

Finance and Cluster-Based Industrial Development in China

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I. Introduction

Industrial development often requires investment in machinery and factory buildings. When one is facing credit constraints, the conventional thinking is to borrow from formal or informal sources. A well-developed financial system can help pool disparate savings to finance the large lump-sum industrial investment. The positive role of financial development on industrialization has been widely studied (Goldsmith 1969; McKinnon 1973; King and Levine 1993; Rajan and Zingales 1998; Ayyagari, Demirgüç-Kunt, and Maksimovic 2006).

In the early stage of industrialization, lack of financial development is more common than not in developing countries. It is a ubiquitous problem that small and medium enterprises (SMEs) have difficulty accessing credit not only in developing countries¹ but also in developed countries at early stages of industrialization.² In some places, developing the financial sector is a daunting task by itself.

When firms face high entry barriers and limited financial means, it is natural for them to start small in industries or sectors with lower hurdles of investment

We are grateful to Andrew Dillon, Shenggen Fan, Lisa Moorman, Keijiro Otsuka, John Strauss, two anonymous reviewers, and seminar participants at the 2008 Chinese Economists Society conference, International Food Policy Research Institute, and Texas A&M University for their helpful comments. Qian Weiguo and Zhu Huiyu provided great support for our survey, which we acknowledge with appreciation. Funding support from the Natural Science Foundation of China (approval no. 70828002) and Ministry of Education of China (approval no. 08JJD840206) is also gratefully acknowledged.

¹ Bigsten et al. (2003) show that SMEs face higher credit constraints than large firms in African countries.

² According to Cull et al. (2005), SMEs in the North Atlantic Core rarely obtained credit from large banks early in their history.

and then use their profit for reinvestment. Some studies (Leidholm and Mead 1987; Mead and Leidholm 1998; McKenzie and Woodruff 2006) show that the median initial investment in micro and small firms in developing countries is very low, particularly for most unskilled sectors, such as petty trade, construction, and personal services. Yet they also find a large variation in capital entry barriers across sectors, and the firm scale is highly variable in many industries. For example, the manufacturing sector presents much higher capital entry barriers than the service and trade sectors. On the basis of manufacturing surveys in several African countries, Bigsten et al. (2000) find the coexistence of high returns to capital and low level of investment, suggesting that African firms face high capital costs in the manufacturing sector.

While these empirical studies find that overall the capital entry barriers for micro and small enterprises are modest in developing countries, they cannot rule out the possibility that high start-up costs may prevent small firms from growing in certain sectors of activities. Some theorists postulate that in the presence of indivisible production technologies and high fixed costs of investment, imperfect credit markets can prevent developing countries from becoming industrialized (Banerjee and Newman 1993). McKenzie and Woodruff (2006) call for more empirical studies to examine whether nonconvex technologies have a threshold effect using data encompassing both small and large firms.

The rapid industrialization in China over the past 3 decades provides a good base to answer this question. When China started its reforms in the early 1980s, rural areas and farmers lacked financial services. Very few SMEs have received credit support from state-owned banks (Lin and Li 2001; Yu 2002; Wang and Zhang 2003; Lin and Sun 2005). Moreover, although China has gradually shed its long-standing prejudice against private business, state bank loans are still primarily directed to state-owned enterprises. Thus, China's financial system is not well developed by existing standards and is not particularly friendly to SMEs (Allen, Qian, and Qian 2005).

In theory, this should have prevented investments in machinery and other assets required for nonfarm production. However, vast rural areas in coastal China have become industrialized at an unprecedented speed and have been able to produce a wide range of manufactured goods. As pointed out by Summers (2007), over the past 2–3 decades China has experienced the same degree of industrialization that took 2 centuries to occur in Europe. This ability to quickly industrialize in such a constrained environment shows that it is possible for a country to escape the poverty trap of imperfect capital markets and high start-up costs in the manufacturing sector.

One common explanation of the puzzle is that although China's formal

finance sector is still in its infancy, informal finance may have played a substitute role in the development of SMEs (Zhang and Li 1990; Shi, Sun, and Yan 1998; Guo and Liu 2002; Allen et al. 2005; Lin and Sun 2005). However, at the onset of China's reform in the late 1970s, a large proportion of rural people were poor (Ravallion and Chen 2007), meaning that local savings would have been rather limited for informal financing.

Without denying the importance of formal and informal finance in pooling resources, we argue herein that clustering contributed to the possibilities of industrialization by making production technologies more divisible and lowering the capital entry barriers of SMEs.³ If a seemingly integrated production process can be broken into smaller steps, then the investment requirement for each stage is naturally lowered. Here we use the Puyuan cashmere sweater cluster, a typical industrial cluster in rural Zhejiang Province, as an example to demonstrate our perspective. Our evidence supports the findings by Mead and Leidholm (1998) and McKenzie and Woodruff (2006) that the nonconvexity problem is not as serious as previously thought. Moreover, this study goes one step further by showing that many technologies are actually divisible in an industrial cluster. Clustering can be an alternative way to circumvent the high investment barriers of some seemingly nonconvex technologies.

