

A Comparative Study on the Competitiveness of Chinese Industrial Enterprise

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This paper studies the comparative competitiveness of Chinese industrial enterprise from the perspective of labor cost and labor productivity. Throughout an international comparison of labor costs, we found that the Chinese economic power or international competitiveness mainly came from the relative low wage rate. Meanwhile, the comparison showed a decreasing trend of labor cost per unit and an increasing trend of labor productivity which meant the competitiveness of Chinese industry as a whole was improved in the comparative period. However, using the datasets of Liaoning Industrial Enterprises Surveys, we found that industrial competitiveness are quiet different between the State-Owned Enterprises (SOEs) and the Non-State-Owned Enterprises (Non-SOEs), the Reformed SOEs and the Un-reformed SOEs. An analysis on the differences of labor cost and productivities among enterprises shows that returns to capital investment tends to be equal as well as returns to labor input trend to be different among enterprises. Meanwhile, the result shows that returns to labor are the lowest for the Un-reformed State Owned Enterprises and the highest for the Non-SOEs, amusing the reformed SOEs on the average level. Consequently this is the most important source causing the differences of competitiveness among enterprises in China.

I. Introduction

In economic theory, globalization and trade liberalization will lead to an efficient allocation of resources and provide incentives to the economies for improving their comparative advantages. It is also well known that China's comparative advantage lies on mainly its rich and relatively cheap labor force. Such a comparative advantage has been further intensified after China's re-entry into the WTO following the rules of free movements of physical capital, technology and management skills though labor mobility is relatively restricted. Based on this

comparative advantage, a better way for China to develop its economy is to introduce foreign capital while foreign enterprises come to China for doing business by using the cheap labor force. This may be the main source of Chinese economic power and one major factors China holds strong international competitiveness. However, these kinds of studies may ignore a fact that, as a whole country, China has strong international competitiveness but the competitiveness differs among Chinese industrial enterprises. This paper will study China's competitiveness by ownership, economic scale and productivity and analyze the

differences in competitiveness between the SOEs, Non-SOEs, Reformed enterprises (enterprises introduced the enterprise reform program) and Un-reformed enterprises.

This paper contains 5 sessions. Session 2 makes an international comparison of labor cost and productivity to show the main source of the Chinese economic competitiveness. Session 3 describes the datasets and methodology of analysis used in the paper. Session 4 makes a factor productivity analysis of the Chinese industrial enterprises and explains the differences in competitiveness between the SOEs and the Non-SOEs from perspectives of labor cost and productivity. Session 5 answers the question as to what extent there exist redundant labor in the SOEs and whether the reform of the SOEs is successful in terms of reducing redundant labors by analyzing the difference of labor productivity between the SOEs and the Non-SOEs. Session VI summarizes the main findings and makes some briefly comments.

II. Main Sources of the Chinese Industrial Competitiveness

The cheap products with good quality produced by the Chinese workers are well recognized as a real strength of the Chinese economy. The Chinese economic power mainly comes from its rich manpower source which gives China an

advantage of low production cost. However, this explanation is not sufficient. There is no doubt that labor cost is the most important part of international competition, but competitiveness is mainly decided by labor productivity.

Some empirical studies argue that economic growth in China is driven mainly by rapid growth of physical inputs rather than by technological progress measured in terms of total factor productivity (TFP). These studies revealed that the TFP of Chinese manufacturing industry had been no significant growth till 1994 comparing TFP of manufacturing sectors between China and the United States. It also indicated that there was a large gap in TFP. For example, TFP of the USA was about 5 times higher than that of China. However, they also showed that there were no big differences in capital productivity as well as rental price of capital between the two countries. These studies conclude that the only source of economic growth in China is the factor of labor and the lower wage rate accompanied with higher labor productivity contributes the main source of rapid economic growth in China (Jefferson, 1996; Ren, 2002).

Here we make an international comparison to show the comparative advantage of the Chinese labor. Table 1 compares wage rate of Chinese workers in manufacturing industry with some other countries. It shows that average wages

Table 1 An International Comparison of Wage Rate in Manufacturing Industry
(Unit: USD/Per Hour)

Countries	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average
China	0.20	0.20	0.28	0.19	0.18	0.20	0.22	0.22	0.36	0.36	0.241
Japan	16.33	16.72	18.76	15.53	15	13.59	12.23	13.84	15.70	15.92	15.36
Korea	4.60	4.89	5.01	5.62	5.95	5.92	3.01	3.96	4.40	4.27	4.76
Singapore	4.89	5.13	5.47	6.37	7.01	7.51	6.58	7.44	7.50	7.64	6.55
USA	10.77	10.45	9.88	9.86	9.42	9.24	9.07	9.01	9.63	8.63	9.60
Canada	12.84	12.01	11.57	11.11	11.19	11.33	10.83	10.24	10.68	9.99	11.18
UK	12.64	10.37	10.44	11.04	10.92	12.18	12.01	12.46	12.40	11.37	11.58
Germany	14.01	13.31	12.51	14.05	15.51	14.56	12.3	13.37	22.84	21.17	15.36
France	9.17	8.71	8.18	---	9.91	9.55	---	---	---	---	9.10

Source: (1) Rheinberg: Data Service & Information GmbH, *International Statistical Yearbook*, various editions; (2) *China Statistical Yearbook*, Various editions; (3) *World Development Indicators* 2002.

