Clustering as an Organizational Response to Capital Market Inefficiency: Evidence from Micro-enterprises in Ethiopia

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Abstract: *Microenterprises in developing countries often struggle with financial constraints. The absence of a well-developed capital market has been listed as a key obstacle to industrialization in developing countries in the development literature. In this paper, we show that industrial clusters, through specialization and division of labor can ease the financial constraints of microenterprises even in the absence of a well-functioning capital market. By using data from microenterprises of the handloom sector in four regions of Ethiopia, we find that clustering lowers capital entry barrier by reducing the initial investment required to start a business. This effect is found to be significantly larger for microenterprises investing in districts of high capital market inefficiency, indicating the importance of clustering as an organizational response to a credit constrained environment. The findings highlight the importance of cluster-based industrial activities as an alternative method of propagating industrialization when local conditions do not allow easy access to credit.*

JEL Classification: L23, L26, L67, M13, O16, R12
Program area and sub-area: Capital and Firms; Small and Medium Enterprises, Entrepreneurship

1 Introduction

Development agencies and policymakers have long stressed the economic importance of microenterprises in developing countries in general and Africa in particularly because of their large number and their contribution to employment. Reports show that micro- and small-scale enterprises constitute the lion's share of the manufacturing activity in Sub-Saharan Africa, accounting for more than 90% of all firms outside of the agricultural sector (OECD, 2004). They are also sources of income and employment in labor intensive sectors, engaging the poorest segment of the society, particularly women and unskilled workers (Nadvi and Barrientos, 2004). Yet, lack of access to finance remains to be a major obstacle to the expansion of microenterprises (Demirgüç-Kunt and Maksimovic 1998; Rajan and Zingales 1998; Ayyagari et al., 2008). Inefficient functioning of capital markets together with collateral requirements that increase the cost of borrowing are mentioned as major causes of microenterprises' limited access to finance (for example, Tybout 1983; Bigsten et al., 2003; Ayyagari et al., 2008). Limited access to finance can affect the investment patterns of microenterprises and aggravate entry barriers, which can be a prime obstacle for industrialization in Africa (Hernández-Trillo et al., 2005; McKenzie and Woodruff 2006, 2008).

In recent literature, industrial clusters are noted as one form of institution that can help ease the financial constraints microenterprises face when both establishing and expanding their business, even in the absence of a well-functioning capital market. Various studies point to the importance of industrial clusters in facilitating access to informal finances where repeated interactions between local producers and traders promote trust that enables reciprocal exchange of information that may reduce the problem of moral hazards and the cost of monitoring in credit relationships (Becattini 1990; Grabher 1993; Schmitz 1995; Nadvi 1999; Russo and Rossi 2001, Ali and Peerlings 2011b). Collaborative networks within clusters may also reinforce mutually beneficial relationships, such as cooperation, allowing access to cheaper credit or the joint purchase of materials at lower prices (Becattini 1990; Banerjee and Munshi, 2004). Industrial clusters can also ease the financial constraints of microenterprises by affecting the organization of production (Ruan and Zhang 2008, 2009). The production system within clusters promotes specialization and division of labor, thereby lowering the

capital requirement to invest in different steps of production. By relying on components manufactured by others, a firm can specialize in its own products, which require relatively lower amounts of capital, rather than organizing an entire production process. Such division of labor can enable small entrepreneurs with limited endowments to invest in and start a business "by focusing on a narrowly defined stage of production" that best suit their capital portfolio even in the absence of a well-functioning capital market (Huang et al., 2008, 414). However, only few studies have empirically shown the role of industrial clusters as an organizational response to financial constraints (Huang et al., 2008; Long and Zhang 2011; Ruan and Zhang 2009). The few studies available focus on the Chinese experience, making it unclear whether the phenomenon exists in other countries, particularly in African countries, where the capital market is likely to be less developed than in China.

The purpose of this study is to investigate the advantage of clustering in easing the financial constraints of microenterprises operating in Africa by looking at evidence from the handloom sector in Ethiopia. Specifically, it investigates whether clustering can lower the capital barrier to entry by reducing the initial capital investment required to start a business. The study looks at more than 1,000 microenterprises of the handloom sector from four regions of Ethiopia operating both in clusters and in isolation. Ethiopia's handloom sector makes a good case for studying the relationship between the capital entry barrier and industrial clusters because the technology in the sector is rather simple and entry is not affected by nontechnical barriers, such as those coming from product differentiation, patents over technologies, and control over supply of raw materials. The only major barrier to entry is access to capital.

The remainder of the paper is organized as follows. Section 2 briefly reviews the existing literature. Section 3 presents a theoretical framework that depicts how clustering can help ease the financial constraints of starting a business in the absence of a well-functioning capital market. Section 4 discusses the data source and describes the Ethiopia's handloom sector. Section 5 formulates the empirical model, and Section 6 presents the empirical results. Section 7 is conclusion and discussions.

2 Literature Review: Capital Market Inefficiency and Organizational Choice of Production

A number of studies have shown that the level of capital market development is related to the organizational choice of production within firms. Acemoglu et al., (2009) showed both theoretically and empirically that in countries where there is greater capital market development together with higher contracting costs, vertical integration becomes the common production system. With inefficiently functioning capital markets, on the other hand, a more specialized production would prevail. This is due to the advantage of specialization, which allows firms to break down the more complex and integrated production process and concentrate on activities in which they have a comparative advantage in terms of capital endowments (Huang et al., 2008; Ruan and Zhang 2009).

Using historical evidence, Haber (1991) also noted that in the early periods of industrialization (1840–1880), the level of specialization in the cotton textile industry of a number of Latin American countries was significantly higher than it was in the United States, where the capital market was more developed. Following the creation of modern financial intermediaries in the last decades of the 19th century, however, the level of specialization in the Latin American textile industry declined substantially. Similarly, McKenze and Woodruff (2006) found that credit constrained entrepreneurs in Mexico tend to enter into manufacturing enterprises characterized by technologies that can be broken down in to smaller steps. Organizational innovations that allow the production process to be broken down into small steps make it possible for entrepreneurs with limited capital endowment to participate in the production process by reducing the capital entry barrier (Leff, 1978; Hayami et al., 1998). A high capital entry barrier is often mentioned as one of the possible reasons for the high return to capital found in micro- and small-scale enterprises in developing countries (Udry and Anagol, 2006; Banerjee and Duflo, 2005; de Mel et al., 2008). Such findings are often considered an indication of microentrepreneurs' unexploited potentials, were the financial constraints to be alleviated (Grimm et al., 2009).

However, there are costs involved with specialization, such as coordinating the various producers involved in different steps of production. Stigler (1951) suggested that the benefits of specialization can best occur when there is clustering that helps to economize coordination

costs and facilitate transactions through physical and social proximity. Industrial clusters would then replace the "internal economies of scale that had been the basis of large scale production within a single firm by external economies of scale arising from the division of labor between a number of small firms" (Helmsing 1999, 11). Although coordination costs might be generally lower in industrial clusters, the continuing new entry of firms due to low capital entry barrier may result in diseconomies of agglomeration (Sonobe and Otsuka 2006a). These could arise from congestion, which would then lead to fierce competition for limited resources such as land (Lall et al., 2003).

Large body of literature has posited the advantages of clustering in terms of information spill-over, labor pooling, and market linkages (for example; Marshall 1920; Schmitz 1995; Visser 1999; Sonobe and Otsuka 2006a; Ali and Peerlings 2011a). However, very few studies have empirically examined the role of clustering in reducing financial constraints. Using a sample of 140 footwear-producing enterprises in China's Wenzhou province, Huang et al., (2008) show how industrial clusters can best explain the rapid industrialization of that region despite a lack of basic conditions necessary for economic growth. The authors show that clustering, through specialization and division of labor, enabled a large number of small entrepreneurs to enter the industry by helping them overcome the financial constraints in the early stage of industrialization. For the cashmere sweater cluster of northern Zhejiang province in China, Ruan and Zhang (2008) found a positive correlation between the capital barrier to entry and return on capital when the capital market is not well developed. They also conclude that the division of labor in the cashmere sweater cluster helped "tap the entrepreneurial talents that are scattered in rural areas, thus making better use of capital" (Ruan and Zhang 2008, 22).

