Informal Economic Activities and Firm Performance in a Transition Economy: The Case of the Cashmere Industry in Mongolia

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The cashmere industry is one of the most important foreign currency generators as well as the major income contributor in Mongolia. This study first finds a tendency that cashmere enterprises in Mongolia engage in the trading of raw cashmere rather than use raw cashmere in the production process given the shortage of raw cashmere, its high prices, and the low competitiveness of the final products (garments). This work also finds that there is a high extent of smuggling by enterprise people in the form of selling raw cashmere in black markets, and that a higher degree of smuggling leads to less output, sales. The results suggest the serious damages brought about by smuggling activities in Mongolia. This is in sharp contrast to the impact of formal trading because this does not harm firm profitability and sales growth although it affects production negatively. Finally, income tax rates have a negative and significant impact on profitability and no significant impact on output.

Keywords: Mongolian economy, Economic reform, Cashmere industry, Cashmere production, Cashmere export, Government policy

JEL Classification: D21, D23, P31

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I. Introduction

The cashmere industry is one of the most important foreign currency generators and is the major income contributor in Mongolia. Mongolia is the second largest producer and supplier of cashmere in the world. The largest is China, which produces about 70 percent of the world's cashmere. Mongolia produces an average of 3200 tons of cashmere a year, whereas China produces 10000 tons. Mongolia has about 80 cashmere processing factories, 70 of which are located in Ulaanbaatar and 10 in the other regions. Before the transition, there were two state-owned final goods processing facilities in Mongolia — Gobi and the Cashmere Experimental Factory (renamed as Buyan Company). All cashmere collected was channeled to these two factories by state trading companies. Unprocessed cashmere was exported to the West by state trading companies because only these enterprises were allowed to trade cashmere internationally. Currently, there are more than 80 semi-processing and final processing firms in Mongolia, but lower than 50 percent of them produce the final goods (clothing), while others are just processing cashmere.

Under the previous central planning system or prior to privatization, the Mongolian cashmere industrial sector was dominated by only one state-owned enterprise (SOE). However, there are now four types of enterprises: foreign-owned enterprise, including joint ventures; Chinese-owned enterprises; locally owned enterprises; and SOEs. There are four key players in the Mongolian cashmere industry and market: Chinese buyers, cashmere processors, herders, and cashmere traders/middlemen. The most powerful player among the four in terms of purchasing capacity and demand-generating potential is the Chinese buyers. Although the number and production capacity of domestic processors have been continuously increasing, they still cannot compete with the Chinese on an equal basis. There are approximately 170000 herders who supply raw cashmere, and their influence on the market is still negligible. Cashmere traders pursue private profit interests and serve those with the greatest financial capacity. For herders, the income generated by cashmere sales makes up the majority of their total income received from the sales of all lands of animal raw materials and products, and thus cashmere has a great impact on their livelihoods. One of the major changes in the domestic market of cashmere over the past 10 years

has been the emergence of stiff competition for raw cashmere. On one hand, the number and capacity of domestic processors have increased, while on the other hand, Chinese competitors have started to dominate the domestic market by claiming the bulb of raw cashmere. As a result of this situation, cashmere processing companies have not been able to procure raw cashmere as easily as they used to. Many of the problems facing the cashmere production and processing business are related to public policy.

Cashmere exports occupy about 20 percent of Mongolia's total exports. It is a luxury product, so all cashmere is exported. The 1991 and 1993 Foreign Investment Laws, the removal of price control, and Mongolia's privatization program promoted the growth of the industry. The Foreign Investment Law provides for an income tax exemption of 50 to 100 percent of the total income for three to five years depending on the sector, the share of export in total output, and terms of negotiation. Given the strategic position of the cashmere industry in the national economy, raising its international competitiveness is therefore very important for the economic development of Mongolia. Understanding the behavior and limitations of the industry should be the first step to the creation of sound policy agenda relating to it. Against this backdrop, the current work focuses on the following aspects of the cashmere industry in Mongolia.

First, this study will examine the tendency of cashmere enterprises to engage in the trading of raw cashmere rather than use raw cashmere in the production process given the shortage of raw cashmere, its high prices, and the low competitiveness of final products (garments). We find that there is a great discrepancy between the value of sales revenues and gross output in each enterprise. Thus, we have created a variable called "trading ratio," which is defined as (sales — gross output)/sales. Then by estimating production functions, we test whether a higher trading ratio leads to less output, and whether the higher trading ratio is related positively with sales and sales growth functions.

Second, this paper examines whether there is a high extent of smuggling by enterprise people in the form of selling raw cashmere in local black and export markets. We can hypothesize that a higher degree of smuggling leads to less output, sales, and profits not only because the money earned through such informal activities would not be reflected in company accounting books but also because such

activities divert the key resources and waste the time of the companies involved. Such hypothesis is consistent with the insight of Johnson *et al.* (1997) on the unofficial economy in transition economies. They predict that in the economies where firms are free to move between the official and unofficial sector, transition is likely to follow one of two parts. Some countries would be characterized by low burden from taxes, regulations, and corruption; relatively high tax revenues; large quantities of public goods provided by the government; small unofficial sectors; and presumably — if the official sector is more efficient — high growth rates. Conversely, other countries would be characterized by high burden from taxes, regulations, and corruption; low tax collections; small quantities of public goods provided by the government; large unofficial sectors; and presumably low growth rates. Mongolia seems to follow the latter path. Given that measuring the degree of smuggling is not easy, this study devises two measures. The first measure of smuggling is an aggregate, non firm-level extent of smuggling in each year. The second measure of smuggling attempts to reflect the firm-level extent of smuggling.

Third, the current research examines the impact of government polices on firm behavior. We note that taxes have been counter-productive to enterprises. Taxation has reduced the availability of raw cashmere for processing within Mongolia as it had the impact of increasing smuggling and border corruption. Especially, Chinese cashmere traders and their mediators (some enterprise people) circumvented tax administration. In the empirical analysis, we add the variable of corporate income tax rates in the regressions of output, sales, sales growth and profitability. Our hypothesis is that higher tax rates have a negative impact on output, sales, and profitability.

This study finds that informal trading or smuggling affects negatively all the gross and net output and sales, and that they are also related negatively to two alternative measures of profitability and sales growth. These results suggest the serious damages brought about by informal activities in Mongolia. Especially, the negative correlation with profitability implies that those extra and irregular cash profits from smuggling go into the pockets of involved individuals and not into company safes. This is in sharp contrast to the impact of formal trading because it does not harm firm profitability and sales growth although it affects production negatively.

The paper is organized as follows. Section 2 provides an overview of the cashmere industry and enterprises in order to derive the hypotheses about their behavior and performance. Section 3 discusses the data and empirical methodologies to estimate production functions, profitability, and sales growth functions. In Section 4, the results of the regression analyses are discussed. Section 5 ends the study by providing a summary of the findings and policy suggestions.

II. The Firm Behavior in Mongolia

A. Cashmere Enterprises in Mongolia

The process for final cashmere production involves many production lines such as washing, dehairing, spinning, and knitting. Value-added luxury products are created through these many lines. Once the cashmere is procured from herders by the processor, it is washed. After washing, it is then dehaired. The dehairing process involves passing the washed combings over wire rollers so that the coarse outer fiber may remain on the rollers, and the fine inner down may be collected at the end of the dehairing chain. This inner down is the material used for cashmere knitting. There are several points to note about the process. First, about half of the raw cashmere is lost during the dehairing process, and thus it requires about two kilograms of raw unwashed cashmere to produce 1 kilogram of processed cashmere. Second, the machines used are not process-specific ones, but the same washing and dehairing equipment can be used for any exotic fiber such as camel (Filmer 2002). Depending on the product mixes, such as the degree of processing and the weight of the final products, we can divide cashmere enterprises into three groups: (1) those producing dehaired cashmere only, (2) those producing only the final products (garments), and (3) those producing both final and dehaired products.

The first type of factories dehairs raw cashmere from coarse hair and produces the dehaired cashmere. Dehaired cashmere is a half-final product principally purchased by the European market's spinning and knitting factories, particularly wholesale traders in England. Knitted cashmere is a good-quality product designed for producing knitted cashmere garments. The market demand for this product is relatively stable. The second type of factories focuses on garment production. These types of factories have existed since 1995

and have expanded jointly with China. The third type focuses on both producing the half-final and final products. Mainly big companies, Gobi and Buyan belong to this category of factories. Most of the processing enterprises in Mongolia conduct basic cashmere processing and export dehaired cashmere.

There is a low capacity for domestic and foreign dehairing factories, so some of the garments-producing factories have to buy and import thread from abroad. This fact indicates that the government should encourage domestic and foreign processing factories to increase their spinning capacity. In addition, the level of machinery and technology being used by processing factories varies greatly. Experts say that most factories use Chinese-made equipment, which is already considered out-of-date. Processors lose 15 percent to 20 percent of raw cashmere as production waste due to this outdated technology. Most processors waste considerable amounts, so a factory called Tuya was established with Japanese investment to re-process production wastes. The diversity of products for export produced by processors does not exceed 13 products. If we consider the volume of cashmere garments exported in 2001-2002 in raw cashmere units, 41.4 percent to 71.9 percent of raw cashmere produced during these years was exported. Mongolian processors export dehaired cashmere to Switzerland, the People's Republic of China, the United Kingdom, Hong Kong, Italy, Japan, and the United States, and knitted yearns to Japan, Italy, People's Republic of China, the United Kingdom, and Korea. It is therefore necessary to increase the knitting capacity of cashmere factories in order to increase the volume of value-added final production and to deal with market competition. Italy is producing luxury garments with very good designs and appearances, so Mongolian processors could certainly learn from these. Mongolia's main competitor, China, successfully competes by maintaining cheaper prices and exporting its final products to developed countries. Ninety-four percent of all processors covered by our research reported that the quality of raw cashmere greatly affected the quality of the final products. Therefore, cooperation between the processors and herders should be developed to a new level in order to improve the quality and competitiveness of the final products.