Note: The wage rate of Chinese worker after 1999 is calculated based on the enterprises survey data from Liaoning Province, designed and conducted by the author. Due to limitations of sample size and survey province, the figures may not represent the whole Chinese manufacturing industry.

per hour earned by a Chinese manufacturing worker is 0.2 cent and it accounts only 1.7% of a US worker in 1991. This means that the cost of hiring one worker in America can hire more than 50 workers in China.

The increasing trend of labor wage rate showed in Table 1 raised a question: Dose the rise of labor cost in China undermine the comparative advantage of Chinese manufacturing industry? To answer the question, we need to make a comparison of labor productivity because wage rate alone cannot explain everything about the competitiveness of Chinese industry without considering the change of labor productivity. Table 2 compares labor costs of the two countries and the result indicates that one

American manufacturing worker is 40 times more productive than one Chinese worker in the year of 1991. However, the gap decreased to 10 times in 2000 as the productivity of Chinese labors increased 4 times in the period.

Labor cost per unit, defined as the cost of labor input required for the production of one unit of output, is a better measure of competitiveness than the indicators of labor cost and productivity. It can be calculated as labor compensation in nominal terms divided by real output. Changes in labor cost per unit reflect the net effects of the changes of hourly worker compensation and labor productivity. Labor cost per unit rises when hourly compensation rises faster than labor productivity, then it will induce a

Table 2 An International Comparison of Labor Productivity in Manufacturing
(Unit: USD/per worker per year)

Countries	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average
China	2,410	2,830	3,380	3,970	4,470	5,100	5,800	8,460	9,840	11,600	5,786
Japan	111,000	110,000	109,000	112,000	118,000	125,000	130,000	125,000	136,000	143,000	121,900
Korea	36,700	40,600	41,700	45,300	50,300	54,400	62,600	59,800	75,200	---	51,844
USA	95,700	95,100	96,300	100,000	104,000	103,000	106,000	107,000	111,000	111,000	102,910
Germany	77,400	77,500	70,200	77,400	---	---	83,600	84,900	---	---	78,500
France	58,300	60,600	61,300	65,900	69,300	70,200	93,600	106,000	---	---	73,150

Source: *International Statistical Yearbook*, Various editions; *China Statistical Yearbook*, various editions; *World Development Indicators 2002*.

Table 3 An International Comparison of Labor Cost Per Unit

Countries	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average
China	0.181	0.157	0.143	0.0844	0.0761	0.07	0.062	0.051	0.07	0.06	0.095
Japan	0.318	0.319	0.354	0.285	0.265	0.209	0.192	0.226	0.237	0.203	0.261
Korea	0.296	0.282	0.282	0.29	0.28	0.253	0.11	0.127	0.14	---	0.229
USA	0.22	0.216	0.204	0.198	0.18	0.178	0.173	0.168	0.174	0.155	0.187
Germany	0.343	0.323	0.333	0.328	---	---	0.264	0.283	---	---	0.312
France	0.292	0.267	0.247	---	0.271	0.261	---	---	---	---	0.268

Source: Same as Table 3 and Table 4.

decline of competitiveness. On the contrary, labor cost per unit will decline and then strengthen the competitiveness if labor productivity rises faster than hourly compensation. By comparing the trends of labor costs with labor productivity of Chinese manufacturing in the period of 1991-2002, Table 3 shown that the competitive advantage of Chinese industry had been improved because labor productivity have grown faster than that of labor cost.

The Chinese case seems contradict to the economic theory in which wage rate is assumed to be equal to marginal

products or productivity of labors in the state of market equilibrium. However, since the labor productivity is measured as the value of real manufacturing output produced by labor input per hour, its increase actually reflects the combined effects of many factors including capital investment, technological progress, organizational efficiencies as well as the improvement of worker's skill. Therefore the large gap we observed in the above tables does not necessarily mean the real gap between labor cost and productivity. To see the real gap, we need to know the real productivity rather than the nominal

productivity of labors in China. Using datasets of industrial enterprises surveys in Liaoning Province, we will look closely at how labors are used by the Chinese industrial enterprises.