Using firm-level data from China's industrial census for the years 1995 and 2004, Long and Zhang (2011) show how clustering eases both starting and working capital constraints through two possible mechanisms. One such mechanism is the specialization and division of labor within clusters that allowed large number of poorly endowed entrepreneurs from rural areas to become part of the industrial process. The second mechanism is the proximity of various agents within clusters who work to facilitate trust-based trade credit, and hence reduce working capital constraints. Using a panel data set, Banerjee and Munshi, (2004) also showed a causal relationship between social ties and the pattern of investment in the knitted garment cluster in the South Indian town of Tirupur. Producers with strong social ties are found to have started their business with almost three times as much fixed capital compared to

outsiders, highlighting the importance of community identity when the capital market is not well developed.

The current study differs from previous work in at least two ways. First, it is the first empirical study to look at the relationship between industrial clusters and financial constraints from an African perspective, using handloom producers in Ethiopia as an example. Second, it compares the financial constraints and entry barriers of microenterprises in industrial clusters with those of microenterprises outside of clusters.

3 Theoretical Framework: Clustering, Capital Market Inefficiency, and Entry Barriers

In this section, we discuss how clustering could help ease the financial constraints of microenterprises when starting a business by lowering the required start-up capital in the absence of a well-functioning capital market. For the moment, we assume that entrepreneurs can invest only their capital endowment—that is, they cannot obtain credit from the capital market.

Let an entrepreneur with a certain capital endowment plan to start a business. The entrepreneur faces a production function Y that is a function of fixed capital stock K, variable inputs X, and fixed inputs Z:

$$Y = Y(K, X, Z). \quad (1)$$

For simplicity, we assume in what follows that output is produced using capital and other variable and fixed inputs. Let an entrepreneur also face fixed transaction costs given by T, which is a function of the concentration of firms producing similar and related goods in nearby areas. Such transaction costs can be incurred while procuring inputs and selling outputs. With the concentration of input suppliers and output buyers in close proximity, as in the case of industrial clusters, the transaction costs for an entrepreneur will be lower (Becattini 1990; Grabher 1993; Schmitz 1995). This could be due either to a reduced transportation cost stemming from proximity or to the developed networks among different agents that help to facilitate the transaction through the flow of information and mutual trust.

For a given level of capital stock and fixed inputs and prices of outputs and variable inputs, the short-run profit function for an entrepreneur is then given by

$$\pi(K, Z, w_X, p, T) = \max_{Y,X}\ pY - w_X X - T, \quad (2)$$

where π is profit, p is output price, and w_X is the variable input price.

Given the capital endowment of an entrepreneur, one would invest in a project if and only if there is a positive profit—that is,

$$\pi(K, Z, w_X, p, T) = \max_{Y,X}\ pY - w_X X - T \geq 0 \quad (3)$$

and

$$\pi^1(K, Z, w_X, p) = \max_{Y,X}\ pY - w_X X \geq T, \quad (4)$$

where $\pi^1(K, Z, w_X, p)$ is optimal profit excluding the fixed transaction costs T.

From the preceding formulation, let K^m be the capital stock at which, given the values of w_X, p, and Z, profit is equal to the fixed transaction costs T. In other words, K^m is the minimum capital stock required to start a business.

$$\pi^m(K^m, Z, w_X, p) = T\ , \quad (5)$$

where $\pi^m(K^m, Z, w_X, p)$ is profit that equals the fixed transaction costs T at the minimum capital stock K^m.

Following the standard theory of profit maximization, the first-order derivative of profit with respect to capital is positive and equal to the shadow price of capital. At the point where the capital stock is equal to K^m, the shadow price of capital is then given by

$$\frac{\partial \pi^m(K^m, Z, w_X, p)}{\partial K} = w_K(K^m, Z, w_X, p) \geq 0, \quad (6)$$

where w_K is the shadow price of capital.

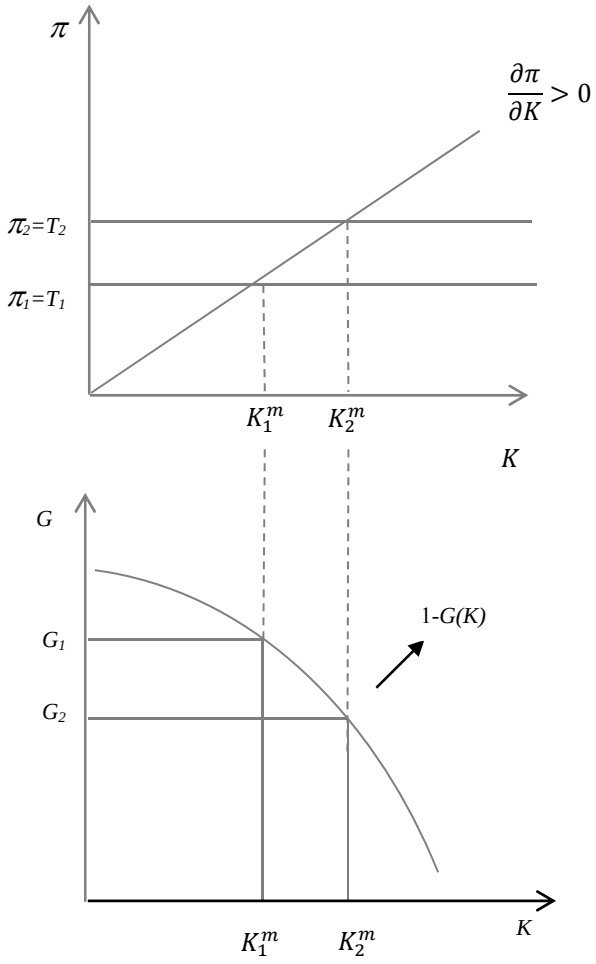
Because the first-order derivative is positive, it can be inferred from equations (5) and (6) that there is a positive relationship between the fixed transaction costs T and the minimum required capital stock K^m. This implies that a reduction in transaction costs (for example, due to clustering) will result in a reduction of the minimum initial capital amount required to start a business. This could be because an enterprise operating inside a cluster can specialize in activities for which it has a comparative advantage or because the other parts and components can be accessed easily at a lower cost from nearby firms. With an increase in transaction costs, on the other hand, the initial capital stock required is higher since the enterprise would have to produce the intermediate parts itself because it is costly to get them from the market. Krugman and Venables (1996) noted that with increased distance between firms, transaction costs tend to increase leading to the emergence of large and vertically integrated industries since the various firms that would provide parts and components are not found in nearby locations. With the concentration of producers of final and intermediate goods in close proximity, more division of labor and specialization would prevail requiring a relatively lower amount of capital to start a business (Lall et al., 2003).

Previously, we assumed there was a fixed capital endowment. In the case of a perfect capital market, entrepreneurs can adjust their capital stock to the profit-maximizing optimum, in which case the shadow price of capital equals the market price. However, if a business activity requires a higher level of start-up capital than the capital endowment, and that extra capital cannot be obtained from the capital market, then entrepreneurs become financially constrained. The high level of start-up capital would then prevent a large number of poorly endowed entrepreneurs from entry with only a few relatively wealthy people being able to invest in a more integrated production. On the other hand, with the co-location of intermediate input suppliers and output buyers, there would be increased specialization and division of labor that lowers the required start-up capital. Hence, even in the absence of a well-functioning capital market, entrepreneurs in industrial clusters would be less likely to be financially constrained with a relatively large share of them investing according to their level of capital endowment. This argument is further depicted in Figure 1, which shows the relationship between start-up capital, transaction costs, and the proportion of entrepreneurs who can potentially invest, given their endowment.