The division of labor is an essential part of classical economics. For instance, in the first chapter of *The Wealth of Nations*, Adam Smith (1776) uses a pin factory as an example to show how division of labor improves productivity. Young (1928) argues that increasing returns depend on the progressive division of labor. Marshall (1920) posits that clustering, as an important way of increasing the division of labor, could enhance enterprises' competitiveness for three reasons: labor pooling, easy access to suppliers, and quick dissemination of knowledge. However, deepening the division of labor within a cluster may involve high coordination costs due to the increased number of transactions among more parties (Williamson 1975; Becker and Murphy 1992).

Despite the potentially higher coordination cost, industrial clusters can be found in both developed and developing countries (Schmitz and Nadvi 1999; Sonobe and Otsuka 2006). Historically speaking, the business model of clus-

³ Porter (1990, 18) defines a cluster as a "geographic concentration of interconnected companies and institutions in a particular field." However, this definition masks the key role of clustering in the division of labor among the enterprises in the cluster (Marshall 1920). In particular, it does not distinguish between the Detroit-style agglomeration with large firms and the Chinese-style clusters (which consist of many SMEs). In this paper, following Pyke, Becattini, and Sengenberger (1990), we define a cluster more narrowly as a production system involving numerous enterprises in a certain location engaged in producing a wide range of stages. This definition fits better with the situation in Puyuan and other specialty cities or towns in China as described in the media, such as the *New York Times* (2004) and *National Geographic* (2007).

tering is not new since it resembles the “putting-out” system widespread in western Europe prior to the Industrial Revolution. Under the putting-out system, a merchant-employer obtained market orders and subcontracted production to nearby farmers or skilled workers, who usually performed the work in small family workshops (Hounshell 1984). The putting-out system was also observed in the textile industry in nineteenth-century Japan and early twentieth-century China (Feng 2005; Nakabayashi 2006).

Empirical studies on industrial clusters (Schmitz 1995; Sato 2000; Yamamura, Sonobe, and Otsuka 2003; Sonobe and Otsuka 2006) generally support Marshall’s hypotheses on information spillover, market linkage, and labor pooling. However, relatively few studies have examined industrial clusters in the context of finance. Hayami, Kikuchi, and Marciano (1998) and Schmitz and Nadvi (1999) are two exceptions. They briefly comment that clustering lowers the capital requirement for new entrants, but they do not elaborate on these arguments with solid empirical evidence. On the basis of an in-depth case study, this paper describes how the production process can be segmented into incremental steps through clustering and how the local government plays an active role in providing key public goods to lower costs due to the increased number of transactions among more parties in a cluster.

One should bear in mind a few limitations of this study. First, China is a large country, and there exist different models of rural industrialization (Xu and Zhang 2008). This paper is a case study of only one industry in one area of China. Our objective is not to test the causal role of financial development on industrial growth but rather to demonstrate that clustering can add to the possibilities of industrialization. Clearly clustering is not a necessary condition for industrialization, but it does expand the set of process choices available for industrialization.

Second, the degree of divisibility is likely to be industry specific. Some labor-intensive industries such as garment making, footwear production, hardware crafting, and metalwork are more suitable for cluster-based production than capital-intensive industries. For example, Zhang and Li (1990) documented that even the production of a simple badge in Cangnan (Zhejiang Province) could be divided into 13 stages that were carried out by different family workshops in a village, forming a virtual production line. In contrast, it is difficult or impossible to divide the oil refinery production process into many incremental stages operated by independent producers.

Third, in our cross-sectional sample, we observe only firms that have survived, but not those that have failed. Firms can fail for many reasons, including lack of management skills, bad luck, and lack of opportunities. We cannot infer from the cross-sectional sample whether some firms have failed as a result

of lack of family resources to finance business expansions or one of these other factors. There is no clear method to correct for this bias since failed firms were not available for interviews, so this could be a limitation of the applicability of this study.

The remainder of the paper is organized as follows: Section II reviews the evolution of the Puyuan cashmere sweater industrial cluster. Section III explains the two business models of production and our survey sampling method. Section IV documents capital entry barriers among different types of production. Section V examines some ways enterprises in Puyuan have found to ease working capital constraints. Section VI presents conclusions.

II. Evolution of the Puyuan Cashmere Sweater Industrial Cluster

Puyuan Township is located in northern Zhejiang Province, between Hangzhou and Shanghai. Historically, Puyuan was an important silk production center. In 1976, a collectively owned enterprise, the Puyuan Tanhua (Weaving) Production Cooperative, purchased three hand-shaken weaving machines and began to produce cashmere sweaters. Its gross output value soared from 28,000 yuan to 300,000 yuan in just 1 year. As a result, the cooperative had devoted all its production capacity to cashmere sweaters by the end of 1977 (Chen 1996).

This firm's huge success prompted farmers in nearby villages and workers from the township- and village-owned enterprises to set up other cashmere sweater production workshops. Meanwhile, market demand for clothes surged suddenly after the success of rural reform in the mid-1980s; this increased demand greatly stimulated production. Because most entrepreneurs had little in the way of savings, the majority initially worked from home using a few secondhand weaving machines and sold the sweaters along a main road linking Shanghai and Hangzhou. However, large crowds often gathered at these points of sale, blocking traffic. In April 1988, the township government and the local administration for industry and commerce responded to this issue by raising 580,000 yuan from different sources and constructing a cashmere sweater marketplace. Located on the southern side of the main road, this marketplace initially comprised over 4,300 square meters of building area and more than 50 rooms. Both local merchants and those from other regions of Zhejiang Province quickly moved into the marketplace and began doing business. The openness of the marketplace deepened the division of labor, because merchants often put out the production to different workshops in Puyuan after receiving market orders. In 1990, the township produced over 2.8 million sweaters, and approximately 90% of the households in Puyuan Township and its peripheral villages were engaged in the production of cashmere sweaters.