III. Dataset and Methodology

The dataset used in this paper comes from a sample survey of industrial enterprises conducted in Liaoning Province in 1999, 2000 and 2001. The surveys were designed to collect detailed information on enterprise's inputs and outputs with an emphasis on the use of labor. This makes it possible to understand the real labor productivity as well as capital productivity in Chinese manufacturing industry through applying the Cobb-Douglas production function.

The sampling frame is designed by referring to the basic information about enterprises collected from the 1998 Unit Census of China. The method of sampling is as follows: all large-size enterprises are automatically selected; the medium-size enterprises are chosen by PPS (probability proportional to size) method; the small-size enterprises are chosen by random with equal distance. Considering the dynamic changes of ownership of the enterprises in the period of survey years, the sample enterprises will be replaced by some similar counterparts if they have no longer existed in the survey year.

Based on the above method, we chosen 597 enterprises in total as our survey samples. The geographical distribution of the samples are 134 in Shenyang, 130 in Dalian, 64 in Anshan, 64 in Fushun, 43 in Jinzhou, 45 in Dandong, 45 in Yingkou, 36 in Benxi, 27 in Tieling, and 17 in Liaoyang, Panjin, Chaoyang, Fuxin and Huludao respectively. The industrial sector distribution is as follows: 14 are mining enterprises, 530 are manufacturing enterprises, 53 are enterprises of water supply, electricity production and provision. The size distribution is that 355 are large-size enterprises; 100 are medium-size enterprises; and 142 are small-size enterprises. The distribution of the ownership is that, 175 are state owned enterprises, 173 are Co. Ltd enterprises, 81 are share-holding enterprises, 101 are foreign investment enterprises, 16 are joint venture enterprises, and 47 are other types of enterprises.

According to *Liaoning Statistics Yearbook 2002*, there are 400 large-size enterprises, 450 medium-size enterprises and 5,000 small-size enterprises in Liaoning Province in 2001. The total national product of the scaled and above enterprises in Liaoning Province are 400 billion RMB, and the sampled enterprises take a proportion of 90% in the total. The total number of workers in scaled and above enterprises (output value are above 5 million Yuan per year) in Liaoning Province are 4 million, and the

sampled enterprises take a share of 60% in the total.

Here we estimate labor cost per unit by using the Cobb-Douglas production function described as follows:

$$\ln Y_{ijt} = \alpha_0 + \alpha_1 \ln K_{ijt} + \alpha_2 \ln L_{ijt} + \alpha_3 \ln M_{ijt} + \alpha_4 D_j + \alpha_5 D_s + \varepsilon_{ijt}$$

Where Y is output, measured in terms of 10 thousand Yuan; K is net value of fixed assets, measured in terms of 10 thousand Yuan; L is real labor times, measured in terms of working hours; M is intermediate inputs, measured in terms of 10 thousand Yuan; i represents enterprises; j represents different sectors in manufacturing; t is year, D_j is dummy of sectors, D_s is dummy of ownership,

$\alpha_k, k = 0, 1, \dots, 5$ is parameter to be estimated, ε is error term.

The output is measured as total value of product, in terms of constant price, which is constructed based on the enterprise's price index of industrial products in various sectors in 2000 and 2001 by taking 1999 as a benchmark. The net value of fixed assets and the value of intermediate inputs are also measured as constant price based on an integrated price index for fixed assets and various raw materials, fuel and energy respectively. A main feature of this study is the availability for more accurate measure of labor input. The surveys collected four indicators for labor use: the monthly working days of the enterprises, the daily average working hours, over-

Table 4 Sample Mean of the Output and Input
Unit = Chinese Yuan

Ownerships	Year	Output Value	Net Value of Fixed Asset	Intermediate Input	Weighted Labor Input
Un-reformed SOEs	1999	19,387	25,222	12,315	6,415,109
	2000	21,460	25,777	14,016	5,959,928
	2001	23,472	26,807	14,683	5,739,044
	Average	21,421	25,929	13,660	6,041,191
Reformed SOEs	1999	52,738	48,510	46,896	11,400,000
	2000	60,838	51,489	56,409	11,000,000
	2001	71,243	58,436	62,013	11,100,000
	Average	61,525	52,757	55,062	11,200,000
Non-SOEs	1999	24,276	16,175	15,544	3,231,617
	2000	31,337	15,061	22,562	2,969,187
	2001	29,597	14,662	20,451	2,763,154
	Average	28,418	15,288	19,529	2,983,986
Total		38,121	32,244	30,471	6,931,681

Source: Liaoning Industrial Enterprises Surveys.

