A Rural-Urban Comparison of Manufacturing Enterprise Performance in Ethiopia*

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November 2009

Abstract:

Manufacturing enterprises in rural and urban Ethiopia are compared to examine how location and investment climate characteristics affect performance. Urban firms are larger, more capital intensive and have higher labor productivity than rural firms. The rural-urban gap in labor productivity is due to differences in capital intensity and total factor productivity. There is no strong evidence of increasing returns to scale. The hypothesis that firms in rural towns have the same average total factor productivity as urban firms is not rejected, however firms in remote rural areas are less productive. Rural firms grow less quickly than urban firms. These results can partly be attributed to differences in the quality of infrastructure, access to credit and transportation costs across rural and urban areas. Since rural firms operate in a business environment that is very different from its urban counterpart, lessons derived from urban investment climate surveys cannot immediately be transferred to rural areas.

Key words: Non-farm enterprises, Market Integration, Investment Climate, Africa, Ethiopia

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* We would like to thank seminar participants at the 2008 Oriel College Oxford Joint Academic Forum on Economics and Finance and the Centre for the Study of African Economics Conference on Economic Development in Africa, attendants of the World Bank's Social Protection and Poverty Reduction Unit's Brown Bag Lunch, four anonymous referees, as well as Magdi Amin, Kathleen Beegle, Paul Collier, Louise Cord, Mary Hallward-Driemeier, Louise Fox, Cornelius van der Meer, Pierella Paci, Peter Lanjouw, Ana Revenga and especially Francis Teal for useful comments. Financial support from the Research Committee of the World Bank, the Swedish Development Agency, the Prins Bernhard Cultuurfonds and the Herbert and the Ilse Frankel Memorial Fund at Oriel College, Oxford University is gratefully acknowledged. The views expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

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1.Introduction

Location and institutions are increasingly recognized as crucial determinants of economic performance (reflected, for example, in the World Bank's 2009 World Development Report on Economic Geography and the New Economic Geography's rise to prominence, summarized by Venables 2008). This burgeoning interest in location and institutions has also manifested itself in the growing literature on the impact of the investment climate on firm performance (see e.g. Dollar et al., 2005, World Bank, 2005a), which attempts to explain spatial disparities in economic outcomes by variation in the geographical, institutional and regulatory environment in which firms operate.[1] Dollar et al. (2005) have demonstrated a strong association between firm performance and the quality of the investment climate; productivity and growth are correlated with infrastructure quality (e.g. access to electricity), export bottlenecks (e.g. days to clear customs) and access to finance (e.g. having an overdraft facility). Conversely, cities with lower customs clearance times, reliable infrastructure, and good financial services attract more foreign investment. At the macro level growth rates are highly correlated with the degree of trade integration. A better investment climate thus seems to promote international economic integration and stimulate growth (Dollar et al., 2006).

Almost all the work on the investment climate thus far has focused on relatively large manufacturing firms in urban areas (notable exceptions include Kinda and Loening, 2010, Deininger et al. 2007, and Jin and Deininger, 2009). Because of a lack of data (Cook and Nixson, 2000, Ayyagari et al., 2003), relatively little is known about the determinants of rural non-farm enterprise performance. It is therefore not clear to what extent the conclusions derived from urban investment climate surveys of relatively large manufacturing firms generalize to rural firms, which tend to be smaller. Yet, diversification beyond agriculture is often considered a promising pathway out of poverty for impoverished rural economies and there is a widespread belief that small enterprises may play an important role in especially the early stages of diversifying beyond agriculture (see the discussions in Barret et al, 2001, Lanjouw and Lanjouw, 2001, Reardon et al., 2000).

This paper attempts to fill this knowledge gap and compares and contrasts the performance of rural manufacturing enterprises in Ethiopia with their urban counterparts, in order to examine how location and certain investment climate characteristics (e.g. transport facilities, access to credit and the availability of utilities) affect enterprise performance, and hence income earning opportunities for entrepreneurs and employees. Location and the investment climate affect firm performance through their impact on efficiency of production and costs, and through their impact on the entrepreneur's operative decisions (involving input choices, technology adoption and enterprise size, for example). As is clear from our data, rural and urban firms differ in several respects, e.g. technology choice and size. Our comparative analysis sheds light on the overall effects of location and investment climate on the income earning opportunities associated with small-scale manufacturing, some of which operate through decisions made by the entrepreneurs while others affect performance more directly.[2]

This paper takes advantage of two recent and largely comparable rural and urban investment climate surveys: the Ethiopian Rural Investment Climate Survey (RICS) and the Ethiopian Enterprise Survey (EES) respectively. Both surveys were conducted as a basis for a Rural and Urban Assessment of the Investment Climate in Ethiopia, in cooperation with Ethiopian institutions and with technical support from the World Bank. Though small differences in survey design and sampling strategies exist, these surveys are standardized and contain common questions regarding basic enterprise characteristics, the constraints facing the entrepreneur, output and input usage. As a result, they greatly facilitate direct comparisons between rural and urban firms.

We focus on one type of activity only, namely manufacturing. Manufacturing growth is one way by which diversification beyond agriculture can be achieved; hence the performance of this sector is of interest in and of itself. Moreover, the manufacturing sector is a useful vehicle for examining the role of the investment climate, as firms in this sector are intensive users of investment climate services (Collier, 2000). While firms engaging in trade and services account for a larger share of both rural and urban GDP than manufacturing firms do (only an estimated 13% of Ethiopian GDP is industrial), the set of trading and services activities is also much more diverse and thus does not lend itself as easily to a rural-urban comparison. To further enhance comparability, we focus predominantly on comparing rural manufacturing firms, which tend to be small and informal, with *small informal* urban firms. As pointed out by Jin and Deininger (2009) using similar data from Tanzania, these groups of firms are fairly similar with respect to the basic technology used and the products produced.

Ethiopia provides a relevant context to examine the impact of location on firm performance, since the Ethiopian economy is characterized by high levels of market fragmentation and limited international economic integration. According to the World Bank *"Sheer remoteness and isolation epitomizes life in rural areas"* (World Bank, 2005b, p.69). In addition, reducing remoteness through improvements in transport facilities is considered a promising method to stimulate diversification beyond agriculture according to Plan for Accelerated and Sustained Development to End Poverty (PASDEP), Ethiopia's guiding strategic development framework.

We contribute to the literature in various ways. To start with, although a large literature is concerned with rural-urban disparities in economic outcomes such as income inequities (see, for example, Skoufias and Katayama, 2009), few studies have used firm-level and investment climate data to examine the determinants of these disparities. To our knowledge this is the first study that systematically compares and contrasts the performance of rural and urban firms within a single country using investment climate data.[3] Most of the available evidence on rural entrepreneurship is based on household surveys. Since the Ethiopian RICS contains very detailed information on both firms and the business environment in which they operate, it constitutes a significant improvement over previous household surveys. The RICS enables us to fill a knowledge gap, since information on even the most basic characteristics of the Ethiopian non-farm enterprise sector was either non-existing or uncertain hitherto (Günter and Olapade, 2007). Secondly, increased variation in key investment climate variables enables us to better estimate to what extent differences in enterprise performance are driven by variation in the investment climate characteristics: since most rural firms hardly grow, it would be difficult to identify the determinants of enterprise success on the basis of the rural data alone. The rural-urban comparison thus helps analyze the impact of the investment climate on firm performance. Thirdly, by using investment climate data to analyze the role of institutions as determinants of within-country differences in economic outcomes, we respond to the observation by Acemoglu and Dell (2009) that systematic measurement and empirical investigation of institutions and public goods at the subnational level is an important area for future research. Fourthly, by studying firms and assessing the empirical relevance of some of the mechanisms often highlighted in theoretical models of spatial disparities in economic outcomes, such as increasing returns to scale and agglomeration effects (see e.g. Romer, 1987, Krugman, 1998), we aim to provide a complementary perspective on the New Economic Geography Literature.

The findings of this paper are expected to be of interest for policymakers concerned with poverty alleviation and promotion of private sector development. Understanding the determinants of small enterprise performance is important since such firms account for the bulk of non-agricultural employment in Sub-Saharan Africa (ILO, 2002). Ethiopia's Central Statistical Agency (CSA) estimates that informal microenterprises alone account for 50.6% of all urban employment in Ethiopia (CSA, 1999). How productively labor is employed in such small enterprises is the chief determinant of the incomes earned by those working in these enterprises. How much they earn working in these enterprises in turn critically affects their welfare, since labor is the most important asset of the majority of the population. By assessing the determinants of firm productivity and firm growth, we hope to help facilitate the identification of policy levers to stimulate private sector development and the creation of productive employment opportunities. Moreover, by documenting how constraints vary across space and across different types of firms, we aim to aid policymakers tailor policy interventions to local circumstances.

This paper is organized as follows. The next section reviews related literature and presents our hypotheses. Section 3 describes the data, presents summary statistics and nonparametric analysis of the non-farm enterprise data. Our empirical framework and results for modeling productivity and growth are discussed in Section 4. A final section concludes.

2.Related Literature

The idea that geographic concentration of economic activity and market integration can enable more efficient production is well-established (for overviews of related literature, see World Bank 2009, Krugman 1998, Venables 2008). To begin with, geographic concentration typically leads to larger markets, which may enable firms to operate at a larger scale and to exploit internal economies of scale (Romer, 1987, Krugman, 1991). The empirical evidence for the existence of increasing returns to scale among African firms is weak, however; studies using manufacturing data generally cannot reject the hypothesis of constant returns to scale, nor that of homotheticity. Surveying the empirical literature, Tybout (2000) argues that there are no large unexploited scale economies in the manufacturing sectors of most developing countries.[4] Tybout nevertheless points out that market size may be an important determinant of the scale at which firms operates, since low levels of economic density and interaction may lead to small, diffuse pockets of demand, which in turn result in small, localized production. Consistent with the idea that larger markets allow firms to operate at a larger scale, Fafchamps and Shilpi (2003) find that the number and size of non-farm enterprises in rural communities in Nepal are positively correlated with proximity to markets. Similarly, Haggblade et al. (2007) argue that growth of rural non-farm enterprises can only be achieved by promoting the production of "tradeables" as increased production of "nontradeables" will merely result in downward price pressure on such "nontradeables" due to oversaturation of local demand.

Moreover, urban firms may benefit from agglomeration economies. Larger markets typically result in thicker markets for capital, labor and material inputs (see e.g. Fujita, Krugman and Venables, 1999), which may affect firms' factor choices. Furthermore, firms may benefit from external economies such as knowledge spillovers, and reduced transaction costs. Of course, concentration may also bring disadvantages such as congestion and increasing land rents (Krugman, 1998). In addition, larger and thicker markets may enable firms to choose a different technology altogether (see e.g. Jones, 2005 and the discussion in Baptist, 2008). Clustering of economic activity can also yield dynamic benefits, such as increased innovation (see e.g. Matsuyama, 1991). More subtly, thicker markets may reduce the scope for opportunistic behavior. Thin markets may result in higher levels of market power, which may reduce investment and discourage predatory behavior (Collier and Venables, 2008).

Moreover, the average cost of supplying public goods to thin markets is typically high since the provision of such goods is often subject to economies of scale (Collier and Venables, 2008). The rural investment climate pilots launched by the World Bank indeed suggest that commercial finance, infrastructure development, business, and government services are weaker in rural areas as a result of the relatively high cost of these services, which in turn appears related to low population density, low levels of economic development, and the slow penetration of commercial activities (World Bank, 2006). Rural enterprises are thus likely to operate in less favorable, fragmented business environments.