Let the distribution of capital endowment be given by the function$G: [0, \overline{K}] \rightarrow [0,1]$, such that $G(K)$ is the proportion of entrepreneurs whose endowment is less than or equal to a certain capital amount K. That is, the proportion of entrepreneurs with an endowment less than or equal to zero is zero, and the proportion of entrepreneurs with an endowment less than or equal to $\overline{K}$, which is the highest capital amount required to start a business, is 1.

According to Figure 1, at relatively high transaction costs, T_2, the initial capital required to start a business is K_2^m and the proportion of entrepreneurs with a capital endowment greater than or equal to K_2^m is the distance from zero up to G_2. At lower transaction costs, T_1, a lower amount of initial capital, K_1^m , is required, which also corresponds to a larger proportion of potential entrepreneurs with capital endowment greater than or equal to K_1^m, given by the distance from zero up to G_1.

Figure 1 Transaction costs, entry barrier, and entrepreneurship



4 Data

4.1 Data Sources

For this study, we had full information on 4,347 microenterprises operating in the handloom sector in 118 districts of four different regions of Ethiopia, namely, Amhara, Tigray, Addis Ababa, and the Southern Nations, Nationalities, and People (SNNP). The data are obtained from the 2002–2003 Cottage/Handicraft Manufacturing Survey conducted by the Central Statistical Agency of Ethiopia (CSAE). In that survey, information specific to an enterprise, such as the value of its starting capital, whether it was financially constrained when it started its business, and its main sources of starting capital, is included. Information regarding the schooling, experience, and age of the owner-operator is also included. Out of the 4,347 establishments, the analysis and empirical estimation are made on 1,325 enterprises that are established in the five years prior to the time of the survey. Additional location-specific variables, such as distance to the nearest all-weather road, are obtained from the 2002–2003 Welfare Monitoring Survey conducted by the CSAE. We also use the CSAE's 2002–2003 Large and Medium Scale Manufacturing Survey to define clustering.

4.2 Definition of Key Variables

Clustering

Different indexes have been developed in the literature to measure the level of clustering of certain activities in certain locations. A *location quotient* that quantifies how concentrated a certain sector is in a certain location compared with a larger geographic unit is one of the widely used measures of clustering (O'Donoghue and Gleave 2004). The location quotient for the handloom sector is calculated for the most detailed spatial unit possible, the district, by using the zone, which is the higher spatial unit next to a district, as a reference point:

$$LQ_d = (H_d/M_d)/(H_Z/M_Z), \qquad (7)$$

where LQ_d is the location quotient of the handloom sector at district d; H_d is employment of the handloom sector at district d; M_d is total manufacturing employment at district d; H_Z is

employment of the handloom sector at zone z; and M_Z is total manufacturing employment at zone z. Here total manufacturing employment includes employment in micro-, medium-, and large-scale manufacturing industries. One possible limitations of this measure is that districts that have large share of handloom employment in the total manufacturing employment may have the same level of concentration index as those districts in which there is only one large enterprise operating in the handloom sector. Taking this into account, we checked if there are districts where only one enterprise is operating in the handloom sector and we did not find any in our data.

To calculate the location quotient, the Cottage/Handicraft Manufacturing Survey and the Large and Medium Scale Manufacturing Survey are used. The Cottage/Handicraft Manufacturing Survey is a large representative survey on micro enterprises covering more than 53,000 establishments both in urban and rural parts in 11 regions of the country. The sampling frame for this survey was obtained from the listing of the 2001–02 Population and Housing Census, which was conducted by CSAE. Taking into account population size and expected distribution of cottage industries, a two-stage stratified cluster sample design was used for regional (urban) capitals, major (other) urban cities, and rural areas (CSAE, 2003). For another eight urban centers a three-stage stratified cluster sample design was used to select the sample. In each case, sample units were selected systematically using probability proportional to size; size being adjusted to the number of cottage industries obtained from the 2001–02 Population and Housing Census (CSAE, 2003). The Large and Medium Scale Manufacturing Survey is a census data covering all large and medium size manufacturing establishments in the country.

Capital market inefficiency

Although one can reasonably assume that Ethiopia's capital market is not well developed, there could be differences between locations with respect to how accessible capital is from both formal and informal sources. Such differences could arise, for example, from the presence of banks and microfinance institutions and variations in household savings. To account for differences in level of access to both formal and informal finances, we define the level of capital market inefficiency in each district.

Under a perfect capital market, agents can borrow and lend freely at the market interest rate, and the marginal product of capital should be equal among enterprises and across different locations. Following the works of Zhang and Tan (2007), Hsieh and Klenow (2009), and Long and Zhang (2011), we use the variation in the marginal product of capital as a measure of capital market inefficiency, which is calculated as follows.

For a production function with a constant return to scale, the marginal product of capital MP_K is proportional to the average product of capital. If we assume a Cobb-Douglas production function of the form $Y = K^{\alpha}X^{\beta}Z^{\gamma}$, the marginal product of capital is given by

$$MP_K = \alpha\left(\frac{Y}{K}\right), \tag{8}$$

where Y is the value of output; K is the capital stock; X is the variable input; Z is the fixed input; and α, β, γ are the elasticities of output with respect to capital, variable inputs, and other fixed inputs, respectively. The financial market inefficiency is then calculated by taking the standard deviation σ of the logarithm of equation (8) at the district level d:

$$\text{Cap. Mkt. Inff}_d = \sigma\left(log\left(\alpha\frac{Y}{K}\right)\right)_d = \sigma\left(log\left(\frac{Y}{K}\right)\right)_d \tag{9}$$

The preceding formulation indicates that in a perfect capital market, the standard deviation of the marginal product of capital among enterprises in a given district would be zero. The larger the deviation, the larger would be the financial market inefficiency. Data for the value of output and capital stock are obtained from the 2002–2003 Cottage/Handicraft Manufacturing Survey and the Large and Medium Scale Manufacturing Survey, both conducted by the CSAE. These data encompass enterprises in all the industries of different sizes.

