The Business Environment, Education and Entrepreneurship in Low Income Countries

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Abstract

This paper presents a model of costly firm creation in an economy with unconducive business environment and skill gaps where an equilibrium outcome can be a low-productivity trap. The model reflects several key stylized facts from the urban labor markets in low income countries where subdued rates of productive entrepreneurship can co-exist with high output growth. Substantial improving the business environment would help raise the entrepreneurial productivity especially if other bottlenecks such as skill shortages addressed. We test model on the World Bank Enterprise Survey for Ethiopia and aggregate data for entrepreneurship, education and governance.

Key words: Model of start-ups, productivity, low income countries, multivariate analysis

JEL classification: L26, J24, J48, O17

1. Introduction

Policymakers in low income countries (LICs) have for a long time viewed productive entrepreneurship to be a key part of their strategies for inclusive growth. In contrast to necessity (or subsistence) entrepreneurship aiming at survival, opportunity entrepreneurship can help people escape poverty and contribute to development (Bruton et al., 2013).[2] In many LICs, however, emergence of opportunity entrepreneurship and its contribution to growth and job creation has been limited. One of the reasons is the low competitiveness, stemming in part from an overall weaker business environment and larger skill gaps in LICs than in more advanced economies.

To encourage entrepreneurship, policymakers in LICs have been reforming their business environments and educational systems, especially in the context of the relatively low global growth and declining trade. To guide these efforts, the Global Entrepreneurship Monitor (GEM) group has developed 'Entrepreneurship Enabling Conditions' framework, which clusters the factors conducive to entrepreneurship into: (i) basic requirements (e.g. institutions, infrastructure, macroeconomic stability and human capital); (ii) efficiency enhancers (e.g., higher education, goods and labor market efficiency, financial sector, technological readiness and market size and (iii) innovation and entrepreneurship policies (e.g., entrepreneurial finance, R&D transfer, etc.).

Drawing on this framework, this paper examines the role of the business environment and skills for firm creation and performance in the LICs.[3] It presents a model of start-ups in an economy with a rigid business environment, skill gaps, and matching frictions; the model is an extension of Brixiová (2013) and builds on Snower (1996).[4] The paper summarizes key stylized facts of the urban labor markets in the LICs such as Ethiopia and shows how an economy can end up in a low-productivity equilibrium, where the overall less productive informal sector provides most of employment. The results of the model are tested on the World Bank aggregate data for entrepreneurship, education and governance and the Enterprise Survey data of Ethiopia. Both theoretical and empirical results suggest that to move the economy into a productive equilibrium, the complementarity matters. Specifically, reforms to the business environment tend to be more effective in creating productive firms when accompanied by narrowing skill gaps and vice versa.

The rest of the paper is organized as follows. Section 2 gives stylized facts on entrepreneurship and the labor market in low income countries. Section 3 presents the model and policy analysis. Section 4 tests the model on World Bank data from low income and other developing countries. Section 5 concludes.

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[2] Other papers that view entrepreneurship as a part of solution to poverty include Anderson et al. (2010), Brixiová (2010), McKague and Oliver (2012), Bandiera et al. (2013), Bruton et al. (2013) and Tobbias et al. (2013).

[3] Focus is on productive entrepreneurship, as its shortage constrains LICs' income catch up with advanced economies. The concept of the business environment utilized in this paper includes both basic institutions and infrastructure as well as greater product and labor market flexibility and access to finance.

[4] The paper draws on several streams of the literature. First, is the literature on market failures and externalities in the labor markets, as in, for example, Snower (1996) who showed that labor market failures lead to suboptimal outcomes in developed countries. Second, it draws on the literature on the business environment and productivity in developing and transition economies, as in Brixiová and Egert (2012) and Bah and Fang (2015). Third, the paper is related to the literature on education and entrepreneurship, recently applied to Malawi by Kolstad and Wiig (2015).

2. The Stylized Facts

This section presents several stylized facts on the quality of the business environment, education and the new firm creation. It utilizes data from the LICs and Ethiopia to gauge association between the business environment, in particular regulatory quality, educational attainments (proxy for skills) and entrepreneurial start-ups (e.g., entrepreneurship data from the World Bank).[5]

(i)   Constraints to Entrepreneurship in Low Income Countries

In developing countries, higher regulatory quality is associated with higher new firm density (proxy for start-ups). Weak property rights can be particularly damaging to entrepreneurship as they raise risk of losses directly through expropriation and indirectly due to increased uncertainty.[6] LICs operate in a lower range of regulatory quality, pointing to a potential for policy interventions.