Turning to the literature on manufacturing firm performance in Sub-Saharan Africa, a striking finding is the skewness of the size distribution; most manufacturing firms are small. As in many other African countries, in Ethiopia the small enterprise sector is the fastest growing segment of the private sector, due to rural-urban migration and limited labor absorption by larger firms (World Bank, 2009, Bigsten et al., 2008). The skewness of the size distribution matters since size is strongly correlated with success; larger firms are more likely to survive, use more capital per worker, are more productive, pay higher wages to workers with similar observable characteristics and are more likely to break into export markets (Teal, 2007). The evidence on the association between firm-size and firm growth is mixed, however (see the discussion in Bigsten and Söderbom, 2006). Van Biesebroeck (2008) uses manufacturing data from nine African countries including Ethiopia and demonstrates that, conditional on other covariates, large firms grow the fastest. Bigsten et al. (2008), however, use manufacturing data from Ethiopia and show that small firms grow the fastest.

Another salient feature of manufacturing firms in Sub-Saharan Africa is the heterogeneity in their performance not only across, but also within countries (see Bigsten and Söderbom, 2006). There is some evidence that such heterogeneity is the result of differences in the investment climate. Firms with better access to electricity have higher levels of productivity and grow faster (Dollar et al., 2005). Enterprises in urban areas generally grow faster than those in rural areas (McPherson, 1996, Bigsten et al. 2008, Nichter and Goldmark, 2009). Access to credit is also often considered an important determinant of firm performance (see e.g. Nugent, 1996). The empirical evidence on the existence of credit constraints is mixed,[5] and some authors argue that the performance of the majority of microcredit programs has been disappointing (see e.g. Morduch, 1999 for an overview of the literature and Cotler and Woodruff, 2008, Akoten et al., 2009 for recent empirical analyses). In addition to the investment climate and firm characteristics, the characteristics of the entrepreneur are strongly correlated with firm performance (see e.g. Ramachandran and Shah, 1999).

2.2 Hypotheses and approach

Our discussion of the related literature suggests that urban areas are likely to be more conducive to efficient production and enterprise growth since urban markets are better integrated and the quality of urban public infrastructure is likely to be better. Rural firms are likely to face severe constraints, such as poor infrastructure and limited public services. These may result in high transaction costs restricting trade.

Consequently, one may expect rural firms to be smaller, to face less competition, to be less likely to grow, innovate and invest. Moreover, one would expect urban areas to have higher labor productivity due to a combination of increasing returns to scale, higher total factor productivity (agglomeration externalities) cheaper inputs and possibly different technologies.

Our approach is to investigate if there is any support in our data for these hypotheses. We document differences in enterprise performance and the investment climate across rural and urban areas and analyze to what extent differences in enterprise performance across locations are associated with differences in the rural and urban investment climate, notably with differences in utilities usage, access to credit and availability of transport facilities. We first focus on static characteristics before turning to an analysis of spatial differences in growth patterns.

3. Data & Descriptive Statistics

3.1 Data

This paper draws on the most recent Ethiopian rural and urban investment climate assessments. The rural data are from the 2007 Rural Investment Climate Survey Amhara (RICS-Amhara), which is representative of four zones of the Amhara region comprising about half of Amhara's population (18 million).[6] The RICS-Amhara covered 2,900 households, 760 enterprises and 180 communities. In order to be able to analyse how the performance of the non-farm enterprise sector is affected by agricultural outcomes, the RICS-Amhara was augmented with wereda (i.e. district) level indicators of predicted agricultural performance based on rainfall information, using a subsample of the National Oceanic and Atmospheric Administration's Africa Rainfall Estimates Climatology dataset 1995-2006.[7] Although Loening et al. (2008) show that results obtained for Amhara are fairly similar to those obtained for Ethiopia at large, it should be borne in mind that Amhara is not a representative region.

The urban data are drawn from the Ethiopia Enterprise Survey (EES) which was carried out by the Ethiopian Development Research Institute (EDRI) in mid-2006 and covered 14 major cities located in seven regions of Ethiopia, with approximately half of the data coming from Addis Ababa (see Mengistae and Honorati (2009) for more information). The EES comprised a survey of 360 manufacturing firms, supposed to employ at least five employees, as well as a survey of 126 micro-enterprises, 84 of whom were engaged in manufacturing activities, supposed to exclude firms with five employees or more. The former group of firms are referred to as "large" enterprises, while firms in the microenterprise survey are referred to as "small" enterprises. In practice, due to measurement error and changes in size in between being documented in the registry and the timing of the survey, these size boundaries were not strictly adhered to when administering the survey.[8] The surveys mainly differ in sampling frame. For the large manufacturing firms, the national manufacturing census provided the sampling frame whereas informal firms were sampled by means of direct enumeration in key urban clusters such as the Merkato, Addis Ababa's central market. That is, enumerators visited all informal firms within certain pre-defined geographical areas. Firms without a fixed business location are not covered in the data, which may bias our sample towards including the more established and possibly larger and more capital intensive firms. Within the rural survey, we distinguish between firms in rural towns and those not located in rural towns, which we shall refer to as firms located in remote rural areas. Rural towns are small towns (they have fewer than 10,000 inhabitants) and are often rural trading centers. Remote rural areas is used to refer to rural areas that are not towns.

Consistency in the definition of variables is important for the rural-urban comparison to be accurate. Here, we briefly discuss the construction of the most important variables. See the Appendix for more details and more variables. To start with factors of production, we measure labor inputs in terms of the "full-time equivalent" number of employees, since the high seasonality of rural enterprise activity renders the total number of workers a misleading indicator of total labor input. We use the replacement value of equipment as our measure of the capital stock. For urban manufacturing microenterprises this variable was imputed on the basis of expenditure data on rented capital. Of course, inaccurate imputations may bias the regression results. Fortunately, our estimates turned out to be rather robust to using different imputations of the capital stock.[9]

3.2 A Bird's-Eye view of rural and urban enterprise activity

This section provides an overview of enterprise activity in rural and urban areas in Ethiopia. We first discuss salient enterprise characteristics, before proceeding to assess differences in the investment climate.

3.2.1 Salient Enterprise Characteristics

Table 1 documents summary statistics on key enterprise characteristics, and reveals large differences in size, factor usage, and productivity across space. These differences are further illustrated by graphs 1-4 which plot kernel density estimates of the sample distributions of size, capital per worker, inputs per worker and value added per worker, respectively. Starting with differences in size, graph 1 illustrates that there are virtually no large firms in rural areas, while relatively large-scale activity is common in urban areas.[10] Urban microenterprises are also larger than rural firms on average. This finding partly reflects the high seasonality of rural non-farm activities (see Loening et al., 2008; recall that we define size on the basis of the full-time equivalent workforce). Secondly, urban firms use more capital and more inputs, both in absolute terms and relative to the number of people they employ. Thirdly, they produce more output per worker, though the relative dispersion of labor productivity is much higher in rural areas (see graph 4), perhaps because of a lack of competitive pressure.

Graphs 5-7 plot the log of the capital labor-ratio, the log of input usage per worker and the log of value added per worker versus the log of firm-size, respectively. Across samples, capital intensity and inputs usage per worker are positively correlated with size, consistent with the relationship between scale and factor intensity and labor productivity documented for urban firms for a variety of African countries (see e.g. Söderbom and Teal, 2004, or Teal, 2007). However, for microenterprises in both rural and urban areas, the correlations between factor intensity and size are insignificant, perhaps because the size range spanned by the microenterprise category is limited. Thus, the positive correlation between firm-size and factor-intensity is predominantly driven by between, rather than within-sample variation. Nevertheless, we find sizeable differences in factor intensity across rural and urban areas when focusing on firms in the same size category; for example, the median capital intensity of urban microenterprises is approximately 15 times the median capital intensity of enterprises located in rural towns. In both rural and urban areas, capital intensity and material inputs usage per worker are positively correlated with value added per worker.

Apart from differences in size, factor intensity, and value added per worker, there are marked differences in the composition of the workforce; rural firms employ more women and rural managers are typically poorly educated, while managers of urban firms typically have at least a high school degree. Rural non-farm enterprises rely almost exclusively on unpaid household labor, while such labor only accounts for a small minority of the workforce in urban areas. In other words, rural enterprises provide self-employment opportunities, while urban enterprises provide wage labor opportunities. The vast majority of urban enterprises are exclusively managed by men, while most rural enterprises are headed by women. Enterprises operating in rural towns are especially likely to be managed by a woman. In addition, the diversity of manufacturing activities is much larger in urban areas and the activities urban firms engage in often require more skill and expertise. For example, the urban sample contains firms making plastic bags, whereas most rural enterprises use labor-intensive traditional technologies to produce “Z-goods”, i.e. simple household manufactures geared towards sale on the local market, and unlikely to be tradable outside the local community (see e.g. Hymer and Resnick, 1969; and Ranis and Stewart, 1993).

3.2.2 The investment climate

Table 2 provides descriptive statistics on the investment climate for firms in different locations, which suggest that rural markets are highly fragmented. Rural firms almost exclusively sell to local markets, supplying goods for local consumers, whereas urban firms cater for larger markets, typically selling to other firms or traders. More than 70% of the rural enterprises indicate private individuals (i.e. consumers) are their most important customer, while the corresponding proportion of large enterprises indicating that private individuals are their main customers is 40%. Some urban firms even export.

Rural markets are thin. More than three quarters of all manufacturers in remote rural areas report not facing any competition. In rural towns 58% of all enterprises report not facing any competition, whereas in urban areas only 2% of all manufacturers face no competition. The lack of competition may help explain why the relative dispersion of productivity is much greater in rural areas, as shown in graph 4.

Firms in urban areas also have much better access to utilities and credit than rural firms, with firms in remote rural areas having the least access. Taking electricity as an example, none of the manufacturers located in remote rural areas use electricity, while in rural towns 19% of all firms use electricity. In urban areas, the situation is very different, with 87% of all microenterprises, and virtually all large enterprises, using electricity. Moreover, the reliability of electricity supply is better in urban areas. The urban investment climate thus generally seems more favorable than its rural counterpart; yet rural non-farm enterprises enjoy some advantages over urban ones, such as facing less regulation.

As documented in Table 3, according to firm managers, markets, credit, transport and electricity are the most pressing problems in rural areas, with transport being less of a constraint in rural towns. In urban areas access to finance and land, taxes and competition are considered the most important constraints (see the Appendix for details on how comparability across surveys was ensured). The importance of different constraints also varies with firm size.[11]

4.Empirical Strategy and Results

4.1 Correlates of Productivity

4.1.1 Model & Estimation Strategy

To compare and contrast the performance of rural and urban enterprises and to examine how the investment climate impacts on productivity a standard Cobb-Douglas production function approach is used; $V = AK^{\beta_K} L^{\beta_L}$ where value-added *V* is modeled as a function of capital, *K*, labor inputs, *L*, and total factor productivity (TFP), denoted *A*, which is in turn modeled as a function of enterprise characteristics, *E*, such as its sectoral affiliation, location, characteristics of the management, and investment climate characteristics, *IC*, i.e. A = exp($\beta_E E$ + $\beta_{IC} IC$). After taking logs and adding an error term our estimable equation becomes:

$$\ln V = \beta_K \ln K + \beta_L \ln L + \beta_E \mathrm{E} + \beta_{IC} \mathrm{IC} + v$$

where *v* is a zero-mean random error term, assumed to be uncorrelated with the regressors in the model. [12] A key objective is to examine to what extent the differences in productivity can be attributed to increasing returns to scale, and differences in TFP and factor intensity. If internal economies of scale are important, one would expect the sum of the coefficients on capital and labor to be larger than one (i.e. $\beta_K + \beta_L > 1$). The β_{IC} coefficient vector can be interpreted as measuring the impact of different investment climate characteristics on total factor productivity.