Table 5 Estimated Result of the Cob-Douglas Production Function

Inputs	1999	2000	2001	Total
Un-reformed SOEs				
Capital	0.19 (2.11)*	0.16 (2.57)*	0.20 (3.21)**	0.19 (5.04)**
Intermediate Input	0.56 (5.68)**	0.53 (6.81)**	0.58 (6.46)**	0.56 (11.77)**
Weighted Labor Input	0.26 (2.29)*	0.33 (3.88)**	0.24 (3.14)**	0.26 (5.16)**
Observations	155	155	158	468
<i>Adjusted R²</i>	0.86	0.89	0.90	0.88
Reformed SOEs				
Capital	0.13 (2.04)*	0.18 (2.60)*	0.13 (1.61)	0.15 (3.55)**
Intermediate Input	0.70 (8.90)**	0.67 (10.67)**	0.62 (6.10)**	0.66 (14.22)**
Weighted Labor Input	0.18 (2.85)**	0.21 (3.35)**	0.33 (3.44)**	0.24 (5.90)**
Observations	169	184	185	538
<i>Adjusted R²</i>	0.93	0.93	0.91	0.92
Non-SOEs				
Capital	0.07 (0.71)	0.10 (1.16)	0.05 (0.53)	0.07 (1.59)
Intermediate Input	0.56 (3.31)**	0.62 (3.69)**	0.63 (4.00)**	0.60 (7.08)**
Weighted Labor Input	0.37 (2.71)**	0.28 (1.77)	0.35 (2.26)*	0.33 (4.16)**
Observations	148	154	172	474
<i>Adjusted R²</i>	0.80	0.82	0.80	0.80
Total				
Capital	0.11 (2.41)*	0.15 (2.92)**	0.10 (1.57)	0.13 (4.68)**
Intermediate Input	0.59 (8.78)**	0.60 (8.78)**	0.61 (8.30)**	0.61 (16.53)**
Weighted Labor Input	0.30 (5.13)**	0.27 (4.18)**	0.34 (4.15)**	0.28 (7.77)**
Observations	468	468	468	1404
<i>Adjusted R²</i>	0.85	0.87	0.86	0.86

Source: Liaoning Industrial Enterprises Surveys.

Note: The dummy for around 35 manufacturing industries is included in all of the regression. T-statistics is included in bracket as * to represent statistical significance at 5% level and as ** to representing statistical significance at 1% level.

time hours and the daily real present workers. These indicators make it possible to obtain the total annual working hours of the enterprise counted by labor

input. The surveys also contain information about worker's education, so the working hours can be weighted by average educational years of workers if we

take the lowest average educational year as a base line.

To see how enterprises perform differently, we estimated the Cob-Douglas production function by ownership from 1999 to 2001. The enterprises are classified as two categories, the SOEs and Non-SOEs based on whether they hold state-owned shares in the share-holding enterprises. The Non-SOEs refer to those enterprises without any state-owned shares, and the SOEs are those enterprises owned partly or totally by the state with the state-shares ranging from zero to hundred percent. Then, the SOEs are further classified as the Un-reformed and Reformed enterprise. The so-called Reformed SOEs refer to those SOEs introduced share-holding system in 1998 in accordance with the new corporation law of China, and the Un-reformed SOEs are those traditional SOEs without any changes in structure or ownership. Table 5 summarizes the estimated results using the Cob-Douglas production function.

We can indentify from Table 5 that the enterprises with different ownerships perform differently and the difference origins mainly from the labor cost. In terms of output elasticity of productive factors, we see that intermediate inputs get the highest return but there is no significant difference among the three types of enterprises. The output elasticity of capital is higher in the SOEs (including Un-reformed and Reformed

enterprises) and it is lower in the Non-SOEs in terms of magnitude. In contrast, the output elasticity of labor shows an opposite pattern to that of the capital, namely the Non-SOEs have much larger elasticity of labor than that of SOEs (both Un-reformed and Reformed SOEs). These findings imply that the ways of using labor are difference in SOEs and Non-SOEs, and the SOEs tend to be more relying on capital inputs while the Non-SOEs are likely to use more labors in their production.

IV. Factor Productivity Analysis of the Chinese Industry

To see the different tendency in use of factors, we calculated the productivity of factors in both nominal terms and real terms. The nominal productivity is directly calculated from the sample with the total value-added divided by the value of correspondent factors. The capital productivity is defined as value-added divided by net value of fixed assets, and labor productivity is defined as value-added divided by total working hours. The real productivity is defined as marginal products of the correspondent factors and is calculated by using the estimates from the production function in Table 5. The real productivity of capital and labor are calculated based on the formula as real factor productivity (marginal products)=Elasticity of Factor \times

Table 6 Factor Productivity by Ownerships (1999-2001)

Ownership	Year	Nominal Productivity		Real Productivity (Marginal Product)		
		Capital	Labor	Capital	Intermediate	Labor
Un-reformed SOEs	1999	10.48	14.06	0.14	0.88	7.89
	2000	13.64	17.46	0.14	0.81	11.70
	2001	14.02	17.64	0.18	0.93	9.61
	Average	12.79	16.55	0.16	0.87	9.11
Reformed SOEs	1999	11.51	22.91	0.15	0.79	8.28
	2000	49.39	24.03	0.21	0.72	11.73
	2001	28.85	24.96	0.15	0.71	21.05
	Average	30.47	23.97	0.17	0.74	12.91
Non-SOEs	1999	19.62	31.56	0.10	0.87	28.02
	2000	47.09	37.70	0.21	0.86	29.02
	2001	45.18	38.04	0.10	0.90	37.06
	Average	38.78	35.80	0.14	0.87	31.24
Total		26.94	25.27	0.15	0.76	15.18

Source: Liaoning Industrial Enterprises Surveys.

