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Does Social Pressure Hinder Entrepreneurship in Africa? The Forced Mutual Help Hypothesis*

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Abstract

In the absence of a public safety net, wealthy Africans have the social obligation to share their resources with their needy relatives in the form of cash transfers and inefficient family hiring. We develop a model of entrepreneurial choice that accounts for this social redistributive constraint. We derive predictions regarding employment choices, productivity, and profitability of firms ran by entrepreneurs of African versus non-African origin. Everything else equal, local firms are over-staffed and less productive than firms owned by nonlocals, which discourages local entrepreneurship. Using data from the manufacturing sector, we illustrate the theory by structurally estimating the proportion of missing African entrepreneurs. Our estimates, which are suggestive due to the data limitation, vary between 8% and 12.6% of the formal sector workforce. Implications for the role of social protection are discussed.

JEL Codes: H53, H55, L26, C51, O14, O17, O55

Keywords: Entrepreneurship; Family Solidarity; Formal Sector; Africa.

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1 Introduction

On average, Sub-Saharan African countries allocate only 4.8% of their gross domestic product to social security (ILO 2010). This is the lowest level of investment in social protection in any region of the world.[1] In the absence of a public safety net, Africans have developed a culture of "forced mutual help" where wealthy Africans have the social obligation to share their resources with their needy relatives and extended family (Firth 1951). Since becoming an entrepreneur marks economic success, it inevitably involves in the African context substantial family taxation. This paper studies how this social redistributive constraint influences entrepreneurship in the formal sector. The impact of the phenomenon is identified by distinguishing between "local" and "nonlocal" entrepreneurs (i.e. entrepreneurs of foreign origin). The theoretical analysis shows that the forced mutual help constraint distorts productivity as it leads to an overstaffing of local firms, which as a result are less efficient than firms owned by nonlocals. Disadvantaged by the family taxation and the misallocation of labor, local people become less often entrepreneurs, everything else equal. Empirical assessment of our theoretical model predictions using the World Bank Enterprise Surveys data for Sub-Saharan Africa suggests that the fraction of missing local entrepreneurs is substantial. Our preliminary suggestive evidence put it between 8% and 12.6% of the formal sector workforce. These figures have to be taken with caution as crucial information is missing in the database used to structurally estimate them. Our empirical exercise is therefore only useful to get a sense of the magnitude of the problem. That being said, this is sufficiently appealing to warrant more empirical work in the future.

The study of barriers to entrepreneurship is not new to the literature. Since the seminal paper by Evans and Jovanovic (1989) that has shown the importance of borrowing constraints in entrepreneurial choice using US data, many papers have emphasized the tightness of credit constraints as a major obstacle to entrepreneurship and development (e.g., Banerjee and Newman 1993, Ghatak and Jiang 2002). In developing countries imperfect capital markets have hence been found to be key determinants of informality (e.g., De Mel et al. 2008, Grimm, Krueger and Lay 2011). Another important determinant of informality, and thus of firm growth, is the existence of entry sunk costs to the formal sector[2] and of excessive or inappropriate government regulations (see for instance Djankov et al. 2002, Botero et al. 2004, Auriol and Warlters 2005). However in the African context, additional barriers to entrepreneurship must exist for local people. Indeed, almost everywhere in Africa, small and medium enterprise (SME) are mainly in the hands of non-African

[1] In comparison the world average is 10.9%, it is 23.2% for Western Europe (ILO 2010). Tanzi and Schuknecht (2000) show that the difference between OECD and developing countries' public expenditure is the OECD's expenditure on social security.

[2] These costs are proportionally higher in poor countries than in advanced economies. As a result many firms in developing countries remain informal, because becoming formal involves fixed costs that are beyond the reach of poor entrepreneurs.

aliens (Tshikuku 2001). For instance, in his study on SME in Kenya and Zimbabwe, Fafchamps (2004) finds that only 32% of firms are in the hands of indigenous-African. This result is confirmed by Biggs and Shah (2006) who find that in Kenya most firms are in the hands of Asians, while in Zimbabwe they are in the hands of Europeans and to a lesser extent Asians. More generally Biggs and Shah (2006) find that the Indians in East Africa, the European in Southern Africa and the Lebanese in West Africa dominate many of the major manufacturing activities. The present paper examines how the forced mutual help norms prevailing in Africa, another type of barriers to entrepreneurship, can help explain this equilibrium.

To guide the analysis, we model the choice of individuals with idiosyncratic abilities and a fixed amount of capital, between becoming entrepreneurs or wageworkers. We distinguish between local and nonlocal entrepreneurs. Contrary to the latter, local entrepreneurs have the social obligation to subsidize their family. We show that they minimize the burden of the family tax by employing their needy relatives. This strategy maximizes the entrepreneurs' net profit as it allows them to receive some labor in exchange for these subsidies. However, recruiting family and relatives, rather than the best qualified workers, distorts productive efficiency. Everything else being equal local firms are less productive and less profitable than firms owned by nonlocals. Reduced profit margins discourage local entrepreneurship: with similar credit constraint and entrepreneurial ability local people become less often entrepreneurs than nonlocals. We derive from the model three main sets of predictions. First, the labor force of local firms, of which a significant proportion comes from the pool of the manager's relatives and extended family, is less qualified and less competent than the labor force of firms owned by nonlocals. This implies that the labor force composition and the nature and amount of training programs offered by both type of firms must differ. Second, local firms have larger labor force embodied in a larger labor/capital ratio. Third, the labor productivity of local firms is lower than the labor productivity of firms owned by non locals.

The empirical relevance of the model predictions is assessed using the World Bank Enterprise Surveys data on manufacturing firms between 2002 and 2007. Although this is the most comprehensive database on formal firms in Sub-Saharan Africa to date, many key variables pertaining to our theory are unobserved (notably entrepreneurs' origin, the amount of the family tax, the borrowing potential) and hence have to be inferred. Our empirical results should therefore be taken with caution and understood as only suggestive. Estimations reveal that African entrepreneurs are constrained both in the credit market (consistent with previous results in the literature), as well as on the labor market (as we argue in our theory). The way firms recruit new employees, the labor force composition, and the labor to capital ratio and labor productivity estimations are all consistent with the model predictions. Building on a structural approach developed in

Nguimkeu (2014), estimating our theoretical model provides suggestive evidence that 8% to 12.6% of African workers are self-excluded from entrepreneurship due to social redistributive pressure.

1.1 Forced Mutual Help, Kinship Taxation and Entrepreneurship in Africa

There is a substantial literature, mainly anthropological but also economic, on the possible negative impact of solidarity norms on economic development. Platteau (2006) explains that private wealth accumulation is perceived as an anti-social behavior in most traditional Africa. He quotes the anthropologist Woodburn (1998, p. 52) who, based on his observations of Hadza hunter-gatherers in Tanzania, wrote "People who have more than they manifestly need are put under relentless pressure to share". In fact, in most social networks in Africa sharing is a moral principle whereas personal accumulation is frowned on. The literature on risk-sharing in developing countries emphasizes that informal networks allow households to smooth over shocks and even pool resources for investments (Udry 1994, Kinnan and Townsend 2012). These norms have therefore important positive welfare implication as they help poor people to cope with uninsured risk. However the impact of these social norms on economic outcome has also been shown to be distortive. Bernard et al. (2010) study how the conflict between social norms and economic differentiation precludes the emergence of market-oriented organizations in Burkina Faso. Anderson and Baland (2002) show that women join roscas to protect their savings from their husbands and hence to save at a higher rate than they would at home. Baland et al. (2011) find that in Cameroon, some entrepreneurs without liquidity constraints systematically take out loans with high interest rates as a way to pretend that they are poor and therefore signal to their kin that they are unable to provide financial assistance. Similarly, Duflo et al. (2011) argue that Kenyan farmers do not invest in fertilizer, although it would substantially raise their yield, because a flourishing farm would make it difficult for them to protect their savings from consumption requests.

These findings are consistent with recent experiments in Kenya, Liberia and Senegal on the disincentive effects of social redistributive pressure. Within a controlled laboratory environment in rural Kenya, Jakiela and Ozier (2015) find that women are willing to pay (i.e. reduce their expected profits) to hide positive income shocks from their community (especially unmarried women who have recently been asked for gifts or loans by relatives). Likewise, in a similar type of experiment conducted in Liberia, Beekman, Gatto and Nillessen (2015) found that individuals with strong family ties within the community tend to make lower profitable investments than individuals with weaker family ties, and are also willing to pay to hide their money. Exploiting data from a controlled setting in urban Senegal, which combines lab-in-the-field measures and out-of-lab follow-up data, Boltz, Marazyan and Villar (2016) estimate a kinship tax of about 9%. When

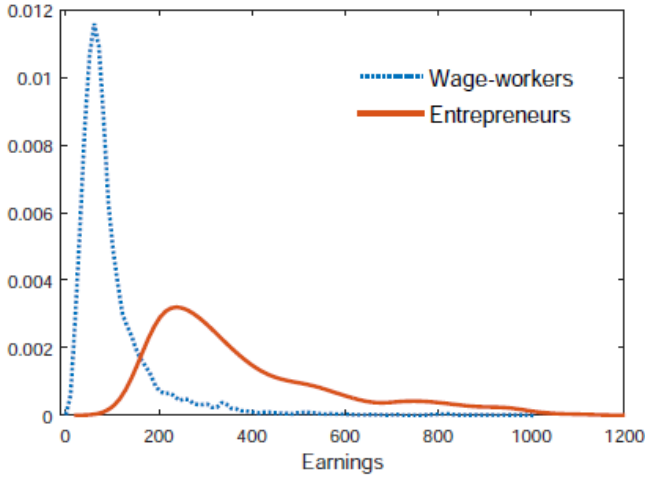
given the opportunity to get hidden income, individuals decrease by 26% the share of gains they transfer to kin (mostly outside the household) and increase health and personal expenses.