Figure 1. Quality of Regulations and New Firms in Developing Countries
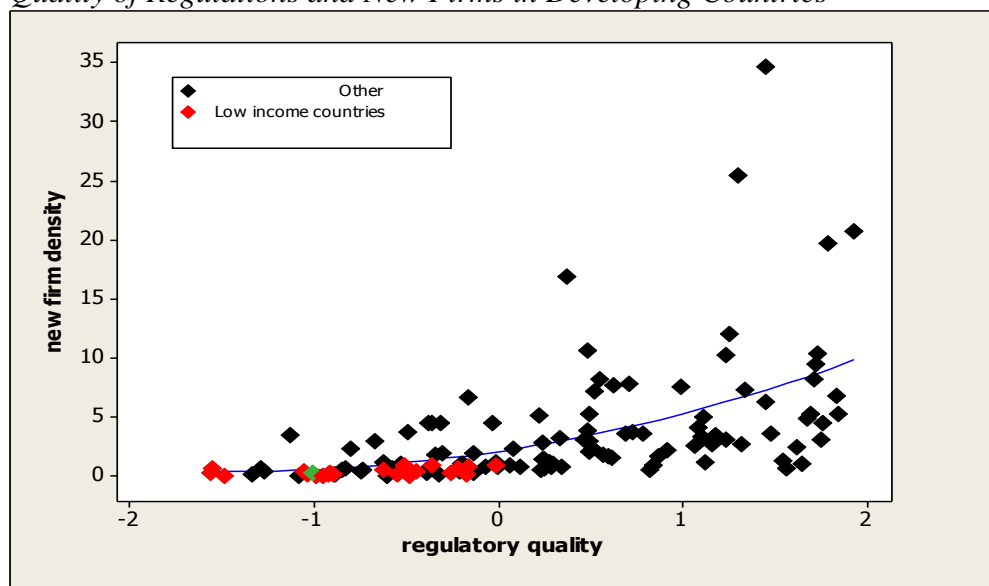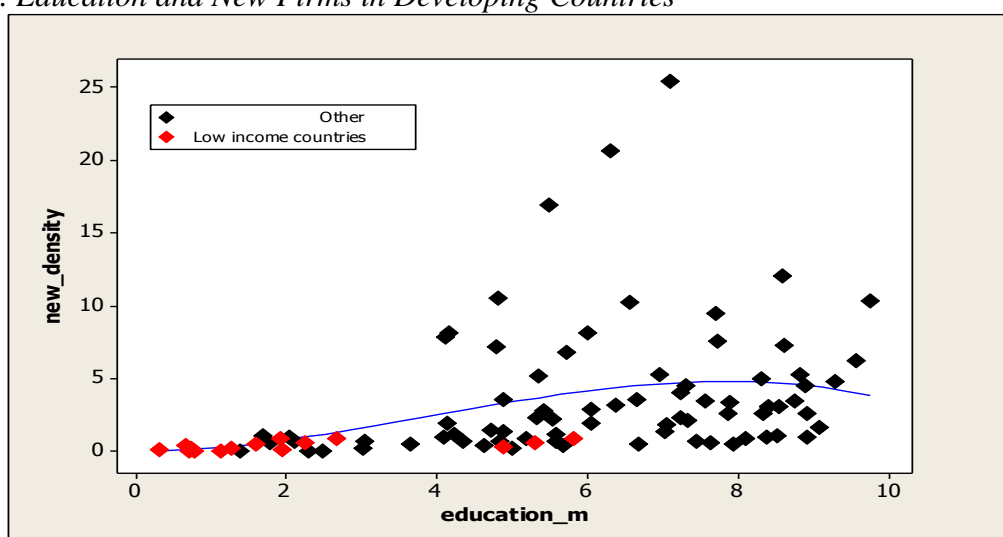

Source: Authors' calculations based on the World Bank Entrepreneurship and Governance databases. **Note:** The sample consists of 96 developing and emerging market countries (including 22 African countries) from the World Bank's Entrepreneurship Database. New Business Entry Density is the number of newly registered companies per 1,000 working-age people in 2013. The governance indicators range from -2.5 to 2.5, for period 2008 - 2011.

While a conducive business environment (starting nosiness regulations) is necessary, other elements of the entrepreneurial ecosystem need to be in place. These include macroeconomic and political stability, access to credit, and an educational system that would instill entrepreneurial attitudes early on. Education and training for both entrepreneurs and workers, accompanied by job or entrepreneurial search assistance, can also stimulate entrepreneurial start-ups (Figure 2). Both figures point to a non- linear relation between these factors and new firm density.

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[5] We define entrepreneurship as in Naude (2010) to be '. . .the resource and process whereby individuals utilize opportunities in the market through the creation of new business firms.' As in Baumol (1990), we distinguish between (highly) productive and unproductive (or less productive) entrepreneurship.

[6] In Ethiopia, for example, would benefit from further strengthening of the rule of law, especially property rights, and improving the regulatory environment, especially start up procedures.

Figure 2. Education and New Firms in Developing Countries

Source: Authors' calculations based on the World Bank Entrepreneurship and Governance databases. **Note:** The sample consists of 96 developing and emerging market countries (including 22 African countries) from the World Bank's Entrepreneurship Database. New Business Entry Density is the number of newly registered companies per 1,000 working-age people in 2013. The governance indicators range from -2.5 to 2.5, for period 2008 - 2011.

(ii)   The Example of Ethiopia

Ethiopia's 'developmental state' model has several unique features, including the key role of the state sector in the non-agricultural output and high growth are combined with low productive private sector employment, labor market mismatches, a constraining business environment and relatively low overall educational attainments.[7] The sections below highlight main stylized facts.

High Growth, Low Labor Productivity

At an average annual growth of 10.6 percent, Ethiopia was one of the fastest growing countries in the world in 2005 - 2014. Growth was driven mostly by the modernization of agriculture, public investment, the expansion of low value-added services (Geiger and Moller, 2013) and recently also large-scale manufacturing. Wide productivity gaps with East Asian economies and some African frontier markets persist (McMillan and Rodrik (2011).). The overall low productivity is partly explained by the sectoral distribution of employment where agriculture accounts for 78 % of employment (Martins, 2014). In contrast, productive entrepreneurship and SMEs have been limited, raising doubts about growth sustainability (World Bank, 2014a).[8]

Constraining Business Environment

The lack of an enabling business environment have contributed to the suppressed private sector. As Lopez-Garcia (2009) noted for transition economies, the two main barriers to firm creation tend to be the administrative burdens related to starting a business and access to finance, while the

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[7] Similarly to other LICs, the informal sector accounts for a large share - 45-50 percent - of the urban employment.
[8] '…Ethiopia pursues a public sector-led growth strategy that focuses on promoting growth through high public investment…' (IMF, 2012, page 4).

government interference and taxes impact the expected profit and firm survival. These are also the main barriers in Ethiopia.[9] For example, minimum capital required to start a business in Addis Ababa amounts to 10 times GNI per capita. Another area that need strengthening is registering property, to ensure property right and facilitate formation of collateral and access to finance. In 2015, Ethiopia ranked as number 104 out of 189 countries (World Bank, 2014b).