The yields from sorting and dehairing depend on a set of factors which include the quality of the raw cashmere purchased, the quality of the processing technology, and others. Dehairing costs are significantly lower in China compared to an average of $US 6 to $US

8 per kilogram in Mongolia. The cost of processing raw cashmere to produce one kilogram of final good is $US 8 to $US 12 in China, whereas it is about $US 24 in Mongolia, on the average. Roughly, the cost of producing a final garment in China is only half of that in Mongolia. It is because labor costs are much lower in China where processors can employ workers for a month for $US 20, and they are under no obligation to keep them on the payroll if they do not need them for a few weeks or months. They can always find qualified replacement workers.

In recognition of the increasing shortage of raw cashmere, the government imposed a ban on the export of raw cashmere in 1994. This ban has led to small and Chinese-owned enterprises to dehair cashmere only partially so that these may be exported as processed goods. Over time, the increase in dehaired cashmere exports compensated for the loss of previous earnings from raw cashmere exports, and eventually offset the overall impact of the ban (Songwe, 2003). In other words, the ban did not help much in decreasing the cost of raw cashmere.

Although the legal export of raw cashmere dropped and the export of semi-processed products increased, those enterprises producing final products did not grow much over time. While Mongolian final goods processors have made significant investments in weaving and knitting equipment, they have not enlarged the capacity of lower-end processing. In Mongolia, the qualified labor (knitters, sorters, and designers) for final goods is difficult to find. The labor law is very strict about hiring and firing workers, and wages are higher than those in China. Many consultants in Mongolia see this as a barrier to the growth of the industry.

At present, there are four types of enterprises classified according to ownership: (1) Foreign-owned enterprises (Foreign): enterprises established by foreigners, including equity joint ventures; (2) Chinese-owned enterprises (PRC): enterprises established by the Chinese on the Mongolian mainland; (3) Locally owned enterprises (Local); and (4) SOEs: enterprises at various levels of state ownership.

The foreign-owned enterprise: In this type of enterprise, the "foreign investor" refers to a foreign legal person or individual (a foreign citizen or stateless person not residing permanently in Mongolia, or a citizen of Mongolia permanently residing aboard) who invests in Mongolia. Since the Foreign Investment Law (1991 and 1993), the number of foreign investment enterprises in Mongolia has increased.

Foreign investors are those from England, Japan, USA, Italy, and other countries. Through the Foreign Investment Law, foreign-invested enterprises are exempted completely from income tax for the first five years and are subject to a reduced rate of 50 percent for the next five years. The increase in the number of fully foreign-owned cashmere processing enterprises in Mongolia in the last 10 years indicates that for cost-efficient companies with adequate capacity and access to raw cashmere, cashmere processing remains to be a profitable business. Also, this means that new companies enjoy tax breaks as an enticement for them to invest in Mongolia.

The Chinese-owned enterprise. The level of machinery and technology used by Chinese enterprises varies greatly. An expert in the Ministry of Industry and Commerce says that most enterprises use equipment made by the Chinese, which are already considered out-of-date. Processors lose 15 percent to 20 percent of raw cashmere as production waste due to this outdated technology (Chimedtseren 2001). Chinese-owned enterprises mainly produce dehaired cashmere only, and they export the dehaired cashmere to China.

The cashmere industry in China has been developing rapidly since the 1990s. The amount of cashmere goat produced in China in 2003 reached 74 million with a cashmere output of 13528 tons, which is 2.35 times of 5751 tons in 1990, and 22 percent more than 11057 tons in 2000 (Cao 2005). The cashmere industry in China is concentrated in Hohhot in Inner Mongolia and Qinghe in Hubei (Cao 2005). About 80 percent of cashmere production in China is either processed or traded in these two regions. Owing to the rapid growth of the industry over the last 15 years, China together with Hong Kong produces about 75 percent of the world's cashmere knitwear. Several enterprises from China also established their affiliates in Mongolia. The large processors, such as King Deer and Erdos, grew rapidly. The King Deer Group currently produces about 2 million cashmere sweaters annually and 1600 tons of dehaired cashmere each year. Erdos produces 1500 tons of dehaired cashmere per year, and in addition, it buys dehaired cashmere to produce 1200 tons of cashmere yarn per year. These largest Chinese cashmere enterprises set up their affiliates with smaller capacity in Mongolia and procure raw materials inside Mongolia.

In a locally-owned enterprise, the "Mongolian investor" refers to a Mongolian legal person or individual (a citizen of Mongolia, an immigrant or a stateless person permanently residing in Mongolia)

who invests (Mongolian Parliament, Foreign Investment Law, 1991). Locally owned processing enterprises have been equipped with an excess capacity to produce large quantities of semi-processed and final products. The main reason for their excess capacity is poor business calculation because many of them increased their processing capacity in the mid-1990s in the hope that the supply of raw cashmere would increase with the prices staying low. However, given the current scarcity of raw cashmere, they failed to attain enough levels of capacity utilization, which led to high unit costs and low competitiveness. In sum, it can be said that they are facing the following constraints in their business: bureaucratization of Mongolian customs and its officers, high interest rate for bank loans, increasing prices of raw cashmere due to Chinese traders and their illegal operations, high customs duty, and income taxes.

The SOE. In our sample, there is only one state-owned cashmere enterprise, which is Gobi. This is the first and biggest cashmere enterprise in Mongolia. Gobi has an annual processing and production capacity of 1200 tons of raw cashmere. Its spinning process facility is equipped with Japanese and Italian spinning equipment; it has a capacity of 120-130 tons of yarn per year and a weaving facility of 140.000-150.000 lengthwise meters of fabric per year. The processing centers for knitting, sewing, and finishing utilize equipment made in Germany, Japan, Taiwan, and Italy, which produce over 500 thousand pieces of final knitted products per year. Cashmere products with the Gobi label are sold in more than 20 cities around the world, such as Tokyo, New York, Hamburg, Moscow, London, Paris, Seoul, and Brussels. Over the last six years, there have been rumors that Gobi is to be privatized, but the privatization plan keeps on being postponed or keeps on being initiated but ends up being cancelled. Initially, there was interest from a number of sources to manage Gobi, including the Chinese. However, no binding bids were submitted under the terms of the tender because they do not like to sell it to the Chinese.

The above discussion allows us to characterize the cashmere enterprise in Mongolia as follows:

First, domestic processing enterprises face a high risk of raw cashmere shortages nowadays in Mongolia because the market price of raw cashmere is affected greatly by foreign markets, especially the Chinese market. In addition, the collection drives of Chinese traders inside Mongolia causes cashmere price to fluctuate significantly year

after year. There is also a general trend towards lesser-quality cashmere being brought to the markets in greater quantities.

It is thus noted that the supply of raw cashmere is one of the most serious bottlenecks in the cashmere industry. The very low capacity utilization ratio, around 50 percent, is known to be caused by the shortage of raw cashmere for most enterprises. Shortage has occurred, among other reasons, because Chinese traders claimed the bulk of supply by paying higher prices in cash to herders and taking them to China often illegally without paying custom duties. In the Mongolian market, raw cashmeres are expensive, and they account for around 30 percent to 50 percent of the total costs of production. However, most local Mongolian cashmere enterprises and even some foreign joint venture enterprises could not compete with Chinese traders who have substantial financial resources to monopolize raw cashmere. Such situation calls for strong measures by the government to check such behavior and related corruption in Mongolian custom offices bribed by Chinese traders. Also, many local enterprises cannot afford to pay higher prices for raw cashmere. However, the situation can be improved if irregular smuggling outside Mongolia can be checked.

B. The Hypotheses

Given the above characterization, we can hypothesize the behavior of enterprises as follows:

First, cashmere firms in Mongolia tend to engage in the trading of raw cashmere rather than use raw cashmere in the production process given the shortage of raw cashmere, its high prices, and the low competitiveness of final products (garments). As a matter of fact, as can be seen from Table 2A, there is great discrepancy between the mean value of sales revenues and gross output. Thus, we have created a variable called "trading ratio," which is defined as (sales — gross output)/sales. Then by estimating production functions, we test whether a higher trading ratio lead to less output and whether a higher trading ratio is related positively with sales function and sales growth function. We can also check the impact of trading on profitability.

