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### **Modeling determinants of SMEs in Ethiopia: Would subsidies matter?**

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African Development Bank Group



Economic Commission for Africa



# **Modeling determinants of SMEs in Ethiopia: Would subsidies matter?**

By Zuzana Brixiova<sup>1</sup>

African Development Bank, Development Research Department, Tunis, Tunisia

## **Abstract**

When the current Ethiopian government came to power in 1991, it strived to create a climate that would support private sector development and entrepreneurship. Almost 20 years later, however, the role of the private sector in the economy remains limited, and is well below that of regional peers such as Uganda or Tanzania. While an abundant empirical literature on Ethiopian urban labor markets, SMEs and their constraints exists, this paper presents a simple theoretical model of firm start ups and skill shortages with imperfections in the labor markets and the business climate. The model captures several stylized facts that characterize the Ethiopian urban labor markets, and is used to analyze policies aimed at encouraging SMEs and the formal private sector, in particular subsidies to entrepreneurship and employment of skilled labor.

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## 1. Introduction

Sub-Saharan Africa (SSA) countries are well aware of the positive role that the private sector in general and small and medium-sized enterprises (SMEs) in particular can play in promoting productivity growth and development of their economies. Responding to competitive pressures, SMEs can innovate, adopt new technology and know-how, create jobs, broaden the tax base, and diversify risk. Benefits of SMEs go beyond their participation in the domestic economy and extend to the export sectors, through their launching of new products and facilitating access to foreign markets. The key role played by the private sector and SMEs as “engine of growth” has been confirmed by the experience of the transition economies of Central and Eastern Europe and the Baltics. In these economies, the successful transition recovery and convergence towards the income levels of the more advanced EU countries has hinged on the dynamic private sector, and especially new private firms, to drive the productivity growth and employment.

When the current Ethiopian government came to power in 1991, it strived to create an enabling climate that would support private sector development. So far, however, the hopes that the private sector and SMEs would contribute to a decisive part of the Ethiopian output and become drivers of sustainable growth and poverty alleviation have not materialized. In fact, accounting for less than 50 percent of total employment in the formal urban sector, the private sector in Ethiopia remains underdeveloped, even comparing to regional peers such as Tanzania or Uganda. In that context, the expectation that Ethiopia would undergo a transition from low productivity jobs to more productive ones also remains unmet.<sup>2</sup> The lack of “good”, i.e. productive and well-paid jobs in the private sector discourages workers to acquire skills, out of fear that such asset would be mostly unutilized. And many of those who do obtain higher education end up emigrating to advanced economies, thus contributing to the “brain drain” problem. The recent growth, driven mostly by the commodity boom, notwithstanding, the country seems to remain stuck in a vicious circle of low productivity, low-paid jobs and extreme poverty.

This paper develops a simple theoretical model of firm start-ups and skill shortages with imperfect information in the labor market and regulatory weaknesses in the business climate. The model extends the framework of Brixiova, Li, and Yousef (2009) to account for frictions arising from imperfect information in the skilled workers’ labor market.<sup>3</sup> The idea of the imperfect information and resulting negative externalities was pioneered by Snower (1996) in the context of labor markets in developed economies. However, this concept is even more suitable for low-income countries such as Ethiopia where the labor market for skilled workers is very thin, and may explain why the private sector remains underdeveloped. In such economies the large informal sector blurs information about the availability of skilled workers and highly-productive/highly-paid jobs in the formal private sector, which leads to underinvestment in training and discourages entrepreneurs’ effort to search for business opportunities.<sup>4</sup>

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<sup>2</sup> Bajona and Locay (2009) develop a model of entrepreneurship under central planning that accounts for the long-run underperformance of planned economies relative to market-oriented ones.

<sup>3</sup> The key difference from Brixiova et al. (2009) is the relaxation of the assumption of perfectly competitive labor markets. Unlike both of the above papers, which deal only with formal sector employment, this paper also examines the movement of firms into the informal sector.

<sup>4</sup> According to the World Bank (2006), 21 percent of vacancies between 1997/98 and 2001/02 remained unfilled, due to a lack of qualified workers or their unwillingness to relocate from urban to rural areas.

Unlike Snower (2006) who focuses on vacancies in existing firms, this framework models explicitly start-ups of highly-productive private firms, a key constraint to growth and job creation in low income countries in general, and in Ethiopia in particular. To reflect the importance of the informal sector in Ethiopia, in the later part of the paper the model is extended to include firms' option to operate underground. In contrast to Gelb et al. (2009), the framework in this paper includes explicitly differences in business climates and how they interact with other factors (tax rates, tax monitoring) to influence trade-offs between formality and informality. The model matches several stylized facts that characterize Ethiopian labor markets, and is used to discuss policies aimed at encouraging SME development, with a focus on subsidies to entrepreneurship.

The paper is organized as follows. Section 2 provides the stylized facts on the private sector and urban labor markets in Ethiopia. It also discusses the institutional framework for the private sector and the role of the informal sector in the economy. Section 3 presents the model and its implications for the number of firms operating in the formal private sector as well as formal and informal employment. It also compares outcomes in the decentralized equilibrium with an optimal solution of the social planner and shows that the decentralized equilibrium is suboptimal in this case. Section 4 examines the factors that may drive private firms into the informal sector, including business environment, tax rates, and intensity of tax monitoring. This section also examines the impact of subsidies to entrepreneurs' search with those for hiring skilled workers on entrepreneurs' search effort and their decision to work in the formal sector. Section 5 concludes.