This approach has well-known limitations. We focus on the direct impact of the investment climate on firm productivity across rural and urban areas, however the investment climate may also impact on allocative efficiency (see e.g. Mengistae and Honorati, 2009).[13] Measurement errors in explanatory variables or omitted variables may lead to biased estimates of the productivity differentials. For example, despite having a rich and detailed dataset, we cannot control for potentially important variables such as price differences.[14] In principle, such endogeneity problems could be remedied by means of instrumental variable estimation but, unfortunately, credible instruments are not available in our data.[15] Using the same dataset on rural enterprises as in the present paper, Loening et al. (2008) check for the potential impact of endogeneity by using local rainfall as a proxy for unobserved demand for non-farm goods, on the grounds that most buyers of non-farm products in rural markets are farmers, and their income is heavily influenced by rainfall. They find the rainfall variable to be significant when included in the production function, yet its inclusion does not lead to marked changes in the coefficients on the factor inputs for the rural sample. This suggests that the magnitude of potential endogeneity bias is likely to be small. Moreover, there is very little variation in inputs over time, despite frequent shocks. This suggests non-farm enterprises in rural areas do not change their inputs very much in response to demand shocks. Thus, endogeneity may not be such a big problem, in terms of leading to bias in the OLS estimator. In addition, the available evidence suggests that a rich set of controls may go a long way towards controlling for unobserved productivity. For example, using data on mostly small manufacturing firms in Ghana, Söderbom and Teal (2004) report instrumental variable estimates of production function parameters that are very similar to their OLS counterparts.

To check whether the endogeneity of inputs is indeed not a major issue, we compute factor shares using the Solow method, a non-parametric procedure to obtain output elasticities, and compare them to our estimated production function parameters. Under the assumption of constant returns to scale and perfectly competitive markets, β_K and β_L are equal to the shares of capital and labor costs, respectively, in total costs (see Hall, 1990 and Escribano and Guasch, 2005). That is:

$$S_K = \frac{\mathrm{rK}}{\mathrm{rK} + \mathrm{wL}} = \beta_K$$

$$S_L = \frac{\mathrm{wL}}{\mathrm{rK} + \mathrm{wL}} = \beta_L$$

where S_K is the capital cost share and S_L is the labor cost share. If these assumptions hold, the average of these capital-input and labor shares should not differ from the capital- and labor-output elasticities estimated by means of OLS.[16] If they differ, this is a sign that endogeneity *may* be a problem, although it might also be that the assumptions of constant returns and perfect competition are false.

4.1.2 Empirical Specifications and Results

In Table 4 we present value-added production functions estimated on separate samples of large urban firms (columns 1 and 4), small urban firms (columns 2 and 5), and rural firms (columns 3 and 6). In columns 1-3 the explanatory variables are the log of the capital stock, the log of the labor force measured as the equivalent number of full-time employees, activity dummies and the gender of the manager. For rural firms we also add a dummy indicating whether or not a firm is located in a rural town.[17] In columns 4-6, we add variables measuring the proportion of firms in a given community that consider a particular constraint – utilities, transport and credit - "a major problem", in order to gauge the impact of the investment climate. This procedure ensures that our investment climate proxies are constant across similar types of firms in each community and has the additional advantage of mitigating endogeneity bias by smoothing the data (Escribano and Guasch, 2005).

Consider first the estimated capital and labor coefficients. The capital coefficient is marginally higher for rural than for urban firms, while the labor coefficient is marginally lower for small urban firms than for the other categories. On balance, and taking into account the size of the standard errors, we would argue however that the estimated labor and capital coefficients are similar across the different types of firms. Moreover, the evidence for increasing returns to scale is weak at best. The parameter estimates for both large urban firms and small urban firms imply decreasing returns to scale, though constant returns scale are not rejected in each subsample. When we pool all urban firms, we find evidence of mildly increasing returns to scale, but again, constant returns to scale cannot be rejected.[18] Similarly, constant returns to scale cannot be rejected for rural firms, even though the parameter estimates imply mildly increasing returns to scale.

The negative and significant coefficient on the gender dummy in column 3 suggests that there is a negative productivity premium associated with female management in rural areas. The productivity premium loses its significance once investment climate controls are included (see column 6). This suggests that firms managed by women are more likely to operate in poor business environments than firms managed by men. One possible explanation this finding is that women in such environments face discrimination or that they lack alternative labor market options. Consistent with this hypothesis Shiferaw (2009), using the Ethiopian manufacturing census data, finds that female owned firms, while being less likely to grow, are less likely to exit than their male counterparts. McPherson (1996) found that female-run firms in South Africa, Swaziland and Botswana grew more slowly than those operated by males, but found no significant association between the gender of the manager and growth in Zimbabwe and Lesotho.

To what extent might these findings be driven by endogeneity? As discussed in section 4.1.1, Loening et al. (2008) argue that endogeneity is unlikely to be a major issue for the rural data. For the urban data, we have information on expenditure on rental capital and the wage bill, which we use to compute Solow shares.[19] For the largest subsample, the sample of large firms, the averages of these Solow shares are reasonably close to the parameter estimates we obtain by means of OLS. For urban microenterprises, the discrepancies between estimated capital and labor shares and Solow shares are also modest; the average Solow share on labor is .06 points larger than the estimated labor-output elasticity and the Solow share on capital is .07 points larger. All Solow shares are within the 95% confidence interval for our parameter estimates. Thus, it could be that endogeneity is a problem in the urban data, but that the resulting bias is unlikely to be large. Unfortunately, there is little we can do probe this issue further with the available data, since credible instruments for capital and labor are not available.

Turning to the investment climate variables, the results in columns 4-6 suggest that problems with accessing credit are associated with significantly lower productivity for firms in rural areas as well as for large firms in urban areas. For transport and utilities constraints, the null hypothesis that they do not matter is never rejected. Some investment climate constraints have the "wrong" sign; for example, the severity of transport problems is positively correlated with the productivity of small firms, though not statistically significantly so. As pointed out by Carlin et al. (2006), one has to be careful when interpreting self-reported investment climate variables. For example, subjectively reported credit constraints might well be endogenous to firm performance. It could be that financial institutions locate near productive enterprises. Alternatively, they may only provide credit to the most productive enterprises. Similarly, productive firms that have plans to expand the scale of their operations may be relatively more likely to perceive transport facilities a constraint than relatively less productive firms.

The fact that the estimated coefficients on capital and labor vary little between rural and urban firms enables us to pool the data. Moreover, it allows us to test how TFP varies across locations as a result of differences in investment climate characteristics such as access to credit, transport facilities and utilities. We focus on the group of small urban firms only as this seems to be the most appropriate comparison group for the rural firms. Pooled regressions are presented in Table 5. In column 1, we test whether the data can indeed be pooled by interacting factors of production with a dummy for being located in a rural area. These interaction terms are jointly and individually insignificant, hence the null hypothesis that rural firms and small urban enterprises have the same capital- and labor-output elasticities is not rejected. We have to bear in mind, however, that our estimates are not very precise which may undermine the power of our testing strategy. In column 2, we present the pooled baseline specification, which includes controls for capital, labor, sector and the gender of the manager, and add location dummies for being located Addis Ababa or in another major city. The omitted category is that of observations for which such information is missing (these are all urban firms). A striking finding here is that the coefficient estimate on being located in a rural town is very similar to the coefficient estimate on being located in another major urban area or even in Addis Ababa, which suggests that the benefits of agglomeration are concavely related to city-size. In other words, productivity levels of firms in rural towns are not very different from those in urban areas, but firms in rural remote areas are much less productive than firms located elsewhere. In column 3 we specify the model so as to more explicitly highlight the difference between rural remote location and location in less isolated areas. Thus we exclude dummies for being located in an urban area or being in rural town, defining the omitted category as the group of firms located in either a rural town or an urban area. The estimated coefficient on rural remote location in this specification is equal to -0.48 and is significantly different from zero at the 5% level. This suggests that firms located in remote rural areas are significantly less productive than firms located in rural towns or in urban areas.

Columns 2 and 3 enabled us to examine “raw” differences in total factor productivity across space since they only include location dummies, but no investment climate proxies. In columns 4 and 5, we attempt to unpack these differences in TFP by adding controls for utilities usage (both columns) and investment climate constraints (column 5 only). The results indicate that differences in utilities usage across space help explain the TFP differences across space. Firms which use electricity are more productive than firms which do not, while experiencing power outages is associated with lower productivity (the latter effect, however, is not significantly different from zero at conventional levels).[20] These findings are consistent with the available cross-country evidence on the impact of the investment climate on firm-performance (see e.g. Dollar et al., 2005). The results shown in column 5 indicate that poor access to credit is associated with low productivity.[21] Finally, we note that the inclusion of variables measuring utilities usage and business constraints mitigates, but does not eliminate, the negative effect of remote rural location on productivity, which remains significant at least at the 10% level. Thus, variation in the local investment climate, as measured by our proxy variables, cannot fully explain why being located in a remote rural area is associated with relatively low productivity.

Taking stock of the results thus far, we have seen that there are major differences in terms of capital intensity, factor usage and labor productivity across firms in different locations. By contrast, differences in the magnitude with which capital and labor impact on output are surprisingly small and returns to scale are modest at best, suggesting that differences in output per worker are driven by capital intensity and TFP differentials. The documented pattern of TFP differentials furthermore suggests that the TFP gains from market integration are highest at low levels of integration. TFP differentials were shown to be correlated with utilities usage and access to credit. In sum, our results suggest that scale matters, but not because of returns to scale.

4.2. Growth

The large differences in the rural and urban size distributions suggest that the rural investment climate does not favor factor accumulation and growth. Comparing the average annual employment growth rates of rural and urban firms in terms of the number of workers corroborates this; whereas urban microenterprises grow some by 5% each year on average, and large urban firms grow on average 9% each year, the rural enterprise average growth rate is 0%.[22] In addition, rural enterprises are much less likely to invest, which is consistent with their lower capital intensity.

Tables 6A and 6B present growth matrices of rural and urban firms. Since our samples are selected on the basis of their current size, it would be unwise to use these matrices to examine the probability of a firm of a certain size at start-up, with, say, one worker, growing into a firm of a given size, say in between 10 and 20 employees. However, we can use the transition matrices to evaluate how many employees a firm of a given current size employed when it started.[23] It is important to keep in mind that these results, as well as those for the subsequent growth regressions, are conditional on firm survival. The matrices confirm that rural firms are stagnant, while there is more mobility across size categories in urban areas. Examining transitions by firm cohort demonstrates that a substantial number of urban firms change size category in the longer run (see Tables 6.B.1-3) and that many size transitions occur when firms are young. The total proportion of firms that has changed size category is smaller for young firms, since these firms have existed for a few years only. Overall, there is substantial persistence in size in both rural and urban areas as transitions across size categories are limited, which is consistent with van Biesebroeck's (2005) findings that in Sub-Saharan Africa, transitions between size classes are slow. The results also reveal, however, that some of the currently medium- and large-sized urban firms started off as small firms, which indicates that small firms are capable of escaping their initial size category in urban areas. The very smallest firms, one person enterprises, are least likely to do so. By contrast, all rural enterprises have remained small.