Second, there is a high extent of smuggling by enterprise people in the form of selling raw cashmere in local black and export markets. We can hypothesize that a higher degree of smuggling leads to less

output, sales, and profits not only because the money earned by such informal activities would not be reflected in company accounting books but also because such activities divert the key resources and waste the time of the companies involved. Such hypothesis is consistent with the insight of Johnson *et al.* (1997) on the unofficial economy in transition economies. They predict that in economies where firms are free to move between the official and unofficial sector, transition is likely to follow one of two parts. Some countries would be characterized by low burden from taxes, regulations, and corruption; relatively high tax revenues; large quantities of public goods provided by the government; small unofficial sectors; and presumably — if the official sector is more efficient — high growth rates. Conversely, other countries would be characterized by high burden from taxes, regulations, and corruption; low tax collections; small quantities of public goods provided by the government; large unofficial sectors; and presumably low growth rates. Mongolia seems to follow the latter path.

An interesting part of the argument of Johnson *et al.* (1997) is the co-existence of the official and unofficial sector within a single firm rather than just across firms. They argue that an officially registered enterprise might produce and sell some of its output unofficially. It would thus avoid paying taxes and escape regulations related to the production of this output, but at the same time, it would rely on the government to enforce related contracts. Indeed, with respect to this unofficial output, the enterprise might pay bribes rather than taxes, and hire private protection agencies to help with the contracts. In this way, the official and unofficial sectors are represented within a single firm and not just across firms.

In this light, we will try to represent both the formal and informal trading activities of firms in the Mongolian cashmere sector. Here, official trading refers to the sales of some of raw cashmere or semi-processed cashmere in official markets and recording these in enterprises' accounting books. Meanwhile, informal trading refers to the smuggling or sales of raw cashmere in the black market, or exporting it illegally to China or other foreign countries. However, measuring the degree of smuggling is not easy. In this study, we attempt two measures. The first measure is a crude one, a yearly variable showing the aggregate, not firm-level, extent of smuggling in each year. This variable each year is defined as (the total raw cashmere production of Mongolia each year less the legal exports of

TABLE 1
TREND OF SMUGGLING RAW CASHMERE (1998-2004)

Indicators (tons)	1998	1999	2000	2001	2002	2003	2004
Output (A)	3282.4	3000	3300	3100	2900	2700	3200
Procurement by enterprises (B)	2552.7	1561	927	2145	1215	1082	842
Legal exports (C)	16.2	749.2	714	24.9	59	252.9	47.4
Amount of smuggling (A-B-C)	713.5	689.8	1659	930.1	1626	1365.1	2310.6
Smuggling (% of A)	21.7	23	50	30	56	51	72

raw cashmere less raw cashmere procurements by enterprises). This is shown in Table1.

This aggregate smuggling ratio has rapidly increased from 22 percent in 1998 to more than 70 percent in 2004. It has been estimated that about 2310.6 tons of raw cashmere or 72 percent of the total raw cashmere of Mongolia was smuggled through the border in 2004.

The second measure of smuggling is also our own invention, which attempts to reflect the firm-level extent of smuggling. It is defined as (the value of raw cashmere/gross output)/(sales/gross output), which is simply equivalent to the ratio of raw cashmere to sales. This formula reflects the idea that when a company conducts more informal selling of its raw cashmere, it should have a high (cashmere/gross output) ratio because some raw cashmere is not used in production but is illegally leaked out of the company and even not shown as official sales. However, companies doing formal selling of raw cashmere and reporting their revenue in accounting books also have high (raw cashmere/gross output) ratio, so we have to take this into account. One way to address this is to simply divide the raw cashmere/gross output ratio by the extent of formal trading. This way, we arrive at the variable of Smuggle2 or firm-level smuggling.

Third, we hypothesize that there is some impact of government polices on firm behavior. We note that taxes have been counterproductive to enterprises. Taxation reduced the availability of raw cashmere for processing within Mongolia as it had the impact of

encouraging smuggling and border corruption. Especially, Chinese cashmere traders and their mediators (some enterprise people) circumvented tax administration. In the empirical analysis, we add the variable of corporate income tax rates in the regressions of output, sales, and the cashmere industry's growth and profitability. Our hypothesis is that higher tax rates have a negative impact on output, sales, and profitability.

Another variable representing government policies is the loan interest rates charged by banks. It is hypothesized that higher interest rates would affect production and profitability negatively.

Fourth, we will examine whether there is any difference among the different types of enterprises. Our investigation indicates that there are diverse types of enterprises, which thus have varying nature. For instance, Chinese-owned enterprises in the Mongolian cashmere sector are smaller than other types of enterprises, and they are involved actively in trading activities. Meanwhile, locally owned enterprises are larger than foreign-owned or Chinese-owned enterprises, but are they smaller than SOEs. There is only one SOE, Gobi, and it has the largest size. However, Gobi's capacity utilization ratio is very low although it is a leading company in the Mongolian cashmere sector. Given some heterogeneity, it is therefore important to examine whether these four types of enterprises show different levels of formal and informal trading as well as productivity, profitability, and growth performance.

III. Data and Model Specifications

A. Data Sources

Regarding cashmere enterprises in Mongolia, we have the data of 50 enterprises with varying availability depending on the years: 42 enterprises in 2001, 46 enterprises in 2002, 49 enterprises in 2003, and 50 enterprises in 2004. We use these data to test several hypotheses regarding the impact on firm behavior of firm characteristics, government policies, formal and informal trading, and firm-type dummy variables using panel data estimation methods in the STATA program.

Not all enterprises in the sample were in operation in 2001, with eight of them established in 2002, four in 2003, and one in 2004. The omission of enterprises with missing values resulted in the

sample size of 187 observations on 50 enterprises. The 145 observations for three years on 50 enterprises are included in the sales growth function.

Data on gross output, profit, and tax are collected by one of the authors from the National Tax Office. The original source of the data is the National Tax Information Database. Its computerized microeconomic database stores firm-level statistics from mandatory annual reports submitted by all government units and business organizations in Mongolia. Data on Consumer Price Index and the total amount of raw cashmere in Mongolia are provided by the National Statistical Office from the Mongolian Statistical Yearbook. The amount of sales and exports of raw cashmere is provided by the National Custom's Office in the Bureau of International Trading. Data on fixed assets, raw material procurement by enterprises, number of permanent workers, number of managerial workers, number of engineers and technicians, number of foreign workers, number of temporary workers, firm age, information on enterprise ownership, and the installed capacity of enterprises are provided by the Ministry of Industry and Commerce from their information database. Lacking data on raw material procurement by some enterprises are provided by the cashmere enterprises from their accounting reports. Data on foreign exchange rates, inflation rates, and interest rates are collected from the Mongolian Central Bank (Mongol Bank), the bureau of the Central Bank. Lacking data on the number of permanent workers, managerial workers, engineers and technicians, foreign workers, and temporary workers are provided by the Mongolian Cashmere Processors' Association from their information database. The current values of gross output, profit, capacity, fixed asset, and raw materials are transformed into 2001 values using the Consumer Price Index (CPI).

B. Basic Descriptive Statistics

For our analysis, we use the firm-level panel data of the four types of Mongolian cashmere enterprises, namely, foreign-, Chinese-, locally owned enterprises, and SOEs. Table 2 shows the basic descriptive statistics for the variables used in our analyses.

***Sales*:** Sales consists of the value of traded dehaired cashmere, traded tops, and cashmere garment products. Sales is much higher than output, so enterprises earn great profits from international

TABLE 2A

BASIC DESCRIPTIVE STATISTICS: SAMPLE MEANS

Variables	Mean	Sd	Min	Max
Sales (000s $US, in 2001)	14008.6	4968.2	4259.3	25517.1
Gross output (000s $US, in 2001)	11118.9	4665.3	2812.1	22677.6
Profit (000s $US, in 2001)	348.7	218.3	58.2	1471.6
Net output (000s $US, in 2001)	7010.4	3261.6	278.2	14457.1
Trading volume (000s $US, in 2001)	2889.7	1300.3	229.67	7778.5
ROA (profit/asset, %)	2.37	1.05	0.32	4.13
Sales growth rate (%)	1.13	0.57	0.25	2.67
Capacity (000s $US, in 2001)	25319.9	13541.9	7300	95978.4
CPI (Consumer Price Index)	105	0.04	100	111
Fixed asset (000s $US)	16293.51	8995.2	2514.6	64820.2
Number of total employees	119	194	29	1394
Number of permanent workers	92	156	20	1109
Number of managerial workers and engineers	28	39	6	285
Raw material (000s $US, in 2001)	4108.5	1653.8	836.5	9581.6
Smuggle1 (%)	53.13	14.82	30	72
Smuggle2 (%)	29.27	5.78	11.08	55.32
Foreign workers ratio (%)	3.6	4.14	0	24.2
Temporary workers ratio (%)	6.33	7.65	0	30.6
Capacity utilization ratio (%)	47.28	17.55	12.77	80
Share of final product in gross output (%)	51.79	30.16	0	100
Rate of income tax (%)	10.5	13.81	0	26.03
Interest rates (%)	32.3	2.9	27.6	35.2
Age (firm age, years)	4.9	3.97	1	26
Foreign (Foreign-owned enterprises)	0.47	0.5	0	1
PRC (Chinese-owned enterprises)	0.36	0.48	0	1
Local (Locally owned enterprises)	0.15	0.36	0	1
SOE (State-owned enterprise)	0.02	0.15	0	1
Dummy for final products	0.09	0.28	0	1
Dummy for final and dehaired products	0.71	0.46	0	1
Dummy for dehaired cashmere	0.20	0.41	0	1

trading. We have deflated the value of sales using the consumer price index.