## **2. Stylized facts about urban labor markets and private sector employment<sup>5</sup>**

### ***2.1 Limited private sector job creation***

The role of the private sector in the Ethiopian economy has evolved through several stages. In the 1950s, 1960s, and early 1970s, the Imperial government pursued market-based policies. At that time, foreign investors were also allowed to operate private companies in Ethiopia and their activities were guided by the same rules as those for Ethiopian nationals, except in strategic sectors. When the Derg regime came to power in 1974, its economic policy was guided by principles of central planning rather than market ones. Accordingly, private property was suppressed with nationalization of land, houses, manufacturing firms, and financial institutions.

Since the current government took over in 1991, it strived to reverse this trend and reduce bureaucratic procedures while encourage private sector development. Towards these goals, the government established the Ethiopian Investment Authority (EIA) immediately in 1992 and the Ethiopian Privatization Agency in 1994 (Enyew, 2008). Almost twenty years later, however, Ethiopia's transition goals –consisting partly of a gradual reallocation of labor from low- to high-productivity sectors and jobs remain to a large extent unmet. The gradual but progressing reallocation of employment and production from the state sector to the private sector during the first decade led to decline of the share of the state sector in industrial output from almost 80 percent in the mid-1990s to above 50 percent in early 2000s. However, almost no change occurred between the early and mid-2000s, with the state sector still accounting for more than 50 percent of the industrial output in 2004/05.

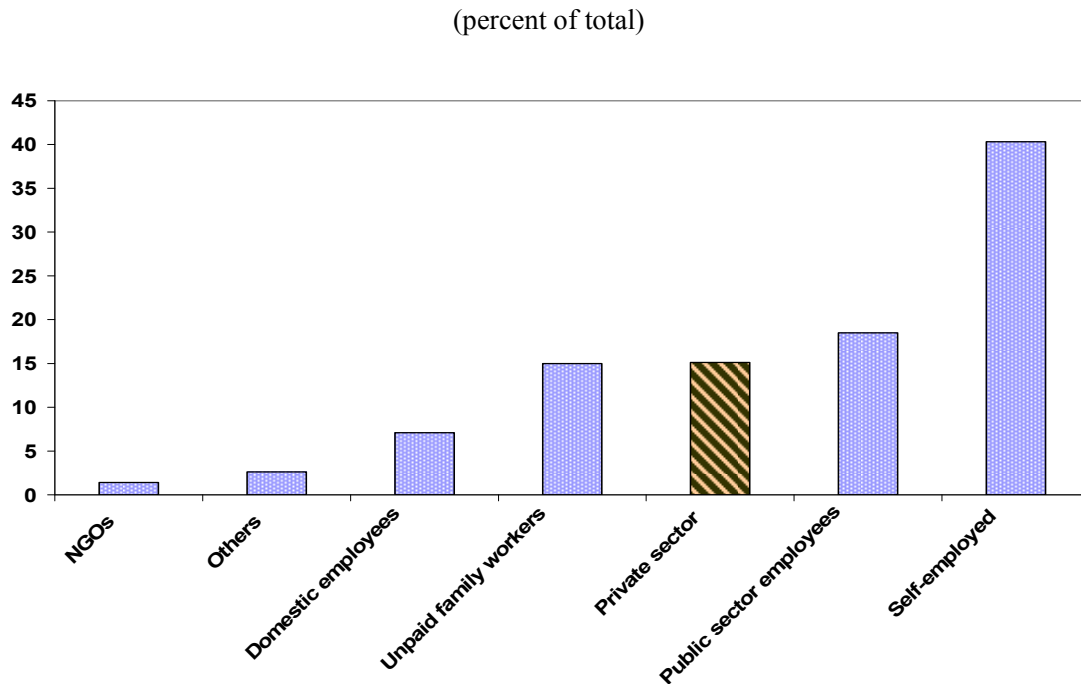
While success stories exist in some specific sectors (flower exports), overall the private sector remains underdeveloped and is concentrated in Addis Ababa. More than 71 percent of workers

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<sup>5</sup> This section is based mostly on World Bank (2007) and the Estonian Labor Force Survey (2005). The paper focuses on urban labor markets, but that does not imply that entrepreneurship in rural areas would be less important. In fact, Kimhi (2009) shows empirically that encouraging rural entrepreneurship could be encourage both income growth and income distribution

from urban areas worked in the informal sector in 2007. Of the remainder, that is wage employees in the formal sector, only about 50 percent of women and 60 percent of men worked in the private sector (i.e. about 15 percent of total), with about half of the women being engaged in household work (Figure 1).

**Figure 1.** Ethiopia: Distribution of employed population in urban areas, 2005



**Source:** Labor Force Survey, 2005.

#### *High self-employment and persistent urban unemployment*

Urban labor markets in Ethiopia consist – as is typical in low income countries – of three distinct segments: (i) privileged public sector jobs which in most fields pay wages above the private sector; (ii) the formal private sector; and (iii) the large informal economy, mainly small scale and more ‘survival’ than entrepreneurial. Most of these segments are stagnant pools – individual transitions across them are limited. Manufacturing sector employment remains among the lowest in the world (World Bank, 2007). Urban labor markets suffered from persistently high unemployment (about 13 percent of labor force in 2007) with long duration spells.