Some papers in the literature look specifically at the impact of the redistributive norms on firms. In a case study of a sample of entrepreneurs in Tanga, Tanzania, who were interviewed about the influence of their extended families on their companies, Egbert (2009) found that 40% of entrepreneurs of African ethnicity provide financial support to family members even if they are fully aware that such financial help is a burden for the business. By contrast, only 3% of entrepreneurs of Asian or Arabic origin support their family if doing so constitutes a burden on the business. Thus a sizable proportion of African entrepreneurs may be unable (or unwilling) to limit the demands of their relatives, which can have negative consequences on a business. Using survey data on small informal firms from seven West-African agglomerations, Grimm et al. (2013) find that while local social networks within the city have positive effects on added value by easing credit and insurance markets constraints, there are robust negative effects associated with social networks tied to the village of origin. These effects get diluted with geographical distance, presumably because with rising distance it is easier to hide income and protect it from abusive requests. Similarly, Henry (1996, 2003), who has studied successful formal local African firms, shows that key to these firms success is the fact that they have found ways to limit the burden of the forced mutual help constraint.[3] Finally, Combining evidence from a lab experiment with data from a sample of Kenyan entrepreneurs, Squires (2016), who quantifies the importance of the tax, finds high distortions for a third of entrepreneurs. He structurally estimates that removing distortions from kinship taxation would increase total factor productivity by a quarter, and increase the share of inputs used in the largest firms substantially.

All these works support the hypothesis that kinship networks may hamper profitable investments in firms, as people may be unwilling to forcibly share their wealth with their relatives. This problem exists across the board, but it is presumably much worse in the formal sector. Indeed evidence show that in Africa, entrepreneurship in the formal sector generates higher earnings than salaried work (see Figure 1). While being the owner and/or manager of a business in the formal sector is a visible sign of material success, and so is most likely subject to the kinship tax, none of the previous studies examine how this problem might affect the decision to become a formal entrepreneur and thus the development of a modern productive sector. The present paper therefore complements the existing literature by investigating how the decision to become an

[3]The strategy of these successful firms include recruitment by external agency and placement office to limit the burden of hiring relatives, the development of very detailed procedure books for workers, including managers, to help them oppose inappropriate requests from their extended family, the division of task so that it requires at minimum two persons to complete one task. This last strategy has proven to be very successful to collect bills in a private water company by helping the agents to oppose demand from their acquaintances to waive their bills (see Henry 1996, 2003).

Figure 1: Distribution of earnings (in USD) in the formal manufacturing sector in Africa



Authors' computation based on data that are described in Section 3

entrepreneur is hindered by social redistributive norms in Africa.

Section 2 formulates a model of entrepreneurial choice which formalizes the forced mutual help constraint for local entrepreneurs and from which we derive a set of testable predictions. Section 3 assesses the relevance of the theory on a sample of Sub-Saharan Africa countries through reduced form regressions and structural estimation. Section 4 discusses policy implications and offers concluding remarks. Most tables and figures as well as supplementary estimation procedures and results are gathered in the Appendix.

2 The Model

The model is an extensively amended version of Evans and Jovanovic (1989) and can be fitted in the broader framework of Roy's models as described in Heckman and Honoré (1990). The economy is populated with a continuum of potential entrepreneurs. They are heterogeneous in their ability (e.g., different education level, human and social capital) captured by a parameter $\theta > 0$.[4] To keep the exposition simple we assume the production function has a Cobb-Douglas specification

$$Y = \theta K^{\alpha} L^{1-\alpha} \qquad \alpha \in (0,1) \tag{1}$$

[4]We assume that entrepreneurs and workers are selected from the same distribution of talent. In the estimation, we allow this distribution of talent to possibly differ between foreigners and locals.

where K is the stock of capital and L is the quantity of labor used in the firm of an entrepreneur with ability θ.[5] We assume that the maximum stock of capital available to the entrepreneur, K, is constrained and may vary from one individual to the other. This assumption is consistent with the fact that entrepreneurs are credit constrained in Africa. While we do not introduce information asymmetries as in Ghatak, Morelli and Sjöström (2007), accounting for these asymmetries would create additional inefficiencies in accessing credit (as shown by these authors), thus reinforcing our assumption of capital constraints. In contrast, labor supply is plentiful, consistent with the high rates of unemployment observed in Africa. The quantity of hired labor, denoted L, is therefore optimized freely by entrepreneurs. The unit price of capital is r and the unit price of labor is w. Each individual has one unit of labor that he can use either to supervise work in his firm as an entrepreneur or to work as an employee for the wage $w > 0$. The optimal occupational choice depends on the capital available to the agent and on his ability.

The model distinguishes between local entrepreneurs, identified by the subscript l, and entrepreneurs of foreign origin (nonlocals) identified by the subscript f.[6] Local entrepreneurs face the social obligation to support their relatives. We assume that they have to pay a tax $T \geq 0$ to their extended family and relatives. We focus on a lump sum tax as it is *a priori* less distortive than a proportional tax and is consistent with the fact that relatives do not necessarily observe entrepreneurs' profit. In fact, empirical evidence show that local entrepreneurs will do everything they can to hide this information (Jakiela and Ozier 2015, Beekman et al. 2015, Baland et al. 2011). Nevertheless our results are robust to the introduction of a proportional tax (see the discussion below). Entrepreneurs can pay the family tax either directly in cash or by hiring their relatives for a wage w. Since needy relatives are hired in the firm more for the extent of their relationship with the business-owner than for their qualifications they tend to be less efficient than regular workers chosen for their qualifications only.[7] The productivity of one unit of labor by a relative is $\beta \leq 1$, while a regular worker's productivity is 1. This assumption concurs with Burkart, Panunzi and Shleifer (2003) who further argue that retaining management inside the family is less efficient than hiring a professional. The amount of productive labor available to a local firm is then

$$L_l = L + \beta L_r \tag{2}$$

[5] We use the Cobb-Douglas function to ease the exposition and the economic interpretations, but our results also hold for a general nonparametric specification of the production function with standard assumptions. The interested reader can get the general derivation from the authors upon request.

[6] In the rest of the paper, we call foreign firms those owned by nonlocals. These are firms that belong to early generations of immigrants and should not be confused with multinational branches of firms belonging to entrepreneurs living in foreign countries. This means that Indians in Kenya or Lebanese in Ivory Coast are all considered nonlocals in our empirical analysis.

[7] The entrepreneur is confronted with a cream-skimming problem. The most productive and educated relatives are certainly able to find a position elsewhere or also become entrepreneurs. People who ask for permanent help in the form of a job will usually be the less productive ones.

where L_r is the number of relatives hired in the local firm and L the number of workers hired outside the family network. In contrast, a nonlocal firm hires workers for their qualifications only. The amount of productive labor available is simply L_f, the number of workers hired by the firm.

$$L_f = L. \tag{3}$$

Finally, since we are focusing on formal enterprises in our application, starting a firm should usually involve sunk costs in the form of entry/registration fees in developing countries. Adding such fixed costs would not change the implications of the paper as both local and nonlocal firms are subject to it. We thus assume it away. In what follows we study the benchmark case of a nonlocal entrepreneur.

2.1 Entrepreneur Without Family Liability

We study the incentive an individual might have to use his time to become an entrepreneur instead of using it to work for a wage w. An entrepreneur is credit constrained so that he can borrow at most K. Without any loss of generality the price of the output is normalized to 1. Since the stock of capital that can be invested is constrained by K, the entrepreneur optimizes his profit with respect to L for a given K. The objective function of the entrepreneur is

$$\max_{L \geq 0} \Pi^f(L) = \theta K^\alpha L^{1-\alpha} - wL - rK. \tag{4}$$

The first order condition is

$$(1-\alpha)\theta K^\alpha L^{-\alpha} - w = 0. \tag{5}$$

Clearly, the objective function is concave in L so that the optimal employment level is:

$$L_f = \left(\frac{(1-\alpha)\theta}{w} \right)^{\frac{1}{\alpha}} K. \tag{6}$$

Substituting L_f in (4), the profit of the nonlocal entrepreneur with ability θ and a stock of capital K is:

$$\Pi^f(\theta) = \left[\frac{\alpha}{1-\alpha} \left(\frac{(1-\alpha)\theta}{w^{1-\alpha}} \right)^{\frac{1}{\alpha}} - r \right] K. \tag{7}$$

$\Pi^f(\theta)$ is linear in K, which implies that the optimum is reached either for 0 or for the maximum value. We deduce that the agent with ability θ and borrowing capacity K will choose to become an entrepreneur if his profit is higher than his earning as a wageworker. That is, if $\Pi^f(\theta) \geq w$. In this case he chooses to invest the maximum possible amount K in his firm. Let $\theta^f(K)$ be the value of θ for which $\Pi^f(\theta) = w$.[8]

$$\theta^f(K) = \left(\frac{w + rK}{K}\right)^{\alpha} \frac{w^{1-\alpha}}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}. \tag{8}$$

The following proposition is easily deduced from the above results.