(Output/Input). The results of the productivity calculated in terms of both nominal and real terms are summarized in Table 6.

Table 6 illustrates that nominal factor productivity are quite different among the three types of enterprises. With an increasing trend, the productivity of either capital or labor tends to be the highest in the Non-SOEs but the lowest in the Un-reformed SOEs taking the Reformed SOEs as a medium level. This pattern can be clearly revealed by comparing the nominal productivity of both capital and labors among the three types of enterprises.

Taking the nominal factor productivity as a measure of overall performance

of the enterprises, the difference may not reflect the efficiency of factor use. If we estimate factor productivity in real terms, we can get a different picture. Obviously there is no significant disparity in real capital productivity among the three types of enterprises while the real labor productivity does show significant difference among the three types of enterprises. The returns to labor seem to be the highest in the Non-SOEs, two times higher than that of the SOEs. It is also evident that the Reformed SOEs have improved their labor productivity comparing to the Un-reformed SOEs even though the improvement is not so big. Meanwhile, the labor productivity had been improved substantially over the

three years in both the Non-SOEs and the Reformed SOEs while it had been stagnant in the Un-reformed SOEs.

To verify if there exist differences in labor productivity in the use of labors and the cost of labors among the enterprises, we summarized some measures of the labor use in Table 7. Attending rate is calculated as the number of attending workers every day divided by total numbers of workers. The rate of working time in use is calculated as total real working hours divided by total legal working hours available. In terms of attending rate, the workers in the Un-reformed SOEs are more likely to show up for working than those in the Reformed SOEs and Non-SOEs. Once the workers show up, the Non-SOEs are more likely to ask them to work more times or overtime than that of the SOEs.

Table 8 summarizes the costs of labors and burdens of labors with different definitions. The average labor costs *I* is measured as total labor costs (total wage total wage + costs of insurance + welfare + other compensation) divided by total number of workers. The average labor cost *II* is measured as the total labor costs divided by total working hours. The average wage *I* is measured as total wage divided by total workers, and the average wage *II* is measured as total wage divided by total working hours. Examining these measures of labor cost, we found that either the average

costs of labors or average wage have no big differences when we put the denominator as total number of workers. However, when the denominator is replaced by the total working hours, the costs of labors will be different among the three types of enterprises, namely the Reformed SOEs tend to pay more to hourly working time than other types of enterprises. Since the costs of labor do not differ much if we take the denominator as the total number of workers, the above difference seems to be driven by the tendency of overtime working in the Non-SOEs. Therefore the result may induce a conclusion that the costs of labors are kept almost at a same level among different types of enterprises though the Non-SOEs tend to use labor more intensively and the wage rate per hour is relatively lower.

In summary, the above descriptive statistical analysis suggests that the main economic power of the Non-SOEs is the way of using labor, and it is this providing a comparative advantage to the Chinese economy. The Non-SOEs are not only able to maintain higher productivity, but also likely to pay labors less mainly through overtime working. By doing so, the Non-SOEs have therefore gained a favorable position in competition, keeping the labor cost per unit relatively low. Table 9 shows that the labor cost per unit in Non-SOEs is the lowest whatever they are calculated in terms of

Table 7 Ways Using Labor by Ownerships

Year	Un-reformed SOEs	Reformed SOEs	Non-SOEs	Total
Attending Rate (%)				
1999	93.39	91.74	90.78	91.98
2000	94.44	91.93	91.18	92.5
2001	97.08	93.46	92.76	94.38
Average	94.96	92.37	91.59	92.95
Rate of Working Time in use (%)				
1999	100.62	101.23	106.66	102.73
2000	100.59	102.29	107.07	103.23
2001	103.02	104.41	104.84	104.11
Average	101.4	102.62	106.16	103.35

Source: Liaoning Industrial Enterprises Surveys.

Note: Attending rate = Number of attending workers/Total number of workers;

Rate of Labor time use = Total available working hours / legal working hours.