Skill Shortages

A possible contributing factor to the low entrepreneurial rates is the overall low level of education, as the success rates and sustainability of early-stage entrepreneurs are positively correlated with their educational attainment. The level of education, and entrepreneurial education, in Ethiopia is lagging other low income countries in SSA (Table 3). The skill shortages have been amplified by an ineffective labor market matching of skilled workers and vacancies (Denu et al, 2005).

Table 1. Entrepreneurial Education and Training in Selected LICs

	ETH	SSA av.	GHA	MLW	NIG	UGA	ZAM
Primary and secondary education:							
encourages creativity, self-sufficiency and initiative	1.9	2.3	2.3	2.3	1.9	1.9	2.2
gives adequate attention to entrepreneurship and new firm creation	2.3	2.0	2.8	2.9	2.7	2.3	2.8
Universities							
provide good and adequate preparation for starting up and growing new firms	1.8	2.5	2.3	2.9	2.6	1.8	2.3
Business and management education							
provide good and adequate preparation for starting up and growing new firms	2.1	2.7	2.8	3.1	2.3	2.1	2.8
Vocational and professional education							
provide good and adequate preparation for starting up and growing new firms	2.6	2.9	3.0	3.3	2.8	2.6	3.0

Source: Herrington and Kelley (2013). Note: Answers are experts' opinions from surveys conducted by the Global Entrepreneurship Monitor, measured on an increasing scale from 0 (lowest score) to 5 (highest score). **Note:** Since 2010, Ghana has been classified as a middle income country.

The education and the environment that individuals are exposed to are key for their entrepreneurial aptitude (Ncube, 2005). In the Ethiopian universities, entrepreneurship is still in its early phase and concentrated mostly in business schools and agricultural colleges. Entrepreneurship promotion centers are scarce. The country thus needs to integrate entrepreneurship in the curricula while establishing centers of entrepreneurial excellence (Gerba, 2012).

Limited Entrepreneurial Activity

The Global Entrepreneurship Monitor 2013 study lists Ethiopia as having one of the lowest rates of entrepreneurial activity in SSA, including among the LICs. Only 15% of the adults were starting or running a new business in 2012, compared to the average of 28% of adults for countries in the region. Further, in Ethiopia, only 10 % of adults were running established businesses relative to the regional average of 13 % (Table 2). Only 24 % of adults intended to create a firm, which is

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[9] This paper considers the access to finance as part of the broader business environment.

less than half of the region's average of 53 %. This is consistent with the observation that about 50 large and medium-sized firms play a key role in the economy (Sutton and Kellow, 2010).

Table 2. Entrepreneurial Activity in Selected LICs, 2012

	Entrepreneurs (% of working age population)		
	Nascent	New	Established
Ethiopia	6	9	10
Ghana	15	23	38
Malawi	18	20	11
Nigeria	22	14	16
Uganda	10	28	31
Zambia	27	15	4

Source: Herrington and Kelley, 2013. Note: Since 2010, Ghana has been classified as a middle income country.

3. The Model and Policy Analysis

This section develops a model illustrating the role of an enabling business environment and skills for stimulating productive entrepreneurship, reflecting the above shortages.

3.1 The Environment

The population is normalized to one. There are two types of agents, entrepreneurs and workers, with population shares μ and $1-\mu$, respectively. They live for one period, are endowed with one unit of time and $\overline{w}$ amount of consumption good, and have preferences, $E(c)$, where c denotes consumption good and E the expectations agents form at the beginning of the period.

Entrepreneurs

At the beginning of the period, entrepreneurs search for opportunities to open productive firms in the private sector. This search costs them $\gamma_1 x + \gamma_2 x^2 / 2, \gamma_1, \gamma_2 > 0$, units of the consumption good and results in the probability x of finding a business opportunity with productivity per worker z_s. They can turn a business opportunity into a highly-productive firm by hiring $\overline{n}_s$ skilled workers. Denoting m_p as number of entrepreneurs searching for skilled workers, the matching h of the aggregate skilled vacancies, $V_s = m_p \overline{n}_s$, with skilled workers, N_s, follows:

$$h = A\min[N_s; V_s] = A\min[N_s; m_p \overline{n}_s] \tag{1}$$

where h is the total number of matches and A denotes matching efficiency. Entrepreneurs with a high-productivity business opportunity find skilled workers with probability $\rho = A\min[\dfrac{N_s}{V_s}, 1]$.[10]

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[10] As Snower (1996) points out, when firms are imperfectly informed about the availability of skilled workers, even skills that are useful to all firms are not general since not all firms have access to these workers. In (1) $A < 1$ to reflect imperfections in the matching process.

After finding a highly-productive business opportunity and skilled workers, entrepreneurs pay start-up cost c^F (e.g. licensing fee, land and building lese, etc.) and produce output according to (2). The output depends on the productivity level, $z_s > 0$, and the quality of the business environment in the formal sector, β^F, $0 \leq \beta^F \leq 1$.[11] Firms in the formal sector pay profit tax τ and earn after-tax profit:

$$\pi^F = (1-\tau)(\beta^F z_s \bar{n}_s - w_s \bar{n}_s - c^F) \tag{2}$$

Where w_s is the wage of skilled workers (in the formal sector), determined through bargaining.