To identify which firms are most likely to grow, we estimate basic growth regressions using information on the age of the firm and its size at start-up. Following Sleuwaegen and Goedhuys (2002), growth is modeled as a function of the age of the firm, a_t, the size of the firm at start-up, S_0, other enterprise characteristics E, and investment climate characteristics IC: $G = g(S_t, a_t)e^{\beta_E \mathrm{E} + \beta_{IC} \mathrm{IC}}$. To allow for non-linear impacts of size and firm-age on growth, as well as possible interactions between them, we can approximate the growth function g by a second-order Taylor expansion to arrive at the following estimable equation;

$$\log G = \beta_S logS_0 + \beta_{S^2}(logS_0)^2 + \beta_{age}\, a_t + \beta_{age^2} a_t{}^2 + \beta_{age\_S} a_t log\, S_0 * a + \beta_E \mathrm{E} + \beta_{IC} \mathrm{IC} + \mathrm{u}$$

where u is a normally distributed zero-mean error term.

We estimate this model separately for large urban firms, small urban firms and rural firms controlling for the size of the firm at start-up and its square, the age of the firm and its square, the interaction between size and age, as well as sectoral dummies, and characteristics of the manager. Baseline specifications are presented in columns 1, 2 and 3. Dummies for utilities usage and investment climate constraints are added to the baseline specifications in columns 4, 5 and 6 to examine to what extent differences in growth performance across locations are associated with differences in utilities usage and investment climate constraints in terms of transport facilities, access to finance and utilities.

Table 7 presents the results, using the average annual growth rate of the permanent workforce as the dependent variable. The most striking finding is that it is very difficult to predict the growth performance of rural enterprises, as evidenced by the very low R2. This is presumably because rural firms hardly grow, resulting in limited variation in the data. Also note that firms in rural towns do not grow at a faster rate than firms in other rural areas. Turning to urban areas, there is strong evidence for a negative relationship between initial size and subsequent growth. This finding is consistent with other empirical studies (e.g. Evans, 1987 and Audretsch 1995) and Jovanovic's (1982) model of passive learning, though it may also be the result of measurement error or sample selection. The relationship between the age of the firm and average annual growth is convex, indicating that very young firms grow most rapidly and that growth rates gradually decline as firms mature. Yet, the interaction between the initial size and the age of the firm is positive and significant, which indicates that the negative association between age and size is somewhat muted for firms which start larger. The specifications presented in columns 4, 5 and 6 reveal that the differences in growth performance within rural and urban areas are not strongly correlated with differences in our investment climate proxies. Controls for utilities usage and investment climate proxies are all insignificant at the conventional 5% significance level.

5.Conclusion

This paper uses a rural-urban comparison of manufacturing firms to examine to what extent spatial disparities in enterprise performance are accounted for by differences in investment climate characteristics such as the availability of utilities, transport facilities and access to credit. By demonstrating how such factors affect enterprise performance and thus business opportunities, the comparison helps explain how income earning opportunities vary across rural and urban areas.

Rural and urban firms were shown to operate in distinctly different business environments. Rural firms sell almost exclusively to local markets, where the number of competitors is limited, while urban firms serve relatively well-integrated and thicker markets. The finding that rural markets are thin also helps account for the larger relative dispersion of labor productivity in rural areas. Furthermore, rural firms consider markets, credit and transport as their major constraints, while access to credit as well as land, taxes and competition are the most important problems for firms located in urban areas, even though urban firms were shown to have much better access to utilities and better and cheaper access to credit. These findings point towards fragmentation in rural markets.

Such fragmentation may also help explain the striking differences in size, capital intensity and labor productivity of manufacturing enterprises across space. Rural firms are very small, typically employing only one worker, often operating only outside the peak agricultural season. Urban enterprise activity is less cyclical and average firm size in urban areas is much higher. Urban firms also use more capital and inputs, both in absolute terms and relative to the number of people they employ, perhaps because they have cheaper access to inputs due to thick market effects. In addition, urban firms produce more output per worker than rural firms. These differences in factor usage and labor productivity were demonstrated to be strongly correlated with firm size across samples.

The results from our production function estimation suggest that the rural-urban gap in output per worker is not driven by increasing returns to scale or substantial differences in capital and labor output elasticities across space. Instead, the differences in output per worker seem to be due to differences in capital intensity and TFP. Importantly, we cannot reject the hypothesis that firms located in rural towns are equally efficient as firms located in major urban localities, suggesting that it is very important not to be totally geographically isolated and that even limited interaction is likely to lead to substantial increases in efficiency. Taken together, our results suggest that scale matters, but not because of increasing returns to scale. Since scale is such a salient correlate of firm-performance, arguably our most important finding is that rural firms remain small. By contrast, urban enterprises exhibit a healthy dynamism. This suggests that location is an important determinant of the scale at which firms can operate.

Our analysis furthermore suggests that improving electricity supply, facilitating better access to credit and rectifying market imperfections that raise the cost of capital would help catalyze the growth of small enterprises. Promoting market towns might help facilitate geographic targeting of such interventions. Of course, however, these arguments are only one side of the coin as a proper evaluation of the desirability of different policy options requires examining both the costs and the benefits of such reforms.

Moreover, our research has shown that lessons derived from urban investment climate surveys cannot be directly transferred to rural areas, thus underscoring the importance of tailoring development policy design to local contexts and the usefulness of rural investment climate surveys. The manufacturing sector in Ethiopia is very underdeveloped even by African standards, especially in rural areas, and so it is not clear whether our findings extend to other countries. This is an interesting area for future research.

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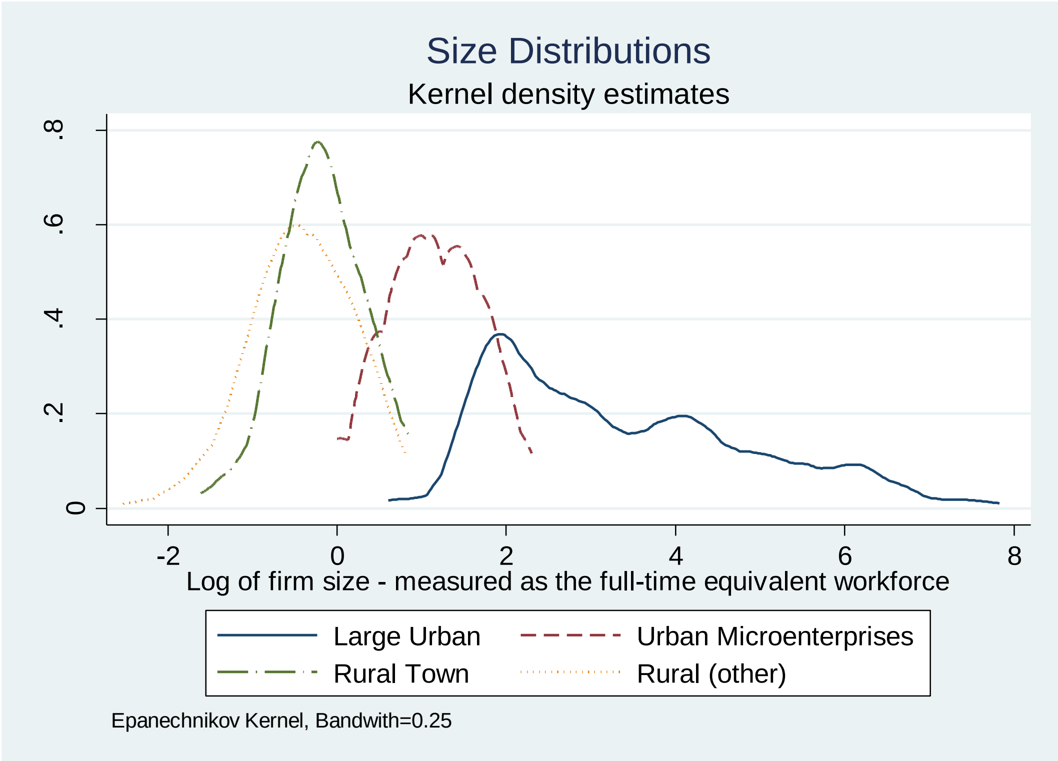
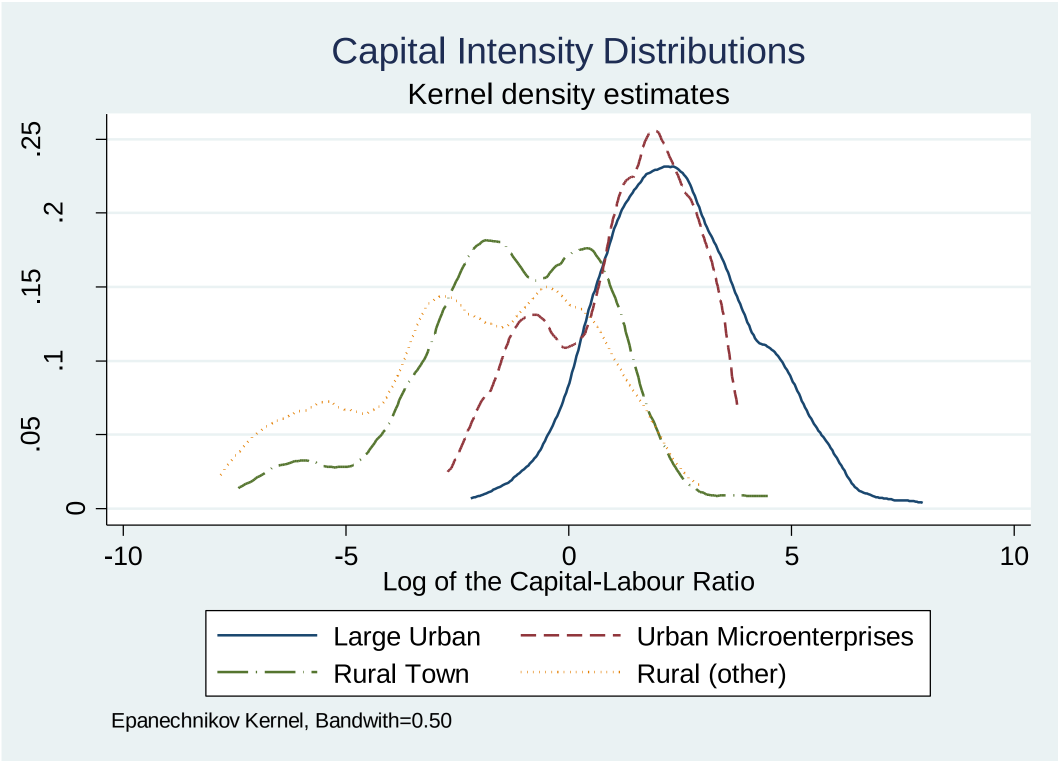
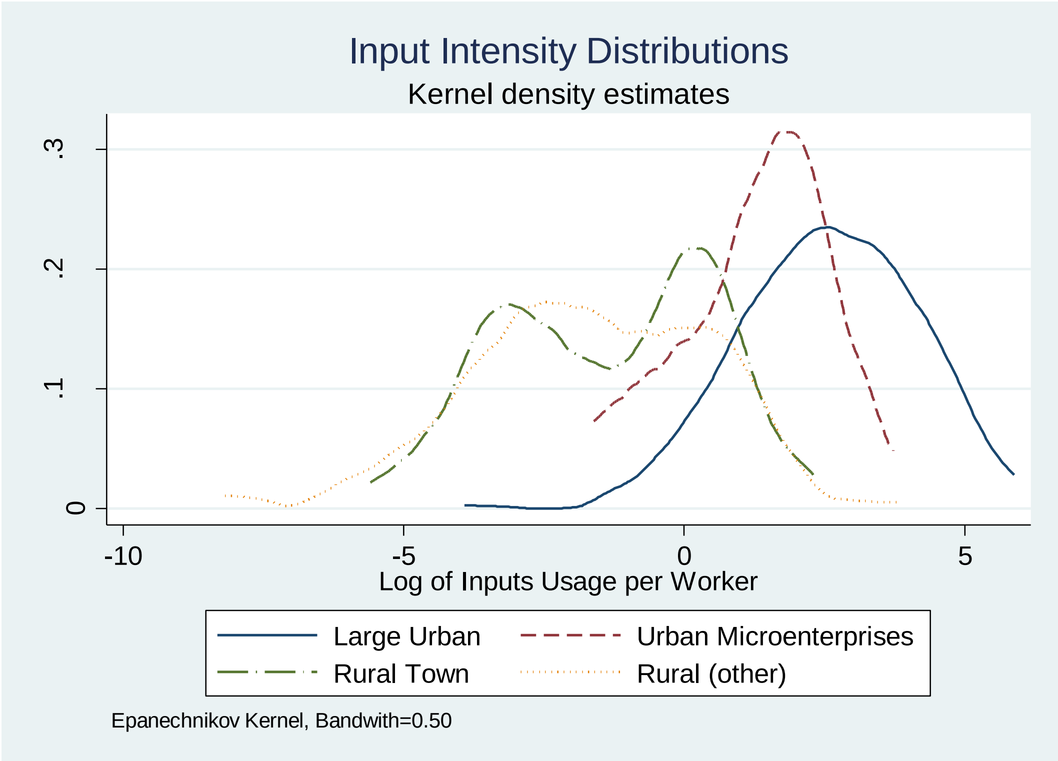
Graph 1: Size distributions