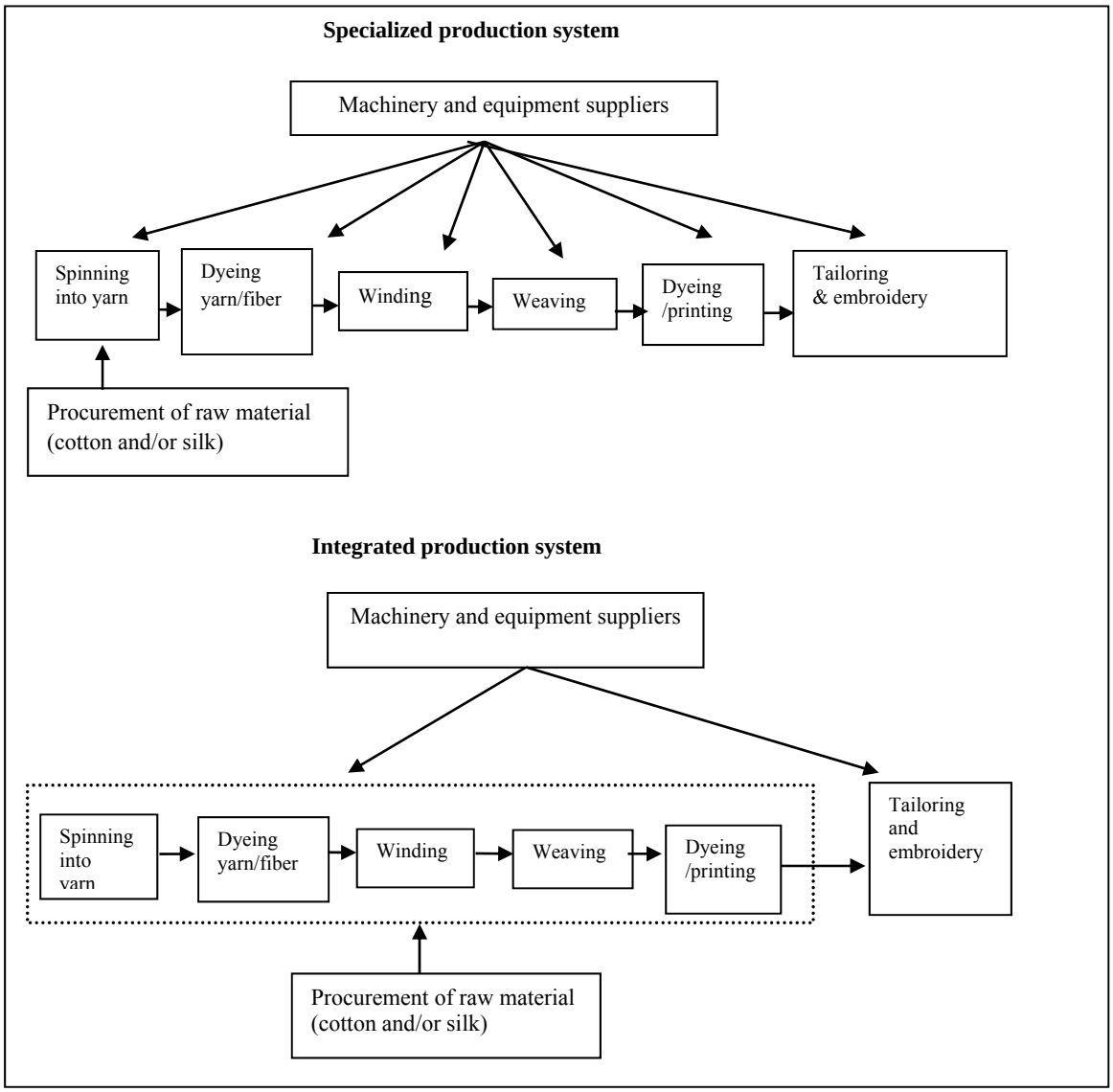
4.3 Description of the Handloom Sector

The handloom sector engages more than 221,000 workers, 55 percent of whom operate in rural areas and 48.5 percent of whom are women (CSAE 2003). Producers in the sector often use simple tools, mainly specializing in hand-woven textiles and not using power-driven machines. Microenterprises in the handloom sector mostly consist of owner-operators with an

average employment size of 1.4 persons. The sector comprises, on average, six different activities ranging from the spinning of cotton into yarn to the tailoring and embroidery of weaved products (Figure 2). These activities are either performed by different specialized producers or integrated in one enterprise. In the specialized system of production, often women engage in the pre- and post-weaving activities, whereas the weaving is predominantly done by males.

As with many other microenterprises in developing countries, financial constraint, especially when starting a business, is a major obstacle in the handloom sector. Table 1 shows this to be the case for 49 percent of the microenterprises in the survey. Microenterprises in the handloom sector also have limited access to loans from formal banks and lending agencies.

Figure 2 Specialized versus integrated production system in the handloom sector



As Table 1 depicts, none of the responding producers in the sample had borrowed money from a formal bank when starting his or her business. Instead, personal savings and informal sources of finance played an important role, with 43 percent and 23 percent of respondents having sourced their starting capital from own savings and friends and relatives, respectively. Assistance from government and nongovernmental organizations also represented a considerable share, while credit from microfinance institutions remained minimal at best (Table 1). The comparison between enterprises operating in more and less concentrated districts further indicates that a lower proportion, 42 percent, of producers operating in more concentrated districts were financially constrained when starting a business compared with 58 percent of producers in less concentrated districts.[1] Borrowing from friends and relatives was the most important source of start-up capital for enterprises in more concentrated districts, probably due to the importance of informal financing in industrial clusters. Own savings and informal money lenders, on the other hand, are important sources of start-up capital to enterprises operating in less concentrated districts (Table 1).

Microenterprises in the surveys reported average start-up capital of 132.69 birr (US$14.91)[2] (Table 2)[3]. That is even lower than the average minimum wage in the public sector, which is around 320 birr ($22.86) in 2010[4]. Using a more recent data of 2008 on handloom clusters in Ethiopia, Zhang et al., (2011) reported a similarly low average value of start-up capital that ranges from $12.82 in non-electrified rural areas to $21.68 in the capital city Addis Ababa.

Overall, initial investment levels are fairly low for microenterprises in the handloom sector compared with those of the large textile factories, which have an average initial investment level of 44,500,000 birr ($5,000,000) (Table 2). Microenterprises in more concentrated districts reported even a smaller amount of start-up capital compared with those in less concentrated districts (Table 2). Figure 3a shows a similar negative correlation between the value of start-up capital and the level of clustering as captured by the location quotient. Although informal finances, such as those from friends and relatives could enable entrepreneurs in industrial clusters to access finance and invest more, increased specialization

[1] The distinction between more and less concentrated districts is made based on the median value of the location quotient at the district level.
[2] All dollars are U.S. dollars.
[3] The values in Table 3.2 are converted to U.S. dollars using the 5 years average exchange rate (1U.S.$ = 8.9 birr) from 1998–1999 until 2002–2003.
[4] The average exchange rate for 2010 was 1U.S.$ = 13.99 birr.

and division of labor in industrial clusters, on the other hand, might reduce the start-up investment needed to establish a business.

Table 1 Problems upon starting a business and most important sources of capital

	Total		More concentrated districts		Less concentrated districts	
	Freq.	%	Freq.	%	Freq.	%
The most important problems faced when starting the business						
Financial constraint	2,121	48.74	890	41.96	1,231	58.04
Lack of technical know-how	354	8.14	164	46.33	190	53.67
Lack of working premises	99	2.28	49	49.49	50	50.50
Lack of access to raw material	74	1.70	44	59.46	30	40.54
Government rules and regulations	5	0.11	1	20.00	4	80.00
No problem	1,623	37.30	586	36.11	1,037	63.89
Others	75	1.72	20	26.67	55	73.33
Total	4,351	100.0	1,754	40.35	2,597	59.74
The most important sources of initial capital						
Informal sources						
Own savings	1,876	43.16	695	37.05	1,181	62.95
Friends and relatives	1,007	23.17	522	51.84	485	48.16
Informal money lenders	108	2.48	31	28.70	77	71.29
Inherited	139	3.20	53	38.13	86	61.87
Formal sources						
Large formal banks	0	0	0	0	0	0
Microfinance institutions	9	0.21	4	44.44	5	55.55
Assistance from government/non-gov. org.	923	21.23	363	39.33	560	60.67
Others	285	6.56	85	29.82	200	70.18

Source: The 2002–2003 Cottage/Handicrafts Manufacturing Survey.

Microenterprises operating in districts characterized by high levels of financial market inefficiency reported less start-up capital on average than those operating in districts with lower levels of financial market inefficiency (Table 2). Figure 3b also depicts a similar relationship—that is, a negative correlation between the value of start-up capital and the level of financial market inefficiency. This may illustrate the poor access to both formal and informal finances in financially inefficient districts, causing entrepreneurs to invest in activities that require relatively less capital.