Proposition 1 *A nonlocal agent with access to capital K chooses to become entrepreneur if and only if $\theta \geq \theta^f(K)$.*

Highly talented people (i.e., those with ability above $\theta^f(K)$) choose to become entrepreneurs. A great concern in developing economies that has been addressed in several papers in the literature is that people who are credit constrained do not become entrepreneurs, even if they are very talented. Indeed it is straightforward to check that the critical threshold $\theta^f(K)$ is decreasing in K. Because of lack of credit, talented entrepreneurs end up as wageworkers, while less able, but wealthier individuals may become entrepreneurs. However, there is an ability threshold, $\theta^* = \lim_{K \to +\infty} \theta^f(K) = \dfrac{r^{\alpha} w^{1-\alpha}}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}$, that depends only on technology and market characteristics, below which an individual never becomes an entrepreneur, regardless of their level of wealth or capital.

2.2 Local Entrepreneur

We now study the incentive to become entrepreneur for local people. They aim to maximize their net income under the constraint that they pay the family tax T for which they have to find the optimal way to do it. They spread this tax between wage payments (labor contracts) and direct transfers. They solve:

$$\max_{L \geq 0, L_r, \tau} \Pi^l = \theta K^{\alpha} L_l^{1-\alpha} - w(L + L_r) - rK - \tau T$$

$$\text{s.t.} \quad \begin{array}{l} L + \beta L_r = L_l \\ \tau T + w L_r = T. \end{array}$$

[8] With entry sunk cost F, the condition is $\Pi^f(\theta) \geq w + F$. Results can therefore be generalized by substituting w by $w + F$.

The first constraint is the amount of productive labor available to the firm when it hires L qualified workers and L_r relatives.[9] The second constraint is the family tax that can be paid either in wages, wL_r, or in cash τT, where $\tau \in [0,1]$ is the fraction of the tax that is given directly in cash. We deduce that $L_r = \dfrac{1-\tau}{w}T$ and that $L_l = L + \beta\dfrac{1-\tau}{w}T$. Substituting L_r and L_l by their value in the objective function and simplifying yields:

$$\max_{L,\tau} \Pi^l = \theta K^\alpha \Big(L + \beta\frac{1-\tau}{w}T\Big)^{1-\alpha} - wL - rK - T. \tag{9}$$

It is straightforward to check that, for all $\beta \geq 0$, the objective function is decreasing in τ so that the optimum is at $\tau^* = 0$. At the limit when $\beta = 0$ the entrepreneur is indifferent between hiring his relatives or paying a cash transfer. This result is collected in the following proposition.

Proposition 2 *Independently of the value of $\beta \geq 0$ a local entrepreneur always prefers to pay the family tax by hiring his relatives in the firm.*

Note that Proposition 2 does not depend on the way the family tax is deducted. For instance with a proportional tax with rate t on profit, the tax constraint becomes $t\Pi^l = wL_r + \tau\Pi^l$. The amount that the entrepreneur pays in cash (i.e., without any labor compensation) is $\tau\Pi^l = t\Pi^l - wL_r$. The entrepreneur then maximizes $\Pi^l(1-\tau) = \Pi^l(1-t) + wL_r$, where $\Pi^l = \theta K^\alpha (L + \beta L_r)^{1-\alpha} - wL - wL_r - rK$. This objective function is increasing in L_r. Hence, the entrepreneur who pays a proportional tax on profit to his family pays it preferably in the form of wages in exchange for labor. Proposition 2 is not financially intuitive because by hiring relatives the entrepreneur reduces the productivity of the firm, and thus its profit. This is especially true when β is very low. However it is optimal for the entrepreneur from a utility perspective. Indeed, he is not interested in maximizing the productive efficiency or the firm's profit. He is interested in maximizing his net income. The entrepreneur who must pay a tax would rather get some in-kind compensation for it than nothing. Family taxation is thus socially distortive because it creates an incentive to hire inefficient workers. It drives the local firms away from the productive efficiency frontier.[10] In practice, however, entrepreneurs pay the family tax both by employing their relatives and by giving direct cash transfers to family members without necessarily involving them in the firm. But the latter cases are usually small amounts and/or one-

[9] Implicit to our model is the assumption that a family worker of quality $\beta < 1$ who works on the regular job market would earn βw by unit of labor, most likely in the informal sector by being self-employed; whereas when they work for formal family business, they earn just like the regular worker, that is, w by unit of labor. So those "low-quality" family members are better off working in the family business. This is obviously not the case for high-quality family members for whom they might be a trade-off between family business and regular job.

[10] Some peculiar production functions may yield mitigating results. For instance with production functions of the "O-ring" type, worker quality would play a more critical role in output. In this latter case, giving away money would be better than hiring inefficient family members. However our database covers mainly fairly standard manufacturing firms where it is always possible to employ not-too-efficient relatives without disrupting the whole production process (e.g. to clean the premise, run some errands, upload deliveries, etc).

shot requests (e.g., for funerals, weddings, hospital fees, medicines) or requests from people who live too far away or are too young to work (e.g., for schooling or migration costs).

We next compute the optimal employment level in the local firm. It is easy to check that the objective function is concave in L. The first order condition, which is also sufficient, is:

$$\frac{\partial \Pi^l}{\partial L} = (1-\alpha)\theta K^{\alpha}\Big(L + \beta\frac{1-\tau}{w}T\Big)^{-\alpha} - w = 0. \tag{10}$$

Since $\tau^* = 0$ we have $L_r^* = \frac{T}{w}$ so that Equation (10) is equivalent to:

$$(1-\alpha)\theta K^{\alpha}\Big(L + \beta\frac{T}{w}\Big)^{-\alpha} = w. \tag{11}$$

The quantity of external labor that maximizes the firm profit is:

$$L = \left(\frac{\theta(1-\alpha)}{w}\right)^{\frac{1}{\alpha}} K - \beta\frac{T}{w}. \tag{12}$$

Depending on the parameters values, L is not always positive. The optimal level of external hiring for a local firm is then:

$$L^* = \text{Max}\left\{0, \left(\frac{\theta(1-\alpha)}{w}\right)^{\frac{1}{\alpha}} K - \beta\frac{T}{w}\right\}. \tag{13}$$

We deduce that $L^* > 0$ if and only if $\theta > \frac{w}{1-\alpha}\Big(\frac{\beta T}{wK}\Big)^{\alpha}$. In order to rule out corner solution in the sequel of the paper we make the following assumption.

A1 $\quad \alpha + \beta \leq 1.$

As it will become clearer later, Assumption A1 implies that if an individual chooses to become an entrepreneur then his θ is large enough so that $L^* > 0$, i.e., $\theta > \frac{w}{1-\alpha}\Big(\frac{\beta T}{wK}\Big)^{\alpha}$. By ruling-out pure family businesses, this assumption is consistent with the data where formal local firms hire both outside qualified workers and workers from their family network (see Table D2).

Substituting L_r^* and L^* in the objective function (9), the entrepreneur's earning is:

$$\Pi^l(\theta) = \left[\frac{\alpha}{1-\alpha}\left(\frac{(1-\alpha)\theta}{w^{1-\alpha}}\right)^{\frac{1}{\alpha}} - r\right]K - (1-\beta)T. \tag{14}$$

Let $\Delta\Pi = \Pi^f(\theta) - \Pi^l(\theta)$. Comparing (7) and (14), we have:

$$\Delta\Pi = (1-\beta)T \geq 0. \tag{15}$$

Since local entrepreneurs pay to their relatives and to outside workers equal wage for a less qualified labor it is intuitive that local firms' profit is lower than nonlocal firms' profit. However, this gap is smaller than T and decreases with β. At the limit, when $\beta = 1$, the two types of firms are equally profitable. This result further justifies why local entrepreneurs would have a strong incentive to support their relatives by employing them rather than giving direct cash transfers. It reduces the burden of the family tax and narrows their revenue gap. Consequently, they would also have more incentives to train them in order to increase β. In the empirical section we examine how training is used by firms for such purpose.

We next compute the threshold value of θ for which a local individual is willing to become an entrepreneur. An agent with characteristics θ and K will choose to become an entrepreneur if his expected profit is higher than his earning as a wageworker. That is, if $\Pi^l(\theta) \geq w$. Let θ^l be the value of θ for which $\Pi^l(\theta) = w$. Then,

$$\theta^l(K) = \left(\frac{w + rK + (1-\beta)T}{K}\right)^{\alpha} \frac{w^{1-\alpha}}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}. \tag{16}$$

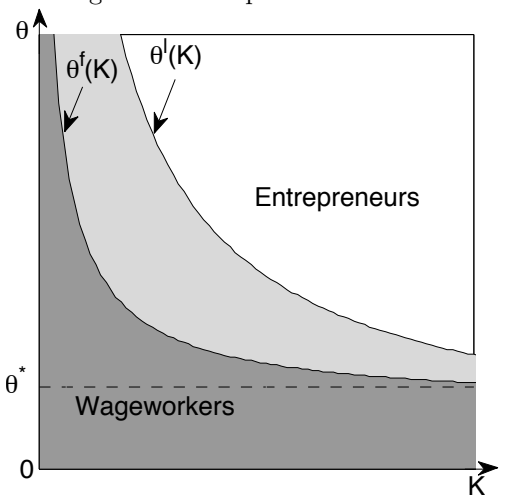
The agent chooses to become an entrepreneur if and only if $\theta \geq \theta^l(K)$. One can check that $\theta^l(K) > \frac{w}{1-\alpha}\left(\frac{\beta T}{wK}\right)^{\alpha}$ is equivalent to $\frac{w+rK}{\beta T} + \frac{1-\beta}{\beta} > \frac{\alpha}{1-\alpha}$, which is always true under Assumption A1. Hence, if an agent becomes an entrepreneur he necessarily chooses a strictly positive level of external labor $L^* > 0$. A comparison of Equations (8) and (16) shows that a local individual with capital K and ability θ is less likely to become an entrepreneur than a nonlocal with the same characteristics, i.e., $\theta^l(K) \geq \theta^f(K)$.