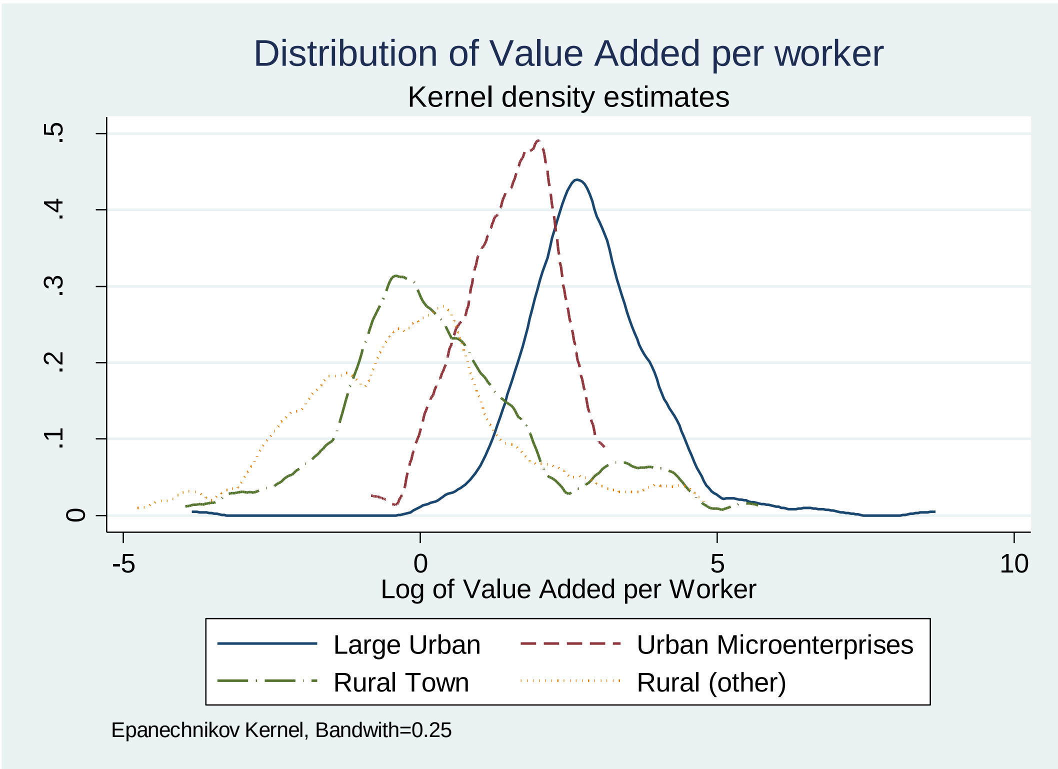
Graph 2: Distributions of Capital Intensity



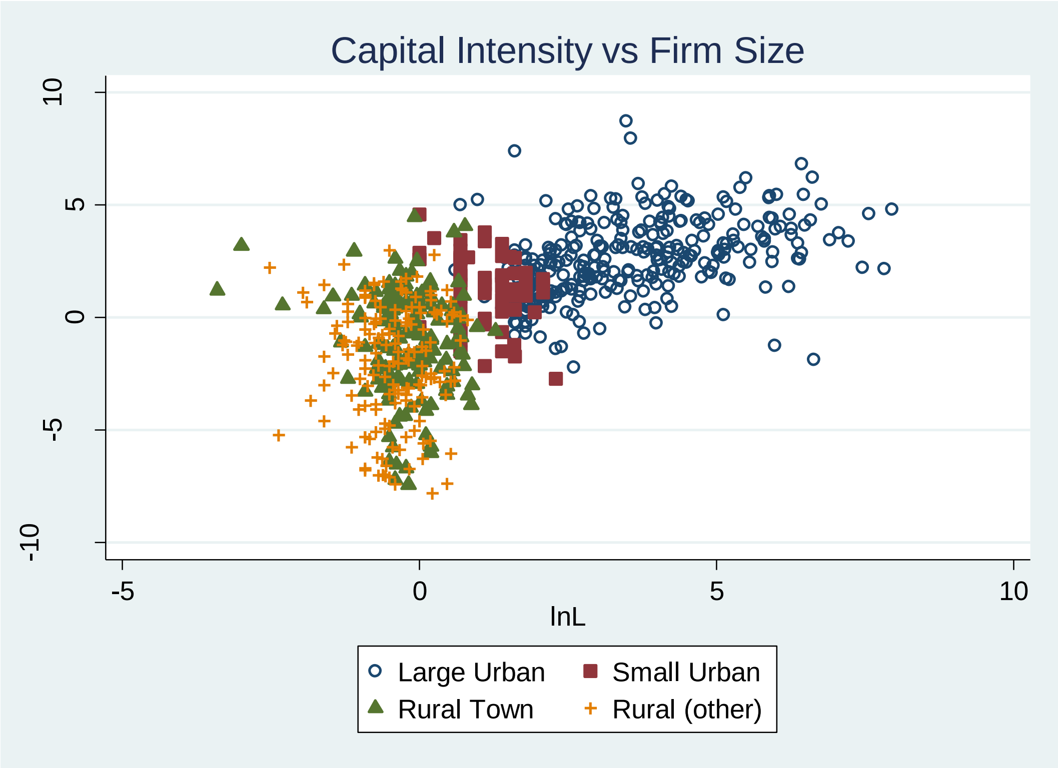
Graph 3: Distributions of Input Intensity



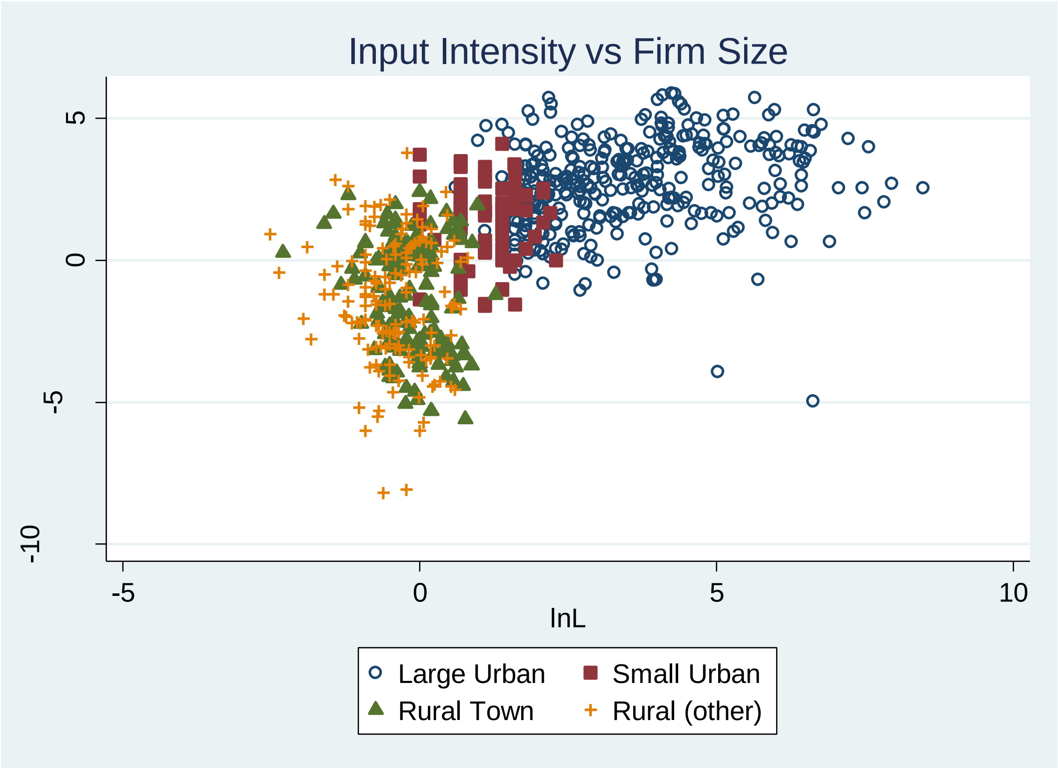
Graph 4: Distributions of Value-added Per Worker



Graph 5: Capital Labor Ratios vs. Firm-size



Graph 6: Input Intensity vs. Firm-Size



Graph 7: Value-added Per Worker vs. Firm-size.