Table 2 Comparison of average starting capital across regions and production systems (currency in birr)

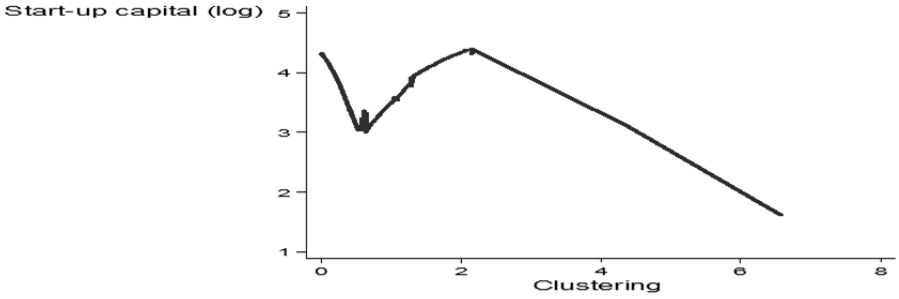
	Average starting Capital	Average capital-labor ratio
Large textile factories	44,500,000 ($5,000,000)	177,775.20
Microenterprises	132.69 ($14.91)	338.85
Tigray	157.37 ($17.68)	462.87
Amhara	123.84 ($13.91)	282.52
SNNP	96.52 ($10.84)	242.45
Addis Ababa	175.56 ($19.73)	491.27
More concentrated districts	123.53 ($13.87)	263.19
Less concentrated districts	149.89 ($16.84)	480.77
Districts with high financial inefficiency	114.36 ($12.85)	359.54
Districts with low financial inefficiency	155.27 ($17.45)	410.84

Source: The 2002–2003 Cottage/Handicrafts Manufacturing Survey and the 2002–2003 Large and Medium Scale Manufacturing Survey. Notes: The average start-up capital is calculated only for the newly established enterprises, that is, those formed in the five years preceding the survey. The average exchange rate from 1998–1999 until the time of the survey, 2002–2003, was 1 US$ = 8.9birr. SNNP = Southern Nations, Nationalities, and People.

Tables 1 and 2 show two important points that correspond with the predictions of the theoretical model presented in Section 3. First, the majority of microenterprises in highly concentrated districts were not financially constrained when starting their business. In addition, they reported low start-up capital versus those operating in less concentrated districts. This could be a result of specialization and division of labor in more concentrated districts that lowers capital entry barriers for entrepreneurs, enabling them to invest in activities that best suit their capital endowment without them necessarily being financially constrained. In addition, the informal financing that is common in industrial clusters could also have played a role in easing their financial constraint when establishing a business.

Figure 3 Correlation between clustering, start-up capital, and capital market inefficiency using locally weighed least-squared smoothing technique.

a. Start-up capital versus clustering



b. Start-up capital versus capital market inefficiency

Source: Constructed based on the 2002–2003 Cottage/Handicrafts Manufacturing Survey and the 2002–2003 Large and Medium Scale Manufacturing Survey. Note: The correlation is depicted for newly established enterprises, that is, those formed in the five years preceding the time of the survey. The unit of the start-up capital is birr.

Second, the majority of those in less concentrated districts were financially constrained and yet had higher start-up capital costs compared with those operating in more concentrated districts. This may be because those investing in less concentrated districts follow a more integrated form of production due to the absence of firms providing parts and components in nearby areas, which could then result in relatively higher start-up capital costs. In the absence of a well-functioning capital market, the high start-up capital costs might cause the majority of entrepreneurs investing in less concentrated areas to be financially constrained. The capital-to-labor ratios in Table 2 also show that producers in less concentrated districts were relatively more capital intensive than their more concentrated counterparts.

3.6 Empirical Model

To investigate the relationship between clustering and starting capital, we formulate the following OLS regression where the dependent variable is value of initial capital investment by each enterprise (K_i).

$$K_i = \beta_1 LQ_d + \beta_2 \text{Cap. Mkt. Inff}_d + \beta_3 R_d + \beta_4 W_i + \gamma E + \varepsilon. \qquad (10)$$

We would expect β_1 to be negative; that is, with increased clustering, entrepreneurs tend to invest a lower amount of capital due to a reduced entry barrier following specialization and division of labor in industrial clusters. Similarly, β_2 is expected to be negative indicating that with increased financial market inefficiency, entrepreneurs tend to have a limited access to capital (both formal and informal) that could then lead them to invest in activities that require a relatively lower start-up investment.

The average distance at each district level from the nearest all-weather road is depicted by R_d. This variable is used as an indicator of the value of the location in which the entrepreneur is establishing a business. For example, accessible locations with good infrastructure might be valued higher than remote locations. This can be reflected by a high value of land or high rental prices for buildings, which could also increase the start-up capital. The wealth of an entrepreneur, indicated by W_i, can also affect how much can be invested in the business. For example, it might be easier for wealthy entrepreneurs to either invest their own savings or have enough collateral that could reduce their cost of borrowing. As an indicator of wealth, we use a dummy that captures whether an entrepreneur owns a non-residential building or not.

E is a vector of enterprise-specific factors such as the age, schooling, and gender of the owner-operator. Regional and urban dummies are also included to capture regional variations. The corresponding enterprise-specific parameters are captured by the vector γ, and ε is a random term. Due to unavailability of data, we are unable to control for the possibility of differences in relative input prices across locations, which could have an effect on the initial investment size.

We further investigate the relationship between starting capital and clustering between enterprises investing in districts of low and high capital market inefficiencies. The distinction is made based on the median value of the capital market inefficiency at the district level. Based on this, two separate regressions are performed for the two groups where the coefficients of the location quotient are compared. We would expect the impact of clustering in reducing the entry barrier of the initial capital investment to be higher (in absolute terms) for microenterprises investing in districts with high capital market inefficiencies.

7 Empirical Results

Location-specific variables such as clustering as captured by the location quotient, level of capital market inefficiency, and distance to the nearest all-weather road; and enterprise-specific variables such as the age and schooling of the owner-operator are all based on current information at the time of the survey. On the other hand, information on start-up capital was asked for at the time of the survey but involves information about the time when the business was actually established. Due to the gap in timing between the dependent and many of the explanatory variables, we have restricted the regression analyses to only enterprises established in the five years previous to the time of the survey. Twenty-five percent of enterprises in the sample started their business during this period, giving us 1,325 observations with which to do the regressions.

7.1 Clustering and Starting Capital

Taking the logarithm of start-up capital as the dependent variable, column II of Table 3 shows that clustering, as captured by the location quotient, reduces start-up capital. Similarly, the greater the capital market inefficiency of a certain district, the lower the start-up capital is, implying the existence of limited access to both formal and informal finances in such locations. Entrepreneurs in accessible locations, as captured by distance to the nearest all-weather road, invest a relatively larger amount of capital than do those in remote areas. On the other hand, entrepreneurs in urban areas invest relatively less capital than do those in rural areas. Whereas the first result may capture the higher valuation of accessible locations that could increase the initial investment size, the urban dummy variable, on the other hand, may have wider implications in terms of capturing the externalities from the existence of large

firms and other complementary services in urban areas that may reduce the transaction costs of operating a business (Krugman 1991; Fujita et al., 1999). Large urban areas are also more diverse, supporting a wide range of industrial activities in close proximity (Fujita et al., 1999), which may help facilitate specialization and the division of labor. Interestingly, the coefficient of the urban dummy variable is much higher than that of clustering, which may indicate that the externalities and multiple specializations in urban centers have a greater impact on helping to reduce starting capital.

Entrepreneurs who own non-residential buildings invest a relatively larger amount of capital than do those who do not own such buildings. This shows that more wealth leads to higher savings, which one can either invest in a business or use to gain relatively better access to capital due to availability of collateral.

Male entrepreneurs are found to invest relatively larger amounts of capital than their female counterparts. The relatively limited savings (McKee 1989; Otero and Downing 1989) and lack of access to both formal and informal sources of finance among women entrepreneurs (FAO 1984) may lead them to invest in activities that have a lower entry barrier. Similarly, more educated and young entrepreneurs are found to make larger investments compared with less educated and older entrepreneurs. This could be due to better information-processing ability and search techniques regarding markets in general and credits in particular among more educated and young entrepreneurs (Wheeler 2006; Freedman 2008), which may result in them taking calculated risks to invest in activities that require larger investments with higher returns.

Columns III and IV of Table 3 show the comparison of the impact of clustering on start-up capital between enterprises investing in districts with low and high capital market inefficiency, respectively[5]. As expected, the impact of clustering on reducing start-up capital is higher for enterprises investing in districts with high capital market inefficiency, which illustrates the importance of industrial clusters as an alternative to propagate industrialization when the local conditions do not allow easy access to credit.

[5] A Chow test between the whole sample of enterprises and those investing in districts with high capital inefficiency shows a significant difference in coefficients across the two, justifying the need to have separate regressions for enterprises in low and high financially inefficient districts.