Entrepreneurs who do not find highly-productive opportunities or skilled workers open low-productivity firms in the informal sector, with productivity per worker of z_u. The entrepreneurs' productivity is further lowered by the business climate factor in the informal sector β^I where $0 < \beta^I < \beta^F < 1$.[12] The entrepreneurs employ unskilled workers, $\bar{n}_u$, where $0 < \bar{n}_u < \bar{n}_s$, that is firms in the informal sector are smaller. Entrepreneurs in the informal sector do not pay taxes, but are subjected to tax monitoring and full confiscation for tax evasion. Their profit amounts to:

$$\pi^u = (1-\phi)(\beta^I z_u n_u - w_u n_u - c^I) \tag{3}$$

where w_u is the wage of an unskilled worker in a low-productivity, informal firm, which equals the income, b, of the self-employed in the informal sector, and ϕ is the probability that the firm's tax evasion is detected by the tax authority. In sum, $z_s > z_u > b > 0$ are productivity levels in high-productivity firms (in the formal sector), low-productivity firms (in the informal sector), and self-employed, respectively.

Workers

When acquiring skills demanded in the highly productive private firms, workers incur cost, $k(q) = \theta q^2 / 2$ where $\theta > 0$ is the cost parameter. Their effort results in probability q of obtaining skills[13] and probability $\xi = A \min[\dfrac{V_s}{N_s}, 1]$ of finding a job in a highly productive firm. Workers who do not obtain skilled jobs work in the informal sector, either as self-employed or in a low-productive firm. In both cases they earn income $b < w_s$.

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[11] More generally, β^F reflects quality of formal institutions. Amoros (2009) shows empirically that differences in institutional quality help explain differences in entrepreneurship across countries.

[12] Dethier at al. (2011) observethat not only can better business environments cause firms to be more efficient, but that also that inherently more efficient firms choose better business environments.

[13] x (and q) are between 0 and 1. Despite their efforts, workers (entrepreneurs) occasionally fail to acquire skills (find business opportunities).

While the market for unskilled workers is perfectly competitive, wages for the skilled workers are set through decentralized bargaining between the skilled workers and the productive private firms. If bargaining does not lead to an agreement, the workers would receive income from self-employment in the informal sector, b. The outcome of decentralized bargaining depends on the relative strength of the skilled worker and the firm, α:

$$w_s = \alpha(\beta^F z_s - \pi_u) + (1-\alpha)b \tag{4}$$

The wage gap between skilled and unskilled jobs amounts to $\alpha(\beta^F z_s - \pi_u - b)$.

The Labor Market Clearing Conditions

The characterization of the environment is completed by the labor market equilibrium conditions. Denoting m_u as the share of entrepreneurs running low-productivity firms and employ the unskilled workers, the market clearing condition for the entrepreneurs is:

$$\mu = m_u + m_p \tag{5}$$

Denoting n_s to be the total number of skilled labor employed in the formal private sector, $n_u = m_u \bar{n}_u$ the total unskilled labor in the informal sector, and n_i as the total number of self-employed in the informal sector, the labor market equilibrium condition for workers is:

$$1 - \mu = n_s + n_u + n_i \tag{6}$$

3.2 Multiple Equilibria

An equilibrium in this economy is defined as an allocation of entrepreneurs and workers and wage rate such that: (i) each entrepreneur chooses the effort x put into search for business opportunities; (ii) each workers chooses effort q put into acquiring skills; (iii) wage rate is set through Nash bargaining as in (4); and (iv) labor market clearance conditions are met.[14]

In equilibrium, the marginal cost of entrepreneur's search for a business opportunity equals the net profit as in Equation (7). Similarly, the worker's marginal cost of acquiring skills equals the expected difference between a skilled wage and alternative income, given by (8): [15]

$$\gamma_1 + \gamma_2 x = \rho(\pi_s - \pi_u) = A \min\left[\frac{(1-\mu)q}{\mu x \bar{n}_s}; 1\right](\pi_s - \pi_u) \tag{7}$$

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[14] It is straightforward to show that depending on the parameters, the model either has (i) a unique 'low-productivity' equilibrium where workers and entrepreneurs exert zero effort or (ii) one 'low productivity' and one 'high productivity' equilibrium with positive efforts by workers and entrepreneurs.

[15] In (7) and (8), the number of skilled vacancies is $V_s = \mu x \bar{n}_s$, where $m_p = \mu x$ is the number of entrepreneurs who found a highly productive business opportunity. Similarly, the number of skilled workers searching is $N_s = (1-\mu)q$.

$$\theta q = \xi(w_s - b) = A \min\left[\frac{\mu x \bar{n}_s}{(1-\mu)q} ; 1\right](w_s - w_u) \qquad (8)$$

and w_s specified in Equation (4). Equations (7) and (8) can be obtained by solving entrepreneur´s and worker´s problems, together with the labor market clearing conditions (5) and (6). In (7), $\gamma_1 + \gamma_2 x \geq 0$ denotes the marginal cost of entrepreneurial search.

The equilibria form at the intersections of the entrepreneurs' 'search curve' as in (7) and workers' 'training curve' given by (8) and (4). The system described by (4), (7) and (8) can lead to two equilibria: (i) a low-productivity equilibrium, where entrepreneurs exhort limited effort to start firms and (ii) a high-productivity equilibrium with higher effort by entrepreneurs.

Low Productivity Equilibrium

The first equilibrium is the low productivity trap, where – under a shortage of private firm, i.e. $\mu x \bar{n}_s < (1-\mu)q$ – the business environment (i.e. tax rates, start–up cost, search cost) is such that $\pi_s - \pi_u \leq \gamma_1 / A$. Equation (7) shows that in such environment where difference between in profit between running high and low productivity firm is small, entrepreneurs will not search for highly productive business opportunities, i.e. *x = 0*. Equation (8) in turn shows that workers will not acquire skills i.e. *q = 0*. The economy will thus consist only of low-productive firms and unskilled workers, both operating in the informal sector.[16] As Snower (1996) emphasized for the case of developed countries, when the economy is in a low-productivity equilibrium (or 'low-skill, bad-job trap'), the need for public stimulus rises markedly relative to other equilibrium cases.