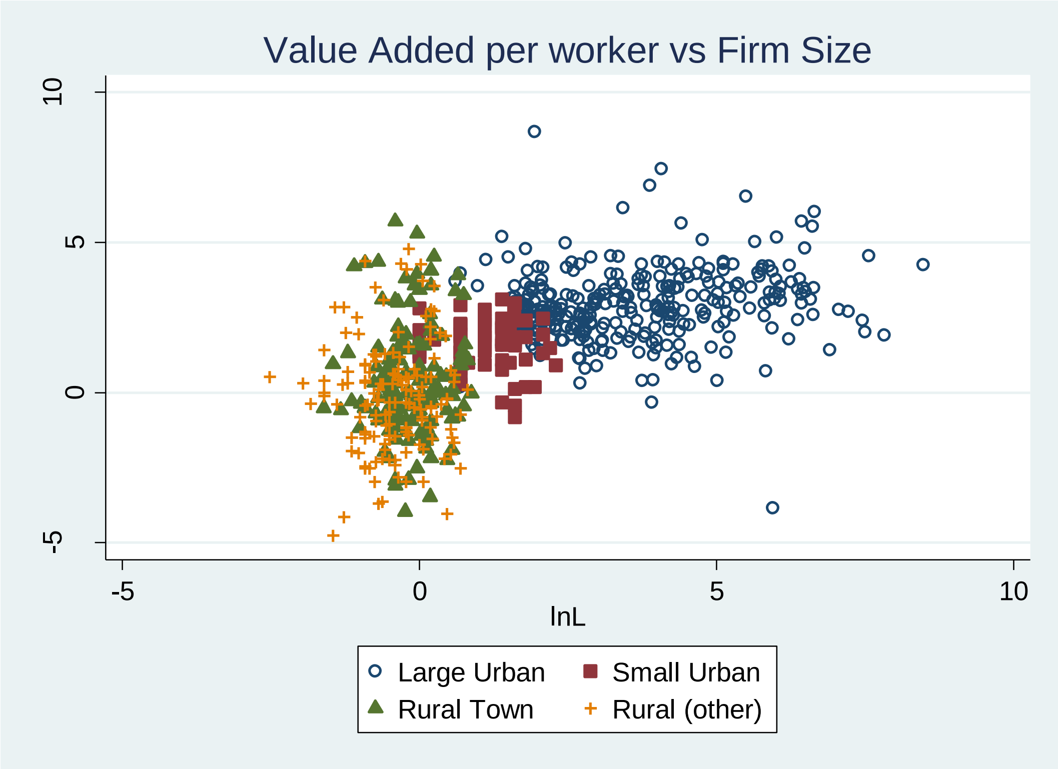


Table 1 : Selected Enterprise Characteristics

	Large urban firms (N=301)		Small urban firms (N=53)		Firms in rural towns (N=151)		Firms in remote rural areas (N=143)	
	Mean	**sd**	**Mean**	**sd**	**Mean**	**sd**	**Mean**	**sd**
Output								
Ln Output	6.85	2.18	3.42	1.04	0.78	1.57	0.01	1.76
Ln Value-added	6.19	2.05	2.65	0.98	0.23	1.86	-0.56	1.95
Factors of Production								
Ln Labor (full-time equivalent)	3.38	1.55	1.12	0.59	-0.17	0.48	-0.41	0.61
Log of permanent workers	3.55	1.53	1.15	0.61	0.14	0.29	0.16	0.30
Share of unpaid labor	na	na	0.11	0.25	0.96	0.18	0.98	0.13
Ln Capital	5.82	2.74	2.26	1.68	-1.47	2.24	-2.52	2.65
Ln Material inputs	5.94	2.46	2.33	1.47	-1.57	1.82	-2.06	2.23
Characteristics of the manager								
Female management	0.27	0.44	0.21	0.41	0.75	44	60	49
Growth								
Firm-age	18.30	15.26	9.55	8.94	10.32	11.06	11.45	11.37
Average annual growth since startup (log)	0.09	0.15	0.05	0.13	0.00	0.04	0.00	0.03
Permanent Workforce at Start-up (log)	2.49	1.75	0.77	0.67	0.11	0.27	0.13	0.28
Invested	0.50	0.50	0.27	0.45	0.20	0.40	0.20	0.40
Per-worker variants								
Ln (Value-added/Labor)	2.87	1.18	1.54	0.72	0.40	1.77	-0.14	1.83
Ln(Output/Labor)	3.47	1.17	2.30	0.90	0.95	1.52	0.43	1.61
Ln(Capital/Labor)	2.44	1.69	1.14	1.66	-1.30	2.21	-2.10	2.58
Ln(Material Inputs/Labor)	2.57	1.54	1.21	1.35	-1.39	1.91	-1.68	2.14
Levels	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
Output	10763	588	48	35	9.7	1.8	5.3	0.9
Value-added	5601	283	22	14	8.9	1.0	4.3	0.6
Capital	9385	210	24	13	2.3	0.3	0.8	0.1
Labor	114	20	4	3	0.9	0.8	0.1	0.7
Material Inputs	5147	320	23	13	0.8	0.2	1.0	0.1
Levels	**Median**	**USD**	**Median**	**USD**	**Median**	**USD**	**Median**	**USD**
Value-added per worker	15.23	1673	4.72	518	1.04	114	0.63	69
Capital per worker	10.32	1134	4.40	483	0.32	35	0.22	24
Material Inputs per worker	13.53	1486	4.80	527	0.83	91	0.36	40
Activity	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Food and beverages	89	30%	0	0%	93	62%	51	36%
Garments and textiles	98	33%	19	36%	50	33%	67	47%
Leather	17	6%	0	0%	0	0%	4	3%
Wood, furniture & metal	83	28%	0	0%	8	5%	13	9%
Other manufacturing	14	5%	34	64%	0	0%	8	6%
Average investment climate proxies								
Credit	39.50%		52.86%		58.84%		62.24%	
Transport	8.54%		15.98%		50.70%		49.47%	
Utilities	15.19%		14.48%		56.49%		58.56%	

Note: Amounts measured in thousands of Birr unless otherwise indicated.

Table 2: Investment Climate Characteristics

	Large urban firms	Small urban firms	Firms in rural towns	Firms in remote rural areas
Markets & Competition				
Exporter?	8%	0%	0%	0%
Faces no competition?	2%	na	58%	76%
Private individuals are the most important customers?	40%	na	78%	73%
Utilities				
Electricity usage?	99%	87%	19%	0%
Power outages?	71%	55%	19%	0%
Owns a landline?	na	43%	0%	0%
Owns a cell phone?	na	na	2%	0%
Security				
Hires Security-staff?	90%	70%	na	na
Credit				
Borrower?	44%	11%	26%	15%
Collateral required for most recent loan?	95%	71%	31%	43%
Interest rate, most recent loan	8.28	12.57	58.24	40.18
Source of the most recent loan				
Bank or government?	79%	0%	2%	0%
Non-bank financial institution (MFI)?	6%	100%	24%	14%
Informal?	16%	0%	74%	86%

Note: For urban microenterprises, we only have information on formal credit, not on informal credit. Interest rates are annualized.

Table 3: Most Important Constraints According to Firm-Managers

Major constraint	Large urban firms	Urban microenterprises	Firms in rural towns	Firms in remote rural areas
(Unfair) Competition	20.27%	1.89%	na	na
Electricity usage	7.64%	0.00%	18.42%	7.04%
Finance	16.61%	41.51%	23.68%	23.62%
Government	6.98%	1.89%	0.00%	0.00%
Labor	4.32%	0.00%	0.00%	0.00%
Land	13.95%	37.74%	0.00%	1.51%
Markets	4.98%	0.00%	37.37	42.21%
Phones & Telecommunication	0.33%	0.00%	0.00%	0.00%
Registration	1.66%	0.00%	0.00%	0.00%
Safety	2.66%	0.00%	0.00%	0.00%
Taxes	18.6%	13.21%	0.53%	0.00%
Technology	0.33%	0.00%	0.53%	1.51%
Transport	1.33%	3.77%	5.26%	16.08%
Water	0.33%	0.00%	13.16%	8.04%

Table 4: Production Functions – OLS
Regressions on separate samples
Dependent variable: Log of annual value-added in 1000 Birr

	(1) Large urban Baseline	(2) Small urban Baseline	(3) Rural Baseline	(4) Large urban Baseline + IC	(5) Small urban Baseline +IC	(6) Rural Baseline + IC
Factors						
lnK	0.162***	0.170***	0.214***	0.169***	0.146**	0.224***
	(0.046)	(0.053)	(0.053)	(0.046)	(0.056)	(0.052)
LnL	0.821***	0.704***	0.856***	0.801***	0.684***	0.857***
	(0.076)	(0.180)	(0.177)	(0.076)	(0.197)	(0.172)
Activity						
Food and beverages	0.088		-1.014*	0.131		-1.013*
	(0.277)		(0.542)	(0.287)		(0.527)
Garments and textiles	-0.449	-0.250	-0.976*	-0.436	-0.143	-0.990*
	(0.293)	(0.226)	(0.532)	(0.297)	(0.258)	(0.518)
Leather	0.061		1.016	0.058		1.150
	(0.391)		(0.884)	(0.403)		(0.876)
Wood, furniture &	-0.244		-2.145***	-0.246		-2.153***
metal	(0.266)		(0.661)	(0.279)		(0.637)
Management						
Female management	0.0001	-0.172	-0.502*	0.023	-0.148	-0.396
	(0.180)	(0.326)	(0.265)	(0.181)	(0.369)	(0.268)
Major Constraints						
Credit				-1.074*	-0.347	-1.270***
				(0.581)	(0.970)	(0.446)
Transport				0.600	3.129	0.288
				(1.087)	(1.922)	(0.477)
Utilities				-1.289	0.106	-0.238
				(0.950)	(1.975)	(0.375)
Geography						
Rural town			0.502**			0.426**
			(0.208)			(0.210)
Constant	2.664***	1.602***	1.625***	3.239***	1.304***	2.378***
	(0.335)	(0.244)	(0.553)	(0.499)	(0.350)	(0.574)
N	301	53	294	301	53	294
R2	0.729	0.373	0.255	0.740	0.416	0.287
Adjusted R2	0.723	0.321	0.234	0.732	0.326	0.259
Median Solow shares						
lnK	0.10	0.24	na	0.10	0.24	na
lnL	0.90	0.76	na	0.90	0.76	na
Mean Solow shares						
lnK	0.15	0.31	na	0.15	0.31	na
lnL	0.85	0.69	na	0.85	0.69	na

Note: Standard errors robust to heteroskedasticity are shown in parentheses. Statistical significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively. The omitted sector category is "other manufacturing". Solow shares could not be computed for rural firms since most rural firms do not hire workers (relying on household members instead) and because the rural data do not contain information on rental expenditure.

Table 5: Pooled Production Functions –OLS
Small firms
Dependent variable: Log of annual value-added in 1,000s of Birr

	(1)	(2)	(3)	(4)	(5)
Factors					
lnK	0.192***	0.215***	0.210***	0.201***	0.209***
	(0.060)	(0.047)	(0.040)	(0.046)	(0.045)
LnL	0.581***	0.801***	0.802***	0.754***	0.762***
	(0.192)	(0.154)	(0.144)	(0.158)	(0.155)
Activities					
Food and beverages	-0.671*	-0.602*	-0.533**	-0.409	-0.357
	(0.350)	(0.351)	(0.259)	(0.283)	(0.291)
Garments and textiles	-0.567**	-0.505*	-0.458*	-0.356	-0.335
	(0.272)	(0.265)	(0.244)	(0.237)	(0.245)
Leather	1.417*	1.459*	1.502*	1.564*	1.711**
	(0.784)	(0.789)	(0.792)	(0.804)	(0.813)
Wood, furniture & metal	-1.744***	-1.696***	-1.636***	-1.565***	-1.536***
	(0.511)	(0.505)	(0.500)	(0.488)	(0.468)
Management					
Female management	-0.417*	-0.427*	-0.425*	-0.458**	-0.373*
	(0.222)	(0.218)	(0.216)	(0.220)	(0.221)
Rural					
Rural Town	-0.151	0.251			
	(0.326)	(0.392)			
Rural other	-0.630**	-0.240	-0.479**	-0.423**	-0.358*
	(0.320)	(0.390)	(0.199)	(0.211)	(0.210)
Rural Area*ln L	0.275				
	(0.263)				
Rural Area*lnK	0.026				
	(0.080)				
Urban Location Dummies					
Other city of over 200,000 people		0.252			
		(0.278)			
Addis Ababa		0.247			
		(0.267)			
Utilities usage					
Electricity usage				0.531**	0.496*
				(0.267)	(0.276)
Power outages				-0.266	-0.302
				(0.216)	(0.225)
Owns a landline				-0.288	-0.254
				(0.268)	(0.278)
Owns a cell phone				0.384	0.395
				(0.310)	(0.315)
Constraints					
Credit					-1.168***
					(0.420)
Transport					0.319
					(0.455)
Utilities					-0.217
					(0.365)
Constant	1.854***	1.380***	1.553***	1.373***	1.942***
	(0.268)	(0.262)	(0.222)	(0.270)	(0.315)
N	347	347	347	347	347
R2	0.431	0.431	0.430	0.435	0.455
Adjusted R2	0.413	0.412	0.417	0.415	0.431

Note: Standard errors robust to heteroskedasticity are shown in parentheses. Statistical significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively. The omitted sector category is “other manufacturing”. In column (1), the coefficient on (Rural Area * ln K) and (Rural Area * ln L) are not jointly significant.