Proposition 3 *A local agent with access to capital K chooses to become an entrepreneur if and only if $\theta \geq \theta^l(K)$.*

It is straightforward to verify that $\theta^l(K)$ is decreasing and convex in K. Moreover, if $w \leq 2K$ then $\theta^f(K)$ is also convex in K. In fact, it is reasonable to believe that employees who decide to quit their job to start their own firm would usually have at their disposal an amount of starting capital that is at least as high as half of their one-period salary. Figure 2 gives a graphical illustration of the selection to entrepreneurship under this assumption. The shaded areas below the curves $\theta^l(K)$ and $\theta^f(K)$ represent local and nonlocal wageworkers, respectively, while the regions above these curves represent the respective entrepreneurs.

Notice that the gap between local and nonlocal entrepreneurs entry decision, $\Delta\theta(K) = \theta^l(K) - \theta^f(K)$,

Figure 2: Entrepreneurial Choice



decreases with increasing values of K. Indeed, one can easily check that

$$\frac{d\Delta\theta(K)}{dK} \leq 0. \tag{17}$$

Thus, the entrepreneurship gap is larger in countries where credit constraints are tighter. This is likely to be the case in the least developed countries. In such countries, the social obligation to help relatives is also the strongest. With small level of capital available for potential entrepreneurs, the family tax should weight heavily on the growth of the formal productive sector.

2.3 Testable Implications of the Model

As derived above, the theory implies that local entrepreneurs pay the family tax preferably by hiring their relatives (see Proposition 2). They should thus hire significantly more through informal channels than their nonlocal counterparts. Moreover, if the theory is consistent with the data we should expect the labor force of local firms to be less qualified and less competent than the labor force of foreign firms. We examine the labor force composition (i.e., the proportion of unqualified workers) to assess the relevance of this point. We also look at the training programs offered by the firms to their variety of employees. Indeed, if workers are hired as a response to social constraints rather than their qualification, local entrepreneurs might want to improve their productivity by training them and hence reduce the profit gap $1 - \beta$. Focusing on the level of employment, the theory predicts that, everything else being equal, a local firm has a larger labor force than

a foreign firm:

$$\frac{L_l}{K_l} = \left(\frac{\theta(1-\alpha)}{w}\right)^{\frac{1}{\alpha}} + (1-\beta)\frac{T}{wK_l} \geq \frac{L_f}{K_f} \quad = \quad \left(\frac{\theta(1-\alpha)}{w}\right)^{\frac{1}{\alpha}}, \tag{18}$$

where $L_l = L^* + L_r^*$, with $L_r^* = \dfrac{T}{w}$, and L^* and L_f defined by Equations (13) and (6), respectively.

Finally, Equation (18) also implies that local firms are less productive (i.e. have a lower per capita productivity) than foreign ones, that is

$$y_l = \theta\left[\frac{K_l}{L_l}\right]^{\alpha} \leq y_f = \theta\left[\frac{K_f}{L_f}\right]^{\alpha}. \tag{19}$$

The next section describes some important features of the data used for this study and empirically assesses the role of forced solidarity on entrepreneurship in Sub-Saharan Africa.

3 Confronting Theory with Data

In this section, we provide descriptive statistics of the available data, run reduced-form multivariate regressions to tests the basic predictions of the theory, and structurally estimate the model to have a sense of how many African entrepreneurs might be missing in the formal manufacturing sector. Given the unavailability of many important variables in our dataset, including entrepreneurs and workers' origin, the amount of the family tax and the borrowing potential of workers, most of the results in this section are only suggestive evidence. Despite their limitation, they are consistent with the theory and suggest that family taxation takes its toll on the growth of the formal sector in Sub-Saharan Africa. These preliminary results therefore call for more empirical work on this issue.

3.1 Data and Descriptive Statistics

We use the World Bank Enterprise Surveys, a detailed database that contains information on formal firms and their employees in Sub-Saharan Africa. This is, to date, the only database that extensively covers and represents the formal sector of the African continent as a whole, using standardized questionnaires.[11] While the surveys encompass both services and manufacturing sectors, our focus in this paper is only on the latter because the former does not contain information on labor composition and very little information on firms capital. This database compiles surveys from 7,514 manufacturing enterprises in 31 Sub-Saharan Africa

[11] Available at http://www.enterprisesurveys.org/.

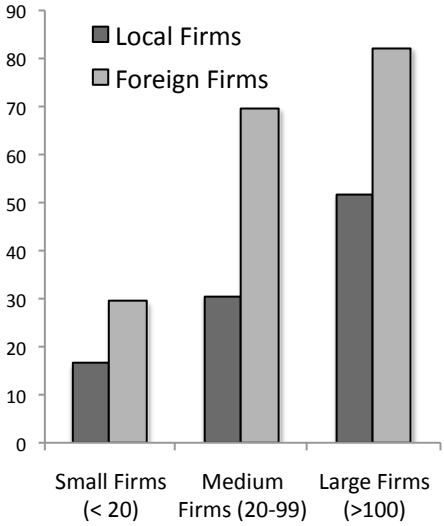
countries administered between 2002 and 2007.[12] The surveys provide information on firm performance, employers' perceptions of investment climate and measures of obstacles hindering firm operations and growth (see Appendix A for more details). Although entrepreneurs origin is not available in the Enterprise Surveys the ownership structure of the firms is. Hence, the key variable used throughout the empirical exercice to distinguish between "local" and "nonlocal" firms is the firm's ownership status. We proxy the firm's origin between "local" and "nonlocal" by assuming that an entirely domestically owned firm is a local firm, whereas a firm financed (even marginally) by individuals of foreign origin cannot be classified as a local family business and is then categorized as a nonlocal firm or foreign firm. In particular, the latter has the possibility to escape from local forced family taxation by appointing a manager of foreign origin. As shown in Table D1 in the appendix our classification works well in pinning down local family businesses. Indeed, in 98% of cases the largest shareholders in these entirely domestically owned firms are individuals and/or families among which 85% of them are managers of the firms. In contrast, only 80% of "foreign firms" are entirely owned by an individual or a family, who are less often managers of the firm.

If social pressure to hire relatives and extended family exists, it should affect the channels through which firms recruit new workers. Table D2 in the appendix shows that local firms, as previously defined, rely heavily on informal sources to meet their recruitment needs. In 64% of the cases they report using family and/or friends networks to hire new employees, a sharp contrast with foreign firms which in 59% of the cases rely on formal means such as public announcements and public or private placement offices. Our theory also highlights that the social pressure which forces local entrepreneurs to hire their relatives translates into a relatively poor quality of the workforce in local firms. The descriptive statistics of the labor force composition presented in Table D3 in the appendix seems to support this argument. It reveals an over-representation of unqualified workers in these firms with a supervision ratio (number of non-production workers per production worker) of 13 percentage point lower in local firms compared to foreign firms. Moreover, not only production workers are over-represented in local firms, they are also significantly less educated. The proportion of local firms with average education level for production workers below 6 years is 42%, that is 11 percentage point higher than foreign firms.

Although these descriptive statistics emphasize the negative role of kinship taxation, there are many positive roles for kinship networks in the African context. For example, family workers might actually be a preferred alternative for many reasons. In the presence of adverse selection, particularly among workers with

[12]The surveyed countries are Eritrea, Ethiopia and Zambia in 2002; Kenya, Lesotho, Mali, Senegal, South Africa, Tanzania and Uganda in 2003; Benin in 2004; Madagascar, Malawi, Mauritius and Niger in 2005; Angola, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, DRC, Gambia, Guinea, Guinea Bissau, Mauritania, Namibia, Rwanda, Swaziland, Tanzania and Uganda in 2006; Ghana, Mozambique, Senegal and South Africa in 2007.

Figure 3: Sales per employee ($1000) according to ownership and size.



no credentials, local firms could use informational rents to attract a better quality of family workers (albeit unqualified), train them more (because they will stay around longer) and provide less supervision (because they are more trustworthy). Evidence that networks play precisely this role of allocating less credentialed workers into higher skilled occupations in other cultural contexts can be found in Munshi (2003, 2011).[13] Another positive impact of family workers is that they might ease credit and insurance markets constraints. They provide informal risk-sharing and informal credit through interpersonal transfers in the absence of well-developed credit markets (Cox and Fafchamps 2007, Barr et. al. 2008). In addition, Grimm et al. (2013) explained that local family networks within the city can have positive effects on production factors and added value in informal firms.[14] Whether "family hiring" has an overall positive or negative quantitative effect in the formal sector of Sub-Saharan Africa can be assessed by examining firms' profitability. Our theoretical model emphasizes that local firms should perform poorly compared to other firms: the social redistributive pressure born by local entrepreneurs leads to an inefficient allocation of labor which reduces local firms' productivity. However, if for the reasons evoked above family members were the preferred alternative we should observe that local firms tend to perform better than the foreign ones. But Figure 3 shows that local firms are significantly less productive than foreign ones, and this underperformance is consistent across all categories of firms (small, medium and large). We now turn to regression analysis to examine these preliminary results with a more comprehensive set of controls.