Table 3 Clustering and starting capital

		Starting capital (log)	
	Full Sample	Low capital market inefficiency	High capital market inefficiency
Clustering (location quotient)	-0.13**	-0.17**	-0.28***
	(0.05)	(0.09)	(0.06)
Capital market inefficiency (log)	-0.19***	—	—
	(0.06)		
Distance to all-weather road (log)	-0.07**	-0.27***	0.07*
	(0.03)	(0.05)	(0.04)
Own building (dummy)	0.43***	0.76***	0.08
	(0.09)	(0.11)	(0.14)
Male (dummy)	2.20***	2.07***	2.14***
	(0.08)	(0.12)	(0.13)
Years of schooling	0.04***	0.02	0.04***
	(0.01)	(0.02)	(0.02)
Age	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)
Addis Ababa (dummy)	0.72***	0.28	1.13***
	(0.12)	(0.21)	(0.17)
Amhara (dummy)	0.14	0.15	-0.04
	(0.11)	(0.14)	(0.16)
Tigray (dummy)	0.63***	0.42***	0.71***
	(0.12)	(0.14)	(0.24)
Urban (dummy)	-0.35***	-0.39	-0.53
	(0.13)	(0.18)**	(0.21)**
R^2	0.478	0.470	0.510
N	1,325	636	689

Notes: Robust standard errors are reported in parentheses.
Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

7.2 Robustness Check Using a Different Measure of Clustering

In this section, we check the robustness of the preceding results by using a different measure for clustering. Following the works of Adelman (1955), Levy (1991), Holmes (1999), and Sonobe and Otsuka (2006b), we use the average sales-to-value-added ratio of enterprises at the district level as a measure of clustering. This ratio tends to increase as the number of enterprises involved in the production process increases. The ratio therefore captures the concentration of specialized firms in a given district.

Table 4 Clustering and starting capital (using alternative measure of clustering)

	Starting capital (log)		
	Full Sample	Low capital market inefficiency	High capital market inefficiency
Clustering (sales-to-value-added ratio)	-0.04**	-0.05**	-0.11***
	(0.02)	(0.03)	(0.04)
Capital market inefficiency (log)	-0.21***	—	—
	(0.06)		
Distance to all-weather road (log)	-0.07**	-0.27***	0.09**
	(0.03)	(0.05)	(0.04)
Own building (dummy)	0.43***	0.69***	0.15
	(0.09)	(0.11)	(0.14)
Male (dummy)	2.19***	2.06***	2.14***
	(0.08)	(0.12)	(0.13)
Years of schooling	0.04***	0.02	0.04***
	(0.01)	(0.02)	(0.02)
Age	0.00	0.01	-0.00
	(0.00)	(0.00)	(0.00)
Addis Ababa (dummy)	0.67***	0.27	1.20***
	(0.12)	(0.22)	(0.18)
Amhara (dummy)	0.14	0 .11	0.17
	(0.11)	(0.14)	(0.18)
Tigray (dummy)	0.55***	0.27*	0.64**
	(0.12)	(0.14)	(0.25)
Urban (dummy)	-0.33**	-0.39**	-0.47**
	(0.13)	(0.18)	(0.20)
R^2	0.478	0.469	0.511
N	1,325	636	689

Notes: Robust standard errors are reported in parentheses.
Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

The sales-to-value-added ratio, however, might be affected over time through a change in the prices of outputs and inputs, and it may not really capture the concentration of specialized firms (Sonobe and Otsuka 2006b). Having that shortcoming in mind, we checked the correlation between the location quotient and the sales-to-value-added ratio for the newly established enterprises at the district level, and we find that the two measures of clustering are positively correlated.

As can be seen in column II of Table 4, similar significant effects are found where an increase in the average sales-to-value-added ratio at the district level reduces the amount of start-up capital, even after controlling for financial market inefficiency. The comparison between microenterprises investing in districts with low and high capital market inefficiency also show the effect to be significantly larger for those investing in districts marked by high capital market inefficiency (column III and IV, Table 4).

7.3 Mechanism Check: Clustering and Likelihood of Being Financially Constrained

In the preceding section, we found that starting capital is lower for those investing inside clusters. In this section, we check if this is actually due to a low capital entry barrier inside clusters. For this, we formulate another regression to investigate the relationship between clustering and the likelihood of being financially constrained when starting a business. If the reduction in starting capital within clusters is due to a low capital entry barrier, we would then expect being financially constrained not to be a major concern for those investing inside clusters. In other words, if clustering is associated with low capital entry barrier, microenterprises investing inside clusters are expected to have a lower likelihood of being financially constrained when starting a business. We try to capture this by the following probit regression using the same explanatory variables as in the previous OLS regression.

$$P(FC)_i = \beta_1 Clustering_d + \beta_2 \text{Cap. Mkt. Inff}_d + \beta_3 R_d + \beta_4 W_i + \gamma E + \varepsilon \quad (11)$$

In the 2002–2003 Cottage/Handicrafts Manufacturing Survey, producers were asked to state the most important problem they faced when starting their business. They were provided with different types of business related constraints to rank, where one of them was being financially constrained. Based on these responses, we define a dummy (FC) that has a value of one if a producer responded that being financially constrained was the most important problem he or she faced when starting a business and zero otherwise. $P(.)$ is the probability that FC =1.

Table 5 reports the marginal effects of the probit regression. As expected, clustering reduces the likelihood of being financially constrained when starting a business and the result is robust for the different measures of clustering. This illustrates that the reduction in starting capital inside clusters is indeed due to a low capital entry barrier, which allows entrepreneurs to invest their limited endowments without necessarily being financially constrained.

An increase in the level of capital market inefficiency in a given district, increases the likelihood of an entrepreneur being financially constrained when starting a business.

Similarly, investing in accessible locations increases the probability of being financially constrained, which is probably due to the increased value of the location that requires a greater amount of start-up capital. Male entrepreneurs in general are less likely to be financially constrained when starting a business than female entrepreneurs. Studies have shown that female entrepreneurs in developing countries generally lack economic resources that can be used as collateral to access credit (FAO 1984; McKee 1989; Otero and Downing 1989; Buvinic and Marguerite 1990). Culture, social norms, and the type of activities women invest in have also been mentioned as possible factors contributing to their limited access to both formal and informal finances (McKee 1989). Entrepreneurs with more years of schooling are less likely to be financially constrained when starting a business. This could be because more educated entrepreneurs are more informed about different ways of gaining access to credit than their less educated counterparts. In addition, educated entrepreneurs might appear creditworthy in the eyes of lenders because of their relative credibility in taking calculated risks and their bookkeeping ability that could help facilitate the monitoring process.

Table 5 Clustering and likelihood of being financially constrained

Marginal effects of probability of being financially constrained		
Clustering (location quotient)	-0.28***	
	(0.03)	—
Clustering (sales-to-value-added ratio)	—	-0.02***
		(0.01)
Capital market inefficiency (log)	0.09***	0.04**
	(0.02)	(0.02)
Distance to all-weather road (log)	-0.03***	-0.02**
	(0.01)	(0.01)
Own building (dummy)	-0.03	-0.02
	(0.03)	(0.03)
Male (dummy)	-0.19***	-0.21***
	(0.03)	(0.03)
Years of schooling	-0.01**	-0.01**
	(0.01)	(0.01)
Age	-0.00	-0.00
	(0.00)	(0.00)
Addis Ababa (dummy)	-0.11**	-0.23***
	(0.06)	(0.05)
Amhara (dummy)	0.05	0.07
	(0.04)	(0.04)
Tigray (dummy)	-0.03	-0.15***
	(0.05)	(0.05)
Urban (dummy)	-0.04	-0.01
	(0.05)	(0.05)
N	1,325	1,325

Notes: Robust standard errors are reported in parentheses.
Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

7.4 The Issue of Causality

Although the preceding results show the relationship between clustering and capital entry barriers, the issue of causality could be a concern if there are any unobservable factors correlated with clustering that can have an effect on start-up capital. The fact that we have a cross-section data set, and not a panel data set so the time dimension of variables is not included, may result in omitted variable bias due to unobservable factors across enterprises. Due to lack of valid instruments to control for biases that may arise from unobservable factors, we perform a "placebo" test by taking large firms that have better access to credit as a control group and analyse the relationship between clustering and start-up capital in their respective situations. Such approach allow us to reduce the risk of endogeniety, if not eliminate it entirely, by showing that clustering reduces start-up capital only when there is lack of access to external financing and not because unobservable factors not captured by the model are at work.