The limited private sector job creation is also suggested by low transition rates from unemployment to the formal private sector: The World Bank’s survey shows that less than half of the urban workers unemployed in 1994 found jobs within the next decade (Table 1). Of those who found jobs, 70 percent worked in the informal sector, 12 percent in the public sector and only 7 percent in the formal private sector. Urban labor markets in Ethiopia are also characterized by substantial wage differentials between the formal and informal sector.

### Large informal sector

The informal sector in Ethiopia plays the role of employer of the last resort, that is workers take up jobs in the informal sector only if they run out of alternative employment possibilities. The views that the informal sector may serve as stepping stone to formal sector employment do not seem to hold in Ethiopia: in cases when workers leave the informal sector, they transit to unemployment, and only very few to formal sector jobs. Equally concerning are the low productivity and low wages, especially for low-skilled workers, that characterize the Ethiopian informal sector.

**Table 1.** Exit rates from unemployment  
(% of the original unemployment)

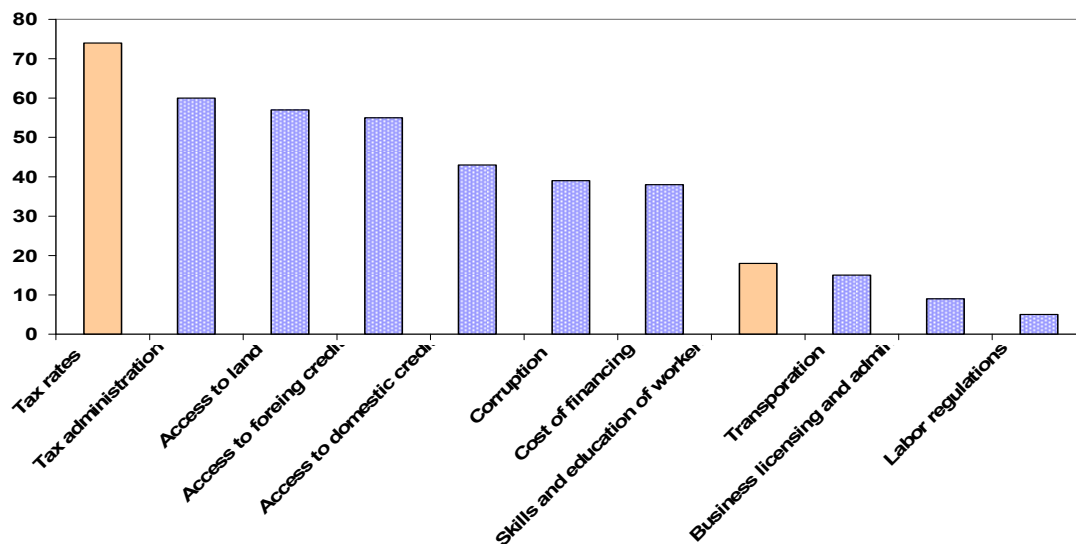
	1997-2000	2000-04	2004-07
Formal sector	2	18	24
Public	1	8	11
Private	1	10	13
Informal sector	4	19	17

Source: World Bank (2007), Table 7.

### Obstacles to SME development

According to the World Bank Investment Climate Assessment (2004), high tax rates were the most common complaint among entrepreneurs. While this is a typical concern of entrepreneurs everywhere, the rate in Ethiopia was above those of regional peers, such as Uganda or Tanzania. While lack of skilled workers is not the most pressing concern of entrepreneurs, it affected 20 percent of entrepreneurs. The section below examines the impact of these constraints on private formal creation and employment in the formal sector.

**Figure 2.** Most cited constraints to SMEs (% of respondents), 2005



Source: World Bank (2007).

Even though the skill profile of the urban labor force has been rising, the persistent *skill shortages* in Ethiopia have been demonstrated through relatively high returns to education. When illiterate workers are taken as the reference group, education raises earnings by 26 percent for those with grade 1-4 and to 130 percent for the highest skilled.

According to the 2003 survey of medium- and small-sized enterprises, *high tax rates* were mentioned as the biggest regulatory obstacle to expansion, while inefficient and unpredictable *tax administration* was another frequent complaint. To ease the taxation burden and increase predictability, all Ethiopian businesses with annual turnover of less than US\$50,000 were recently included in the SMEs group (up from US\$11,000), which seems to improve the tax system for SMEs. These businesses fall under a “presumptive tax”, where they are not required to keep accounting records and their income is estimated (presumed) by the tax authority. Their profit tax rates have ranged from 10 percent to 70 percent, depending on the nature of their business vs. 35 corporate tax rate for other businesses. For micro-enterprises, there is a tax free threshold on businesses and minimum profit tax for unincorporated businesses, but they still need to pay VAT and turnover taxes.<sup>6</sup>

According to the 2009 African Competitiveness Report (World Economic forum, World Bank and African Development Bank, 2009), it was the inefficient government bureaucracy that has constituted a major obstacle to entrepreneurship, with tax system and skill shortages being perceived as less constraining.

The model developed below reflects the following three constraints: (i) imperfections in the business climate (referred to above as government bureaucracy); (ii) high tax rates; and (iii) shortages of skilled workers. The model is consistent with several stylized facts on the Ethiopian economy, namely limited private sector employment, existence of self-employment and the informal sector employment, and the wage gap between the formal and informal sectors. The model is applied to examine the impact of several measures, including subsidies to searching entrepreneurs and to operating firms that hire skilled workers, on firm creation and their decision whether to work in the formal sector or not.