Table 8 Labor Costs and Burdens with Different Definitions by Ownerships

Year	Un-reformed SOEs	Reformed SOEs	Non-SOEs	Total	Un-reformed SOEs	Reformed SOEs	Non-SOEs	Total
Average Labor Costs I (10,000 Yuan/person)					Average Wage I (10,000 Yuan/person)			
1999	1.29	1.42	1.34	1.35	0.98	1.11	1.06	1.05
2000	1.37	1.43	1.44	1.41	1.03	1.11	1.15	1.1
2001	1.53	1.58	1.46	1.52	1.17	1.19	1.15	1.17
Average	1.39	1.48	1.41	1.43	1.06	1.14	1.12	1.11
Average Labor Cost II (Yuan/per hour)					Average Wage II (Yuan/per hour)			
1999	6.24	9.16	6.01	7.22	4.77	7.74	4.75	5.82
2000	6.65	8.4	6.42	7.22	4.98	6.96	5.09	5.74
2001	7.22	8.91	6.73	7.65	5.47	7.23	5.27	6.02
Average	6.7	8.82	6.39	7.36	5.07	7.31	5.04	5.86
Dependent Rate of Workers (%)					Burdens of Workers (%)			
1999	102.17	72.26	65.31	82.41	8.41	7.35	9.95	8.25
2000	122.99	77.11	67.82	92.49	7.83	9.28	13.99	9.49
2001	133.43	82.45	81.87	101.69	8.24	7.77	11.2	8.61
Average	119.44	77.31	71.94	92.26	8.16	8.15	11.72	8.79

Source: Liaoning Industrial Enterprises Surveys.

Note: Average labor costs I = (total wage + costs of labor protection + welfare + other compensation)/

(total number of actual workers); Average wage = Total wage/ (total number of actual workers);

Dependent Rate of Workers I = (Layoffs + retirees + number without working due to diseases)/ Total

workers on positions; Burdens of workers = costs of layoffs / total costs of labors.

Table 9 Unit Labor Costs by Ownerships (1999-2001)

Year	Un-reformed SOEs		Reformed SOEs		Non-SOEs	
	Average	Weighted Average	Average	Weighted Average	Average	Weighted Average
Unit Labor Cost (calculated by nominal labor productivity)						
1999	0.4	0.4	0.3	0.2	0.1	0.2
2000	0.3	0.4	0.3	0.2	0.1	0.2
2001	0.3	0.4	0.3	0.2	0.1	0.2
Means	0.3	0.4	0.3	0.2	0.1	0.2
Labor Costs Per Unit (calculated by real labor productivity)						
1999	0.6	0.6	0.7	0.4	0.3	0.3
2000	0.4	0.5	0.5	0.3	0.1	0.2
2001	0.6	0.6	0.3	0.2	0.1	0.2
Means	0.5	0.5	0.4	0.3	0.3	0.2

Source: Liaoning Industrial Enterprises Surveys.

Note: The average value is calculated by industries, the weighted average is calculated by industries weighted by the size of enterprises.

nominal labor productivity or real productivity.

Ironically, this result is similar to the criticism on capitalism made by Carl Max who complained that capitalist earns high profits by paying workers less, explicitly the so called “surplus value” of workers. Here we do see the tendency to pay workers less than their productivity is still a way for the enterprises to earn profit in the socialist economy of China. In Table 10, we calculated the difference between labor productivity and labor costs as percentages to labor costs, in order to see the enterprises’ use of labors differently. In terms of the difference between labor productivity and labor costs, we found that the Non-SOEs are the biggest benefiter, the Reformed

SOEs follow and the Unreformed SOEs perform the worst.

Table 10 shows that wages paid to workers are not equal to their marginal product. The workers in the worst-performed Un-reformed SOEs are paid by around 30-50%, much less than their productivity. Meanwhile, we found that workers are paid by around as high as 3-5 times less than their productivity in the best-performed Non-SOEs and 1-2 times less than their productivity in the Reformed SOEs.

As the difference of labor use by ownership is more attributable to the difference of labor productivity than that in labor costs, the Non-SOEs therefore gain competitive advantages over the SOEs in terms of efficient use of labor.

Table 10 The Difference in Uses of Labors by Ownerships

	Unreformed SOEs		Reformed SOEs		Non-SOEs		Total	
Difference between Real Labor Productivity and Labor Cost (%)								
Year	Average	W-Aver	Average	W-Aver	Average	W-Aver	Average	W-Aver
1999	31.8	26.6	26.2	114.9	531.8	338.3	159.2	220.7
2000	82.3	58.7	67.4	169.6	468.4	274.3	183.1	255.1
2001	36.0	25.7	168.4	327.0	651.4	392.9	274.6	375.7
Average	49.8	37.3	85.9	205.5	555.1	336.0	206.9	284.8
Difference between Real Labor Productivity and Wages (%)								
1999	73.4	67.0	49.0	180.3	701.2	436.9	220.7	273.2
2000	143.8	113.3	101.5	247.7	615.4	358.5	255.1	293.6
2001	79.8	67.5	230.8	457.5	860.1	526.2	375.7	407.2
Average	98.6	82.9	124.0	297.1	731.1	441.4	284.8	327.3

Source: Liaoning Industrial Enterprises Surveys.