Compared to micro- and small-scale enterprises, large firms in Ethiopia, particularly state-owned and foreign-owned firms, have better access to credit (World Bank 2009). According to the investment climate survey conducted by the World Bank in 2001–2002 and 2006–2007, large firms and especially state-owned ones are far less likely to identify themselves as constrained by costs of financing because they tend to have collateral either through ownership of buildings or land. In addition, the concentration of the banking sector by state-owned banks (nearly two-thirds of the banking system) has resulted in preferential treatment for state-owned and large firms (World Bank 2009). Large firms with better access to credit are therefore more likely to use the integrated mode of production and hence clustering would be less important for them at least in terms of reducing starting capital.

Table 6 shows the regression results of the logarithm of starting capital on the two measures of clustering[6], capital market inefficiency, and other explanatory variables using the 2002–2003 census data of the CSAE's Large and Medium Scale Manufacturing Survey. The regression, which is performed on the firms established in the five years preceding the time of the survey, shows that the clustering variables in both columns have the expected signs but are not significant, implying that clustering is not important when there is better access to

[6] Clustering of large firms is calculated at the zonal level by taking regions as a reference point.

credit. Although the regression is not done based only on data from the textile industry[7], the results in Table 3.6 show that clustering relates differently for producers with different levels of access to credit. However, these results should be interpreted with caution because even if the effect is zero, there may also be other differences between small and large firms that are responsible for this result.

Table 6 Placebo test on the role of clustering on starting capital for large firms with good access to credit

	Starting Capital (log)	
Clustering (location quotient)	-0.11	—
	(0.38)	
Clustering (sales-to-value-added ratio)	—	-0.11
		(0.45)
Capital market inefficiency (log)	-0.32	-0.51
	(1.14)	(0.86)
Distance to all-weather road (log)	0.36	0.45
	(0.36)	(0.31)
Own building (dummy)	2.16***	2.16***
	(0.39)	(0.39)
Male (dummy)	1.16*	1.14*
	(0.59)	(0.59)
Public (dummy)	3.47***	3.47***
	(0.58)	(0.58)
Foreign (dummy)	1.62***	1.63***
	(0.56)	(0.56)
Addis Ababa (dummy)	0.32	0.51
	(0.84)	(0.97)
Amhara (dummy)	0.28	0.25
	(1.01)	(0.89)
Tigray (dummy)	-0.06	-0.16
	(0.97)	(1.13)
Urban (dummy)	1.18	1.07
	(0.74)	(0.82)
R^2	0.206	0.206
N	153	153

Notes: Demographic information other than gender is not available about the owner of the firm. Sectoral dummies for different manufacturing activities are included in the regression but not reported in the table. Robust standard errors are reported in parentheses. Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

8 Conclusions and Discussion

Microenterprises in developing countries often struggle with financial constraints. The absence of a well-developed capital market has been listed as a key obstacle to industrialization in developing countries in the development literature (Bigsten et al. 2003; Hernández-Trillo et al., 2005; McKenzie and Woodruff 2006, 2008). In this paper, we show that industrial clusters, through specialization and division of labor, can ease the financial

[7] Because the number of newly established manufacturing firms in the textile sector is very small (only seven firms), the regression is done for all manufacturing firms and by including sectoral dummies.

constraints of microenterprises even in the absence of a well-functioning capital market. By using data from microenterprises of the handloom sector in four regions of Ethiopia, we find that clustering lowers capital entry barrier by reducing the initial investment required to start a business. This effect is found to be significantly larger for enterprises investing in districts of high capital market inefficiency. The results are also robust for different measures of clustering.

Even if financial development is crucial for industrial development, developing a well-functioning capital market is a daunting task. Clustering could therefore be an alternative way to propagate industrialization when local conditions do not allow easy access to credit. China has achieved rapid industrialization in the past three decades despite its lack of a well-functioning capital market. Clustering largely explains how Chinese micro- and small-scale enterprises were able to function in a credit-constrained environment (Huang et al. 2008; Ruan and Zhang 2009; Long and Zhang 2011). Even if the institutional contexts in which clusters operate are not the same as in China, the cluster-based industrialization model may be applied to developing countries in Africa with similar capital endowments. Promotion of clusters, especially in divisible sectors, could therefore help developing countries engage the vast number of entrepreneurs in micro- and small-scale industries in production processes and make better use of limited capital.

A possible caveat of this study is its reliance on cross-sectional data, which does not allow us to see the effects of inter-temporal changes of relative prices. That we cannot entirely control for possible unobservable factors that can be correlated with clustering is another limitation. In addition, due to lack of detailed data on forward and backward linkages between different agents within clusters, we could not identify the potential mechanisms that could explain the cluster effects, such as the promotion of trust through repeated interaction, the exchange of information and promotion of cooperation, which all can facilitate access to finance. Despite these shortcomings, however, the results of this study show the role of clustering as one way of enhancing industrialization in developing countries by fostering entrepreneurship and by reducing capital entry barriers.

References

Acemoglu, D., S. Johnson, and M. Todd (2009) Determinants of vertical integration: Financial development and contracting costs, *Journal of Finance,* 64(3): 1251–1290.

Adelman, M. A. (1955) Concept and statistical measurement of vertical integration. In *Business concentration and price policy*, ed. G.J. Stigler. Cambridge., USA: National Bureau of Economic Research.

Ali, M., and J. Peerlings (2011a) Value added of cluster membership for microenterprises of the handloom sector in Ethiopia, *World Development,* 39(3): 363-374.

Ali, M., and Peerlings J. (2011b) Ethnic ties in trade relationships and the impact on economic performance: The case of small-scale producers in the handloom sector in Ethiopia, *Journal of Development Studies*, 47(8): 1241-1260.

Ayyagari, M., A. Demirgüç-Kunt, and V. Maksimovic (2008) How important are financing constraints? The role of finance in the business environment, *World Bank Economic Review,* 22 (3): 483–516.

Banerjee, A., and E. Duflo (2005) Growth theory through the lens of development economics. In *Handbook of economic growth*, ed. P. Aghion and S. Durlauf., the Netherlands: Elsevier, pp. 473-552.

Banerjee, A., and K. Munshi (2004) How efficiently is capital allocated? Evidence from the knitted garment industry in Tirupur, *Review of Economic Studies,* 71 (1): 19-42.

Becattini, G. (1990) The Marshallian industrial district as a socio-economic notion. In *Industrial districts and inter-firm co-operation in Italy*, ed. F. Pyke, G. Becattini, and W. Sengenberger., Geneva: International Institute for Labour, pp. 37-51.

Bigsten, A., P. Collier, S. Dercon, M. Fafchamps, B. Gauthier, J. Gunning, A. Oduro, R. Oostendorp, C. Patillo, M. Soderbom, F. Teal, and A. Zeufack (2003) Credit constraint in manufacturing enterprises in Africa. *Journal of African Economies* 12 (1): 104–125.

Buvinic, M., and B. Marguerite (1990) Sex differences in access to small enterprise development fund in Peru, *World Development,* 18 (5): 695–705.

CSAE (Central Statistical Agency of Ethiopia). (2003) *Report on Cottage/Handicraft Manufacturing Industries Survey*, Addis Ababa: Central Statistical Authority of the Federal Republic of Ethiopia.

de Mel, S., D. McKenzie, and C. Woodruff (2008) Returns to capital in microenterprises: Evidence from a field experiment, *Quarterly Journal of Economics,* 123 (4): 1329–1372.