Around 1990, the Puyuan Administration for Industry and Commerce decided to levy higher management fees from the merchants in the market. Nearby Honghe Township seized the opportunity by opening a similar marketplace with reduced fees. In response, many merchants moved to Honghe. In 1992, facing the pressure of an eroding tax base, the local government of Puyuan lobbied the upper-level government to transfer the head of the Puyuan Administration for Industry and Commerce (which is vertically administered under China's governance structure) elsewhere, and this policy was reversed.

In the aftermath of this reversal, the Puyuan market rebounded. Between 1992 and 1994, the local government further raised nearly 100 million yuan from the Puyuan Township government; the Puyuan Administration for Industry and Commerce (Puyuan Zhen Gongshangsu); the Puyuan General Company of Agriculture, Industry, and Commerce (Puyuan Nonggongshang Zong Gongsi); the Tongxiang City Goods and Materials Company (Tongxiangshi Wuzi Gongsi); the Tongxiang Supply and Sale Cooperative (Puyuan Gongxiaoshe); various banks; and other sources. Using these resources, the local government built 11 more marketplaces with more than 3,000 shops for cashmere sweaters and their intermediate inputs. Once again, the new marketplaces were very popular, and they were quickly filled by merchants from all around China. With easy market access, transportation and marketing costs were also reduced.⁴ The cashmere sweater production industry recorded explosive growth during this period. As of 1994, Puyuan's sweater output reached as many as 10 million pieces, with market sales exceeding 2 billion yuan, making it the largest production center of cashmere sweaters in China.

As production grew rapidly, so did the volume of transportation into and out of Puyuan. Initially there were many small private logistics companies, each operating only one or two routes. It was not economical for each transportation company to build separate loading docks and parking lots, meaning that trucks often blocked the streets when loading goods. Moreover, some of these companies even hired thugs to fight for the most lucrative routes. In 1995, to reduce chaos and improve efficiency, the local government intervened by organizing 27 private logistics and transport companies into a shareholding company with the local government as the largest shareholder. The company invested 40 million yuan to build a logistics business center, a loading dock, a 150,000-square meter warehouse, and a parking lot. The company has auctioned off 109 routes to over 140 major cities in China to private investors. However, although the company would seem to have a natural local monopoly,

⁴ Sonobe, Hu, and Otsuka (2002), in a study of a garment cluster in Zhejiang Province, detail how the establishment of standardized markets helped lower the entry barriers for new business.

shipping costs through the Puyuan logistics center have decreased since the company's inception. This may be due to competition from the neighboring Honghe Township's logistics center.

During the period 1995–97, the national textile market reached a low point. To compete in these harsh market conditions, some enterprises in Puyuan started using cheap materials at the expense of product quality. This greatly damaged the reputation of Puyuan's cashmere sweater industry. In response, the Puyuan Township Government promulgated two decrees in 1997: the Quality Control and Inspection System in Cashmere Marketplaces in Puyuan, Tongxiang (Tongxiangshi Puyuan yangmaoshan chanpin zhiliang jiandu jiancha zhidu) and the Product Quality Guarantee Stipulation in Cashmere Sweater Marketplaces (Yangmaoshan shichang chanpin zhiliang baozheng guiding). The Administrative Committee of Puyuan Marketplace was asked to earnestly enforce these two regulations and was given three specific measures to achieve these aims. First, the Puyuan Administration for Industry and Commerce was invited to set up a branch office in the main marketplace to help enforce product quality. Second, one marketplace was earmarked specifically for the sale of high-end sweaters. Third, the Zhejiang Jingwei Notarization and Inspection Company was invited to set up a quality inspection center in Puyuan in order to provide third-party quality certification.

Owing to the ease of imitation within the cluster, it was difficult for a given company to establish its own brand when intellectual property was not securely protected. In 2000, the local government set up an industrial park of 2,245 mu (0.067 hectare) and sought to attract well-established enterprises with famous brands from elsewhere in China by granting preferable land, tax, and credit policies. In addition, local enterprises with high growth potential were encouraged to settle in the park, where they could expand production and establish their brands.⁵

In addition to developing marketplaces and the logistics center, the local government has also provided many other public goods and services over time. For example, the past several years have seen intensification of street patrols in an effort to ensure security in the marketplaces. An information system connecting the local police station and hotels was established to screen out businesspeople with false identification, who would be more likely to commit fraud. In 2000, the local government devoted 3 million yuan to advertisements aimed at promoting the cluster, and ever since 2003, the annual government-supported Puyuan International Textile Exhibit has sought to attract merchants

⁵ The three major criteria used to determine growth potential are (1) registered trademarks, (2) a sound brand name, and (3) sufficient investment.

from both China and overseas. These generic promotion efforts have enhanced Puyuan's image and decreased marketing costs for individual enterprises.