[13] We are grateful to Andrew Foster and an anonymous referee for suggesting this discussion.
[14] However, they also find negative effects associated with social networks tied to the village of origin.

3.2 Regressions Analysis

The variables used in the regressions are described in Table D4 in the appendix. With missing data the sample size is reduced to $4,500$ observations. In particular the information on the capital of the firm is not always available. In each specification the regressions are ran with country, year and/or industry and size (small, medium, large) fixed effects, after controlling for other firms' characteristics. Standard errors are clustered at the country/industry level. In the first set of regressions presented in Table 1, we focus on the

Table 1: Explaining Labor to Capital ratio

	Dependent Variable : Labor/Capital ratio (log)				
Equations	(1)	(2)	(3)	(4)	(5)
Constant	-8.377	-5.228	-6.766	-7.605	-6.05
	(52.93)***	(6.87)***	(8.91)***	(20.42)***	(7.80)***
Local	0.768	0.662	0.392	0.398	0.401
	(6.32)***	(5.11)***	(2.86)***	(2.87)***	(2.65)***
Firms' characteristics					
Average wage rate (log)		-0.636	-0.556	-0.569	-0.541
		(5.66)***	(5.18)***	(5.14)***	(5.00)***
Age of the firm (log)		0.087	0.179	0.203	0.251
		(1.36)	(2.73)***	(3.08)***	(3.49)***
Location		-0.215	-0.254	-0.234	-0.195
		(0.78)	(0.91)	(0.83)	(0.69)
Workforce characteristics					
Experience of the				-0.048	-0.049
top manager (log)				(0.96)	(0.97)
Unqualified workforce				-0.175	-0.184
is a major constraint				(1.32)	(1.18)
Access to credit					
Overdraft/Credit					-0.930
					(6.47)***
Fixed Effect					
Firm size	No	No	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Industry	No	No	Yes	Yes	Yes
Observations	3,169	3,029	3,029	2,976	2,831
R-squared	0.21	0.21	0.24	0.24	0.25

OLS Method, Standard errors are clustered at the country / industry level.
Absolute value of robust t-ratios in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

prediction related to the workforce composition. Our dependent variable is the labor to capital ratio (in logs). We regress this variable over a dummy variable for firm type (Local), while controlling for the firm's average wage rate and access to credit. Columns (1) and (2) control for country and year fixed effect; while Columns (3), (4) and (5) control for country, year, industry and firm size fixed effect. In all the regressions the dummy variable of interest (Local) is significantly positive, as expected. Introducing firm characteristics

(Columns (2) and (3)), firm and workforce characteristics (Column (4)), or firm, workforce characteristics and access to credit (Column (5)) does not change the basic result. The regression results also show that whether the top manager perceives skilled labour as a major constrain or not does not significantly affect firm performance.

Table 2: Explaining Sales per Employee ratio

	Dependent Variable : Sales/Employee ratio (log)				
Equations	(1)	(2)	(3)	(4)	(5)
Constant	9.755	9.041	8.982	5.955	5.147
	(109.02)***	(67.99)***	(16.89)***	(9.61)***	(11.17)***
Local	-0.809	-0.56	-0.41	-0.415	-0.417
	(12.57)***	(11.13)***	(8.85)***	(8.93)***	(8.63)***
Firms' characteristics					
Average wage rate (log)		0.506	0.473	0.489	0.498
		(8.31)***	(8.03)***	(7.97)***	(8.22)***
Age of the firm (log)		0.024	-0.011	-0.007	-0.024
		(0.87)	(0.42)	(0.31)	(0.93)
Location		0.097	0.116	0.138	0.124
		(1.31)	(1.72)*	(2.01)**	(1.86)*
Workforce characteristics					
Experience of the				-0.017	-0.023
top manager (log)				(0.81)	(1.10)
Unqualified workforce				0.077	0.046
is a major constraint				(1.31)	(0.77)
Access to credit					
Overdraft/Credit					0.449
					(8.69)***
Fixed Effect					
Firm size	No	No	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Industry	No	No	Yes	Yes	Yes
Observations	4,383	4,024	4,024	3,898	3,731
R-squared	0.5	0.49	0.53	0.53	0.54

OLS Method, Standard errors are clustered at the country / industry level.
Absolute value of robust t-ratios in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

According to the theory, labor productivity should be smaller in local firms. The difference in labor productivity between local and nonlocal firms is assessed in Table 2 where the dependant variable is the total sales per employee. The results show that sales per employee in local firms are on average significantly lower than in nonlocal firms, by a rate ranging from 41% to 81%. Although sales data are a better measure of productivity than profit data as it is subject to less measurement errors, we also ran the regressions with profit per employee and the results were robust (they are available from the authors upon request).[15] If

[15]It would have been interesting to also look for heterogeneous results depending on localities, to the extent that location can be mapped into ethnic groups with various degrees of sharing norms. Unfortunately, our data do not allow us to explore

it is true that the local firms' challenge is not only to gain a better access to the credit market, but also to manage the social redistributive pressure and the related poorly qualified hired workers, it raises the question of how many entrepreneurs are actually missing. In what follows, we propose a method inspired by Nguimkeu (2014) to estimate this number and illustrate it with the available data.

3.3 Structural results

We employ a structural approach to estimate the theoretical model and use it to compute the proportion of missing entrepreneurs, that is, the proportion of workers who would have chosen to become entrepreneurs in the absence of potential high family tax. The data used to estimate our structural parameters come from the Employees Questionnaires of the same Enterprise Survey data described above. The survey provides information about workers age, position in the company, experience and qualifications, education, wage/salary and allowances, etc. Our final dataset contains a sample of $9,309$ observations from workers of the formal manufacturing sector of ten African countries: Benin, Eritrea, Ethiopia, Kenya, Madagascar, Mali, Mauritius, Senegal, Tanzania, and Uganda. Two crucial pieces of information are missing from this dataset. First, we do not observe the nationality/origin of the wage-workers, but only the category of the firms, local or nonlocal (as defined in section 3.1), for which they work for. We therefore make the assumption that workers in a local firm are locals and workers in a nonlocal firm are nonlocals. While this assumption might be reasonable for the local firms (that recruit essentially through family networks and are thus populated with local workers), it is clearly less accurate for nonlocal firms (that recruit through more formal channels and are likely to have both local and nonlocal workers on board). This limitation is likely to adversely affect our empirical results. To assess their sensitivity, we run some robustness check with alternative definition of "local" versus "nonlocal" workers in the appendix. Second, we do not observe the amount of family tax entrepreneurs face. Since our theory predicts that this tax is proportional to the difference between the entrepreneurs actual profit and their counterfactual profit, we use this relationship and the data on profits to approximate it as described in Appendix B. Third, we do not observe the stock of capital available to the workers in case they would like to set up a firm. All the structural estimation results presented in this paper are those where the capital has been fixed to the average industry capital used by firms in the country in which the worker operates. We ran other (unreported) estimations where the potential capital is set as a combination of income and industry average, or as the average capital of entrepreneurs with the same education, and with various specifications, including when talent distribution is assumed the same for both

such patterns.

locals and nonlocals. These additional results are consistent with those presented and are available from the authors upon request.

The structural estimation approach, which is based on Nguimkeu (2014), is thoroughly described in the Appendix B. We assume that talent follows a log normal distribution with a mean that is shifted along education and experience and whose parameters possibly differ across locals and nonlocals. In other words, if θ_i is the level of entrepreneurial talent of individual i and d_i denotes a dummy variable such that $d_i = 1$ when individual i is of local origin and $d_i = 0$ when i is a nonlocal, then the ability equation is specified by:

$$\ln \theta_i = \begin{cases} \delta_{0l} + \delta_{1l} s_i + \delta_{2l} x_i + \epsilon_{il} & \text{for } d_i = 1 \\ \\ \delta_{0f} + \delta_{1f} s_i + \delta_{2f} x_i + \epsilon_{if} & \text{for } d_i = 0 \end{cases} \tag{20}$$

Here, $s_i = \ln(1 + S_i)$ and $x_i = \ln(1 + X_i)$ are the logs of years of education (S_i) and years of experience (X_i) of agent i, respectively. The error terms ϵ_{il} and ϵ_{if} are assumed to be normally distributed, with mean 0 and variances σ_f^2 and σ_l^2, respectively. As described in Appendix B, this specification allows to derive the conditional probabilities of entrepreneurship versus wage-work based on the theoretical results and to build a likelihood function by matching them with the actual occupational statuses of workers observed in the data. The estimation is performed by maximizing this likelihood function, and the fraction of missing entrepreneurs follows by computing the gap between threshold ability levels required to become entrepreneurs for locals and nonlocals.

Since the redistributive pressure on local entrepreneurs could be attributed to the absence of public safety net, local entrepreneurs could be under less pressure to hire their relatives in countries with better social protection. We therefore split the countries into two subsamples according to their Institutional Solidarity Index (ISI) developped by the Research Center in International Economics (CEPII), which assesses the presence of social safety nets within each country.[16] We label by "Worse Solidarity Sample" countries whose ISI is relatively low (ISI below or equal to the sampling median) and by "Better Solidarity Sample" countries with relatively high ISI (ISI above this sampling median).[17]

The descriptive statistics of variables used in the structural estimation are presented in Table 3. As

[16] Available at http://www.cepii.fr/anglaisgraph/bdd/institutions.htm.