***Gross output*:** Gross output consists of dehaired cashmere, tops, and cashmere garment products. We have deflated the value of output using the consumer price index.

***Profit*:** Profit is defined as gross output less the total cost of cashmere enterprises. We have deflated the value of profit using the consumer price index.

***Net output*:** Net output is defined as gross output less raw material.

***Trading volume*:** Trading is defined as sales less gross output.

***ROA (Profit/fixed asset)*:** The measurement of profitability (return on asset) is defined as

$ROA = P/FA$ where P is the profit, and FA (fixed assets) represents the total amount of fixed assets. Profit on the fixed asset indicates the level of profit from each dollar of fixed asset.

***Sales growth*:** We have deflated the value of sales using the consumer price index. Then sales growth rates are defined as *Sales growth rates = (sales in year t)/(sales in year t-1)*

***Capacity*:** The installed capacity of enterprises is provided by the Ministry of Industry and Commerce from their information database. Production capacities for dehaired cashmere, tops, and cashmere garment are added after being multiplied to their unit prices and deflated by the CPI.

***CPI (Consumer Price Index)*:** Data on consumer price index are provided by the National Statistical Office from the Mongolian Statistical Yearbook.

Fixed Asset. Fixed asset consists of enterprise building, machinery, and equipment. The data of the fixed assets of enterprises are provided in Tugrugs (Mongolian currency) and then are converted to US dollars.

Number of employees. Employees consist of the number of workers, engineers and technicians, managerial workers, foreign workers, and temporary workers. The biggest cashmere enterprise, Gobi, has over 1000 employees, but some small enterprises have less than 30 employees. In total, there are 5703 workers in cashmere enterprises in 2004.

Number of permanent workers. The number of permanent workers consists of the number of workers and foreign workers. The mean of the number of permanent workers was 92, with 1109 and

20 being the maximum and minimum, respectively.

Number of managerial workers and engineers. The number of managerial workers and engineers consists of the number of managerial workers and engineers and technicians (managerial workers + engineers and technicians). The mean of the number of managerial workers and engineers was 28, with 285 and 6 being the maximum and minimum, respectively.

Raw material (Raw_mat). The value of raw material measures the value of raw cashmere. The raw material input is constructed by deflating the raw cashmere cost by CPI. The mean value of raw material was $US 4.1 millions.

Smuggle1. The aggregate smuggling ratio is defined as the differences between the total raw cashmere supply in Mongolia, the legal export of raw cashmere, and the size of raw cashmere, which is procured by cashmere enterprises (total raw cashmere production of Mongolia each year less the legal exports of raw cashmere less raw cashmere procurements by enterprises). The mean of smuggling ratio ranges from 30 percent in 2001 to 72 percent in 2004. It has been estimated that about 2310.6 tons of raw cashmere or 72 percent of the total raw cashmere of Mongolia were smuggled through the border in 2004.

Smuggle2 (Raw material per sales). As explained above, Smuggle2 is defined as the value of raw materials divided by sales. The mean of raw material ratio was 29.3 percent, with 55.3 percent being the maximum and 11.1 percent being the minimum. The mean of this variable ranges from 28.3 percent to 30.6 percent during 2001-2004.

Foreign workers ratio (Fo_w). Foreign workers ratio is defined as the number of foreign workers divided by the total number of employees. The mean of foreign workers ratio was 3.6 percent. Some enterprises have an interest in highly qualified foreign workers in terms of machinery operation skills possessed and techniques known. Some Chinese enterprises have an interest in Chinese workers because they work for a lower salary than Mongolians.

Temporary workers ratio (Temp_w). Temporary workers ratio is defined as the number of temporary workers divided by the total number of employees. The mean of temporary workers ratio was 6.3.

Capacity utilization ratio (Caput). The capacity utilization ratio is defined as the gross output divided by the total installed capacity in each year. The mean of capacity utilization ratio was 47.3 percent. The mean of capacity utilization ratio ranges from 45.8 percent to

47.8 percent depending on the years. The main reason for low capacity utilization is the shortage of raw cashmere, which can be explained as follows. First, Chinese traders and enterprises buy the majority of raw cashmere in high prices from herders, and then they export raw cashmere both legally and illegally. In Mongolia, corruption is widespread, and Chinese traders do not pay any tax on raw cashmere exported legally. However, locally owned cashmere enterprises' financial resource is insufficient for raw cashmere procurement. However, the Mongolian government is weak in controlling this aspect, and it does not give much attention to the cashmere sector anyway.

Share of final product in the gross output (Final_p). The share of final product in the gross output is defined as the value of garments divided by the gross output. The mean of share of the final product in gross output was 51.8.

Rate of income tax. The mean of income tax rate was 10.5 percent, with 26 percent being the maximum and 0 being the minimum. The mean of income tax rate ranged from 7.9 percent to 12.1 percent from 2001 to 2004. According to Mongolian tax law, the highest rate of income tax is 30 percent. Since the Foreign Investment Law has been enacted (1991 and 1993), the number of foreign-invested enterprises has risen. Through such law, foreign-invested enterprises have enjoyed an income tax exemption of 100 percent for the first five years and 50 percent for the next years. Therefore, some foreign-invested enterprises do not pay taxes, thanks to the Foreign Investment Law.

Interest rates. The mean of interest rates was 32.3 percent, with 35.2 percent being the maximum and 27.6 percent being the minimum. The mean of interest rates has increased from 27.6 percent in 2001 to 35.2 percent in 2004. Out of 13 cashmere enterprises involved in the questionnaire survey, three companies funded the procurement using their own resources, while three companies financed 100 percent of the procurement expenses through bank loans. Other businesses combined their own funds with loans for purchasing cashmere. Most processors agreed that using only their own resources for raw cashmere procurement is not enough in the recent highly competitive market. Generally, the Mongolian commercial bank loan interest rate is on an average of 30 percent per year, which is very high as compared to that of the Chinese.

Age. The mean of age was 5, with 26 being the maximum and 1 being the minimum. The enterprises became older from 3.8 years in 2001 to 6 years in 2004. The oldest cashmere enterprise is the state-owned enterprise Gobi, which is 26 years old, while the youngest one is a year old.

Final (final product making firms). The number of final product-producing enterprises is 5.

Final_dehaired (firms producing both final and dehaired cashmere). This type of enterprise produces both the final goods and dehaired cashmere.

Dehaired (firms producing dehaired cashmere). The number of dehaired cashmere-producing enterprises is 9.

C. Comparison by Firm Type

Table 2B shows the basic descriptive statistics according to firm type. There are four types of enterprises: Foreign (Foreign owned), PRC (Chinese owned), Local (Locally owned), and SOE (State-owned enterprise).

The table shows that foreign-owned enterprises are subject to lower rates of income taxes than other types of enterprises, which is consistent with the fact that foreign-invested enterprises are exempt from income tax. Chinese-owned enterprises are shown to be smaller than other types of enterprises, with the smallest value of sales, gross output, profit, fixed asset, installed capacity, and number of workers. However, it is shown that they are involved in a similar level of trading as the other types. Also, in Chinese firms, the share of final products per gross output is the lowest (36.4 percent), indicating that they tend to be involved in more trading and export dehaired cashmere from Mongolia to head enterprises in China. Chinese enterprises make money from trading.

Local enterprises (locally owned enterprises) are comprised of Mongolia's second biggest enterprise, Buyan, the third biggest enterprise, Eermel, and others. The value of sales, gross output, profit, fixed asset, raw material cost, installed capacity, and number of workers of local enterprises are larger than those of foreign-owned and Chinese enterprises but smaller than those of SOEs. Their capacity utilization ratio (45.6 percent) is higher than those of foreign-owned and Chinese enterprises, but it is under 50 percent. Their share of final products per gross output (67.9 percent) is

TABLE 2B
BASIC DESCRIPTIVE STATISTICS ACCORDING TO FIRM TYPE
(IN AVERAGE, 2001~2004)

Variables	Foreign	PRC	Local	SOE
Sales (000s $US, in 2001)	13541.1	12919.2	16352.99	24977.5
Gross output (000s $US, in 2001)	10709.9	10023.4	13448.6	22132.3
Profit (000s $US, in 2001)	323.1	301.5	399.5	1304.8
Net output (000s $US, in 2001)	6766.5	6332.3	8464.4	13430.3
Trading volume (000s $US, in 2001)	2831.1	2895.8	2904.4	2845.2
ROA (profit/asset, %)	2.3	2.43	2.4	2.16
Sales growth rate (%)	1.1	1.07	1.08	1.03
Capacity (000s $US)	23054.2	20449.04	32829.2	95978.4
Fixed asset (000s $US)	15819	13034.07	18884.62	63106.58
Number of total employee	94	78	119	1351
Number of permanent workers	72	58	93	1073
Number of managerial workers and engineers	22	20	26	278
Raw material (000s $US)	3943.5	3691.1	4984.2	8701.96
Smuggle2 (%)	29.45	28.53	30.24	34.83
Foreign workers ratio (%)	3.44	5.12	1.46	0
Temporary workers ratio (%)	6.82	6.66	4.56	0
Capacity utilization ratio (%)	48.27	49.25	45.65	23.1
Share of final products in gross output (%)	55.79	36.36	67.86	79.5
Rate of income tax (%)	7.61	7.24	16.67	23.51
Age (firm age, years)	4.71	3.27	6.29	24.5
Dummy for final products	0.11	0.9	0.14	0
Dummy for final and dehaired products	0.74	0.52	0.86	1
Dummy for dehaired cashmere	0.15	0.39	0	0
Observations	91	66	28	4

higher than those of foreign-owned and Chinese enterprises. They also manufacture final products after Gobi. Locally owned enterprises could increase their capacity utilization and share of final products per gross output through enough procurement of raw cashmere.