### **3. The model**

#### *3.1 The environment*

The population size is normalized to one. There are two types of agents, entrepreneurs and workers, with population shares  $\mu$  and  $1 - \mu$ , respectively.<sup>7</sup> Agents live for one period, are endowed with one unit of time, and have risk neutral preferences,  $E(c)$ , where  $c$  is consumption of a single good, and  $E$  denotes the expectations agents form at the beginning of the period about income they will receive either from working or running a firm. In addition to their income from productive activities, all agents are endowed with  $\bar{w}$  amount of consumption good.

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<sup>6</sup> Another frequently mentioned constraint to SMEs is their lack of access to credit. Brixiova and Kiyotaki (1997) examine impact of this constraint in the context of transition economies.

<sup>7</sup> Thus supply of entrepreneurs is not endogenous. As numerous research found, entrepreneurs tend to be individuals with specific schooling and family background. For example, examining data of Brazilian entrepreneurs, Djankov and others (2007) found that family characteristics had the strongest influence on becoming an entrepreneur. Similar assumption about entrepreneurs in Africa is used in Gelb et al. (2008).



At the beginning of the period, entrepreneurs search for opportunities to open private firms. This effort,  $x$ , costs them  $d(x) = x^2 / 2\gamma$ ,  $\gamma > 0$ , units of consumption good, and results in the probability  $x$  of finding a highly-productive business opportunity. In order to run a firm, the entrepreneur needs to find  $\bar{n}_s$  number of skilled workers. Specifically, denoting  $V_s$  to be the number of skilled vacancies,  $N_s$  number of skilled workers searching for jobs, and  $h$  number of skilled-job matches, the “matching” function can be described as  $h = \min[N_s, V_s]$ . Entrepreneurs with high-productivity business opportunity thus find skilled workers with probability  $\rho = \min[\frac{N_s}{V_s}, 1]$ . The output is then produced according to  $y_s = Ez_s \bar{n}_s$ . If

entrepreneurs find both a business opportunity and skilled workers, they open a highly productive firm. The output of such a firm is influenced by the quality of the business climate, which enters as an efficiency component of the production function:  $0 \leq E \leq 1$ .<sup>8</sup> Each worker receives wage  $w_s$  and entrepreneurs earn profit  $\pi_s = (Ez_s \bar{n}_s - w_s \bar{n}_s)$ , where  $w_s$  is determined through wage bargaining (below).<sup>9</sup> If entrepreneurs do not find a business opportunity and/or skilled labor, they will run a low-productivity firm with unskilled workers,  $n_u$ . Their profit then amounts to  $\pi_u = z_u \bar{n}_u - w_u \bar{n}_u$ , where  $w_u$  is the wage in the low-productivity firm. The output is produced by one of the two technologies, which differ in the labor input required per unit of output, where  $z_s > z_u > 0$  are productivity levels in high-productivity and low-productivity firms, respectively.

Workers acquire skills demanded in the private sector, and incur cost  $k(q) = q^2 / 2\theta$ , where  $\theta > 0$ . The learning effort results in probability  $q$  of obtaining skills.<sup>10</sup> Skilled workers find employment in a high-productivity firm with probability  $\xi = \min[\frac{V_s}{N_s}, 1]$ . Workers who either do

not obtain skills or do not become hired by high-productivity firm can become self-employed in the informal sector or work for low-productivity private firm. In each case their pay-off would be  $b = w_u < w_s$ , where  $b$  is the income from being self-employed. Put differently, the market for unskilled workers is perfectly competitive, while the skilled worker’s wage is determined through decentralized Nash bargaining between the highly-productive private firm and each of the skilled workers it employs. If bargaining does not lead to an agreement, the worker would exercise its fall-back option, which is the income when self-employed in the informal sector  $b$  or low-productivity firm,  $w_u$ . Since the outcome depends on the relative strength of the skilled worker vs. the firm,  $\alpha, 0 < \alpha < 1$ , the resulting wage is  $w_s = \alpha Ez_s + (1 - \alpha)w_u$ .

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<sup>8</sup> More generally,  $E$  reflects quality of institutions as they may affect productivity of the private firms. Amoros (2009) shows empirically that differences in institutional quality help explain differences in entrepreneurship across developed and developing countries. Brixiova and Egert (2009) developed a model where an enabling business environment stimulated start-ups of high-productivity firms during transition.

<sup>9</sup> In Parente and Prescott (2000), this component reflects country-specific policies and institutions.

<sup>10</sup> We restrict  $x$  (and  $q$ ) to be between 0 and 1. This assumes that despite their efforts, workers (entrepreneurs) occasionally fail to acquire skills (find highly-productive business opportunities).

The characterization of the environment is completed by market *clearing conditions*. Let  $n_s = m_s \bar{n}_s$  be the total skilled labor employed in the high-productivity private sector,  $n_u = m_u \bar{n}_u$  total labor employed in the low-productivity private sector, and  $n_i$  self-employed. Then the market clearing condition for workers is  $1 - \mu = n_s + n_u + n_i$ . The market clearing condition for the entrepreneurs can thus be written as  $\mu = m_s + m_u$ , where  $m_s$  denotes entrepreneurs who run firms with skilled workers (highly-productive firms), while  $m_u$  denotes those who run firms with unskilled workers (low-productive firms).

