

Efficiency and Innovation in China's Large and Medium-Size Enterprise

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1. Introduction

1.1 China's industrial sector consists of nearly 8 million enterprises. A relatively small number of these – 20,000 or so large and medium-size enterprises – accounts for approximately one-half of China's industrial output. This collection of enterprises at once includes China's most successful companies – those that have grown and sustained their status at the pinnacle of China's industrial enterprise sector. Yet, by virtue of decades of central planning and the administered allocations of subsidized capital, skilled labor, and raw materials to support China's largest state-owned enterprises, some of these enterprises are also China's most troubled enterprises – those that are most impeding China's smooth transition to a market economy.

1.2 China's National Bureau of Statistics (NBS) maintains an annual survey of the country's large and medium-size enterprises (LMEs) thus providing a rich opportunity for understanding the evolving character of this important set of enterprises. In particular, we use data for this collection of enterprises to analyze the following issues.

1.2.1 Change in ownership composition, entry and exit for individual ownership classifications, and changes in asset composition – state-owned, foreign-owned, and other domestic-owned assets – within each ownership type.

1.2.2 Differences in productivity, profitability, and export orientation across ownership types and across time.

1.2.3 The distribution and change in intensity of China's industrial R&D activity, both inputs to R&D activity, including expenditure and personnel, and outputs of R&D activity, including new products and patents.

1.3 Our purpose in this study is to organize a statistical description of key variables within the data set. We do not at this stage use econometric methods to examine in depth particular issues. Rather we initially offer a statistical overview of the data to describe ownership changes during the latter half of the 1990s measured by 23 formal categories of ownership and the shares of state, foreign, and non-state domestic asset ownership within this collection of large and medium-size enterprises. We compare these measures of ownership along several dimensions of economic performance, including productivity, profitability, export orientation, R&D effort, and R&D output.

2. Ownership reform

2.1 The numbers show that of the 22,111 firms reporting in 1999, 46.2 percent reported the same enterprise identification number in 1994;

2.2 The largest increase in the number of enterprises occurred in the shareholding sector.

2.3 Across ownership types, at a 62.3 percent exit rate, collectives exhibited the highest rate of exit;

2.4. State industry nonetheless accounted for the plurality – nearly one-third – of all new entrants during these years. That the SOE sector also accounted for nearly two-thirds of all exits during this period explains the net decline in this traditional sector.

3. Financial and Export Performance

3.1 We combine labor and capital productivity using a Cobb Douglas index with weights obtained from the estimation procedure. We see a wide range of levels of MFP in 1999, ranging from state industry at 1.69 to the foreign sector at 4.25. Measured in terms of annual rates of growth of MFP, the private sector outstrips all other sectors, although with only seven firms in 1995 and a high rate of entry, this rate of growth is driven more by the characteristics of the new entrants than by the performance of a stable sample of firms.

3.2 we note that, other than the other domestic category, the only category that enjoyed a *rise* in profitability during 1996-99 was the highly-reformed state-owned enterprises.

4. R&D

- 4.1 For the full population of large and medium-size enterprises, the data show relatively low rates of R&D intensity. Table 1 reveals from 1995 to 1999 only a small sustained increase in R&D intensity for the R&D performers – from 2 percent of sales in 1995 to 2.2 percent of sales in 1999. For the sample inclusive of non-performers, we see a one-time increase in 1995-96, which is sustained throughout the following years.
- 4.2 The least R&D intensive LMEs are collectives, overseas firms, and foreign firms.
- 4.3 The largest proportional increases were for the high R&D intensity ranges. Most notably, the number of enterprises for which R&D activity exceeded three percent of sales nearly doubled to 1,076, approximately 5 percent of the total LME population. Moreover, the mean ratio for these firms was over 10 percent.
- 4.4 The share of R&D personnel in total employment rises from 5.2 percent in 1995 to 8.2 percent in 1999.
- 4.5 While a smaller proportion of overseas and foreign-owned enterprises conduct (or at least report) R&D, those that do are high-intensity R&D performers.
- 4.6 LME R&D performers a significant increase in the proportion of new product sales grow to nearly one-quarter in 1999. That for the full population the proportion does not rise as rapidly indicates that the proportion of non-performing LMEs is growing over the period 1995-99.
- 4.7 In 1999, during which the performers produced on average of 5.45 applications per firm, the average for all of the LMEs was just 0.354, a disparity implying that only 6.5 percent of LMEs in that year produced patent applications.
- 4.8 For all ownership categories, display increasing numbers of patent applications both for their performers as well as for all LMEs. Collectives show the highest intensity of patenting activity; they also include among their ranks four, half of the total number of, the highest intensity patent innovators. We see therefore that this upward swing in patent activity is consistent with trends revealed in other measures of innovative activity. Measures of R&D effort – R&D expenditure and personnel – and R&D outcomes – new products sales and patent applications – all show in varying degrees increasing intensity in China's large and medium-size enterprise system.

Table 1: R&D Effort: R&D expenditure/sales ratio

Measure	1995	1996	1997	1998	1999
R&D/sales [*] : all	0.020** [0.004]#	0.028 [0.007]	0.027 [0.007]	0.022 [0.006]	0.022 [0.007]
SOEs: all** Of which:	0.020 [0.004]	0.027 [0.00]	0.028 [0.008]	0.024 [0.007]	0.024 [0.008]
S = 100%	n.a.	0.027 [0.007]	0.029 [0.008]	0.025 [0.007]	0.025 [0.008]
50<S<100%	n.a.	0.031 [0.010]	0.020 [0.007]	0.024 [0.007]	0.024 [0.009]
S<50%	n.a.	0.022 [0.007]	0.029 [0.009]	0.015 [0.003]	0.021 [0.009]
Collectives	0.022 [0.003]	0.030 [0.005]	0.024 [0.005]	0.014 [0.003]	0.022 [0.004]
Overseas	0.008 [0.001]	0.022 [0.004]	0.025 [0.006]	0.024 [0.005]	0.025 [0.006]
Foreign	0.018 [0.003]	0.031 [0.005]	0.023 [0.004]	0.032 [0.007]	0.022 [0.004]
Shareholding	0.016 [0.005]	0.026 [0.009]	0.023 [0.008]	0.019 [0.007]	0.021 [0.007]
Private	0.008 [0.003]	0.075 [0.015]	0.006 [0.001]	0.027 [0.004]	0.049 [0.008]
Other domestic	0.022 [0.003]	0.024 [0.006]	0.059 [0.013]	0.018 [0.005]	0.053 [0.016]