SOEs have the largest value of sales, gross output, profit, fixed asset, amount of procured raw cashmere, installed capacity, and number of workers. SOEs are the biggest cashmere enterprises in

Mongolia, but Gobi's capacity utilization ratio is the lowest (23.1 percent). However, in terms of low capacity utilization, Gobi's share of final products per gross output is the highest (79.5 percent). Gobi is the leading company in the Mongolian cashmere sector.

D. Model Specifications

Now let us provide an account of the methodology of empirical analysis to test the hypotheses proposed above. Mainly, we estimate the production functions with gross output, net output, and sales as the dependent variables, profit functions, and sales growth functions. Each of the estimation processes is explained below with some review of the related literature.

a) Production Functions

To specify the regression models, this study starts with the following general Cobb-Douglass-type production function.

$$Q = A\ K^{\alpha} L^{\beta} e^{\varepsilon}$$

where Q is the output, K is the capital, L is labor, and ε is the error term. When Q is the gross output, intermediate input *(M)* is added to the equation. In actual regressions, we try three measures of output, namely, gross output, sales, and net output where net output is simply measured by subtracting the value of raw cashmere from the value of gross output.

Aside from these primary inputs, we see the impact of the following three groups of variables. The first group *(X)* includes several firm characteristics as variables. They are firm age, ratio of temporary workers, ratio of foreign workers, and so on. The second group of variables *(S)* includes variables representing trading and smuggling. The third group *(G)* includes government policies, such as corporate income tax rates and loan interest rates. The final group *(D)* consists of the dummies representing the type of the enterprise. Here, firms are classified either by ownership or product mixes. With these additional variables, production function is specified as follows:

$$Q = A\ K^{\alpha} L^{\beta} M^{\gamma} e^{aX} e^{bS} e^{cG} e^{dD} e^{\varepsilon}$$

Taking logarithmic form, this can be changed as follows:

$$LnQ = LnA + \alpha LnK + \beta LnL + \gamma LnM + aX + bS + cG + dD + \varepsilon$$

b) Profitability Function

In this study, the empirical estimation of the profit function (profitability) of Mongolian cashmere enterprises is based on the work Zhang *et al.* (2002). The basic and extended models are given as follows:

(a) Basic model plus firm characteristics

$$ROA_i = Size_i + a1Age_i + a2Eng_i + a3Fo\_w_i + a4Temp\_w_i + e$$

(b) Impacts of government policy variables

$$ROA_i = Size_i + a1Age_i + a2Eng_i + a3Fo\_w_i + a4Temp\_w_i + b1Tax_i + b2Loan_i + e$$

(c) Formal and informal trading activity variables

$$ROA_i = Size_i + a1Age_i + a2Eng_i + a3Fo\_w_i + a4Temp\_w_i + d1Smuggle1_i + d2Smuggle2_i + d3Trading_i + e$$

where ROA_i = profit/fixed asset, $Size_i$ = log of raw material, Age = firm age,

Eng = engineers and technicians ratio, *Fo_w* = foreign workers ratio,

Temp_w = temporary workers ratio, *Tax* = rate of income tax,

Loan = Interest rates, *Final* = Dummy for final products,

Dehaired = dummy for dehaired cashmere,

Final_p = share of final products in gross output,

Smuggle1 = aggregate smuggling ratio, *Smuggle2* = raw material per sales, and *Trading* = trading ratio.

c) Sales Growth

Empirical research on firm growth is motivated by Gibrat's law, and Sutton (1997) interprets such law as follows: the "expected value of the increment firm's size in each period is proportional to the current size of the firm." In most of the classical works on firm growth in advanced economies (Evans 1987ab), the model takes a very simple form:

$$(LnS_{t'} - LnS_t)/d = F(A_t, S_t) + u_t$$

where S_t stands for size at time t, A_t for age at time t, $d = t' - t$ (time difference), and u_t is normally distributed with mean zero, possibly a non-zero constant variance, and is independent of size and age. Without other firm characteristics as variables, the two key variables

of size and age are supposed to represent everything that is taking place inside the firms. Size may represent the size of firm capacities and resources, and age may represent the learning process through which firms uncover their true inefficiencies, accumulate capabilities, and conduct innovations (Jovanovic 1982). Such reasoning makes sense at least when we consider long-term performance and the growth of firms. However, regarding short-term sales growth, it is better to include other firm-specific control variables as long as they are available. This study follows this reasoning. Model specifications are basically similar as in the case of profitability estimation, except the difference in dependent variables.

IV. Results of the Empirical Analysis

This study has estimated production function, sales and sales growth, and profit function using the panel data of cashmere enterprises in Mongolia from 2001 to 2004.

A. Baseline Results

We have first attempted regressions only with basic control and firm characteristics as variables. This can be called as the baseline model. To save space, we do not report the results in tabular forms but summarize the main results in what follows. We have estimated all the production functions (both gross output and net output), sales function and sales growth, and profitability (return to asset and return to sales). We have estimated both random and fixed effects, and conducted Hausman test to verify if the random effect models are appropriate. Thus, we will present and/or discuss only the random effect models hereafter.

In the results, capital as measured by production capacity is positive and significant in all the production function estimations with gross output, net output, and sales as the dependent variables, which is according to expectation. However, the number of permanent workers is significant in none of the estimations, whereas the amount of intermediate input measured by cashmere is significant and positive in terms of gross output and sales function. This is consistent with the observation that the binding factor is not labor but intermediate materials.

In profitability and sales growth regressions, the focus is the

impact of size, capacity utilization, and age, among others. It is shown that the size measured by the value of procured raw materials is positive and significant in profit to asset and profit to sales ratio regressions, as well as sales growth regressions.

B. Impact of Formal and Informal trading

In Tables 3 A, B, C, D, E, and F, it is shown that the more formal trading an enterprise does, the lesser the gross output, net output, and sales. This is expected as greater trading of raw cashmere means diversion from production activity. However, while this variable of trading is negative and significant when added alone to the basic variables, it loses its significance when joined with smuggling variables. It is also shown that greater trading does not necessarily lead to higher profitability, although it is positively related to sales growth. We have also tried to see what determines trading (Table 3 A, B, C). As expected, it is shown that firms with higher capacity utilization ratio are involved in less trading. Of course, the real causality may be the opposite, such that firms doing more trading tend to have low capacity utilization ratios. It is also interesting to have the results of negative correlation between the value of raw materials and trading ratio, which possibly implies that when firms have more supply of raw materials, they tend to do less trading but more production. Both firm-type variables are also shown to have no impact on trading ratio.

The more important finding is that in all production function regressions with gross and net output and sales, the impacts of two informal trading variables (Smuggle1 and Smuggle2) are shown to be significant and negative, both alone and when put together. These two smuggling variables are also shown to be negatively related to both measures of profitability and sales growth. These results suggest the serious damages brought about by smuggling activities in Mongolia. Especially, the negative correlation with profitability implies that those extra and irregular cash profits from smuggling become the private benefits of the involved individuals and not the company as a whole. This is in sharp contrast to the impact of formal trading because it does not harm firm profitability and sales growth although it affects production negatively.

Table 3A shows the gross output function results with the impact of formal and informal trading variables Smuggle1, Smuggle2, and

TABLE 3A

IMPACT OF FORMAL AND INFORMAL TRADING

Dependent variable: Gross output

	Smuggle1	Smuggle2-A	Smuggle2-B	Trading	Combination-A	Combination-B
Capacity	0.0173	0.0248	0.7136	0.1112	0.0270	0.0988
	[0.47]	[1.51]	[1.85]*	[2.38]**	[2.50]**	[1.86]*
Workers	0.0477	-0.0052	-0.0048	-0.0301	-0.0036	-0.0006
	[1.48]	[0.32]	[0.06]	[0.69]	[0.35]	[0.42]
Man&Eng	-0.0262	0.0105	0.0103	0.0264	0.0074	0.0694
	[0.74]	[0.59]	[0.11]	[0.55]	[0.65]	[0.88]
Raw_mat	1.0809	0.9593		0.6903	0.9573	
	[34.83]***	[72.84]***		[17.94]***	[94.77]***	
Age	0.0000	0.0000	0.0170	0.0000	0.0009	0.0108
	[0.94]	[1.05]	[1.54]	[0.15]	[0.88]	[1.21]
Eng	0.0072	0.0007	0.0105	0.0032	0.0005	0.0002
	[2.54]**	[0.49]	[1.47]	[0.82]	[0.49]	[0.03]
Fo_w	-0.0017	0.0003	0.0081	0.0041	0.0006	0.0095
	[0.64]	[0.29]	[1.03]	[1.20]	[0.84]	[1.56]
Temp_w	0.0002	0.0006	0.0051	-0.0025	0.0004	0.0038
	[0.13]	[0.72]	[1.30]	[1.22]	[0.92]	[1.11]
Smuggle1	-2.9482				-1.4053	-2.2167
	[16.30]***				[1.81]*	[9.98]***
Smuggle2		-2.2374	-0.6596		-3.1711	-0.5397
		[41.21]***	[6.38]***		[54.73]***	[6.86]***
Trading				-1.2007	-0.7928	-0.3786
				[8.62]***	[1.57]	[1.08]
Constant	0.7693	1.8841	2.2585	2.6725	0.7486	4.6201
	[2.46]**	[14.03]***	[2.26]**	[6.33]***	[2.30]**	[5.74]***
Observations	187	187	187	187	187	187
No. of Firms	50	50	50	50	50	50
R-squared	0.87	0.96	41.8	0.77	0.98	73.8