### 3.2 Entrepreneurs' and workers' problems and the equilibrium

The entrepreneurs' decision to search for a business opportunity and open a firm is:

$$\begin{aligned} & \max_{c,x} E(c) \\ \text{s.t. } & c + \frac{x^2}{2\gamma} \leq \bar{w} + x\rho\pi_s + x(1-\rho)\pi_u \end{aligned} \quad (1)$$

The worker's decision to obtain training can be described by:<sup>11</sup>

$$\begin{aligned} & \max_{c,x} E(c) \\ \text{s.t. } & c + \frac{q^2}{2\theta} \leq \bar{w} + q\xi w_s + q(1-\xi)w_u + (1-q)w_u \end{aligned} \quad (2)$$

The *equilibrium* is defined as a wage rate for skilled workers and an allocation of workers and entrepreneurs such that (i) entrepreneurs and workers maximize their utilities; and (ii) labor and product markets clear.<sup>12</sup>

### 3.3 Model solution, comparative statics and policy discussion

At the beginning of the period, firms and workers decide how much effort to put into search for business opportunities and training, respectively. Solving the utility maximization problems of workers and entrepreneurs and substituting from the labor market clearing condition yields:

$$\frac{x}{\gamma} = \rho(\pi_s - \pi_u) = \min \left[ \frac{(1-\mu)q}{\mu x \bar{n}_s}, 1 \right] (\pi_s - \pi_u) \quad (3)$$

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<sup>11</sup> Where  $w_s = \alpha E^F z_s + (1-\alpha)w_u$  is the skilled worker wage when working for a firm in the formal sector and  $w_s = \alpha E^I z_s + (1-\alpha)w_u$  when working for a firm in the informal sector.

<sup>12</sup> Depending on the parameters, the model either has (i) a unique trivial equilibrium where workers and entrepreneurs exert zero effort, or (ii) a trivial equilibrium and a unique one with positive effort by workers and entrepreneurs. We focus on the unique equilibrium with positive workers' and entrepreneurs' efforts.

$$\frac{q}{\theta} = \xi(w_s - w_u) - b = \min \left[ \frac{\mu x \bar{n}_s}{(1 - \mu)q}; 1 \right] (w_s - w_u) - b \quad (4)$$

Equation (3) states that in equilibrium, the marginal cost of entrepreneur's search for business opportunity,  $x/\gamma$ , equals to the expected net profit from search. Equation (4) states that, the workers' marginal cost of acquiring skills equals the net marginal benefit from working (premium of the expected difference between skilled wage and wage in the low productivity firm over the income in the informal sector,  $b$ ).

Eq. (3) shows that with higher search efficiency  $\gamma$  (i.e. lower search cost), entrepreneurs will put more effort into looking for business opportunities. In the same vein, an improved business climate increases firms' productivity and profitability, i.e. payoff for search, and induces the entrepreneurs to increase their effort. This search will result in higher number of skilled vacancies for skilled workers, which raises their incentive to acquire skills. Hence in equilibrium both entrepreneurs' and workers' efforts increase with higher  $\gamma$  and  $E$  (Figure 3). Improved business environment thus leads to higher number of highly productive private firms and well-paid jobs.<sup>13</sup>

Similarly, when the learning cost decreases, workers will put more effort into acquiring skills, which raises the probability of firms to fill their openings and their expected net profits. Training support thus turns into incentives for entrepreneurs to search.

### 3.4 Optimal allocation and the market failure

The efficient allocation would solve the following social planner's problem:

$$\begin{aligned} \max & \left[ m_s E z_s \bar{n}_s - \frac{x^2}{2\gamma} - \frac{q^2}{2\theta} \right] & (5) \\ \text{s.t.} & (1 - \mu)q = \mu x \bar{n}_s \\ & m_s = x\mu, n_s = q(1 - \mu), 0 \leq q, x \leq 1 \end{aligned}$$