Within a given cluster, the worker turnover rate is very high. Therefore, it does not make sense for an individual firm to invest heavily in training employees because it cannot recover the training cost if a trained worker jumps to another company. To overcome this externality, in 2000, Tongxiang City Labor and Social Welfare Bureau, the Administrative Committee of Puyuan Marketplace, the Puyuan Township Government, and Donghua University jointly set up a human resource development center, responsible for collecting labor market information and training workers and managers.

As of 2004, over 3,900 enterprises and family workshops in Puyuan Township were engaged in the production of a variety of cashmere sweaters, and there were more than 6,000 sweater shops in the market. Over 50,000 people worked in the various stages of cashmere sweater production in this cluster, accounting for 38% of the total population and 65% of the total labor force in Puyuan.⁶ The market transaction turnover topped 10 billion yuan, and the business volume amounted to nearly 500 million pieces.

In summary, throughout the course of cluster development, the local government has played an active role in providing necessary local public goods and services that enable enterprises to become more specialized in their production.

III. Two Business Models of Production and Survey Sampling Method

A. Two Business Models of Production

The production of cashmere sweaters in Puyuan consists of eight major steps: yarn purchasing, weaving, dyeing, finishing, printing, ironing, packing, and selling. There are two major business models that may be used to organize this production. Figure 1 depicts the first business model, which has a core of integrated enterprises. This organizational chart consists of four entities: large integrated manufacturing factories, yarn dealers, dyeing factories, and finishing factories. Most of these integrated enterprises are located in the industrial park. They purchase yarn from marketplace yarn dealers or directly from yarn factories elsewhere and complete the weaving process in-house. They then outsource the semifinished goods to specialized dyeing factories and

⁶ According to the *Tongxiang Statistical Yearbook* (Statistical Bureau of Tongxiang City 2005), Puyuan Township had a registered population of about 44,000, excluding migrants. The Puyuan Public Security Bureau estimated that the total number of migrant workers was about 90,000 in 2005. CNBS (2001) published population data by age at the county level. In Tongxian City, which includes Puyuan Township, the share of working-age individuals in the total population was 71%. We used this ratio as a proxy to estimate the size of the labor force in Puyuan.

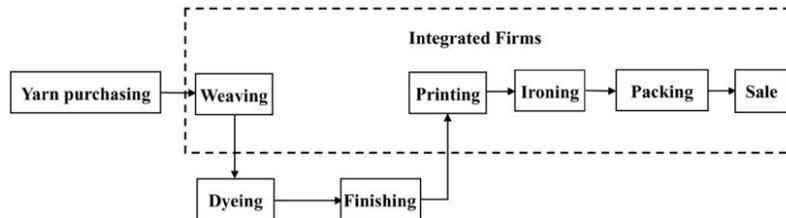


Figure 1. Integrated production organization. The dashed line represents the production process of the big factory, and the arrows show the flow route of the raw material and semifinished goods in the manufacturing process.

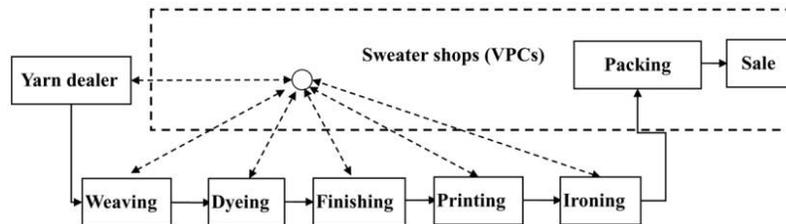


Figure 2. Virtual enterprise organization. The dashed line represents the production processes of sweater shops. The solid arrows denote the actual flow route of the raw materials and semifinished goods, and the dashed arrows show information exchange among the entities. Raw materials, semifinished goods, and final products are mainly transported by a specialized group of workers using three-wheeled electric carts. Although they are not shown in the figure, the three-wheelers are analyzed as a separate production stage in the tables.

finishing factories. After this process, the products are ironed, sorted and packaged inside the factory before being ultimately shipped out to the national market through the logistics center.

Figure 2 illustrates the second business model, a virtual enterprise model in which sweater merchants, acting as a group of “virtual” production coordinators (VPCs), play a key coordinating role. These VPCs either rent or own shops in the township’s designated sweater marketplaces. More often than not, they imitate the designs of big companies or those seen in fashion magazines, using them to guide production of sample sweaters, which they display in their shops. As Puyuan is the largest cashmere sweater market in China, many merchants visit the shops in the marketplaces. When the VPCs receive orders or believe that a certain style will sell well, they purchase raw materials from the marketplace and have them delivered to family weaving workshops down the production chain. The generated semifinished goods are sent to dyeing, finishing, printing, and ironing enterprises, and the VPCs (merchants) perform quality inspections and package the final products in their shops. If any quality problems are identified, they are traced back to the sources of production, and the VPC resolves the issue with the responsible party. In this business model, the raw materials and intermediate products are frequently transported from

one processing point to another by a number of couriers who use electric or man-powered three-wheeled vehicles. After going through this “assembly line,” the final products are transported to other markets through the Puyuan logistics center. In essence, this business model is similar to the putting-out system that was widespread in the United Kingdom prior to the Industrial Revolution.