Trading. Raw material's effect on gross output is positive and significant at the 1 percent level. The impacts of Smuggle1, Smuggle2, and trading variables on gross output are negative and significant at the 1 percent level. Also, there is possible collinearity problem between the variables of raw material and Smuggle2, so we have run regressions of gross output function without the variable of raw material, and the result is shown in the column Smuggle2 (B) and the combination (B) model. Smuggle1 and Smuggle2's effects on gross output are negative and significant at the 1 percent level in the

TABLE 3B

IMPACT OF FORMAL AND INFORMAL TRADING

Dependent variable: Net output

	Smuggle1	Smuggle2	Trading	Combination
Capacity	0.6999	0.6613	0.4392	0.5518
	[5.47]***	[7.54]***	[4.23]***	[6.28]***
Workers	0.0934	-0.0081	-0.0705	-0.0489
	[0.85]	[0.09]	[0.68]	[0.59]
Man&Eng	-0.0980	-0.0279	0.0508	0.0144
	[0.80]	[0.28]	[0.44]	[0.16]
Age	-0.0000	-0.0000	-0.0000	-0.0069
	[0.88]	[1.28]	[0.81]	[0.69]
Eng	0.0184	0.0092	0.0059	0.0029
	[1.97]**	[1.15]	[0.64]	[0.40]
Fo_w	0.0099	0.0080	0.0116	0.0103
	[0.97]	[1.10]	[1.38]	[1.51]
Temp_w	-0.0065	-0.0048	-0.0090	-0.0050
	[1.22]	[1.13]	[1.83]*	[1.25]
Smuggle1	-2.4719			-4.0758
	[4.93]***			[9.89]***
Smuggle2		-3.7946		-3.4460
		[12.82]***		[13.44]***
Trading			-2.7191	-0.0013
			[8.86]***	[0.75]
Constant	2.1336	3.5897	5.0292	5.3409
	[1.71]*	[4.20]***	[4.86]***	[5.93]***
Observations	187	187	187	187
Number of Firms	50	50	50	50
R-squared	0.3	0.64	0.52	0.51

combination (B) model. Capacity's effect on gross output is positive and significant at the 10 percent level in combination (B).

Table 3B shows the net output function results with the impact of formal and informal trading variables Smuggle1, Smuggle2, and Trading. Capacity's effect on net output is positive and significant at the 1 percent level. Smuggle1, Smuggle2, and Trading's effects on net output are negative and significant at the 1 percent level, while Smuggle1 and Smuggle2's combined effects on net output are negative and significant at the 1 percent level.

Table 3C shows the sales function results with the impact of formal

TABLE 3C
IMPACT OF FORMAL AND INFORMAL TRADING
Dependent variable: Sales

	Smuggle1	Smuggle2-A	Smuggle2-B	Trading	Combination-A	Combination-B
Capacity	0.0235	0.0244	0.0145	0.0851	0.0239	0.0127
	[2.17]**	[2.17]**	[1.81]*	[1.97]**	[2.10]**	[1.75]*
Workers	-0.0073	-0.0075	-0.0512	-0.0152	-0.0073	-0.0075
	[0.70]	[0.74]	[0.73]	[0.38]	[0.70]	[0.71]
Man&Eng	0.0114	0.0118	0.0570	0.0244	0.0119	0.0129
	[0.99]	[1.02]	[0.71]	[0.55]	[1.02]	[1.35]
Raw_mat	0.9485	0.9484		0.6492	0.9467	
	[98.31]***	[98.52]***		[19.99]***	[93.12]***	
Age	0.0000	-0.0002	-0.0857	-0.0000	-0.0002	-0.0187
	[0.17]	[0.17]	[0.26]	[0.36]	[0.15]	[0.25]
Eng	0.0003	0.0003	0.0042	0.0052	0.0004	0.0004
	[0.35]	[0.34]	[0.68]	[1.44]	[0.41]	[0.29]
Fo_w	0.0011	0.0011	0.0088	0.0031	0.0011	0.0077
	[1.47]	[1.44]	[1.36]	[1.02]	[1.38]	[1.23]
Temp_w	0.0004	0.0004	0.0042	-0.0031	0.0003	0.0041
	[0.89]	[0.82]	[1.28]	[1.63]	[0.64]	[1.24]
Smuggle1	-3.1587				-0.0109	-0.1837
	[54.13]***				[2.32]**	[4.96]***
Smuggle2		-3.1599	-0.5756		-3.1464	-0.5156
		[53.53]***	[6.82]***		[48.67]***	[6.29]***
Trading				-0.1203	-0.0033	-0.4564
				[5.62]***	[0.54]	[1.43]
Constant	2.3413	2.3362	3.7072	2.2633	2.3254	2.6380
	[26.69]***	[25.36]***	[4.56]***	[6.09]***	[23.67]***	[3.16]***
Observations	187	187	187	187	187	187
No. of Firms	50	50	50	50	50	50
R-squared	0.98	0.98	46.9	0.71	0.98	49.6

and informal trading variables Smuggle1, Smuggle2, and Trading. Raw material's effect on sales is positive and significant at the 1 percent level. Smuggle1, Smuggle2, and Trading's effects on sales are negative and significant at the 1 percent level. Also, because there is a possible collinearity problem between the variables of raw material and Smuggle2, we have run regressions of sales function without the variable of raw material, and the result is shown in the column Smuggle2 (B) and the combination (B) model. In Combination (B), Smuggle1 and Smuggle 2's effects on sales are negative and significant at the 1 percent level. The

TABLE 3D
IMPACT OF FORMAL AND INFORMAL TRADING
Dependent variable: ROA

	Smuggle1	Smuggle2	Trading	Combination
Size	0.0180	0.0175	0.0169	0.0176
	[11.36]***	[13.72]***	[13.01]***	[10.48]***
Age	0.0000	0.0002	0.0000	0.0002
	[0.91]	[1.41]	[0.89]	[1.36]
Eng	-0.0001	-0.0001	-0.0000	-0.0001
	[0.53]	[0.60]	[0.35]	[0.55]
Fo_w	0.0003	0.0005	0.0003	0.0005
	[2.07]**	[2.43]**	[2.08]**	[2.28]**
Temp_w	0.0001	0.0001	0.0001	0.0001
	[1.31]	[1.22]	[1.14]	[1.22]
Smuggle1	-0.0093			-0.0030
	[0.95]			[0.28]
Smuggle2		-0.0001		-0.0001
		[2.37]**		[2.22]**
Trading			0.0010	0.0008
			[1.10]	[0.77]
Constant	-0.1252	-0.1240	-0.1271	-0.1301
	[10.63]***	[11.52]***	[10.39]***	[10.55]***
Observations	187	187	187	187
Number of Firms	50	50	50	50
R-squared	0.55	0.52	0.55	0.53

impact of capacity on sales is positive and significant at the 10 percent level.

Table 3D shows the ROA function results with variables to capture the impacts of formal and informal trading variables, such as Smuggle1, Smuggle2, and Trading. Size's effect on ROA is positive and significant at the 1 percent level. Smuggle2's effect on ROA is negative and significant at the 5 percent level. The ratio of foreign workers' effect on ROA is positive and significant at the 5 percent level. In the combination, size's effect on ROA is positive and significant at the 1 percent level. The ratio of foreign workers' effect on ROA is positive and significant at the 5 percent level. Smuggle2's effect on ROA is negative and significant at the 5 percent level.