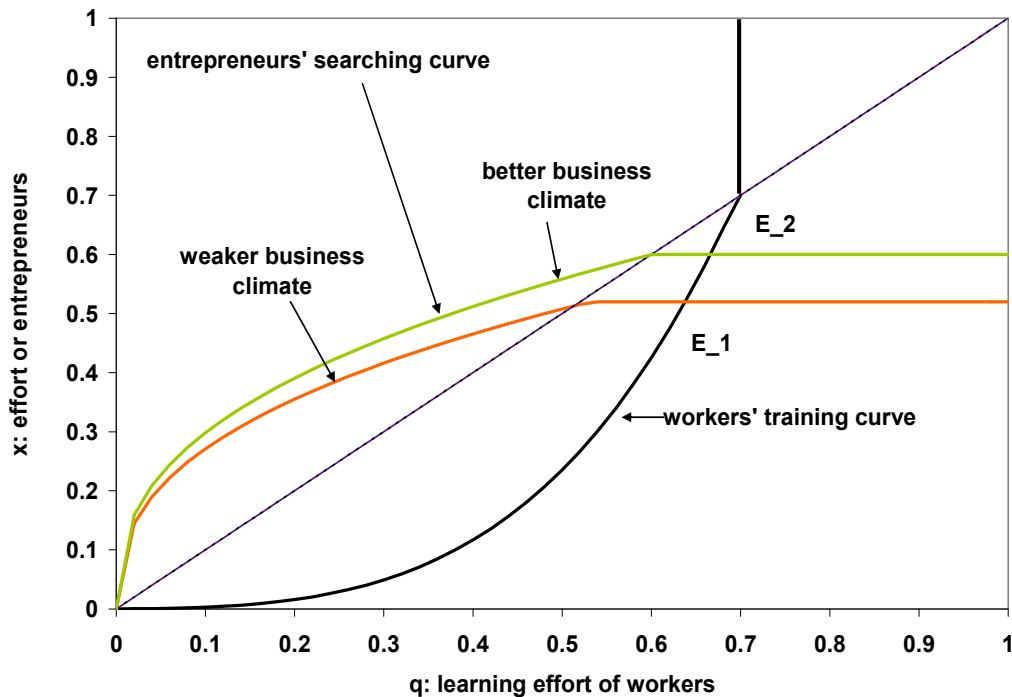
In the optimal allocation, no effort is wasted and both skilled workers searching for jobs and entrepreneurs searching for skilled workers find their matches.<sup>14</sup> In the decentralized equilibrium, however, the unskilled workers or searching entrepreneurs do not take into account the positive impact of their decisions on the aggregate outcomes, and hence their efforts are suboptimal. Specifically, solving for the optimal allocation and comparing with (3) and (4) shows that the conditions of the efficient allocation would be identical to those of the decentralized equilibrium, provided that (i) workers' income in the informal sector and firms' profit from running low-

<sup>13</sup> The positive impact of higher search effort entrepreneurs on workers applies only if the search curve intersects the training curve in the concave part of the latter Figure 2. Same applies to impact of workers' training effort on entrepreneurs' search effort. For simplicity, Figure 2 assumes that  $\mu \bar{n}_s = 1 - \mu$ .

<sup>14</sup> In a perfectly competitive market, workers would find employment with certainty once they would succeed in acquiring skills, and the firm would compensate them fully for the firm-specific skills.

productivity firm would be zero, and (ii) number of skilled vacancies would equal exactly to number of skilled workers searching for jobs, to avoid wasted efforts. If such subsidies would be financed either by lump-sum or consumption taxation, they need to amount to  $\pi_u$  for each entrepreneur and  $b = w_u$  for each worker to offset their disincentives to search (Figure 4).

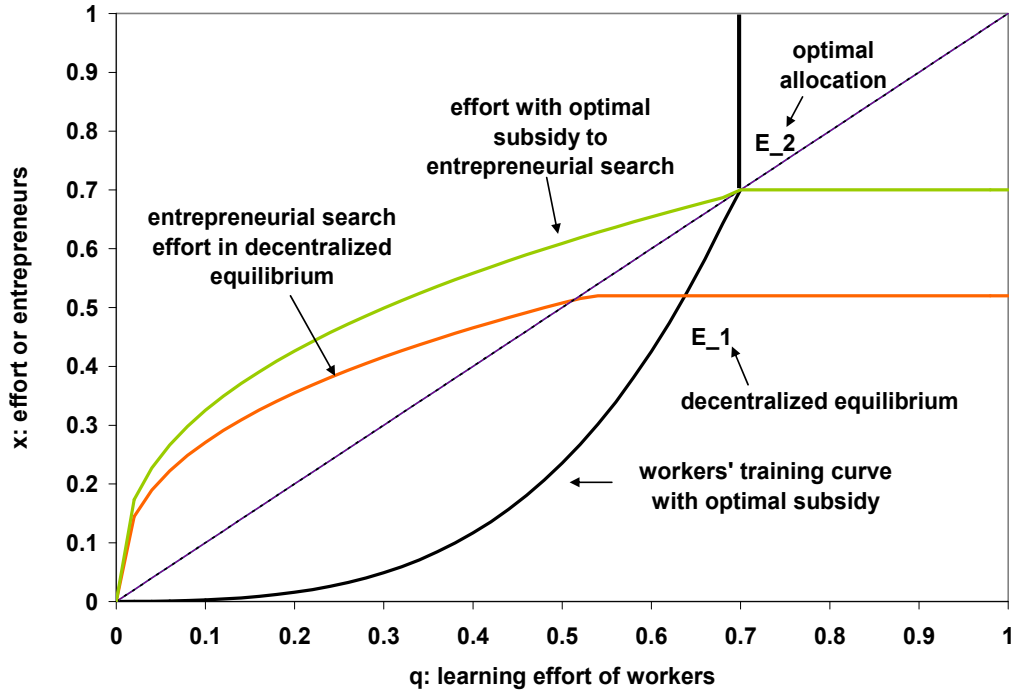
**Figure 3.** Entrepreneurs' and workers' efforts and the decentralized equilibrium



#### 4. What drives firm into the informal sector?

This section extends the basic model by adding profit taxes and allowing firms to operate in the informal sector to avoid taxation. Such an extension is especially useful when discussing externalities in the context of low income countries such as Ethiopia. Since the informal sector plays a key role in these economies, it is necessary to understand: (i) the factors that influence firms' decision to go underground, (ii) how the decision of firms to operate in the informal sector affects incentives of other potential entrepreneurs and unskilled workers. In addition, the sections below examine whether government subsidies for wages or entrepreneurs' search cost would be more effective for encouraging skill acquisition by workers.