[17] There are 21 countries out of the 31 surveyed by the World Bank that are covered by the Institutional Profiles Database for the relevant period. The values of the average ISI index in our sample range from a minimum of 0.00 for Namibia to 2.72 for Mauritius, the median ISI is 1. Here we focus on the sample of 10 countries that have suitable data for our structural estimations. The better solidarity sample is Benin, Kenya, Mauritius and Senegal, whereas the worse solidarity sample is Eritrea, Ethiopia, Madagascar, Mali, Tanzania, and Uganda. ISI for Eritrea was not available; but we classified it in the worse ISI group based on the African Economic Outlook (2012) statement that in Eritrea "Social safety nets remain based on extended family networks and are steeped in customary law."

one would expect, the proportion of local firm workers, the average difference in profit between nonlocal firms and local firms, and the borrowing rate are higher in the worse ISI sample compared to the better ISI sample, whereas monthly wages are lower in the former. Table 4 presents the maximum likelihood

Table 3: Descriptive Statistics of variables used in the Structural Estimation

Variables		Whole Sample	Better ISI	Worse ISI
Name	Definition	mean (std. dev.)	mean (std. dev.)	mean (std. dev.)
n	Sample size	9,309	4,205	5,104
Individual characteristics				
E	Equals 1 if Entrepreneur, 0 otherwise	0.0870 (0.3181)	0.0832 (0.3041)	0.0901 (0.3336)
S	Years of education	10.9352 (5.2187)	10.7170 (5.1763)	11.1150 (5.2470)
X	Years of work experience	6.4331 (6.5044)	6.8114 (6.9036)	5.9821 (6.0605)
K	Amount of capital (in US dollars)	11,411 (30,225)	14,581 (20,2120)	13,697 (36,466)
d	Equals 1 if local, 0 if nonlocal	0.5046 (0.0051)	0.4492 (0.0076)	0.5502 (0.0069)
Country specific characteristics (averages)				
$\Delta\Pi$	Avg. Diff. of profits nonlocal vs local ($)	40,947 (9,123)	26,678 (2,148)	72,485 (11,392)
w	Wage (monthly, in US dollars)	108.287 (57.286)	128.4925 (64.7447)	90.6400 (43.8047)
r	Gross interest rate	1.1710 (0.0546)	1.1298 (0.0338)	1.2039 (0.0450)

estimation results of the theoretical model parameters for our sample. We report estimates for the whole sample, for the better solidarity sample and for the worse solidarity sample. We also provide p-values for the comparison of estimates between better and worse samples (see last column of the table). The structural parameter estimates are reasonable and significant at 5% in general. The log talent parameter estimates show that education tends to have larger effect on entrepreneurial ability compared to professional experience for nonlocals whereas these effects are reversed for locals. They also suggest that individuals in worse ISI countries need to accumulate more education and experience to be able to catch up with those from better ISI countries, as they face more constraints.

As expected, the capital elasticity parameter α tends to be significantly higher for worse solidarity countries compared to better solidarity countries, whereas standard deviations for ability, σ_f and σ_l, are larger in the better solidarity sample compared to the worse solidarity sample. This is presumably due to

Table 4: Structural Maximum Likelihood Estimates: Worker's capital is the average industry capital

Type	Parameter	Name	Whole sample	Better solidarity	Worse solidarity	Difference Pvalue
Nonlocals	Log ability - constant	δ_{0f}	0.1225	0.0253	0.2897	0.0094
			(0.0638)	(0.0418)	(0.0936)	
	Log ability - education	δ_{1f}	0.9364	0.9558	0.7852	0.0109
			(0.1140)	(0.0461)	(0.0491)	
	Log ability - experience	δ_{2f}	0.1218	0.1459	0.0238	0.0001
			(0.0092)	(0.0092)	(0.0166)	
	Stand. dev. for ability	σ_f	1.1977	1.2972	1.2758	0.0001
			(0.1354)	(0.0027)	(0.0075)	
Locals	Log ability - constant	δ_{0l}	-0.7905	0.0040	0.1813	0.2979
			(0.8187)	(0.0047)	(0.1690)	
	Log ability - education	δ_{1l}	0.4963	0.4986	0.0761	0.0001
			(0.0421)	(0.0216)	(0.0048)	
	Log ability - experience	δ_{2l}	0.6783	0.9373	0.5319	0.0022
			(0.3186)	(0.1258)	(0.0405)	
	Stand. dev. for ability	σ_l	2.2897	2.9949	2.5163	0.0001
			(0.2502)	(0.0146)	(0.0024)	
All	Capital returns	α	0.2910	0.2890	0.3412	0.0001
			(0.0353)	(0.0130)	(0.0701)	
	Log-likelihood		-2.4559	-2.3667	-2.0709	
	Number of Obs.		9309	4205	5104	
	Frac. missing entrepreneurs	m	0.0980	0.0766	0.1243	0.000
			(0.0020)	(0.0015)	(0.0021)	

Standard errors in parenthesis

the fact that a better institutional environment attracts a larger variety of talented individuals.

Using the estimated structural parameters, we calculate the fraction of the local population that has values of θ, and of other characteristics, satisfying the conditions of Proposition 1, yet prefers wage-work to entrepreneurship because of the social redistributive pressure that the latter occupation implies. This fraction of the local population is the proportion, m, of missing African entrepreneurs and our results predicts that they represent about 9.8% of the overall local formal manufacturing sector workforce for our baseline specification. This proportion is even higher in countries with worse institutional solidarity environment and the difference in the loss of entrepreneurs across the two sub-samples is significant. As already explained earlier, some useful information are not available in our data. Among the important limitations of these data, the origin/nationality of each respondent is not directly available. To check the robustness of our results, we redefined as "local firm" one for which one of the principal owners is of African origin (and as "local worker" one who works for such firm). In other words, these local firms are those that are either entirely domestically owned, or are partially owned by foreigners provided at least one of the principal owners is of

African origin. The results presented in Table D5 in the appendix are consistent with the earlier ones and show a higher fraction of missing entrepreneurs of 12.6%.

Although the above results seem to corroborate with the forced mutual help hypothesis, one can think of alternative explanations that would produce similar empirical results. For example, it could be that local and foreign firms differ in terms of their respective technologies, so that the observed differences in productivity between them may be simply arising from differences in the capital intensity of the technologies rather than the family tax. In particular it could be that foreign firms have a superior technology in terms of having higher total factor productivity (TFP); and because the technology's TFP is conflated with entrepreneurial ability in the model, it would appear that foreign entrepreneurs have superior ability compared to the local ones thereby lending support to the conclusion that it is the family tax that is dissuading some potential entrepreneurs from starting firms. To address this issue, we re-estimate the model by allowing locals and nonlocals to have different technologies and by distinguishing entrepreneurial ability from TFP in their respective production functions (see Appendix C for details of the method). The results are presented in Table D6 in the appendix. They show that while capital intensity and TFP are higher in foreign firms compared to local firms as expected, accounting for these differences in technologies does not cancel the effect of family taxation. In particular, we found that family tax is still considerable for locals, leading to a significant fraction, albeit smaller, of missing entrepreneurs of 8% of the formal sector workforce.

Finally it is useful to compare our results with those that Jakiela and Ozier (2015) found in their randomized experiment. Averaging across different simulated values of firm productivity and family tax rates ranging from 0% (i.e. absence of social pressure) to 4.5% (estimated tax in their pooled data), they found a proportion of missing women entrepreneurs in Kenya of about 7.8%. This fraction falls within our estimated range of 7.1% to 8.4% for the better solidarity sample to which Kenya belong (see Tables 4, D5 and D6).

4 Discussion

This paper argues that the social redistributive norm prevailing in Africa whereby wealthy individuals have the social obligation to share their resources with their relatives and extended family is detrimental to the continent economic growth. Since becoming an entrepreneur sends a signal of economic success, it involves a substantial family taxation and therefore discourages many local talented people to engage in such occupation. We identify the impact of the phenomenon by distinguishing between local entrepreneurs,

who are subject to this social norm, and entrepreneurs of foreign origin, who are not. Local entrepreneurs are therefore constrained both on the credit market and on the labor market. In contrast, nonlocals have a competitive hedge as they do not suffer from the same labor distortions. The resulting productivity gap helps explain the over-representation of minority entrepreneurs in the region, like the Indians in East Africa, the Lebanese and Syrians in West Africa, and Europeans in Southern Africa (Biggs and Shah 2006). It also suggests that talented entrepreneurs may prefer to keep running smaller informal firms because growing toward bigger formal ones may imply facing a higher taxation from their extended network of relatives. Combined with tight credit constraints, it helps explain the excessive returns on small firms puzzle identified by Banerjee and Duflo (2014) and De Mel et al. (2008).

More importantly the analysis sheds a new light on social protection in developing countries, since mutual help in these countries is often perceived as a risk-sharing mechanism that allows households to smooth over shocks (Udry 1994, Kinnan and Townsend 2012). Our analysis suggests that while social security, public retirement plans and other public schemes aimed at protecting the unemployed, the sick and the elderly play a redistributive function, they also play an important role in preventing inefficient allocation of labor in firms and skills across occupations. Social security does not only provide social benefits, but it may also lead to economic efficiency, as it allows workers and firms to disconnect their investment, savings and managerial decisions from family protection. This argument lines up nicely with the results of Michelacci and Silva (2007) who found that in the US and Italy, i.e. countries with high social protection, local people turn out to have more incentives to become entrepreneurs compared to nonlocals. In contrast the lack of such public mechanisms in Sub-Saharan Africa appears to be very distortive. A back of the envelope computation suggests that moving from the current equilibrium to an equilibrium with a minimum protection could be possible and overall beneficial for Sub-Saharan Africa.[18] This might help to explain why it is currently being developed in emerging economies, such as Brazil, China or India (Barrientos 2013).