Table 3E shows the ROS function results with the impact of

TABLE 3E
IMPACT OF FORMAL AND INFORMAL TRADING
Dependent variable: ROS

	Smuggle1	Smuggle2	Trading	Combination
Size	0.0089	0.0038	0.0094	0.0030
	[7.31]***	[2.89]***	[7.35]***	[2.30]**
Age	0.0010	0.0011	0.0011	0.0009
	[6.27]***	[7.25]***	[6.72]***	[6.38]***
Eng	-0.0001	-0.0000	-0.0001	-0.0000
	[0.99]	[0.04]	[0.86]	[0.18]
Fo_w	0.0002	0.0003	0.0003	0.0002
	[1.38]	[2.48]**	[1.95]*	[1.73]*
Temp_w	-0.0001	-0.0003	-0.0002	-0.0002
	[1.11]	[4.20]***	[2.50]**	[2.36]**
Smuggle1	-0.0001			-0.0001
	[3.20]***			[4.87]***
Smuggle2		-0.0662		-0.0759
		[7.68]***		[8.58]***
Trading			0.0015	0.0011
			[1.61]	[1.25]
Constant	-0.0585	-0.0311	-0.0458	-0.0424
	[5.69]***	[3.20]***	[3.88]***	[4.33]***
Observations	187	187	187	187
Number of Firms	50	50	50	50
R-squared	0.47	0.58	0.48	0.62

formal and informal trading variables Smuggle1, Smuggle2, and Trading. Size and firm age's effects on ROS are positive and significant at the 1 percent level. Smuggle 1 and Smuggle 2's effects on ROS are negative and significant at the 1 percent level. The ratio of temporary workers and foreign workers' effects on ROS are positive and significant at the 5 percent to 10 percent level. In the combination, firm age's effect on ROS is positive and significant at the 1 percent level. Size's effect on ROS is positive and significant at the 5 percent level. The ratio of foreign workers' effect on ROS is positive and significant at the 10 percent level. The ratio of temporary workers' effect on ROS is negative and significant at the 5 percent level. Smuggle1 and Smuggle2's effects on ROS are negative and significant at the 1 percent level.

Table 3F shows the sales growth function results with the impact

TABLE 3F
IMPACT OF FORMAL AND INFORMAL TRADING
Dependent variable: Sales growth

	Smuggle1	Smuggle2	Trading	Combination
Size	0.5530	0.9566	0.4147	0.8804
	[4.16]***	[7.00]***	[3.02]***	[5.16]***
Caput	0.4657	0.1050	0.7443	0.2113
	[1.43]	[0.36]	[2.32]**	[0.64]
Age	-0.0003	0.0040	0.0106	0.0055
	[0.02]	[0.32]	[0.76]	[0.42]
Eng	0.0045	0.0019	0.0047	0.0017
	[0.51]	[0.23]	[0.54]	[0.20]
Fo_w	-0.0062	-0.0028	-0.0066	-0.0041
	[0.57]	[0.30]	[0.65]	[0.43]
Temp_w	0.0050	0.0053	0.0027	0.0054
	[0.88]	[1.06]	[0.51]	[1.01]
Smuggle1	0.0024			0.0016
	[0.61]			[0.42]
Smuggle2		-4.2789		-3.8687
		[5.03]***		[3.89]***
Trading			0.2412	0.0727
			[2.90]***	[0.79]
Constant	-3.8748	-5.6685	-4.6642	-5.8734
	[3.72]***	[6.05]***	[4.71]***	[5.98]***
Observations	145	145	145	145
Number of Firms	50	50	50	50
R-squared	0.26	0.34	0.30	0.37

of formal and informal trading variables Smuggle1, Smuggle2, and Trading. Size's effect on sales growth is positive and significant at the 1 percent level. Smuggle2's effect on Sales growth is negative and significant at the 1 percent level. Trading's effect on sales growth is positive and significant at the 5 percent level. In the combination, size's effect on sales growth is positive and significant at the 1 percent level. Smuggle2's effect on sales growth is negative and significant at the 1 percent level.

TABLE 4A

IMPACT OF GOVERNMENT POLICY VARIABLES

Dependent variable: Gross output and Net output

	Gross output			Net output		
	Tax	Loan	Combination	Tax	Loan	Combination
Capacity	0.0960	0.1304	0.1275	0.6054	0.6685	0.6685
	[1.69]*	[2.26]**	[2.20]**	[4.54]***	[4.73]***	[4.72]***
Workers	0.0135	0.0231	0.0241	0.0559	0.0668	0.0671
	[0.26]	[0.46]	[0.47]	[0.48]	[0.57]	[0.57]
Man&Eng	0.0034	0.0209	0.0194	-0.0312	-0.0219	-0.0161
	[0.06]	[0.37]	[0.34]	[0.24]	[0.17]	[0.12]
Raw_mat	0.8168	0.8262	0.8301			
	[19.56]***	[20.20]***	[19.99]***			
Age	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000
	[0.52]	[1.30]	[1.35]	[0.67]	[0.05]	[0.05]
Eng	0.0088	0.0097	0.0097	0.0181	0.0185	0.0186
	[1.95]*	[2.13]**	[2.13]**	[1.81]*	[1.84]*	[1.85]*
Fo_w	0.0014	-0.0004	-0.0006	0.0115	0.0085	0.0094
	[0.35]	[0.11]	[0.14]	[1.06]	[0.78]	[0.86]
Temp_w	-0.0029	-0.0036	-0.0035	-0.0094	-0.0099	-0.0104
	[1.18]	[1.50]	[1.43]	[1.66]*	[1.73]*	[1.81]*
Tax	0.0007		0.0009	-0.0032		-0.0031
	[0.38]		[0.51]	[0.77]		[0.74]
Loan		-0.0134	-0.0136		-0.0210	-0.0205
		[2.29]**	[2.31]**		[1.23]	[1.20]
Constant	1.3187	0.8353	0.8249	2.3312	1.6485	1.6543
	[2.75]***	[1.66]*	[1.64]	[1.78]*	[1.17]	[1.17]
Observations	187	187	187	187	187	187
No. of Firms	50	50	50	50	50	50
R-squared	0.69	0.69	0.69	0.23	0.24	0.24

C. Impact of Government Policy

We examine the impacts on firm behavior of two policy variables, corporate income tax rates and loan interest rates. The results are more or less consistent with common reasoning. Income tax rates have a negative and significant impact on profitability and no significant impact on output and sales. Meanwhile, interest rates have a negative and significant impact on output and sales, and an unstable impact on profitability. Both policy variables are shown to be insignificantly related to sales growth.

Table 4A shows the gross output and net output function results with

TABLE 4B

IMPACT OF GOVERNMENT POLICY VARIABLES

Dependent variable: Sales

	Tax	Loan	Combination
Capacity	0.1154	0.1430	0.1449
	[2.47]**	[2.98]***	[3.00]***
Workers	-0.0367	-0.0281	-0.0292
	[0.85]	[0.66]	[0.68]
Man&Eng	0.0324	0.0450	0.0466
	[0.68]	[0.94]	[0.97]
Raw_mat	0.6694	0.6726	0.6696
	[18.89]***	[19.45]***	[19.08]***
Age	-0.0000	0.0000	0.0000
	[0.13]	[0.76]	[0.70]
Eng	0.0026	0.0031	0.0031
	[0.67]	[0.81]	[0.79]
Fo_w	0.0048	0.0033	0.0034
	[1.43]	[1.00]	[1.02]
Temp_w	-0.0027	-0.0029	-0.0030
	[1.30]	[1.41]	[1.44]
Tax	-0.0007		-0.0005
	[0.49]		[0.36]
Loan		-0.0104	-0.0103
		[2.14]**	[2.11]**
Constant	2.8283	2.4632	2.4743
	[7.30]***	[5.92]***	[5.91]***
Observations	187	187	187
Number of Firms	50	50	50
R-squared	0.66	0.67	0.67

the impact of government policy variables. The government policy variables are rate of tax and loan interest rates. Raw materials' effect on gross output is positive and significant at the 1 percent level. The capacity utilization and ratio of engineers and technicians' effects on gross output are positive and significant at the 5 percent to 10 percent level. Loan interest rates' effects on gross output are negative and significant at the 5 percent level.

Capacity utilization ratio's effect on net output is positive and significant at the 1 percent level. The ratio of temporary workers' effect on net output is negative and significant the 1 percent level. The ratio

TABLE 4C
IMPACT OF GOVERNMENT POLICY VARIABLES
Dependent variable: ROA and ROS

	ROA			ROS		
	Tax	Loan	Combination	Tax	Loan	Combination
Size	0.0167	0.0174	0.0170	0.0101	0.0092	0.0085
	[13.13]***	[13.59]***	[13.29]***	[7.94]***	[7.43]***	[7.29]***
Age	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	[0.66]	[1.71]*	[1.32]	[4.55]***	[3.04]***	[2.42]**
Eng	0.0000	-0.0001	-0.0000	-0.0001	-0.0001	-0.0001
	[0.33]	[0.47]	[0.37]	[0.65]	[0.83]	[0.77]
Fo_w	0.0004	0.0003	0.0003	0.0000	0.0002	0.0003
	[2.37]**	[1.65]*	[1.91]*	[0.17]	[1.50]	[1.89]*
Temp_w	0.0001	0.0001	0.0000	-0.0002	-0.0001	-0.0001
	[0.86]	[0.84]	[0.59]	[2.38]**	[1.39]	[2.10]**
Tax	-0.0002		-0.0001	-0.0003		-0.0003
	[2.60]***		[2.35]**	[4.20]***		[5.38]***
Loan		-0.0005	-0.0004		0.0009	0.0011
		[2.23]**	[1.87]*		[5.46]***	[6.40]***
Constant	-0.1163	-0.1222	-0.1178	-0.0619	-0.0595	-0.0517
	[10.72]***	[11.33]***	[10.87]***	[5.70]***	[5.73]***	[5.22]***
Observations	187	187	187	187	187	187
No. of Firms	50	50	50	50	50	50
R-squared	0.53	0.52	0.55	0.50	0.49	0.58

of engineers and technicians' effect on net output is positive and significant the 1 percent level.