Table 6: Transition matrices

6.A Rural firms: Transition Matrices, by cohort

	Current Size (no of workers)								
	All Firms			*Young firms (5 years or younger)*			*Old Firms (older than 5 years)*		
Size at Start-up (workers)	*1*	*2-5*	*Total*	*1*	*2-5*	*Total*	*1*	*2-5*	*Total*
1	316	23	339	157	5	162	159	18	177
	98%	**30%**	**85%**	**99%**	**19%**	**88%**	**97%**	**36%**	**83%**
2-5	6	54	60	1	22	23	5	32	37
	2%	**70%**	**15%**	**1%**	**81%**	**12%**	**3%**	**64%**	**17%**
Total	322	77	399	158	27	185	164	50	214
	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: The percentages represent the number of firms as a proportion of firms in the size category.

6.B.1 Urban firms (small and large) : Transition Matrix – All firms

	Current Size (no of workers)						
Size at Start-up (no of workers)	*1*	*2-5*	*5-10*	*10-50*	*50-100*	*> 100*	*Total*
1	8	24	13	0	0	0	45
	67%	**25%**	**15%**	**0%**	**0%**	**0%**	**11%**
2-5	2	66	50	36	4	1	159
	17%	**69%**	**60%**	**31%**	**11%**	**1%**	**38%**
5-10	1	4	18	28	2	1	54
	8%	**4%**	**21%**	**24%**	**6%**	**1%**	**13%**
10-50	1	1	3	50	19	20	94
	8%	**1%**	**4%**	**43%**	**53%**	**27%**	**23%**
50-100	0	0	0	2	6	8	16
	0%	**0%**	**0**	**2%**	**17%**	**11%**	**4%**
> 100	0	0	0	1	5	43	49
	0%	**0%**	**0**	**1%**	**14%**	**59%**	**12%**
Total	12	95	84	117	36	73	417
	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: The percentages represent the number of firms as a proportion of the number of firms currently in the urban pooled manufacturing sample.

6.B.2 Urban firms (small and large): Transition Matrix – Young Firms (most 5 years of age)

	Current Size (no of workers)						
Size at Start-up (no of workers)	*1*	*2-5*	*5-10*	*10-50*	*50-100*	*> 100*	*Total*
1	2	11	1	0	0	0	14
	67%	**31%**	**5%**	**0%**	**0%**	**0%**	**14%**
2-5	1	22	16	3	1	1	44
	33%	**61%**	**73%**	**15%**	**17%**	**10%**	**45%**
5-10	0	3	4	5	0	0	12
	0%	**8%**	**18%**	**25%**	**0%**	**0%**	**12%**
10-50	0	0	1	12	1	2	16
	0%	**0%**	**5%**	**60%**	**17%**	**20%**	**16%**
50-100	0	0	0	0	4	1	5
	0%	**0%**	**0%**	**0%**	**67%**	**10%**	**5%**
> 100	0	0	0	0	0	6	6
	0%	**0%**	**0%**	**0%**	**0%**	**60%**	**6%**
Total	3	36	22	20	6	10	97
	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: The percentages represent the number of firms as a proportion of the number of firms currently in the urban pooled manufacturing sample that have existed at most 5 years.

6.B.3 Urban firms (small and large) : Transition Matrix – Old Firms (older than 5 years)

	Current Size (no of workers)						
Size at Start-up (no of workers)	*1*	*2-5*	*5-10*	*10-50*	*50-100*	*> 100*	*Total*
1	6	13	12	0	0	0	31
	67%	**22%**	**19%**	**0%**	**0%**	**0%**	**11%**
2-5	1	44	34	33	3	0	115
	11%	**75%**	**55%**	**34%**	**10%**	**0%**	**36%**
5-10	1	1	14	23	2	1	42
	11%	**2%**	**23%**	**24%**	**7%**	**2%**	**13%**
10-50	1	1	2	38	18	18	78
	11%	**2%**	**3%**	**39%**	**60%**	**29%**	**24%**
50-100	0	0	0	2	2	7	11
	0%	**0%**	**0%**	**2%**	**7%**	**11%**	**3%**
> 100	0	0	0	1	5	37	43
	0%	**0%**	**0%**	**1%**	**17%**	**59%**	**13%**
Total	9	59	62	97	30	53	320
	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: The percentages represent the number of firms as a proportion of the number of firms currently in the urban pooled manufacturing sample that have existed for more than 5 years.

Table 7: OLS Growth Regressions
Separate Samples
Dependent variable: Average annual employment growth (log)

Sample	(1) Large urban	(2) Small urban	(3) Rural	(4) Large urban	(5) Small urban	(6) Rural
Initial Conditions & Age						
LnL at start-up	-0.047***	-0.254***	0.009	-0.049***	-0.275***	0.008
	(0.011)	(0.090)	(0.077)	(0.012)	(0.092)	(0.083)
LnL at start-up^2	0.002	0.049	-0.029	0.002	0.059	-0.029
	(0.002)	(0.035)	(0.066)	(0.002)	(0.035)	(0.077)
Firm's age	-0.012***	-0.015***	-0.001	-0.012***	-0.016***	-0.001
	(0.002)	(0.004)	(0.001)	(0.002)	(0.005)	(0.001)
Firm's age^2/100	0.013***	0.020**	0.001	0.013***	0.025***	0.001
	(0.003)	(0.008)	(0.001)	(0.003)	(0.009)	(0.001)
Firm's age* lnL at start-up	0.001**	0.007***	-0.0001	0.001**	0.006**	-0.0001
	(0.0003)	(0.002)	(0.001)	(0.0002)	(0.003)	(0.001)
Activity						
Food and beverages	-0.022	0.001	0.010**	-0.017	0.060*	0.009*
	(0.017)	(0.017)	(0.004)	(0.018)	(0.035)	(0.005)
Garments and textiles	0.031	-0.040	0.001	0.036	-0.047	0.001
	(0.027)	(0.032)	(0.007)	(0.027)	(0.037)	(0.007)
Leather	0.021		-0.005	0.026		-0.005
	(0.021)		(0.008)	(0.022)		(0.008)
Wood, furniture & metal	0.005		-0.007	0.009		-0.007
	(0.018)		(0.010)	(0.019)		(0.009)
Management						
Female Management	0.029	-0.030	-0.009	0.030	-0.026	-0.010
	(0.021)	(0.029)	(0.012)	(0.022)	(0.034)	(0.013)
Geography						
Rural town			-0.001			-0.001
			(0.005)			(0.006)
Utilities usage						
Electricity				0.035	-0.030	0.007
				(0.033)	(0.037)	(0.018)
Power outage				-0.008	0.052*	
				(0.017)	(0.030)	
Constraints						
Credit				0.014	-0.051	0.016
				(0.048)	(0.113)	(0.014)
Transport				0.117	0.167	-0.017
				(0.094)	(0.165)	(0.010)
Utilities				-0.012	0.007	0.003
				(0.061)	(0.223)	(0.009)
Constant	0.286***	0.285***	0.015	0.244***	0.295***	0.013
	(0.027)	(0.062)	(0.015)	(0.044)	(0.068)	(0.015)
N	347	71	399	347	71	399
R2	0.266	0.430	0.018	0.270	0.468	0.027
Adjusted R2	0.244	0.356	-0.009	0.237	0.347	-0.012

Note: Standard errors robust to heteroskedasticity are shown in parentheses. Statistical significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively. The omitted sector category is "other manufacturing".

7. Data Appendix: Notes on the construction of key explanatory variables

Factors of production

Full-time Equivalent Workers: Rural enterprise activity is highly seasonal. The total number of workers is consequently a misleading indicator of labor inputs into rural enterprise. To compare labor usage of rural and urban firms, the "full-time equivalent" number of employees is computed. For rural firms, the total number of days worked by the entire workforce divided by 300 is the total number of full-time equivalent employees. The equivalent of a full-time employee is thus 300 labor days. Unfortunately, the urban data do not contain information on the number of days employees typically work. The full-time equivalent labor input of urban part-time employees is computed by multiplying the total number of part-time employees by the total number of months they work on average and dividing by 12. The total number of full-time employees is then computed by adding the total number of full-time employees and the full-time equivalent of all part-time employees working for the firm.

Capital: For urban firms and rural firms the capital stock is measured as the replacement value of the capital stock. For urban informal firms we impute the capital stock on the basis of rental expenditure using the formula

$$K_{imputed} = rent * \frac{1+r}{r+\delta}$$

Where *rent* is observed rental expenditure , *r* is the discount rate which we set equal to 0.10, and δ is the depreciation rate, which we assume equal to 0.05.

Gender of the manager

A dummy variable which takes the value 1 if the manager is a woman for rural firms and for small urban firms. For large urban firms, it is coded 1 if at least one of the managers is female.[24] For urban firms, the share of female managers is thus likely to be overestimated.

Sectoral Affiliation

In order to classify enterprises as belonging to a certain (sub-) industry, the following classification was adopted:

Table B.1: Sectoral Affiliation

Industry/Group of Activities	**Activities – Large urban firms**	**Activities – small urban firms**	**Activities- rural data**[25]
Food and Beverages	Food, beverages	Food	Food and beverages, brewing/distilling, grain milling **c**
Textiles and clothing	Polyester button, textiles, garments	Textiles	Manufacture of textiles, of wearing apparel; dressing and dying of fur

Woodwork & Metal	Woodwork, furniture and metalwork, wire and nails		Manufacture of wood and of products of wood and cork, except furniture; Manufacture of fabricated metal products, except machinery and equipment, Manufacture of furniture
Leather	Leather		Tanning and dressing of leather; manufacture of luggage, saddlery, harness, footwear
Other Manufacturing	Polyester buttons, tobacco, camping equipment, coffee roasting and grinding, plastic products manufacturing, tannery (sheep, goats), printing, non-metal products (glass, rubber), wire and nails, cement production, PP Bag production, and firms classified as "Others" in the manufacturing survey	Other manufacturing and electronics	Other manufacturing **c**

Constraints

The investment climate surveys ask very detailed questions about constraints. These questions overlap considerably, but not perfectly, across the different surveys. To construct constraints measures that are comparable across rural and urban enterprises, we categorized individual constraints into coarser groups of constraints, documented in the Tables below. A drawback to this procedure is that the different constraints categories do not contain an equal number of items. Moreover, due to imperfect overlap, they may not measure exactly the same constructs across rural and urban areas.