High Productivity Equilibrium

The second, high productivity equilibrium comprises both positive entrepreneurial search and workers' learning efforts (*x, q>0*). A pre-condition is a business environment conducive enough so that profits in the highly productive private firms employing skilled workers sufficiently higher than those in productive firms with unskilled workers, i.e. $\pi_s \geq \pi_u > 0$. In this equilibrium, the economy consists of both high productivity private firms in the formal sector, low productivity firms in the informal sector as well as self-employed workers in the informal sector.

3.3 Policy Analysis

In this section, we relate the key parameters of our model to evidence on the business environment in Ethiopia and other low income countries.

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[16] The second case is when the share of skilled workers is below that or same as the share of skilled vacancies, i.e. $(1-\mu)q \leq \mu x \bar{n}$. When $w^s \leq w^u = b$, that is $\beta^F \leq \dfrac{\pi^u + b}{z_s}$, unskilled workers will not have incentives to obtain training. The absence of the skilled workers will remove incentives for entrepreneurs to search for business opportunities requiring skilled workers.

During a start-up phase, each entrepreneur searches for a business opportunity. After a suitable opportunity is identified, the entrepreneurs need to turn it into productive firms. At this stage, they can be hampered by cumbersome registering and licensing procedures, stringent hiring regulations, and the lack of skilled workers, among other factors. The ability of the legal framework to protect property rights is equally important, as it influences the expected profit and hence effort that entrepreneurs put into search. The entrepreneurs also consider the state of the financial infrastructure such as development of capital markets, control of corruption, and effectiveness of the government during their start-up phase (Ncube, 2005).

Improving the Business Environment

This section underscores the impact of improved business environment on (i) entrepreneurs' search for highly-productive business opportunities; and (ii) workers' effort to acquire skills. It follows from (4), (7) and (8) that in the case of shortage of skilled vacancies, $(1 - \mu)q < \mu x \bar{n}_s$, a better business environment (e.g. higher β^F and lower γ) will encourage entrepreneurs to intensify their search effort *(x)* for productive business opportunities. This in turn, will incentivize unskilled workers to acquire skills.[17] A more intense search by entrepreneurs due to improved business environment and the subsequent additional learning efforts by workers will result in a higher number of productive firms, increased output, and additional productive employment.

Reforming Property Rights

Unclear property rights, which imply a possibility of expropriation (where $\beta^F = 0$), are an important component of the business climate in many low income countries. Denoting probability of expropriation as ψ, the efficiency coefficient in the production function changes to $\bar{\beta}^F = (1 - \psi)\beta^F + \psi 0$. Entrepreneurs are more likely end up running low productivity firms in the informal sector, as the expected profit in the formal sector is reduced by the possibility of expropriation. The reverse also holds – if improvements to property rights are sufficiently large, entrepreneurs who will increase their search effort and more likely end up in the formal sector.

Given two negative externalities (searching and learning) that characterize the low-productivity trap, sizeable interventions both on the side of business environment (generating labor demand) and training (improving quality of labor supply) are needed. The non-linearity in the searching and learning are key for prioritizing interventions. Specifically, policies should first target the most significant constraint to the creation of productive firms. In sectors or communities with shortages of productive firms, policies should focus on better business environment to encourage entrepreneurial search. In (some high-tech) sectors characterized by skill shortages, interventions

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[17] More formally, from (2) $\dfrac{\partial \pi_s^F}{\partial \beta^F} > 0$ and $\dfrac{\partial \pi_s^F}{\partial \tau}, \dfrac{\partial \pi_s^F}{\partial \gamma} < 0$. From (7) the entrepreneurial search effort *x* becomes

$x = A(\pi_s^F - \pi_u)/\gamma$ if skilled jobs are scarce. Hence $\dfrac{\partial x}{\partial \beta^F} > 0$ and $\dfrac{\partial x}{\partial \gamma}, \dfrac{\partial x}{\partial \tau} < 0$. From (8) then $\dfrac{\partial q}{\partial x} > 0$.

encouraging training should be prioritized. Since the binding constraint may be changing over time, complementary, and well-sequenced, policies would be most effective.

3.4 Illustrative Numerical Solution

To illustrate the impact of policies such as improved functioning of the labor market, A, and a better business environment, β^F, as well as lower cost of search for business (or entrepreneurs' skills), γ, this section provides a numerical example. The baseline parameters are set in Table 3; these values were set to yield the share of informal sector employment in total employment of 50 percent and of formal sector firms in total firms of 29 percent.[18]

Table 3. Baseline Parameters

Parameter	A	μ	ϕ	θ	γ	β^F	β^I	α	n_s	n_u	z_s	z_u	b	τ
Value	0.5	0.3	0.1	0.1	1	0.55	0.4	0.5	4	2	2	1	0.2	0.35

The indicative elasticity of informal sector employment to changes in each of the business environment variable (A, γ, β^F) is calculated by changing values of these variables by 20 percent and computing the new informal employment rate (Table 4).

Table 4. Elasticities of Key Outcomes w.r.t. Changes in the Business Environment

Variable	New value	New share of formal firms	New share of informal employment	Elasticity of informal and unskilled employment to 20 % change in variable
		% of total		% change
A	0.60	35	40	-20.0
γ	1.20	32	45	-9.4
β^F	0.65	37	36	-27.1

The results in Table 3 indicate that the 20 % improvement in the business environment would reduce employment in the informal sector by 27 % with a corresponding increase in productive employment. Improvements in the job matching would have similar impact.

4. Empirical Analysis

4.1 Drivers of Entrepreneurship Globally and in LICs

This section utilizes multivariate regression analysis to find out whether the number of start-ups (e.g., new firm density) is related to the quality of the business environment and education level.[19]

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[18] Parameters are chosen to match the limited available information. For example, the wage of unskilled workers in the informal sector amounts to 30-40 percent of the wage of the skilled workers, and the wage gap between skilled workers in the formal and informal sector. 2005, is 30 percent.