In this study, we have focused on the firm side entirely, and did not discuss the potential welfare consequences of the social pressure of family hiring or the potential impact of related policies aiming to reduce extended family liability on economic activity in Africa. These considerations are left for future research. Future work would also require that more data be collected in Africa, particularly household firm level panel data, with detailed information about wealth, socioeconomic activities and interactions within kinship net-

[18]Since the formal sector represents about 60% of the GDP in Sub-Saharan Africa (Schneider 2005), our results imply that the family taxation generates a shortfall of about 3.9% - 7.8% of GDP. On the other hand, the International Labor Organization estimated that a universal basic child benefit scheme in Sub-Saharan Africa would cost between 1.7% and 3.4% of GDP, a universal basic old age pension scheme would cost between 0.7% and 1.3% of GDP, and an employment guarantee scheme covering 10% of the working age population would cost between 0.4% and 0.7% of GDP (see ILO 2010). This represents a total cost of 2.8%-5.1% of GDP in social protection, an amount lower than the associated benefit implied by our structural estimates.

works. With such information it should be possible to estimate more accurately the percentage of African wageworkers that the forced mutual help constraint precludes to become entrepreneurs in the formal sector.

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Appendices

A Data Sources and Questionnaire Description

The data used in the empirical analysis come from two sources: The Enterprise Survey database maintained by the World Bank(http://www.enterprisesurveys.org/), and the Institutional Profiles Database maintained by the Research Center in International Economics (http://www.cepii.fr/anglaisgraph/bdd/institutions.htm).

The standard Enterprise Survey questionnaire comprises three parts: (i) The first part deals with the internal structure of businesses and the investment climate within which these businesses operate; (ii) the second part deals with finances, production and markets and provides information on business performance which can be correlated to business characteristics and investment climate obtained in the first part of the questionnaire; (iii) the third part of the questionnaire, which is particularly relevant for the present study, deals with human resources and labor market issues, including the effects of government labor regulations on the cost of doing business and the structure, as well as the cost and quality of the workforce.

B Structural Estimation of the model

The structural estimation is similar to Nguimkeu (2014). The starting point is the log-linear specification of entrepreneurial talent given by Equation (20) in the main text. A smilar specification of the talent distribution has been first considered by Evans & Jovanovic (1989) and Paulson, Townsend & Karaivanov (2006). Our specification of ability allows the distribution of talent of locals to be qualitatively different from nonlocals' one. We are therefore able to capture differences in variances and elasticities that may exist across the two types.

The allocation of agents between entrepreneurship ($E_i = 1$) and wage-work ($E_i = 0$) can be modeled by

$$E_i = \begin{cases} \mathbf{1}\{\theta_i \geq \theta_{il}\} & \text{for} \quad d_i = 1 \\ \mathbf{1}\{\theta_i \geq \theta_{if}\} & \text{for} \quad d_i = 0 \end{cases}$$

where $\mathbf{1}\{\cdot\}$ is the indicator function that equals 1 if its argument is true and 0 otherwise. The critical ability thresholds θ_{if} and θ_{il} that determine entrepreneurial decision for nonlocals and locals are those given by equations (8) and (16), respectively. The probability of becoming an entrepreneur is given by

$$\begin{aligned} \Pr[E_i = 1|d_i] &= (1 - d_i)\Pr[\theta_i \geq \theta_{if}] + d_i \Pr[\theta_i \geq \theta_{il}] \\ &= (1 - d_i)\Pr[\ln\theta_i \geq \ln\theta_{if}] + d_i \Pr[\ln\theta_i \geq \ln\theta_{il}]. \end{aligned} \tag{21}$$

Denote by K_i the amount of capital used by the agent i; because agent i is not necessarily an entrepreneur, this variable is not observed for all individuals. We therefore need to construct a measure for the agent's capital or potential capital. We use three different approaches: the first, which is presented in the main text, is to fix the capital of agent i to be the industry sample mean of the capital used by the firms in the country in which agent i operates.[19] Agents of the same country operating in the same industry therefore face the same amount of capital. This way, estimated variations in decisions can be interpreted as due to other conditions than capital constraints. The second approach (available from the authors) is to take K_i as the actual capital of the firm if the agent i is an entrepreneur. If agent i is a wageworker, K_i is taken to be a weighted average of his total labor income (including salary, allowances and benefits) topped up with the amount he would be willing to pay for an HIV test and the average industry capital of the corresponding country computed above.[20] The last approach (also available from the authors) is to take K_i as the average

[19] The capital of a firm is calculated as the three-years average of the total annual investment of this firm. A better proxy would be the yearly book value of the firm, but very few firms reported this amount.

[20] A better proxy would have been their total wealth including savings and other belongings, but our data are drawn from

capital of entrepreneurs in the same country and industry who have the same level of education as agent i. Workers with the same education operating in the same country and industry therefore have the same expected capital. The vector $[1, s_i, x_i, K_i, w_i, r_i,]'$ is the vector of observable characteristics of agent i, where w_i is the country's average wage in agent i's industry, and r_i is the borrowing interest rate in the commercial banks observed in the country in which agent i operates.[21]

From Equations (8) and (16), the expressions of $\ln \theta_{if}$ and $\ln \theta_{il}$ for agent i are given by

$$\ln \theta_{if} = \alpha \ln \left(\frac{w_i}{K_i} + r_i \right) - \alpha \ln \alpha - (1-\alpha) \ln(1-\alpha) + (1-\alpha) \ln w_i \tag{22}$$

$$\ln \theta_{il} = \alpha \ln \left(\frac{w_i}{K_i} + r_i + \frac{(1-\beta)T_i}{K_i} \right) - \alpha \ln \alpha - (1-\alpha) \ln(1-\alpha) + (1-\alpha) \ln w_i. \tag{23}$$

The available data do not contain information about the family tax, T_i, imposed on agent i. However, Equation (15) from the theoretical model indicates that $\Pi^f(\theta_i) - \Pi^l(\theta_i) = (1-\beta)T_i$. This suggests that we can approximate $(1-\beta)T_i$ with $\Delta\bar{\Pi}_i$, the industry average difference of profits between nonlocal and local firms in the country where agent i operates. Denote $Z_i = [1, S_i, X_i, K_i, w_i, r_i, d_i, \Delta\bar{\Pi}_i]'$; using Expression (20) in Equation (21) we then have[22]

$$\begin{aligned} \Pr[E_i = 1 | Z_i] &= (1-d_i)\Phi\left(\frac{\delta_{0f} + \delta_{1f} s_i + \delta_{2f} x_i - \ln \theta_{if}}{\sigma_f} \right) + d_i \Phi\left(\frac{\delta_{0l} + \delta_{1l} s_i + \delta_{2l} x_i - \ln \theta_{il}}{\sigma_l} \right) \\ &= H(Z_i, \psi), \end{aligned} \tag{24}$$

where $\ln \theta_{if}$ is given by Equation (22), $\ln \theta_{il}$ is given by Equation (23) with $\Delta\bar{\Pi}_i$ in lieu of $(1-\beta)T_i$, and $\Phi(\cdot)$ is the cumulative density function (CDF) of the standard normal. The choice function $H(Z_i, \psi)$ has the form of a convex combination of two gaussian distributions, as commonly encountered in mixture probability models. The vector of structural parameters of interest is given by $\psi = [\delta_{0f}, \delta_{1f}, \delta_{2f}, \sigma_f, \delta_{0l}, \delta_{1l}, \delta_{2l}, \sigma_l, \alpha]'$.

Given a random sample of observations of size n, $\{(E_i, Z_i), i = 1, \ldots, n\}$, the sample log-likelihood

enterprise surveys rather than household surveys and therefore do not contain this information. However, since income is likely related to savings and the amount the worker is willing to pay for a HIV test is likely correlated with their wealth, this variable gives information that reasonably differentiate workers in their capacity of obtaining capital for their business venture.

[21] These rates are available on the countries central bank websites.

[22] Note that unlike in the standard probit models, the variance parameters σ_f and σ_l are identified here because of the nonlinearity of the model in α.

function of the econometric model can therefore be written as:

$$L_n(\psi) = \sum_{i=1}^{n} \left[E_i \ln H(Z_i, \psi) + (1 - E_i) \ln(1 - H(Z_i, \psi)) \right]. \tag{25}$$

The maximum likelihood estimation is performed by numerically maximizing (25) with respect to the set of parameters $\psi = [\delta_{0f}, \delta_{1f}, \delta_{2f}, \sigma_f, \delta_{0l}, \delta_{1l}, \delta_{2l}, \sigma_l, \alpha]'$. These parameters correspond to the constant term of the ability distribution, δ_{0j}; the interaction between education and ability, δ_{1j}; the interaction between experience and ability, δ_{2j}; the standard deviation of the ability distribution, σ_j; and the productivity of capital in the production technology, α, where $j = f, l$.