Most important constraint

Table B.2: Construction of the "Most Important Constraint" Variable

Constraint Category	**"Constituent" Urban Constraints**	**"Constituent" Rural Constraints**
Markets	- Availability of raw materials - Lack of market - Rising of input prices - Shortage of spare parts - Shortage of input - Shortage of capital - Others - Massive inflows of aid food	- Access to inputs - Access to markets (distance and cost)) - Difficulty to obtain information on your product's market - Demand for goods and services produced
Finance	- Access to financing (availability/collateral) - Cost of financing (interest rates, fees) - Access to finance due to religious constraints	-(Im)Possibility of borrowing from family, friends or others - (Im)Possibility of borrowing from formal financial institutions - Interest rates - Complicated bank loan procedures (too many forms) -Fear of not being able to pay loan installments

Transport	-Transportation	-Road access -Road Quality -Road Cost -Traffic - Facilities to transport goods
Water	-Shortage of water supply	- Water access - Water Quality - Water cost
Government	- Macroeconomic instability - Political instability - Implementation of government regulation - Control and regulation	- Corruption - Uncertain Economic Policy - Restrictive Laws and Regulations
Electricity	- Electricity	-Electricity access -Electricity quality -Electricity cost
Labor	- Inadequately educated workforce - Labor regulations	- Lack of skilled Labor - Difficulties in hiring labor from outside region
Phones/telecom	-Telecommunication	- Fixed phone line access (household phone) - Fixed phone line quality (household phone) - Fixed phone line cost (household phone) - Cellular access - Cellular quality - Cellular cost
Technology	- Lack of critical spare parts and specialized technologies	-Lack of training -Research Costs -Access to Computer -Access to Information and Technology
Taxes	- Tax rates - Tax administration	- High taxes - Complicated procedures - Unofficial levies
Registration	- Customs and trade regulations - Business licensing and permits - Bureaucratic burden	- Government policy & regulations associated with enterprise registration - Government policy & regulations associated with enterprise operating permits
Safety	- Corruption - Street crime, theft and disorder - Functioning of the judiciary	- Criminality, theft and lawlessness - Conflicts and social friction
Land	-Access to land	- Land-use regulations - Obtaining construction permits - Land-use certification
(Unfair) Competition	- Practices of competitors in the informal sector - Practices of competitors in the formal sector - Excessive flooding of illegally imported goods - Competition from imported goods or foreign companies	(Not available)

Major constraints

The "major constraints" variables document whether a particular type of constraint is a major problem for the enterprise in question. If any constraint listed as a "constituent constraint" is considered a 'major' or 'severe' problem by the firm, then the dummy variable for that constraint category takes the value 1. If none of the constituent constraints in a particular category are considered problematic, then the dummy variable takes the value 0. Whenever information on one of the constituent constraints is missing, the constraint variable (a dummy variable) is recorded as missing. Notice that some constraints categories - notably, markets, competition and customs - do not overlap across datasets.

Table B.3: Construction of the "Major Constraints" Variables

	"Urban Constraints in this category"	**"Rural Constraint Category"**	**Rural Constraints in these categories:**
Utilities	Electricity Water	Electricity Water	-Electricity access -Electricity quality -Electricity cost -Water-access -Water-quality -Water-costs
Telecommunications	Telecommunications (NB information on this constraint is not available for informal firms)	Telecom	-Fixed phone line access (household phone) -Fixed phone line quality (household phone) -Fixed phone line cost (household phone) -Cellular access -Cellular quality
Transport	Transport	Transport	-Road access -Road quality -Road cost -Traffic -Facilities to transport goods
Credit	Credit-access Cost of finance	Credit	-Possibility of borrowing from family, friends or others -Possibility of borrowing from formal financial institutions -Interest rates -Complicated bank loan procedures (too many forms) -Fear of not being able to pay loan installments
Registration	Licensing	Registration	-Government policy & regulations associated with enterprise registration - Government policy & regulations associated with enterprise operating permits

Taxation	Tax rates Tax administration	Taxation	-High taxes -Complicated procedures -Unofficial levies
Labor issues	Education of the workforce	Labor issues	- Lack of skilled labor - Difficulties in hiring labor from outside region
Land	Land	Land	-Land-construction permit -Land-certificate
Safety	Judiciary Crime	Safety	-Criminality, theft and lawlessness -Conflicts and social friction
Government	Corruption Macroeconomics Political instability	Government	-Corruption -Uncertain economic policy -Restrictive laws and regulations
"Additional/Non-overlapping categories"			
Competition	Competition from the informal sector	(Not available)	(Not available)
Customs	Customs	(Not available)	(Not available)
Markets	(Not available in any of the urban datasets)	Markets	- Access to inputs - Access to markets (distance and costs) - Difficult to obtain information on your product's market - Demand for goods and services produced
Technology	(Not available in any of the urban datasets)	Technology	-Lack of training -Research costs -Access to computer -Access to information and technology

[1] The World Bank defines the investment climate as *the set of location-specific factors shaping the opportunities and incentives for firms to invest productively, create jobs and expand* (World Bank, 2005a, p. 19). De facto, any factor that affects firm performance and decision making can be considered part of the investment climate. This has led some (e.g. Easterly, 2002) to criticize the concept as being devoid of any meaning. We take the view that it is important to clearly specify which aspects of the investment climate we are considering.

[2] One might be concerned that, because the rural and urban firms are different in many respects, they are simply not comparable. However, our objective is to compare the income earnings opportunities associated with small-scale manufacturing. Seen in this light, the differences between rural and urban firms are findings rather than problems. Indeed, if researchers were to impose on themselves a rule that the types of firms included in a comparative analysis must be identical in every respect except for the explanatory variable of interest, this would disqualify a lot of comparative studies in the literature. Consider, for example, Dollar et al. (2005) and Eifert et al. (2008). Both papers have made important contributions to the literature on firms in developing countries. The first compares manufacturing firms in different sectors across different *countries* in Asia, with different cultures, different languages, different legal systems etc. The second compares firms in developing countries across different *continents*. In our view, these papers are good examples of comparisons from which we can learn a lot even though the firms in the different countries/continents are in many ways inherently different.

[3] The only similar study of rural-urban disparities in enterprise performance we are aware of is the 2004 Sri Lankan investment climate assessment (World Bank, 2004). This study is descriptive and comprises two

separate analyses of the rural and the urban investment climate; the comparison is based on the conclusions of these analyses.

[4] See Söderbom and Teal (2004) for a productivity analysis of Ghanaian firms)

[5] For example, Habyaramina (2004) uses evidence from Uganda where four banks were closed because of imprudent banking practices to show that firms which consequently lost a banking relationship experienced lower growth. On the other hand, Bigsten et al. (2003) show that the demand for loans amongst manufacturing firms is low and argue that credit constraints are relatively unimportant

[6] A technical manual prepared by CSA (2008) documents methodologies and procedures. The manual also assesses the quality of RICS-Amhara. Household assets and basic demographic characteristics are compared with the Welfare Monitoring Surveys for 2000 and 2004. Such a comparison reveals a very close fit for relevant indicators.

[7] See Love et al. (2004) for details on the methodology.

[8] The microenterprise data consequently contain some firms with more than 5 employees, while the "large" urban manufacturing data contains some firms with fewer than 5 employees. For the purpose of our productivity analysis, we exclude firms with more than 10 employees, the conventional cutoff used to define a microenterprise, from the microenterprise sample. For the analysis of growth, we did not use this cutoff, since curtailing the sample at 10 employees might bias our growth estimates downwards.

[9] Results are available from the authors upon request.

[10] This is not an artefact of the sampling strategy. Only 3 enterprises in the rural dataset employ more than 10 workers. Since these enterprises are all household-based we might miss out on fully commercial enterprises owned or managed by individuals not living in these communities. However, from the community level dataset one can infer that there are not more than a dozen firms with more than 20 employees in a radius of 1-hour commuting distance from the 179 surveyed communities. It thus seems safe to conclude that there are very few large firms in rural areas.

[11] For example, managers of large urban firms are more likely to rate taxes as an important problem, presumably because they are both easier to tax and face higher tax rates.

[12] We also experimented with the more flexible translog production function, which can be interpreted as a second-order Taylor approximation to a more general production function. Based on this framework, we did not reject the Cobb-Douglas restrictions for any of our estimations. We therefore proceed with the Cobb-Douglas framework, which is remarkably robust across African firm-level data. This facilitates interpretation of the results, and retains comparability with both micro- and macro-approaches to determining the impact of the investment climate (see e.g. Dollar et al., 2005) on firm performance.

[13] Mengistae and Honorati (2009) have investigated the impact of the investment climate on allocative efficiency in Ethiopia and find that shortage of land, financial constraints, and problems of tax administration affect young and small firms more than larger ones and, consequently, have helped incumbent firms protect their market shares.

[14] If prices for outputs diverge between rural and urban areas, our production function estimates may give misleading estimates of true underlying productivity, presumably overestimating the productivity of urban enterprises, since price levels in urban areas are usually higher than those in rural areas. As pointed out by Eberts and McMillen (1999), failing to control for land may result in a downward biased estimate of the rural-urban productivity gap, since urban firms are more likely to be constrained for space than are rural firms. A priori, it is thus difficult to sign the omitted variable bias.

[15] A less well-documented endogeneity problem that may hamper the identification of production function is that of selection bias (see e.g. Ackerberg et al. 2007). Loening et al. (2008) show that such bias is not a problem for rural firms.

[16] Of course, it is quite restrictive to assume that the production function exhibits constant returns to scale and that markets are competitive. These assumptions are not needed if the production function is estimated by means of regression.

[17] We cannot reject the null hypothesis that the coefficients on the capital and labor are the same in rural towns and other rural areas.

[18] When we run a pooled regression small urban firms and large urban firms, the coefficient estimates on capital and labor sum to 1.06, yet are not statistically significantly different from 1. Results are omitted to conserve space but available from the authors upon request.

[19] It is not possible to compute Solow shares for rural firms since most labor in rural firms is unpaid.

[20] Since firms in remote rural areas do not use electricity, these effects are identified on the basis of variation in electricity usage in rural towns and urban areas.

[21] Following Deininger et al. (2007), we also experimented with interactions between firm-size and investment climate variables, but found no evidence of any effects of interactions between the investment climate and firm-size, perhaps because there is relatively little variation in terms of size in our sample of small enterprises.

[22] These growth rates measure growth in the number of workers, not in terms of days worked.

[23] The informal firm survey was designed to exclude firms employing more than 10 employees. Consequently, the most successful microenterprises are left out of the survey. On the other hand, the large manufacturing firm survey was intended to exclude firms with fewer than 10 employees, thus excluding the most unsuccessful enterprises. Using information on size at start-up to inform questions about the probability of a firm of a given size ending up in a certain size category is thus likely to yield misleading answers. Since we pool the data across different samples, the resulting biases might partially offset each other. However, given that the underlying population proportions are unknown, it is difficult to gage the magnitude and the sign of the bias. Fortunately, we can still use the information to ask whether firms which are currently large (small) started small (large), since by conditioning on current size, the sample selection bias should be controlled for.

[24] Since we do not have information on the number of managers per enterprise ,it was not possible to compute the proportion of female managers.

[25] **c** indicates that this category contains a number of sub-activities – listings of which are available upon request.