**Figure 4.** Decentralized equilibrium and optimal allocation (with subsidies)



With profit taxes and firms' option to go underground added to the model, entrepreneurs' profit from running a highly-productive firm changes to  $\pi_s = \max[\pi_s^F, \pi_s^I]$ , where  $\pi_s^F$  is the after-tax profit in the formal sector and  $\pi_s^I$  profit in the informal sector. Entrepreneur will operate in the formal sector with probability  $p_s$ . If entrepreneurs do not find a highly productive business opportunity and/or skilled labor, they operate a low-productivity firm with unskilled workers,  $n_u$ , and will always go to the informal sector.<sup>15</sup> The output of a highly productive firm depends on the business climate, which enters the production function as efficiency component  $E^h$ ,  $h = F, I$  where  $F$  means formal and  $I$  informal. Hence the output of a highly productive firm is produced according to  $y_s^h = E^h z_s \bar{n}_s$ , and the component is higher in the formal sector, i.e.  $E^F > E^I$ .<sup>16</sup> The resulting wage, depending on the sector, is now  $w_s^h = \alpha E^h z_s + (1 - \alpha)w_u$ ,  $h = F, I$ . Since the *de facto* productivity of highly productive firms decreases when they go underground, wages of skilled workers fall when in the informal sector.

In this setting, the government monitor (high productivity) firms' tax payment and imposes tax rate  $\tau$  on firms profit. The government also spends expenditures on monitoring tax payment of

<sup>15</sup> In what follows, we assume that low productivity firms always operate underground and earn profit  $\pi_u^I$ , to focus on a more complex and interesting decision faced by highly productive firms.

<sup>16</sup> The efficiency component of low-productivity firm is normalized to 1.

high productive private firms (K), which results in probability  $\phi > 0$  of detecting tax evading firms. Assuming that the government confiscates the entire profit in case of tax evasion, it receives net tax revenues:  $p_s \tau (E^F z_s \bar{n}_s - w_s^F \bar{n}_s) m_s^F + (1 - p_s) \phi (E^I z_s \bar{n}_s - w_s^I \bar{n}_s) m_s^I - K$ .

With firms' possibility to go underground, the entrepreneur's budget constraint changes to  $c + \frac{x^2}{2\gamma} \leq \bar{w} + x\rho\pi_s + x(1 - \rho)\pi_u$ . The profit from operating a highly-productive firm now becomes  $\pi_s = p_s(1 - \tau)\pi_s^F + (1 - p_s)(1 - \phi)\pi_s^I$ , where  $p_s$  is the probability that the firm is in the formal sector and  $\phi$  is the probability that if a firm is in the informal sector, it is monitored. The entrepreneur takes profit tax rate and the probability of being monitored as given. The firm will choose to be in the informal sector if (and only if) the after-tax profit in the formal sector is less than the expected profit in the informal sector, that is:<sup>17</sup>

$$p = 0 \Leftrightarrow (1 - \tau)\pi_s^F < (1 - \phi)\pi_s^I. \quad (6)$$

The key variable in the model is now the firm's decision to operate in the formal sector, characterized by probability  $p_s$ . Table below summarizes the relevant comparative statics and shows how different factors that influence this probability. Lower tax rates may clearly induce firms to operate in the formal sector since the return on doing so rises. Less clear may be that while improving monitoring could also help, the impact depends on costs of these improvements, especially relative to those for strengthening the business environment. A positive impact of improvements in the business climate is that they would also increase tax revenues, which in Ethiopia are among the lowest in Africa (in terms of share in GDP).

**Table 2.** Comparative statics

Effect of increase in	On probability to work in the formal sector
Tax rate $\tau$	-
Monitoring $\phi$	+
Better business climate $E^F$	+
Improved functioning in the informal sector $E^I$	-
Workers' income in the informal sector $b$	ambiguous
Workers' bargaining power $\alpha$	Ambiguous

#### 4.1 Policy application – subsidies of entrepreneurs' search vs. skilled-workers subsidies

This section focuses on stimulating entrepreneurs' search effort to create firms and jobs, since that it the key constraint for private sector development in the Ethiopian economy. Moreover, in response to low firm and job creation, active support to entrepreneurs has become more common in developing economies. This section analyzes the impact of partial government financing of entrepreneurs' search for business opportunities, where the subsidy of entrepreneurs' search is

<sup>17</sup> This is the well-known "Sandmo" condition (Sandmo, 2005).

positively linked to their effort. This policy is then compared with wage subsidies to skilled workers. In both cases, the subsidy is financed by the same amount of lump-sum tax  $\bar{T}$ .

In case of subsidy to searching entrepreneurs,  $sx$ , the entrepreneur's budget constraint changes to:

$$c + \frac{x^2}{2\gamma} - sx \leq \bar{w} + x\rho\pi_s + x(1-\rho)\pi_u.$$

Profits of an entrepreneur running a high productive businesses (and employing skilled labor) amount again to

$$\pi_s = p_s(1-\tau)\pi_s^F + (1-p_j)(1-\phi)\pi_s^I, \text{ where } \pi_s^F = (1-\tau)(E^F z_s \bar{n}_s - w_s^F \bar{n}_s) \text{ is after-tax profit of a firm in the formal sector and } \pi_s^I = (E^I z_s \bar{n}_s - w_s^I \bar{n}_s).$$