B. Sampling Method

With the two types of production models in mind, we will now discuss our survey design. In August and December of 2005, we surveyed 140 enterprises and gathered 126 complete questionnaires. On the basis of detailed field interviews and observations, we then designed a sampling scheme. Table 1 shows the total number of enterprises and our sample size by production process. There are two types of yarn dealers: the sales agents of big yarn manufacturers who earn commissions on the basis of sales volume and the buyers who purchase yarns from different places and sell them in the store. We selected about the same number of yarn stores representing each type. There are also two types of sweater stores: those specializing in low-end products targeting the mass market and those focusing on high-end products. We randomly selected representative shops in proportion to the total number of stores of each type. In terms of three-wheelers, although regulations require that they be registered and have a legal license plate, in reality at least half of the three-wheelers do not have a legal plate. We randomly sampled both types of three-wheeler drivers according to the total number of registered and nonregistered three-wheel vehicles provided by the Puyuan Administration for Industry and Commerce. Most family weaving workshops were concentrated in two villages; the same number of family weaving workshops was sampled from each village. The dyeing, finishing, printing, and ironing factories or workshops were concentrated in certain designated areas. We randomly picked samples from those areas. Most of the large manufacturing factories were located in the industrial park. We randomly selected 14 of them from the complete list provided by the Administrative Committee of Puyuan Industrial Park.

IV. Initial Capital Investment

Table 2 details the sources of start-up capital for all surveyed enterprises, both integrated companies and those engaged in a vertical division of labor. As shown in table 2, the capital-intensive enterprises (e.g., dyeing, finishing, logistics, and integrated firms) received more than 20% of their starting capital from banks. The other, more labor-intensive, enterprises acquired only a neg-

TABLE 1
THE NUMBER OF ENTERPRISES BY TYPE IN 2005

Type	Sample	Total	Sample Proportion (%)	Total Employment	Main Characteristics
Yarn dealers	11	250	4.40	535	Yarn market shop required
Family weaving workshops	32	3,518	.91	42,074	Leased family workshop, small equipment, small-lot production required
Dyeing factories	5	23	21.74	1,150	Factory building, big equipment, governmental pollution control required
Finishing factories	6	42	14.29	3,073	Factory building, big equipment, governmental pollution control required
Printing workshops	5	100	5.00	500	Family workshop, certain amount of equipment required
Ironing workshops	3	100	3.00	318	Family workshop, certain amount of equipment required
Sweater shops (VPCs)	39	5,750	.68	12,133	Shop required
Three-wheeler drivers	10	2,000	.50	2,000	Electric or man-powered three-wheeler required
Integrated enterprises	14	121	11.57	8,254	Factory building, assembly line required, multiple stages of production
Logistics company	1	1	100.00	...	Big parking lot, loading ground, a transport team, large investment required
Total	126	11,905		70,037	

Source. Puyuan Township Statistical Center, Administrative Committee of Puyuan Industrial Park, and Administrative Committee of Puyuan Marketplace.

TABLE 2
SOURCE OF STARTING CAPITAL

	Average Amount (10,000 Yuan)	Founder (%)	Relatives or Friends (%)	Banks (%)	Others (%)
Yarn dealers	12.45	83.21	16.79	.00	.00
Family weaving workshops	7.31	81.46	15.64	2.90	.00
Dyeing factories	340.07	47.50	31.87	20.63	.00
Finishing factories	177.82	29.91	34.14	25.68	10.27
Printing workshops	10.60	77.36	22.64	.00	.00
Ironing workshops	3.83	88.26	11.74	.00	.00
Sweater shops (VPCs)	12.74	80.58	12.47	6.95	.00
Three-wheeler drivers	.54	63.28	36.72	.00	.00
Logistics company	4,000.00	50.00	.00	50.00	.00
Integrated enterprises	263.84	59.59	19.28	21.13	.00

Source. Survey by authors.

TABLE 3
SUMMARY STATISTICS OF REQUIRED INVESTMENTS FOR DIFFERENT TYPES OF ENTERPRISES

	Maximum	Minimum	Median	Mean/ Wage	Variation
Yarn dealers	30.00	3.00	10.00	6.25	.17
Family weaving workshops	43.00	.22	4.50	3.65	.70
Dyeing factories	876.75	68.51	200.00	170.05	.37
Finishing factories	548.05	55.53	65.27	88.90	.46
Printing workshops	20.00	6.00	10.00	5.30	.10
Ironing workshops	4.50	3.00	4.00	1.90	.01
Three-wheeler drivers	1.20	.05	.45	.25	.34
Sweater shops	50.00	2.00	10.00	6.35	.21
Logistics company	4,000.00	4,000.00	4,000.00
Integrated enterprises	863.36	11.11	220.38	131.90	.43
Total inequality					1.75
Within-type inequality					.38
Between-type inequality					1.37
Between-type inequality/total inequality (%)					78.29

Note. The unit is 10,000 yuan for the investment levels. The figures have been adjusted to the 2005 level on the basis of the national fixed asset price index (see n. 9). The variation in starting capital is measured by the family of generalized entropy index $GE(a)$, where a is set to zero here. The results are similar if a is set to other parameters. The advantage of GE is that it can be easily decomposed into between- and within-group inequalities.

