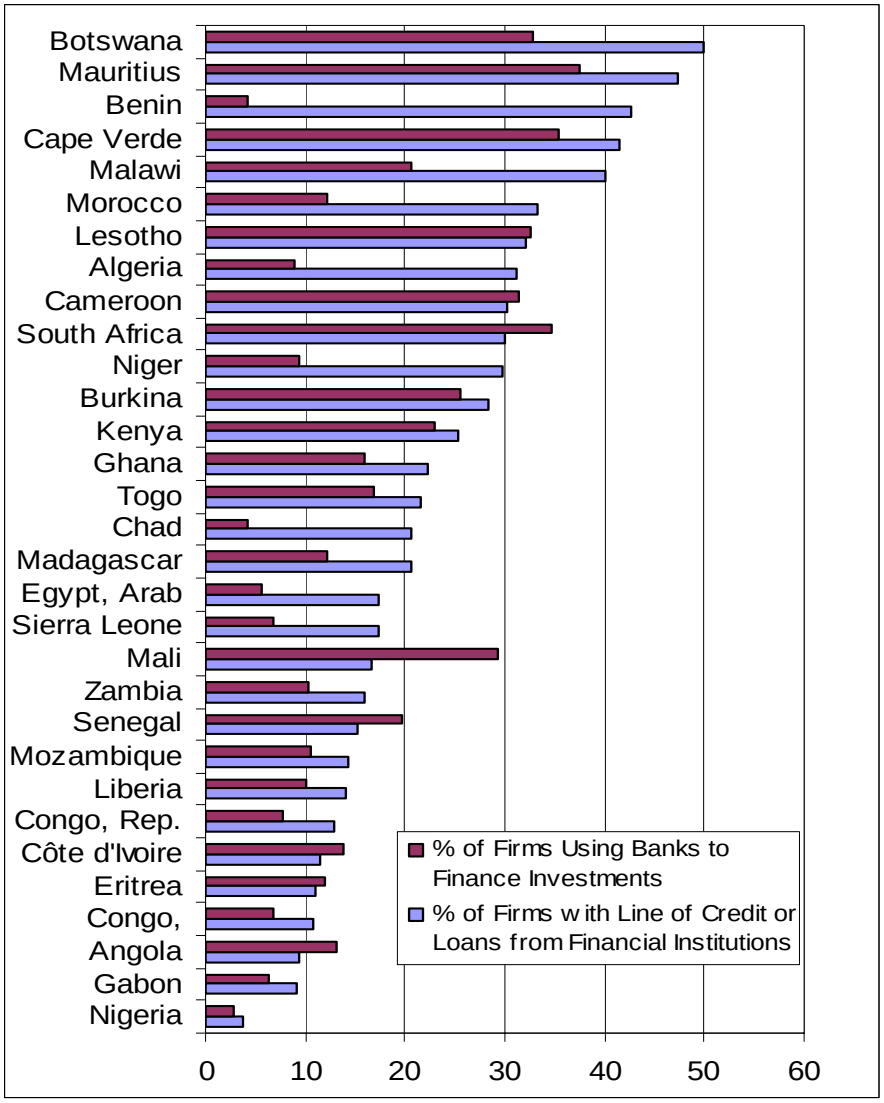
Figure A5

% of Firms Identifying Access to Finance as a Major Constrain



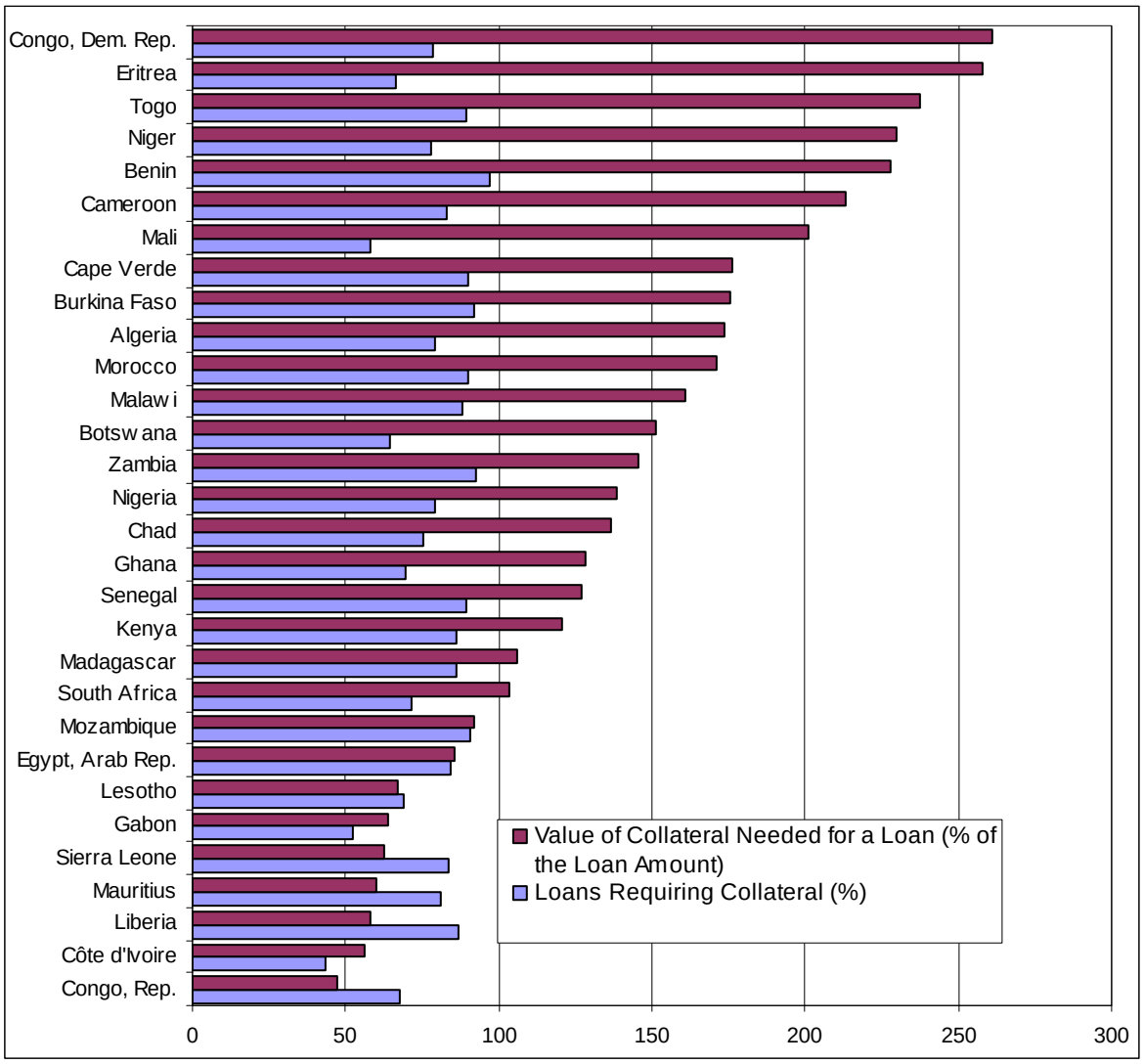
Source of data: Enterprise survey, World Bank's Enterprise database (based on various years during 2007-2010)

Figure A6



Source of data: Enterprise survey, World Bank's Enterprise database (based on various years during 2007-2010)

Figure A7



Source of data: Enterprise survey, World Bank's Enterprise database (based on various years during 2007-2010)

Appendix B

Table B1
List of countries

Algeria	Madagascar*	Senegal*
Burkina Faso*	Malawi*	South Africa
Egypt	Mauritius	Togo
Ethiopia*	Morocco	Tunisia
Gabon*	Niger*	Uganda
Ghana	Nigeria*	Zambia
Kenya	Rwanda*	

* Not included in the larger sample (20 countries).