Consequently, there are many reasons to explain why the SOEs are not as efficient as the Non-SOEs, the different wages level and the different ways of using labor force, are some of the explanations.

V. The SOEs Reform and the Redundant Labors

The Chinese government began to reform the SOEs and give them more freedom to decision making in order to build up a modern enterprises system marked with the implementation of China's first Corporation Law in 1994. This process has been accelerated since 1998 when the central government proposed to basically complete the modern enterprises system and let the SOEs be profitable within 3 years through

reform, reorganization, restructuring and management improvement. As surplus labor being regarded as a main cause for the profit-loss SOEs, the most important measurement to achieve above goal is to cut off surplus worker in the SOEs. From 1998 to 2003, the SOEs had laid off workers as many as about 28 million, and the numbers of employees in the SOEs declined from 52.2 million to 30.67 million in the period. In other words, this reform led to millions of jobless in the name of efficient improvement. However, the question is that did the reform achieve its purpose throughout labor restructuring?

Using the dataset we calculated the profitability and answered the question. The changing trends demonstrate that the reformed SOEs get some improvements in profit-making in the first year

Table 11 Nominal Productivity and Redundant Rate of Labor in the SOEs

	Nominal Productivity				Redundant Rate	
	Un-reformed SOEs	Reformed SOEs	Non-SOEs	Total	Un-reformed SOEs	Reformed SOEs
Simple Average						
1999	12.41	23.12	32.82	22.78	62.2	29.6
2000	15.12	24.57	38.87	26.13	61.1	36.8
2001	16.38	25.43	38.86	27.20	57.8	34.5
Average	14.61	24.37	36.90	25.37	60.4	34.0
Weighted Average						
1999	11.92	28.0	28.94	24.91	58.8	3.2
2000	13.08	27.84	34.52	28.20	62.1	19.4
2001	15.43	29.51	34.45	28.53	55.2	14.3
Average	13.44	28.45	32.65	27.20	58.8	12.9

Source: Liaoning Industrial Enterprises Surveys.

of the reform but turned to be profit-loser again in the later two years. Meanwhile, the Un-reformed SOEs had been profit-loser for all three years. In contrast, the Non-SOEs performed much better and made profits except for the year 1999. The figure suggests that the reform policy improved the performance of the SOEs to some extent in terms of profitability but there had been no big help to the profit-loss SOEs.

One of the objectives of the reform is to improve efficiency by restructuring surplus labor of the SOEs. As we analyzed in above, there has some improvements in the reformed enterprises, but how about the result of restructuring? By comparing the differences of labor productivity between the SOEs and the Non-SOEs, we calculated the nominal productivity of labor by ownership as

well as the correspondent redundant rate of labor in nominal labor productivity. Table 11 shows the result and it indicates that there exist no redundant labor in the Non-SOEs, and the redundant rate of labors is assumed to be equal to the difference of labor productivity between the Non-SOEs and the SOEs as percentages of labor productivity in the Non-SOEs. On the on hand, since sectors or size of enterprises are related to labor productivity, the calculation of the redundant rate of labor in terms of labor productivity must take into account of their effects. Therefore the redundant rate of labors is firstly calculated by sector and then aggregated by both simple average and weighted average by the size of enterprises. In terms of simple average, we found that the Un-reformed SOEs are overstuffed by about 60%, and the

Table 12 Real Productivity and the Redundant Rate of Labor in the SOEs

	Nominal Productivity				Redundant Rate	
	Un-reformed SOEs	Reformed SOEs	Non-SOEs	Total	Un-reformed SOEs	Reformed SOEs
Simple Average						
1999	8.08	12.03	38.37	19.10	78.9	68.6
2000	11.86	14.60	36.77	20.75	67.8	60.3
2001	9.71	24.66	51.33	29.10	81.1	51.9
Average	9.87	17.00	42.36	22.98	76.7	59.9
Weighted Average						
1999	8.89	14.76	30.23	19.62	70.6	51.2
2000	11.53	17.60	28.44	21.38	59.4	38.1
2001	9.86	30.98	37.23	28.89	73.5	16.8
Average	10.12	21.03	32.11	23.34	68.5	34.5

Source: Liaoning Industrial Enterprises Surveys.

Reformed SOEs are overstuffed by about 30-40% comparing to that of the Non-SOEs. In terms of weighted average, the rate of redundant labors in the Un-reformed SOEs has no big changes comparing with the result calculated by simple average while the rate of redundant labor in the Reformed SOEs has decreased to a range of 3-20%. In conclusion, the enterprise reform do have some effects on reducing redundant labors in the SOEs.