ligible share from banks and primarily relied on founders, relatives, and friends for start-up capital.⁷

Table 3 provides major summary statistics, including maximum, minimum, and median level of and variation in start-up capital for different types of enterprises. It also lists the ratio of average start-up capital to the average

⁷ Prior to 2004, there were only state banks. In March 2004, Jiaying Commercial Bank, a locally owned shareholding company, set up a branch office in Tongxiang City, about 20 kilometers from Puyuan Township. In 2005, the first pawnshop opened in Puyuan Township.

annual earnings in Puyuan: 20,000 yuan. The bottom part of the table also presents total inequality, within-type inequality, between-type inequality, and the ratio of between-type inequality to total inequality using the generalized entropy measure. These measures reveal the relative importance of the within- and between-type components in total variation in starting capital.

For production enterprises (e.g., integrated enterprises, family weaving workshops, dyeing factories, finishing factories, printing workshops, and ironing workshops), we collected information on both the starting capital and current capital stock. For yarn dealers and VPCs, we did not distinguish between starting and current capital since these entities did not need to buy machines when starting their business. We counted total capital investment as the sum of the current annual rents, tax payments, and working capital for inventory.⁸ For three-wheelers, we asked about the purchase date and price of their transportation vehicles. Since our survey included the year of starting the business, we were able to convert a given enterprise's initial capital investment into its 2005 price level, using a national fixed asset price index.⁹

As shown in tables 1 and 2, the numbers and sizes differ greatly among the 10 types of enterprises in the cluster. The logistics company requires large areas for storage, parking, and loading and therefore represents a significant amount of fixed investment. It is centrally managed by a single company, with the local government as its largest shareholder.

The average investment for a family weaving workshop exceeds 70,000 yuan, but the output volume varies greatly among weaving workshops, as shown by the large within-group variation. Entrepreneurs with small amounts of capital may buy a single secondhand machine for only around 2,000 yuan, whereas those with deeper pockets may buy a larger number of new automatic machines. On average, it requires about 3.5 years of earnings to start up a family weaving workshop for a typical worker.

Dyeing and finishing factories require large equipment (170 and 89 times an average worker's salary) and are suitable for mass production. Furthermore,

⁸ Rents and taxes are usually required to be paid on a yearly basis. In Puyuan, because there are so many small businesses, it is hard for the limited number of tax collectors to assess their profit. Instead they just set up a fixed amount for every business in the same area. For one to start a business, the lump-sum cost of renting and taxes is a major investment for consideration. Utility and wage bills were not included because they are recurrent expenditures on a monthly basis.

⁹ China did not publish a fixed asset price index until 1992. On the basis of CNBS (1997), Mingxiu Liu and Qi Zhang computed the index prior to 1992 and posted it on the Web site of Forum for Economic Development (<http://www.fed.org.cn/>). We used Liu and Zhang's price index for the period 1985–91. The index since 1992 was obtained from various years of the *China Statistical Yearbook*.

they are subject to stringent pollution control by the government. These factors raise the bar of entry, with the result that there are relatively few such factories in Puyuan; there were only 23 dyeing and 42 finishing factories present within the cluster in 2005. These two types of enterprises received 21% and 26% of their starting capital from banks by using fixed assets as collateral.

The equipment for printing workshops costs more than 100,000 yuan. On average, an ironing workshop requires about 40,000 yuan of investment. These entry barriers are rather modest compared to the average annual wage level of 20,000 yuan in Puyuan. Owing to government regulations, ironing workshops are standardized and concentrated in a designated zone of the industrial park, where natural gas is centrally supplied. It would be extremely expensive for a single enterprise to supply its own heating system. With centrally supplied natural gas, the size of an ironing workshop is greatly reduced. This group of enterprises is rather homogeneous, which is why it has the lowest in starting capital within-group variation among all the production types.

The yarn dealers, VPCs, family weaving workshops, and three-wheelers are far more numerous than the other categories, likely because of the lower threshold of investment. If yarn is sold on a commission basis, dealers do not bear the risk of maintaining an inventory. However, if dealers purchase the yarn outright, the required working capital for inventory will be much higher.

There are two types of three-wheelers: the electric ones may cost several thousand yuan, whereas the man-powered ones are less than 1,000 yuan. On average, it costs only 3 months' salary of a typical worker to enter the business. Because the required investment for a three-wheeler is minimal, this profession is almost totally open to entry. Most three-wheeler drivers are migrants from the less developed Henan and Anhui provinces; these individuals tend to be young, physically strong, and hard working.

The integrated firms often either have their own brands or engage in the manufacture of original equipment for other manufacturers. In order to ensure better quality control, these firms often keep multiple stages of production in-house. Therefore, they usually own factory buildings in the industrial park. With an average investment of over 2.6 million yuan, only a few investors can afford to enter the industrial park. At the time of the survey in 2005, there were 121 such integrated firms. More than 20% of their starting capital came from banks.