[19] Data sources are: the World Bank's Knowledge assessment methodology database (for education), the World Bank's governance database (for regulatory quality and the rule of law), and the World Bank's entrepreneurship database (for the new form density per 1,000 population).

The basic empirical equation is specified as follows:

$$Density_i = \alpha.Educ_i + \alpha_1.Educ_i^2 + \beta.Bu\sin ess\_env_i + \theta Control_i + \varepsilon_i \qquad (9)$$

The main findings are that entrepreneurship is positively associated with education and the financial sector development, but is negatively related to countries' low or lower-middle income level. Further, increased educational levels have diminishing effect on entrepreneurship, as shown in our model and stylized facts in Section 2 (Table 7, columns 1-4). However, in this specification we have not found direct impact of the business environment (other than the financial sector development) on entrepreneurship.

To find out if there is complementary effect between education and the business environment, as suggested by the results of the model in Section 3, we use two approaches. First, we generate variable equal to the product of education and the business environment or the rule of law (in levels): $Educ_i * Bu\sin ess\_env_i$. A positive coefficient indicates that a better business environment raises the positive effect of additional education (skills) on entrepreneurship.

$$Density_i = \alpha.Educ_i + \delta Educ_i * Bu\sin ess\_env_i + \beta.Bu\sin ess\_env_i + \theta Control_i + \varepsilon_i \qquad (10)$$

The second approach accounts for the heterogeneity among countries by having the effect of the business environment to depend on whether it is below or above the medium in the sample:

$$Bus.\_env\_med_i = \begin{cases} 1 & if \quad Bu\sin ess\_env_i < Median(Bu\sin ess\_env_i) \\ 0 & Otherwise \end{cases} \qquad (11)$$

Equation (10) is then written as:

$$Density_i = \alpha.Educ_i + \delta Educ_i * Bus\_env\_med_i + \beta.Bu\sin ess\_env\_med_i + \theta Control_i + \varepsilon_i \qquad (12)$$

Our model posits that the effect of skills (proxied by education) on entrepreneurship (new firm density) varies with the quality of the business environment achieved. To capture this heterogeneity, we estimate marginal effect of an interaction variable between education and the business environment. Education indeed has a positive effect on new firm density, but its marginal effect decreases as the as the quality of the business environment (the quality of regulations and the rule of law) rise. As previously, entrepreneurship is positively related to the financial sector development but negatively to countries' low or lower-middle income level (Table 5, columns 5-6). To put differently, when the quality of the business environment is very low (and below median), the effectiveness of educational improvements on entrepreneurship is diminished.

Table 5. New firms density, Education and Business environment, full sample

Dependent variable New firm density	(1)	(2)	(3)	(4)	(5)	(6)
Educ	**1.188****	**1.132****	**1.152****	**1.159****	**-0.789***	**-0.684***
	(0.559)	(0.545)	(0.571)	(0.550)	(0.426)	(0.401)
Educ^2	**-0.146****	**-0.135****	**-0.140****	**-0.138****		
	(0.0667)	(0.0645)	(0.0692)	(0.0666)		
Educ*regulatory env. (below median)					**0.821****	
					(0.379)	
Educ*rule-law (below median)						**0.657***
						(0.352)
Regulatory env.	0.532					
	(0.866)					
Rule-law		-0.272				
		(0.915)				
Regulatory (below median)			-0.577	**-5.239****		
			(0.864)	**(2.325)**		
Rule-law **(below median)**				0.874		-2.589
				(1.251)		(2.062)
Domcredit _gdp	**0.0512****	**0.0582****	**0.0541******	**0.0585******	**0.0553******	**0.0596******
	(0.0225)	**(0.0240)**	**(0.0192)**	**(0.0199)**	**(0.0196)**	**(0.0206)**
Africa	0.641	0.748	0.741	0.784	0.604	0.387
	(0.745)	(0.794)	(0.716)	(0.759)	(0.666)	(0.807)
Low_income	-1.274	**-1.831***	-1.305	**-2.131***	-1.537	**-2.648****
	(1.008)	(1.098)	(0.979)	(1.160)	(0.997)	(1.138)
Lower_midincome	**-2.279****	**-2.733******	**-2.319****	**-2.968******	**-2.313****	**-3.215******
	(0.932)	(1.019)	(0.903)	(1.038)	(0.957)	(1.065)
Constant	-0.751	-0.846	-0.531	-1.287	5.717**	4.352*
	(1.758)	(1.667)	(1.899)	(1.852)	(2.432)	(2.242)
Observations	90	90	90	90	90	90
R-squared	0.462	0.460	0.461	0.463	0.457	0.453

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

We repeat this exercise on the sub-sample of low and middle income countries. Higher education and better business environment (higher quality regulations) are associated with higher rates of entrepreneurship. The variable Educ*law(<median) (resp. Educ*regulation(<median)) indicates whether the effect of education depends on the quality of the role of law (resp. regulatory quality). Column 6, Table 6 shows that in low and middle income countries, education has a higher effect with better enforcement of the rule of law.