Wage subsidy per worker amounts to  $\omega$ , and entrepreneur's budget constraint changes to

$$c + \frac{x^2}{2\gamma} - sx \leq \bar{w} + x\rho\pi_s(\omega) + x(1-\rho)\pi_u; \text{ where } \pi_s^F(\omega) = (1-\tau)[E^F z_s \bar{n}_s - (w_s^F - \omega)\bar{n}_s]$$

is profit of an entrepreneur who works in the formal sector and receives wage subsidy for hiring skilled workers while  $\pi_s^I = E^I z_s \bar{n}_s - w_s^I \bar{n}_s$  is profit of an entrepreneur working in the informal sector. The worker's take-home wage,  $w_s = pw_s^F + (1-p)w_s^I$ , is unaffected by the subsidies. With subsidies to entrepreneurs' search, (3) changes to:

$$\frac{x}{\gamma} = \rho(\pi_s - \pi_u) = \min \left[ \frac{(1-\mu)q}{\mu x \bar{n}_s}; 1 \right] (\pi_s - \pi_u) + s \quad (7)$$

Similarly, when entrepreneurs receive subsidies for hiring skilled workers, (3) changes to

$$\frac{x}{\gamma} = \rho[\pi_s(\omega) - \pi_u] = \min \left[ \frac{(1-\mu)q}{\mu x \bar{n}_s}; 1 \right] [\pi_s(\omega) - \pi_u(\omega)] \quad (8)$$

In both cases, the workers' learning curve, summarizing their decision to obtain training, remains as described in (4).

It is straightforward to see from (7) and (8) that when  $\rho = 1$ , that if there is a shortage of entrepreneurs, and  $s = \omega \bar{n}_s$  that is when search subsidy equals the wage subsidy, then the solutions are identical under both types of subsidies, as long as firms operate in the formal sector.<sup>18</sup> In other words, when firms decide to work in the formal sector, they exert the same effort under both wage and search subsidies. This conditionality on the sector in which the firm operates constitutes the key difference in how subsidies impact the entrepreneurs' efforts. *Search subsidies*, which are paid before entrepreneurs find their business opportunities, impact only their decision how much to spend on their efforts, but not whether to operate in the formal sector or not. With *wage subsidies*, forward-looking entrepreneurs increase their effort only when they intend to work in the formal sector upon finding a business opportunity.

The *wage subsidies* thus affect both entrepreneurs' decision how much to search and in what sector – formal or informal – to operate. When wage subsidies are so low that firms prefer to operate in the informal sector regardless, they have no impact on entrepreneurs search effort, firm

<sup>18</sup> This holds as long as the wage subsidy is exempted from profit taxation.

creation and employment. In cases where the wage subsidies move firms from operating in the informal into the formal sector, however, they effect positively both formal sector employment and tax revenues collected by the government. In contrast, *search subsidies* always influence entrepreneurs' efforts and hence the total number of highly-productive private firms and skilled employment in the economy, but have no impact on the size of the formal sector and hence government revenues.

The government's decision about which type of subsidy to use to stimulate private sector development does depend on the main constraints that entrepreneurs face as well as government objectives. In economies where entrepreneurship and private sector are in their infancy and productivity low, the key objective should be to stimulate firm creation through assisting entrepreneurs in starting up their firms, and in those cases a search subsidy is more suitable. In countries with some private sector already in place, but a sizeable informal sector, wage (or other type of) subsidies to existing firms would be more appropriate as long as they are sufficiently large to entice firms to move to the formal sector. It goes without saying that providing wage subsidies is inferior to improvements in the business environment. This is because in addition to encouraging entrepreneurs to search and operate in the formal sector, business climate improvements also raise firms' productivity and wage rates for skilled workers. Wage subsidies should therefore be used only when immediate improvements to the business climate would be particularly costly. At the same time, in economies with an underdeveloped private sector, wage subsidies are preferable to expenditures on tax monitoring, which do not change the profitability of running firm in the private sector and hence do not influence entrepreneurs' search.

## 5. Conclusions

This paper develops a model of firm creation and skill shortages in an environment with rigidities in the labor markets and the business climate that characterizes low-income countries such as Ethiopia. The model is consistent with several stylized facts about the Ethiopian urban labor markets, such as the existence of self-employment, informal sector employment, limited formal private sector and large wage gap between formal and informal sectors. The model is then applied to examine the impact of subsidies to searching entrepreneurs and to operating firms that hire skilled workers on firm creation and their decision to work in the formal sector or not.

The model shows that in countries such as Ethiopia, where the private sector is underdeveloped and the business environment constitutes one of the key constraints, reforms in this area should take priority over tax administration. This is because some minimal (threshold) share of the private sector and diversification of the economy is needed for sustainable growth and even lower taxes will not entice firms to operate in the formal sector, unless there are other sufficient payoffs for them to do so.

Taking a broader view, the importance of development of the private sector and in particular of SMEs has been underscored by the latest global financial and economic crisis, which has triggered rethinking on the part of policymakers of their growth strategies. Before the crisis many SSA small open economies, including Ethiopia, relied almost exclusively on FDI and exports as the main drivers of growth. However, in light of the crisis, countries are trying to rebalance their growth and shift some of their resources towards domestic private enterprises and demand. To succeed, enhanced efficiency of the financial sector would help channel savings to their most productive use. In addition, the domestic resources would need to be supplemented by external financing to ease credit constraints and shortages of foreign exchange.



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