Table 4B shows the sales function results with the impact of government policy variables. The government policy variables are rate of tax and loan interest rates. Raw material and capacity's effects on sales are positive and significant at the 1 percent to 5 percent level. The capacity utilization ratio and ratio of engineers and technicians' effects on gross output are positive and significant at the 5 percent to 10 percent level. Loan interest rates' effect on sales is negative and significant at the 5 percent level.

Table 4C shows the ROA and ROS functions' results with the impact of government policy variables. The government policy variables

TABLE 4D

IMPACT OF GOVERNMENT POLICY VARIABLES

Dependent variable: Sales growth

	Tax	Loan	Combination
Size	0.4069	0.4128	0.5407
	[6.63]***	[6.82]***	[4.06]***
Caput	0.0006	0.0004	0.4861
	[0.27]	[0.18]	[1.49]
Age	-0.0125	-0.0176	0.0037
	[1.51]	[2.19]**	[0.24]
Eng	0.0045	0.0046	0.0050
	[0.82]	[0.85]	[0.57]
Fo_w	-0.0010	-0.0039	-0.0041
	[0.15]	[0.58]	[0.38]
Temp_w	0.0003	0.0045	0.0026
	[0.07]	[1.16]	[0.43]
Tax	-0.0012		-0.0013
	[0.58]		[0.29]
Loan		0.0211	-0.0110
		[2.27]**	[0.44]
Constant	-2.3125	-3.0396	-3.2865
	[4.40]***	[5.03]***	[2.45]**
Observations	145	145	145
Number of Firms	50	50	50
R-squared	0.23	0.26	0.26

are rate of tax and loan interest rates. Size's effects on ROA and ROS are positive and significant at the 1 percent level. The rate of tax's effect on ROA is negative and significant at the 1 percent level. Loan interest rates' effect on ROA is negative and significant at the 5 percent level. The ratio of foreign workers' effect on ROA is positive and significant at the 10 percent level. The rate of tax and loan interest rates' effect on ROS is negative and significant at the 1 percent level.

Table 4D shows the sales growth function results with the impact of government policy variables. The government policy variables are rate of tax and loan interest rates. Size's effect on sales growth is positive and significant at the 1 percent level. Loan interest rates' effect on sales growth is positive and significant at the 5 percent level.

D. Impact of Firm Types

We try two groups of firm-type variables. In the first grouping, firms are classified according to their ownership, such as state-owned, locally owned, Chinese-owned, and foreign-owned enterprises. In the second grouping, firms are classified according to their product mix, those producing only dehaired cashmere (semi-processed products), those producing final products (garment) only, and those producing both. The results which are not reported here show a very consistent pattern that none of these firm types have significant impacts on gross and net output and sales when other firm characteristics are controlled for. The impacts of firm types are shown only in profitability regressions. The state-owned firm dummy, actually representing only one giant state enterprise which is Gobi, is shown to be negatively related to profit on asset and positively related to profit on sales. This is somewhat expected because Gobi has an extraordinarily large capacity and asset while making large amounts of profit in absolute terms.

V. Summary and Concluding Remarks

In Mongolia, the cashmere industry is one of the most important foreign currency generators and is the major income contributor. Mongolia is the second largest producer and supplier in the world of cashmere, next to the People's Republic of China. Currently, there are more than 80 semi-processing and final processing firms in Mongolia, but less than 50 percent of them produce final goods (clothing), while others are just processing cashmere.

This thesis has focused on the following aspects of the cashmere industry in Mongolia. First, the study has examined the tendency that cashmere enterprises engage in the trading of raw cashmere rather than use raw cashmere in the production process given the shortage of raw cashmere, its high prices, and the low competitiveness of the final products (garments). Second, the thesis has examined whether a higher degree of smuggling leads to less output, sales, and profits. Third, this work has delved into the impact of government polices on firm behavior.

Through an estimation of the functions of production, the main results of the investigation can be summarized as follows. First, the number of permanent workers is significant in none of the production

function estimations, whereas the amount of intermediate input measured by cashmere is significant and positive in terms of gross output and sales function. This is consistent with the observation that the binding factor is not labor but intermediate materials. Second, in all production function regressions with gross and net output and sales, the impacts of two informal trading variables (Smuggle1 and Smuggle2) are shown to be significant and negative, both alone and when joined together. These two smuggling variables are also shown to be negatively related to both measures of profitability and sales growth. These results suggest the serious damages brought about by the smuggling activities in Mongolia. Especially, the negative correlation with profitability implies that those extra and irregular cash profits from smuggling go into the pockets of involved individuals and not into company safes. This is in sharp contrast to the impact of formal trading because it does not harm firm profitability and sales growth although it affects production negatively. Third, income tax rates have a negative and significant impact on profitability and no significant impact on output and sales, whereas interest rates have negative and significant impacts on output and sales and unstable impacts on profitability.

Based on the results of the empirical analysis, the following are suggested as policy directions for the government and the cashmere industry.

First, domestic processors run a high risk of facing raw cashmere shortages. The collection drives of the Chinese traders inside Mongolia have caused prices to fluctuate significantly year after year. This situation can be improved if herders and domestic processors develop a strategy to cooperate closely. It is recommended that processors collaborate with local herders, cooperatives, and traders through their local agents on the basis of partnership contracts in order to procure high-quality raw cashmere. They can forge agreements with herders for raw cashmere by paying cash in advance when herders lack the money. It is also important to help herders obtain fine cashmere goat. It is important to spread fine cashmere goat in the southern and western parts of Mongolia.

Second, cashmere enterprises are in need of large amounts of cash for cashmere procurement due to the high price of cashmere, the seasonal nature of procurement, and price fluctuations and increases due to dependence on the dollar exchange rate. In addition, Chinese competitors appear to control cheaper resources and run lower-cost

operations. Taking into account the specific features of this business, soft loans should be provided by the government for cashmere processors during the period of cashmere procurement. The government can also create a cashmere fund for cashmere stakeholders. Furthermore, it can improve the financial system so it can provide loans with low interest rate to cashmere enterprises during the cashmere collection period.

Third, it is impossible for cashmere processors to compete in the international market without enhancing their spinning and design capacity. The purpose of this is to increase the production of both value-added final products and dehaired cashmere. Overseas markets are segmented by their specific features. In the long run, processors should produce products that meet the specific needs of clients belonging to different segments of the cashmere market overseas as well as run a high-quality advertising campaign for their products. Upon an examination of the needs and requirements of customers, it is revealed that they are most interested in the design, color, and quality of cashmere garments. Domestic enterprises should therefore produce products that have their own image in the market and aim to occupy a large share of the market. It is necessary for domestic enterprises to maintain individual marketing positions and develop their reputation for producing quality luxury cashmere garments (final goods). The opportune time has come for enterprises to conduct a market survey on design opportunities in order to update the design of traditional garments. There is likewise a great need to implement new technologies, assess the demand of world consumers for cashmere goods, and implement measures to enhance marketing.

Fourth, there should be substantial reforms in the current taxation arrangements for the industry. At present, there is substantial tax evasion among and tax relief provided to foreign-invested enterprises only. A taxation system that is administratively more feasible and revenue generating than the current arrangements should be proposed. This new system has to remove the incentive for smuggling raw cashmere. Since the market-oriented reform, the government has adopted various measures for the cashmere industry, which have brought about subsequent impacts with specific consequences. This study shows that Mongolia is to implement in the near future a policy towards imposing tax on cashmere exports in compliance with its treaties with the WTO and current market conditions. The Mongolian government likewise needs to decrease the tax rate and to

apply tax laws uniformly to both foreign and local firms.

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References

Cao, X. The Role That the Industry Organization Plays in Strengthening International Cooperation and Promoting the Healthy and Sustainable Development of the Cashmere Industry. China, 2005.

Chidmedtseren, S. Monitoring Report on Cashmere Enterprises. Ministry of Industry and Commerce, 2001.

Evans, D. S. "Tests of Alternative Theories of Firm Growth." *Journal of Political Economy* 95 (No. 4 1987a): 657-74.

_____. "The Relationship between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries." *Journal of Industrial Economics* 35 (No. 4 1987b): 567-81.

Filmer, R. J. *The Mongolian Cashmere Industry*. The World Bank, 2002.

Mongolian Parliament. *The Foreign Investment Law*. 1991.

Johnson, S., and Kaufmann, D. "The Unofficial Economy in Transition." *Brookings Paper on Economic Activity* 28 (No. 2 1997): 159-239.

Jovanovic, B. "Selection and Evolution of Industry." *Econometrica* 50 (No. 3 1982): 649-70.

Songwe, V. *From Goat to Cashmere*. The World Bank, 2003.

Sutton, J. "Gibrat's Legacy." Journal of Economic Literature 35 (No. 1 1997): 40-59.

Zhang, Anming., Zhang, Yimin., and Zhao, Ronald. "Profitability and productivity of Chinese industrial implications." *China Economic Review* 13 (No. 1 2002): 65-88.

Web Sites

http://www.adb.mn
http://www.carinsgruop.org/proposals/index.html
http://www.gschneider.com/marketinindexes/index.html
http://www.gobi.mn
http://www.mongolchamber.mn
http://www.mofa/gov/mn

http://www.moti/gov/mn
http://www.nso.mn
http://www.tcimongolia.org
http://www.undp.mn