Compared to the within-group variation, the between-group variation in starting capital across different types of production is much larger, accounting for over three-quarters of total variation. Overall, the entry barriers vary greatly across and within different types of production within the cluster. For some stages of production, the entry barriers are low compared to earnings. This

TABLE 4
THE MOST IMPORTANT FINANCING SOURCE WHEN FACING WORKING CAPITAL PROBLEMS

Type of Division	Borrowing from Relatives and Friends (%)	Borrowing from State-Owned Banks (%)	Trade Credits (%)	Other Channels (%)
Yarn dealers	63.60	.00	27.30	9.10
Family weaving workshops	53.00	.00	47.00	.00
Dyeing factories	40.00	60.00	.00	.00
Finishing factories	33.33	50.00	16.67	.00
Printing workshops	60.00	.00	40.00	.00
Ironing workshops	66.67	.00	33.33	.00
Sweater shops (VPCs)	56.40	7.70	33.30	2.60
Logistics company	.00	100.00	.00	.00
Integrated enterprises	50.00	42.90	.00	7.10

Source. Survey by authors.

Note. Because the three-wheeler drivers do not need working capital, this question is not applicable to them.

opens doors for a wide range of entrepreneurs, who can use their own savings or borrow from relatives or friends to start up. Although the capital requirement is still rather high for some types of production in the cluster, many of them had access to credit at the time of start-up by using fixed assets as collateral.

V. Ways of Easing Working Capital Constraints

A. Major Ways to Finance Working Capital

Apart from capital barriers to entry, enterprises may also encounter credit constraints in the course of daily operation. Table 4 shows the proportion of entities using each of four different financing strategies, broken down by production process.¹⁰ The logistics company and production-related enterprises (e.g., dyeing factories, finishing factories, and integrated manufacturing factories) are more likely to receive bank loans compared to the labor-intensive enterprises, primarily because the former can use their fixed assets (e.g., buildings and machines) as collateral to apply for bank credit.

The small enterprises rely more on relatives and friends as their major means of informal finance. Yarn dealers, family weaving workshops, printing workshops, ironing workshops, and sweater shops depended heavily on relatives and friends to ameliorate their working capital constraints. This underscores the important role of social networks in providing informal financing and mitigating the constraints of working capital, in particular for SMEs.

In addition to formal and informal financing, enterprises in the cluster also rely on credit support from upstream or downstream enterprises. Trade credits

¹⁰ Because three-wheel drivers do not need working capital, this question is not applicable to them.

are ranked as the second or third most popular way to deal with working capital crunches, depending on the type of business (table 4).

With repeated close interactions within a cluster, the members of upstream and downstream enterprises get to know each other very well, often building a certain level of trust. This trust forms a basis for a given enterprise to acquire trade credit support from the upstream or downstream enterprises. In the Puyuan industrial cluster, capital credits start from the stage of yarn purchasing. When a yarn dealer makes a first purchase from a yarn manufacturer, the trade generally does not involve credit. However, after a number of transactions have occurred and mutual trust has been established, the yarn dealers can often order yarn with delayed payment.

When a VPC organizes production, it will first purchase raw materials in the yarn marketplace, usually from the same yarn dealers, so as to acquire credit support. Similarly, when the VPC sends raw materials or semifinished goods to family weaving workshops, dyeing factories, finishing factories, printing workshops, and ironing workshops for processing, the payment of processing fees can often be postponed until after the products are sold. With the availability of trade credits, therefore, VPCs can typically organize production with a rather low level of working capital.

The yarn manufacturers, which are usually large state-owned enterprises, often enjoy generous support from state banks. Through bank loans, part of the capital pressure is passed from SMEs in the cluster to the state-owned commercial banks. This kind of credit transfer along the production chain enables many SMEs to indirectly access credit. In this way, the trade credit arrangements among upstream and downstream enterprises largely alleviate the constraints of working capital. However, this mode of operation also carries potential risks: if a large financial crisis occurs, credit collapses will likely spill over to downstream enterprises along the chain and adversely affect numerous SMEs.

B. Flexible Payment Schedule

Flexible payment is another feature in the Puyuan cluster. At least four methods of payment settlement are prevalent in the Puyuan cluster. The first one is to make a payment every given period of time (e.g., every month, quarter, half year, or year). The second is to settle the payment once the accrued amount reaches a predetermined threshold (e.g., 100,000 yuan). The third approach is a flexible settlement according to the financial status of the debtor and creditor enterprises. In this system, the debtor enterprises pay off their debts once they have sufficient capital; however, if the creditor enterprise is in urgent need of capital (e.g., for meeting employee salaries), debtor enterprises must

make partial payments to help the creditor enterprise. The fourth settlement method is to issue payments following the order of each batch of production.

Panel A of table 5 shows the proportions of the four major settlement methods that the various surveyed market entities adopt. The integrated enterprises and most of the production-processing enterprises choose the first method more often, settling the payment according to a fixed time period (usually monthly or quarterly). The yarn dealers and sweater shops prefer a more flexible payment schedule contingent on their sale status, primarily because they bear the most market risk and their sales and profits are more variable than those of the production-processing workshops. For transportation services, payment most often follows the orders.

Mutual financing and flexible settlements fit the rural industrial cluster very well. The system ensures the normal operation of enterprises in the production chain and avoids collapses due to credit crunches.