Table 6. New firms density, Education and Business environment, low income countries

Dep. var : New firm density	(1)	(2)	(3)	(4)	(5)	(6)
Education	**0.922***	**1.089****	**0.934***	**1.179****	**0.547****	**0.592****
	(0.478)	**(0.484)**	**(0.491)**	**(0.503)**	**(0.237)**	**(0.249)**
Education^2	**-0.0765**	**-0.0889**	**-0.0654**	**-0.0940**		
	(0.0580)	**(0.0573)**	**(0.0580)**	**(0.0588)**		
Educ*regulation(<median)					**-0.296**	
					(0.236)	
Educ*law(<median)						**-0.374***
						(0.218)
Regulatory_quality	**1.591*****					
	(0.589)					
Rule-law		1.283				
		(0.799)				
Regulatory(<median)			**-1.048****		**0.0220**	
			(0.518)		**(1.094)**	
Rule-law(<median)				**-1.589****		**0.0115**
				(0.629)		**(0.873)**
Domcredit_gdp	0.0263	0.0270	0.0364	0.0276	0.0371	0.0297
	(0.0258)	(0.0302)	(0.0244)	(0.0237)	(0.0243)	(0.0240)
Africa	1.063	0.810	1.253	0.781	1.217	0.853
	(0.752)	(0.805)	(0.829)	(0.901)	(0.796)	(0.881)
Constant	-1.224	-1.349	-1.648	-1.241	-1.553	-1.076
	(1.168)	(1.528)	(1.151)	(1.187)	(1.235)	(1.211)
Observations	58	58	58	58	58	58
R-squared	0.330	0.312	0.294	0.321	0.295	0.318

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.2 The Example of Ethiopia

This section presents empirical results from the World Bank Enterprise Survey of the urban Ethiopia.[20] It examines entrepreneurial performance (sales) based on the actual and perceived business environment as well as education. Based on the model, the average sales performance, defined as $sales = \rho\beta^F z_s n_s + (1-\rho)\beta^I z_u n_u$, and hence depends directly on the business environment and indirectly, through probability of finding a skilled worker, on education.

Below we present the kernel density estimates of the probability density function of (log of) annual sales for entrepreneurial firms (micro and small enterprises with less than 20 employees). They examine if the business environment impacts positively average annual sales. Figure 3a shows that almost the entire probability density function shifts to the right for MSEs operating under a government contract relative to those without such contract. Further, at higher sales ranges, registered firms outperformed unregistered ones (Figure 3b), indicating that being registered and having government contract – which could help avoid regulations -- may be beneficial for sales.

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[20] The 2011 World Bank Enterprise Survey of Ethiopia consists of 150 enterprises in the manufacturing and service sectors in Addis Ababa, of which 117 enterprises were micro (less than 5 employees) and small (5 – 19 employees) enterprises and 33 medium (20 – 99 employees) and large (100 or more employees) enterprises. For empirical purposes of this paper entrepreneurship is represented by micro and small firms, i.e. firms with less than 20 employees.

Figure 3. Obstacles to operations, MSE characteristics and estimates of sales in Addis Ababa
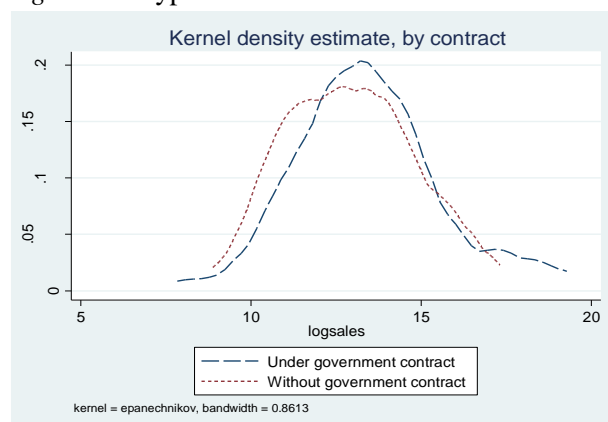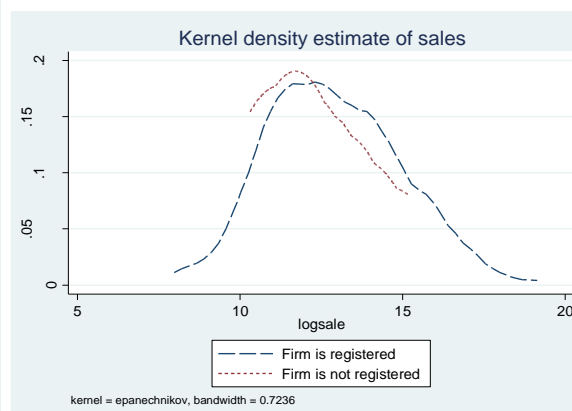
Figure 3a. Type of contract

Figure 3b. Registration

Source: Authors' calculations based on the World Bank Enterprise Survey of Ethiopia (Addis Ababa, 2011). Note: Only enterprises with less than 20 employees are included in the graphs.

We tested if the business environment remains significant for firm performance (e.g., sales) in a multivariate OLS regression. The baseline model links the log of sales to the actual and perceived business environment as well as to characteristics of the firm (e.g., number of its employees, education of its workers). As one of the robustness checks, we also looked at the role of corruption, telecommunications and the combination of the two.

The findings are that besides the size of the firm (number of employees), the sales performance of micro and small enterprises is positively related to the level of education of its workers, pointing again to the importance of education. Among the business environment factors, sales are negatively associated with the limited supply of credit and power outages.[21] Firms that perceived both corruption and the lack of telecommunication services as an obstacle to operations reported lower sales than firms that perceived either one or none of these factors as an obstacle (Table 7).

5. Conclusions

In this paper, we first presented a model of entrepreneurial start-ups where an equilibrium outcome could be a low-skill, low-productivity trap. We showed that an improved business environment and education would foster creation of high-productivity private firms, output and employment. We also pointed to complementarities between education and the business environment.

More specifically, due to frictions in matching, search cost, and weaknesses in the business climate (including property rights), the equilibrium conditions lead to suboptimal outcomes in terms of workers' and firms' efforts and the number of productive SMEs, skilled employment and output.

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[21] The sales performance is also positively correlated with the higher education of the owners (Table 8, Columns 1 and 3). However, since the sampling design was stratified, un-weighted estimates can be biased, while the unbiased estimates were not statistically significant. Specifically, the strata used in the sample encompass three dimensions: region, industry, and size http://www.enterprisesurveys.org/nada/index.php/catalog/323/sampling . Under stratified random sampling, un-weighted estimates are biased unless sample sizes are proportional to the size of each stratum. This sampling issue was accounted for by weighting individual observations by the inverse of the weights.