Demirgüç-Kunt, A., and V. Maksimovic (1998) Law, finance, and firm growth, *Journal of Finance,* 53 (6): 2107–2137.

FAO (Food and Agriculture Organization of the United Nations). (1984) *Promotion of women's activities in marketing and credit: An analysis, case studies, and suggested actions.* Rome: FAO.

Freedman, M. L. (2008) Job hopping, earning dynamics, and industrial agglomeration in the software publishing industry, *Journal of Urban Economics,* 64 (3): 590–600.

Fujita, M., P. Krugman, and A. Venables (1999) *The spatial economy: Cities, regions, and international trade*. Cambridge, Mass., U.S.A: MIT Press.

Grabher, G. (1993) Rediscovering the social in the economics of inter-firm relations. In *The embedded firm: On the socioeconomics of industrial networks*, ed. G. Grabher. London: Routledge, pp. 1-31.

Grimm, M., J. Krüger, and J. Lay (2009) *Barriers of entry and capital returns in informal activities: Evidence from Sub-Saharan Africa.* Paper presented at the IARIW-SAIM conference "Measuring the Informal Economy in Developing Countries," September 23–26, Kathmandu, Nepal.

Haber, H. (1991) Industrial concentration and the capital markets: A comparative study of Brazil, Mexico, and the United States, 1830–1930, *Journal of Economic History,* 51 (3): 559–580.

Hayami, Y., M. Kikuchi, and E.B. Marciano (1998) Structure of rural-based industrialization: metal craft manufacturing on the outskirts of greater Manila, the Philippines, *Developing Economies*, 36 (2), 132−154.

Helmsing, B. (1999) *Flexible specialization, industrial clusters and districts, and "second" and "third generation" local and regional policies.* ISS Working Paper 305. The Hague, the Netherlands: Institute of Social Studies.

Hernández-Trillo, F., J. A. Pagán, and J. Paxton (2005) Start-up capital, microenterprises, and technical efficiency in Mexico, *Review of Development Economics,* 9 (3): 434–447.

Holmes, T. J. (1999) Localization of industry and vertical disintegration, *Review of Economics and Statistics,* 81 (2): 314–325.

Hsieh, C.T., and P. Klenow (2009) Misallocation and manufacturing TFP in China and India, *Quarterly Journal of Economics,* 124 (4): 1403–1448.

Huang, Z., X. Zhang, and Y. Zhu (2008) The role of clustering in rural industrialization: A case study of Wenzhou's footwear industry, *China Economic Review,* 19 (3): 409–420.

Krugman, P. (1991) Increasing returns and economic geography, *Journal of Political Economy,* 99 (3): 483–499.

Krugman, P., and A. **Venables** (1996) Integration, specialization, and adjustment, *European Economic Review,* 40 (3–5): 959–967.

Lall, S.V., Z. Shalizi, and U. Deichmann (2003) Agglomeration economies and productivity in Indian industry, *Journal of Development Economics,* 73 (2): 643–673.

Leff, N.H. (1978) Industrial organization and entrepreneurship in the developing countries: the economic group, *Economic Development and Cultural Change,* 26(4): 661-675.

Levy, B. (1991) Transaction costs, the size of firms, and industrial policy: Lessons from a comparative case study of the footwear industry in Korea and Taiwan, *Journal of Development Economics,* 34 (1–2): 151–178.

Long, C., and X. Zhang (2011). Cluster-based industrialization in China: Financing and performance*, Journal of International Economics*,, 84: 112-123.

Marshall A. (1920) *Principles of economics*, London: Macmillan.

McKee, K. (1989) Micro-level strategies for supporting livelihoods, employment, and income generation of poor women in the world: The challenge of significance, *World Development,* 17 (7): 993–1006.

McKenzie, D. J., and C. Woodruff (2006) Do entry costs provide an empirical basis for poverty traps? Evidence from Mexican microenterprises, *Economic Development and Cultural Change,* 55 (1): 3–42.

McKenzie, D. J., and C. Woodruff (2008) Experimental evidence on returns to capital and access to finance in Mexico, *World Bank Economic Review,* 22 (3): 457–482.

Nadvi, K. (1999) Shifting ties: Social networks in the surgical instrument cluster of Sialkot, Pakistan, *Development and Change,* 30 (1): 141–175.

Nadvi, K., and S, Barrientos (2004) *Industrial cluster and poverty reduction: Towards a methodology for poverty and social impact assessment of cluster development initiatives*. <http://www.unido.org/fileadmin/user_media/Services/PSD/Clusters_and_Networks/publications/industrialClustersandpoverty_NADVI.pdf>.

O'Donoghue, D., and B. Gleave (2004) A note on methods for measuring industrial agglomeration, *Regional Studies,* 38 (4): 419–427.

OECD (Organization for Economic Co-operation and Development). (2004) *Promoting Entrepreneurship and innovative SMEs in a global economy: towards a more responsible and inclusive globalization*. 2nd OECD conference of minsters responsible for SMEs. Istanbul, Turkey 3-5 June 2004.

Otero, M., and J. Downing (1989) *Meeting women's financial needs: Lessons for formal financial institution,.* Paper presented at the Seminar on Informal Financial Markets in Development sponsored by Ohio State University, the United States Agency for International Development, and the World Bank, October 18–20, Washington, D.C.

Rajan, R., and L. Zingales (1998) Financial dependence and growth, *American Economic Review,* 88 (3): 559–586.

Ruan, J., and X. Zhang (2008) *Credit constraints, organizational choice and returns to Capital*, IFPRI Discussion Paper 00830. Washington DC, USA: International Food Policy Research Institute.

Ruan, J., and X. Zhang (2009) Finance and cluster-based industrial development in China, *Economic Development and Cultural Change,* 58 (1): 143–164.

Russo, P. F., and P. Rossi (2001) Credit constraints in Italian industrial districts, *Applied Economics,* 33 (11): 1469–1477.

Schmitz, H. (1995) Collective efficiency: Growth path for small-scale industry, *Journal of Development Studies,* 31 (4): 529–566.

Söderbom, M., and F. Teal (2004) Size and efficiency in African Manufacturing firms: evidence from firm level panel data, *Journal of Development Economics,* 73(1): 369-394.

Sonobe, T., and K. Otsuka (2006a) *Cluster-based industrial development: An East Asia model*. New York: Palgrave Macmillan.

Sonobe, T., and K. Otsuka (2006b). The division of labor and the formation of industrial clusters in Taiwan, *Review of Development Economics,* 10 (1): 71–86.

Stigler, G. J. (1951) The division of labor is limited by the extent of the market, *Journal of Political Economy,* 59 (3): 185–193.

Tybout, J. (1983) Credit rationing and investment behavior in a developing country, *Review of Economics and Statistics,* 65 (4): 598–607.

Udry, C., and S. Anagol (2006) The return to capital in Ghana, *American Economic Review,* 96 (2): 388–393.

Van Biesebroeck, J. (2005) Firm size matters: Growth and productivity growth in African Manufacturing, *Economic Development and Cultural Change,* 53(3): 545-583.

Visser, E. J. (1999) A comparison of clustered and dispersed firms in the small-scale clothing industry of Lima, *World Development,* 27 (9): 1553–1570.

Wheeler, C. H. (2006) Cities and the growth of wages among young workers: Evidence from the NLSY, *Journal of Urban Economics,* 60 (2): 162–184.

World Bank. (2009) *Toward the competitive frontier: Strategies for improving Ethiopia's investment climate.* Report 48472-ET. Washington, D.C.: World Bank.

Zhang, X., L. Mooman, and G. Ayele. (2011). Infrastructure and Cluster Development: A Case Study of Handloom Weavers in Ethiopia, *Journal of Development Studies*, forthcoming.

Zhang, X., and K.-Y. Tan (2007) Incremental reform and distortions in China's product and factor markets, *World Bank Economic Review*, 21 (2): 279–299.