A procedure to estimate the proportion of missing local African entrepreneurs can be readily derived from this setup. Our theoretical model predicts that a local wageworker i whose ability θ_i belongs to $[\theta_{if}, \theta_{il}]$ is a missing local entrepreneur (i.e., this individual is talented enough to become an entrepreneur but prefers to work as wageworker because of potential social redistributive pressures). The probability that the ability θ_i of a local wageworker i belongs to $[\theta_{if}, \theta_{il}]$ is given by

$$\begin{aligned} m_i(\psi) &= \Pr\left[\theta_{if} \leq \theta_i \leq \theta_{il} | d_i = 1\right] \\ &= \left[\Phi\left(\frac{\delta_{0l} + \delta_{1l} s_i + \delta_{2l} x_i - \ln \theta_{if}}{\sigma_l} \right) - \Phi\left(\frac{\delta_{0l} + \delta_{1l} s_i + \delta_{2l} x_i - \ln \theta_{il}}{\sigma_l} \right) \right]. \end{aligned} \tag{26}$$

In other words, for a local agent i, m_i computes the difference in his probability of becoming an entrepreneur had he faced a nonlocal's threshold rather than a local's threshold. From this equation the proportion of missing entrepreneurs in the sample of local wageworkers is estimated as

$$\widehat{m} = \frac{\sum_{i=1}^{n} m_i(\widehat{\psi})(1 - E_i) d_i}{\sum_{i=1}^{n} (1 - E_i) d_i} \tag{27}$$

where $m_i(\widehat{\psi})$ is obtained from (26) by plugging-in the parameter estimates $\widehat{\psi}$. Equation (27) therefore gives the fraction of local wageworkers who have enough talent to become entrepreneurs but are discouraged to start a business because of high family taxation.

C Estimation with different technologies for locals and nonlocals

The baseline discussion of the paper assumed that the technologies of the local firms are the same as those of the foreign firms. However, in the context of the African continent, one might suspect that foreign firms

would be structurally different from than local one, so that these differences may cloud family tax effects. To account for this issue, we reestimate the model by assuming different technologies for locals and foreigners. In particular, we allow capital elasticity to be different between these categories of firms. In addition, since foreign firms may also have a superior technology in terms of total factor productivity (TFP), we also assume different TFP for local and foreign firms technologies. The corresponding production functions are therefore defined by

$$f_j(\theta, K, L) = \theta A_j K^{\alpha_j} L^{\alpha_j}, \quad j = f, l$$

where A_j is the TFP and α_j is the elasticity of capital in firms of origin $j \in \{f, l\}$.[23] The structural estimation results are presented in Tables D6.The differences in returns to capital suggest that capital intensity is higher in foreign firms compared to local firms. Moreover, total factor productivity is also higher in foreign firms compared to local firms. However, despite accounting for these differences in technologies, the family tax is still significant for local entrepreneurs, leading to a fraction of missing entrepreneurs of 8% of the formal sector workforce.

D Additional Tables

Table D1: Firm Ownership and Size

Type	Local Firms (%)	Foreign Firms (%)	Difference
Largest shareholder/owner of the firm			
Individual/Family	97.88	80.57	-17.3***
Manager/Director	*85.12*	*73.01*	*-12.11***
Female	*11.65*	*12.59*	*0.94**
Local company	34.62	15.76	-18.85***
Foreign company	0.00	70.86	70.86***
Bank/Investment fund	1.35	3.23	1.87
Other	14.03	12.62	-1.41
Size of the firm			
Small firms (< 20)	55.25	23.53	-31.72***
Medium firms ($20 - 100$)	32.18	35.77	3.59**
Large firms (> 100)	12.57	40.70	28.13***

[23]Note that to identify the TFP, we have to drop the constant term in the specification of the log-ability distribution given

Table D2: Recruitment Channels

Channel	Local Firms (%)	Foreign Firms (%)	Difference (%)
Family/friends	63.86	41.40	-22.46***
Placement office	6.40	10.93	4.53***
Public advertisement	16.38	32.65	16.28***
Other	13.37	15.01	1.65

Table D3: Labor Force Composition by Ownership

Composition	Local Firms (%)	Foreign Firms (%)	Difference (%)
Type of worker			
Blue collar	75.08	72.16	-2.92 ***
White collar	24.92	27.84	2.92***
Supervision ratio	45.17	58.44	13.26***
Average total workforce	65.01	250.37	185.36***
Education of the workforce†			
0 - 6 years	26.9	21.8	-5.11 ***
7 - 9 years	24.3	18.8	-5.54 ***
10 - 12 years	34.5	36.6	2.08
$>$ 12 years	14.2	22.8	8.55***
Education of production workers			
0 - 6 years	41.8	31.3	-10.50***
7 - 9 years	48.6	53.8	5.21**
10 - 12 years	6.1	11.1	4.99***
$>$ 12 years	3.6	3.8	0.21

† This question was only asked in countries surveyed between 2002 and 2005

Table D4: Descriptive Statistics of Variables Used in the Regressions

Variables	Mean	Median	Std Dev	Min	Max
Local firm (dummy)	0.81	1	0.39	0	1
Total sales per employee ($ thousands)	33.48	9.03	157.18	0.00	8,863
Labor to capital ratio ($)	3.09	0.00	45.61	0.00	2,665
Frac. of production workers	0.78	0.80	0.18	0.00	1.00
Net book value of capital ($ millions)	1.63	0.05	12.10	0.00	425
Export (dummy)	0.16	0.00	0.36	0.00	1.00
Age of the firm (years)	16.12	11.00	15.52	0.00	128
Firm location(dummy)	0.58	1.00	0.49	0.00	1.00
ISO certification (dummy)	0.18	0.00	0.38	0.00	1.00
Training program (dummy)	0.34	0.00	0.48	0.00	1.00
Overdraft/credit facilities (dummy)	0.42	0.00	0.49	0.00	1.00
Experience of top manager (years)	13.07	10.00	10.05	0.00	68.0
Unqualified workforce is a major constraint (dummy)	0.14	0.00	0.35	0.00	1.00
Working capital is 100% internal(dummy)	0.27	0.00	0.45	0.00	1.00
Credit is a major constraint (dummy)	0.28	0.00	0.45	0.00	1.00

Table D5: Structural Estimates with a Redefinition of Local Firm

Type	Parameter	Name	Whole sample	Better solidarity	Worse solidarity	Difference Pvalue
Nonlocals	Log ability - constant	δ_{0f}	-0.0841	-4.7149	0.7055	0.0000
			(0.1968)	(0.0154)	(0.0813)	
	Log ability - education	δ_{1f}	0.4401	2.0109	0.2999	0.0000
			(0.0008)	(0.0006)	(0.0082)	
	Log ability - experience	δ_{2f}	0.2260	0.2344	0.0938	0.0000
			(0.0476)	(0.0004)	(0.0013)	
	Stand. dev. for ability	σ_f	1.3278	2.3999	0.5234	0.0000
			(0.0013)	(0.0002)	(0.0037)	
Locals	Log ability - constant	δ_{0l}	-0.2505	3.1923	-0.8688	0.0000
			(0.0078)	(0.0188)	(0.0815)	
	Log ability - education	δ_{1l}	0.6350	0.8440	0.1317	0.0000
			(0.0001)	(0.0059)	(0.0132)	
	Log ability - experience	δ_{2l}	0.3494	0.1322	0.6316	0.0000
			(0.0964)	(0.0024)	(0.0026)	
	Stand. dev. for ability	σ_l	2.5976	3.8250	3.4894	0.0000
			(0.0000)	(0.0010)	(0.0021)	
All	Capital returns	α	0.4709	0.1648	0.6954	0.000
			(0.0069)	(0.0009)	(0.000)	
	Log-likelihood		-0.2825	-0.2675	-0.2706	
	Frac. missing entrep.	m	0.1259	0.0841	0.1742	0.000
			(0.0034)	(0.0043)	(0.0053)	

Standard errors in parenthesis

Table D6: Structural Estimates with different technologies

Type	Parameter	Name	Whole sample	Better solidarity	Worse solidarity	Difference Pvalue
Nonlocals	Total factor productivity	A_f	1.1304	1.0256	1.3360	0.0092
			(0.0815)	(0.0439)	(0.1671))	
	Log ability - education	δ_{1f}	0.8980	0.9135	0.7524	0.0110
			(0.1140)	(0.0461)	(0.0502)	
	Log ability - experience	δ_{2f}	0.1234	0.1501	0.0278	0.0001
			(0.0091)	(0.0092)	(0.0171)	
	Stand. dev. for ability	σ_f	1.1992	1.3011	1.2862	0.0001
			(0.1371)	(0.0028)	(0.0076)	
	Capital returns	α_f	0.2981	0.2922	0.3385	0.0001
			(0.0433)	(0.0137)	(0.0762)	
Locals	Total factor productivity	A_l	0.4536	1.0041	1.1987	0.2011
			(0.1685)	(0.0047)	(0.2429)	
	Log ability - education	δ_{1l}	0.4896	0.4987	0.0759	0.0001
			(0.0418)	(0.0237)	(0.0047)	
	Log ability - experience	δ_{2l}	0.6593	0.9032	0.5647	0.0023
			(0.3186)	(0.1301)	(0.0511)	
	Stand. dev. for ability	σ_l	2.2901	2.9952	2.0642	0.0001
			(0.2618)	(0.0151)	(0.0026)	
	Capital returns	α_l	0.2789	0.2697	0.3026	0.0001
			(0.0353)	(0.0130)	(0.0701)	
	Log-likelihood		-2.4812	-2.3703	-2.1534	
	Frac. missing entrepreneurs	m	0.08013	0.0710	0.1189	0.000
			(0.0018)	(0.0017)	(0.0024)	

Standard errors in parenthesis