Table 8. Firms' performance and the business environment in Addis Ababa

Variables	(1)	(2)
Year of formal registration	**-0.0723****	**-0.0760****
	(0.0301)	**(0.0295)**
Number Of full-time employees	**0.202****	**0.174****
	(0.0855)	**(0.0842)**
Share by the largest owner(s)	0.00200	0.00118
	(0.00911)	(0.00893)
Experiencing power outages	**-1.013***	**-1.571****
	(0.554)	**(0.606)**
University education-largest owner	1.199**	1.272**
	(0.545)	(0.524)
Education as obstacle	0.487	0.978**
	(0.344)	(0.424)
Educated full time workers	**0.0170****	**0.0205*****
	(0.00681)	**(0.00669)**
Top manager is female (=1)	-0.0275	-0.722
	(0.718)	(0.744)
Outstanding personal loans	0.948	1.313**
	(0.600)	(0.598)
Supply of credit	**-0.0378***	**-0.0400****
	(0.0190)	**(0.0187)**
Government contracts	-0.427	-0.334
	(0.598)	(0.595)
Corruption as an obstacle		0.662
		(0.761)
Telecommunication as an obstacle		0.766
		(0.675)
Corruption* telecommunication		-2.632**
		(1.095)
Constant	155.8**	162.8***
	(60.98)	(59.77)
Observations	54	54
R-square	0.484	0.561
Weights	No	No
Normality test (adj. Chi 2)	0.28	0.36
Multicollinearity (Mean VIF)	1.27	1.86

Source: Authors' calculations based on the World Bank Enterprise Survey of Ethiopia (Addis Ababa, 2011). Note: Enterprises with less than 20 employees are included in the graphs. Note: VIF stands for variance inflation factor. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Because of weak business environment, entrepreneurs under-invest in searching for business opportunities relative to the effort they would exhort in a more conducive climate. In the model. the impact of the low number of private firms on employment is amplified by workers who are uncertain about finding skilled jobs and under-invest in training.

We tested the results of the model on the World Bank data for entrepreneurship, education and governance and the business environment. We found that education has a positive effect on new

firms' density, however, its marginal effect is decreasing as the level of education increases. In low income countries, education has a higher effect with better business environment, in particular better enforcement of the rule of law. Further, entrepreneurship is positively related to the financial sector development but negatively related to countries' low or lower-middle income level. The case of Ethiopia further underscores the role of education and some elements of the business environment, especially the infrastructure (electricity) and access to credit, for sales performance.

Many African countries would benefit from addressing the remaining obstacles to private sector activities, such as high costs of starting a business, weak property rights, burdensome profit tax rates, unstable tax regimes, and limited access to finance. In the case of high-tech SMEs, skill shortages among entrepreneurs and workers may need to be tackled to foster innovation and high value-added activities. Stronger institutions, including business service providers and those channeling information about business and funding opportunities would also encourage productive entrepreneurship. These and other constraints, especially in the financial sector, to productive entrepreneurship in African regions, countries, and sectors could be a topic for further research.

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Annex I. Table: Description of Variables

Variables	Definition	Source
New_density	New business density indicates new registrations per 1,000 people ages 15-64.	World Bank's Entrepreneurship Survey
Education	Education is an index computed using the Adult literacy rate (% age 15 and above), the Secondary enrolment and the Tertiary enrolment	World Bank data 2010, from Barro Lee and UNESCO (2006, 2007).
Regulatory	This index measures the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.	Governance Indicators, World Bank, 2013
Domcredit _gdp	Domestic credit to private sector by banks (% of GDP)	WDI (2014)
Rule-law	This indicator measures the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.	Governance Indicators, World Bank, 2013

Source: Authors.

Statistical tests

We first implement a *normality test* (Jarque-Bera) for the residuals of each specification in table xx. The conclusion of these tests is that we cannot reject the hypothesis that the residuals are normally distributed, at least at the 86% level (and 34% level resp.). The second test implemented is a *specification test*. Even if, the model has a relatively god predicting power, according to the R square, we would like to ensure that it is well specified. In practice, we regress the dependent variable *Logsale* on its predicted value and the square of this prediction value; and the model is mis-specified if the prediction squared is significant. We find that the prediction squared does not have explanatory power, so our specification is well specified.

We also check for the presence of multicollinearity issues utilizing the *Variance Inflation Factor* (VIF) test. The VIF shows us how much the variance of the coefficient estimate is being inflated by multicollinearity. As a rule of thumb, a variable whose VIF values are greater than 10 is highly correlated to the others. Since, the average VIF for all specifications is by far lower than 10, we can conclude that our specifications do not suffer from multicollinearity issue.

Stratification and sampling bias

According to World Bank (2011), since the sampling design was stratified and employed differential sampling individual observations should be properly weighted when making inferences about the population.[22] Under stratified random sampling, un-weighted estimates are biased unless sample sizes are proportional to the size of each stratum.[23]

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[22] The strata used in the sample encompass three dimensions: region of the establishment, industry screener sector, screener size.

[23] With stratification the probability of selection of each unit is, in general, not the same.

In Column 2 of table xx account for this sampling issue by weighting individual observations by the inverse of the weights to account for the fact that the different subjects have different chances (the probability) of being included in the sample.[24]

The results are still robust except for few variables. In the weighted regression, whether the largest owner has University-level education does not matter anymore, while the gender of the top manager is important determinant of firms' performances. Indeed, male top managers perform better than their female counterparts.

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[24] The cost of correcting for the potential sample bias is a reduction of the efficiency of estimated parameters.