C. Contract Enforcement and Conflict Resolution

Because there are numerous transactions involving different parties in a cluster, the use of formal contracts for each transaction could lead to prohibitive transaction costs. Thus, while many large enterprises sign formal business contracts, most SMEs prefer oral agreements. For example, when a VPC sends a batch of yarn to a family weaving workshop for processing, there might be an oral agreement about the desired weaving, the time of delivery, and the time and manner of payment to the workshop. There is no formal contract, which leads to the question of who ensures execution of the agreement.

Although the agreements are not legally binding, SMEs tend not to break the oral agreements for the following reasons. First, there are so many family weaving workshops and VPCs in the Puyuan cluster and the barriers to entry are so low that the market approximates perfect competition. If a family weaving workshop cannot ensure its promised delivery schedule and product quality, it will lose both current and potential clients because word spreads quickly. Conversely, why don't VPCs violate their oral agreements of payment, given the abundance of substitutes? In practice, this rarely happens because an unfamiliar subcontractor offers no guarantee regarding quality and delivery, and it takes time and money to build trust. Consequently, VPCs may not want to act opportunistically to break oral agreements. In these ways, the market serves as a powerful disciplinary mechanism in clusters, helping to enforce informal contracts.

Panel B of table 5 depicts how different types of enterprises in the cluster resolve disputes. It is apparent from the table that large enterprises typically opt for formal, legal methods of dispute resolution, whereas SMEs prefer out-

TABLE 5
MAJOR MODES OF PAYMENT SETTLEMENT AND CONFLICT RESOLUTION IN 2004

Type of Division	A. Mode of Payment				B. Conflict Resolution			
	By Time (%)	By Accrued Amount (%)	By Mutual Financial Status (%)	By Production Batch (%)	Lawsuit (%)	Out of Court (%)	Mediation (%)	
Yarn dealers	36.40	9.00	45.60	9.00	.00	90.90	9.10	
Family weaving workshops	65.63	3.12	28.13	3.12	.00	96.87	3.13	
Dyeing factories	80.00	.00	.00	20.00	40.00	60.00	.00	
Finishing factories	83.33	.00	.00	16.67	83.33	.00	16.67	
Printing workshops	60.00	20.00	20.00	.00	.00	80.00	20.00	
Ironing workshops	.00	33.33	33.34	33.33	.00	100.00	.00	
Sweater shops (VPCs)	30.80	5.10	61.50	2.60	10.30	89.70	.00	
Three-wheeler drivers	.00	.00	.00	100.00	.00	100.00	.00	
Logistics company	.00	.00	.00	100.00	
Integrated enterprises	78.57	.00	.00	21.43	50.00	50.00	.00	

Source. Survey by authors.

of-court settlements, largely for two reasons: first, because it is hard to obtain reliable evidence for legal prosecution, given that most SMEs do not have formal contracts; and second, because the relative court costs are higher for small enterprises than for larger ones.

VI. Conclusions

The rapid development of rural SMEs in China provides a good example to closely observe the process of rural industrialization. On the basis of a primary survey in a cashmere sweater cluster in Puyuan, we describe how firms start operations and the synergistic effects of the private and public sectors, together with the clustered and nonintegrated firms. We show that there is a wide range of investment options in a cluster and that the capital barriers to entry are modest in many types of production. Through clustering, an integrated production process can be divided into many incremental steps, resulting in lower entry barriers. The fine division of labor in the cluster provides a wide range of investment choices for entrepreneurs. Clustering can be a useful way to facilitate the entry of numerous new businesses at the earliest stage of industrial development, when the financial sector is still in its infancy. It must be noted, however, that clustering is not a necessary condition for industrialization for all industries. In industries with indivisible and nonconvex technologies, clustering will prove much less effective and other ways of industrialization will prove more appropriate.

During the course of daily operations, most entities inside the cluster have found ways to ease the constraints of working capital. Clustered SMEs often depend on informal finance from friends and relatives. In addition, SMEs in the cluster indirectly gain access to working capital through trade credits. The availability of flexible payment methods helps buffer credit constraints in daily operations. Finally, oral agreements typically substitute for formal contracts in the cluster. Transaction costs increased when the division of labor increased, but oral contracts can lower these increasing transaction costs.

The development of labor-intensive industries is crucial for generating employment and reducing poverty in many developing countries. Therefore, studying the formation and evolution of clustering, a labor-intensive mode of production, has important policy implications. However, as Williamson (1975) pointed out, subcontracting, which is a common feature among clusters, may also involve excessive transaction costs. It is difficult for an individual enterprise to act alone to reduce many of these transaction costs. As shown in this case study, the local government in Puyuan has taken actions to diminish transaction costs and support the growth of the cluster. In many parts of the developing world, local governments may not be as entrepreneurial as the

local government in Puyuan. In the future, it will be useful to examine whether clustering is a viable strategy for rural industrialization in the absence of an active local government and to identify what kinds of institutions and policies can support cluster-based industrial development.

Although it shows the possibility of industrialization through clustering, the case study has some limitations. Our study observes only the successful firms and cannot rule out the possibility that some firms may fail because of a lack of financial resources. More studies are needed to keep track of firms in a cluster for a longer time and examine their dynamics. Finally, since the case study is just about one industry in one limited area, it is important to examine whether the described patterns of industrial clustering prevail in a broader context in future works.

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