To verify the above results, we calculated the redundant rate of labor in terms of the real labor productivity. The results summarized in Table 12 show that on the simple average, the Un-reformed SOEs are overstuffed by around 70-80% and the Reformed SOEs by around 50-70% comparing to the Non-SOEs. It seems there is no big

improvement in reducing redundant labors. On the weighted average, the redundant rate of labor in the Un-reformed SOEs remains almost unchanged as that of on simple average while the rate in the reformed SOEs decreased significantly to a range from 16%-50%. This implies that there is a big improvement in reducing redundant labors measured by weighted average. Meanwhile, the different results may reflect the different effects of the reform on different enterprises, because the large-sized enterprises are relatively successful than smaller-sized enterprises in reducing redundant labor.

Even though the survey data shows a reduction of the redundant rate of labor in the reformed SOEs during the reform period, it is still evident that the redundant labors exist in the reformed SOEs.

This means that there is still a long way to go for reducing surplus labor and improving efficiency of the SOEs.

VI. Conclusion and Remarks

This paper discussed competitiveness of the Chinese industry mainly from the perspective of labor cost and labor productivity. An international comparison of labor cost and labor productivity shows that an increase of differences between labor cost and labor productivity leads to a decrease of labor cost per unit and an increase of competitiveness for the Chinese industrial enterprises. Using the survey datasets of industrial enterprise in Liaoning Province 1999-2001, we analyzed how factor productivity differs among enterprises and found that capital investment tends to get equal returns across enterprises while returns to hourly labor input demonstrate great differences across enterprises. Consequently the Un-reformed SOEs get the lowest returns to labor while the Non-SOEs get the highest one, taking the Reformed SOEs as medium level. In contrast, because the Non-SOEs tend to pay workers even less than that of the SOEs, there induce a wider gap between labor cost and labor productivity between the two types of enterprises. This in return gives a great competitive advantage to the Non-SOEs over the SOEs. We think that this is one of the main factors

explaining why the Non-SOEs are more successful than their counterparts of the SOEs in China's transition economy. By comparing the labor productivity, the paper have examined the redundancy of labors in the SOEs and found that the reform policy aiming to reduce the redundant labors did get some successes but the redundant labors remain existing in the Reformed SOEs.

The findings in this paper suggest that the way using labor is critical not only to the whole economic growth but also to the success of individual enterprises. Keep other things equal, the competitive advantages derived from the use of labor seems to be the most important source of the Chinese economic power. Excluding the factors like technological progress, China still be able to maintain a sound economic growth for a relatively long period by exploiting its rich and cheap labor force.

However, the remaining question is, how long can China keep its low labor cost competitiveness? The updated population projection based on the data from the most recent population census in 2000 seems not optimistic in the near future.

The China 2000 Population Census reported that the total fertility rate (TFR), a measure for population growth trend, is only 1.7, much lower than that of projected before and it trends to decline further. Even based on the TFR adjusted upper bound value as high as 1.8,

the projected population at working age (16-60 by the Chinese definition) will not grow by 2011, and the dependent ratio for labors would begin to increase after reaching its lowest level at the same year. This means that the demographic bonus, which has placed a very favorable demographic environment for China's rapid economic growth in the past 30 years, will soon be exhausted. With acceleration of aging population, the biggest comparative advantage of China, — the cheap labor, will certainly tend to be weakened gradually. This will further undermine the foundation of economic growth. Will China still be able to keep rapid economic growth without the labor power advantage? This is a new issue we should study further.

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Appendix Table 1: Real Labor Productivity and Labor Costs (1999)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)
Food Processing Industry	3.79	3.24	17.1	28.84	86.16	-66.5	52.74	5.06	942.4	28.48	34.90	-18.4
Food Manufacturing Industry	3.22	3.11	3.5	6.90	5.42	27.3	117.49	3.58	3185.4	46.99	3.86	1116.4
Beverage Manufacturing Industry	5.31	3.71	43.4	16.90	6.38	164.8	21.12	7.30	189.4	17.27	6.44	168.0
Textile Industry	5.21	3.40	53.2	6.72	3.50	92.0	12.61	2.80	350.8	9.48	3.10	205.4
Clothing and Other Chemical Fiber Products Manufacturing Industry	4.45	6.65	-33.1	0.94	4.28	-78.0	43.11	10.02	330.4	26.04	8.24	216.2
Petroleum Processing and Coking Industry	57.64	8.39	586.7	31.72	12.24	159.3	133.49	7.57	1662.7	85.85	9.42	810.9
Raw Chemical Materials and Chemical Products Industry	7.94	8.10	-1.9	23.21	9.25	151.0	38.85	4.15	835.8	23.82	7.27	227.7
Medical and Pharmaceutical Products Industry	9.39	5.27	78.3	6.36	6.25	1.8	18.93	3.82	396.1	9.47	5.54	71.0
Rubber Products Industry	7.09	7.67	-7.5	10.86	5.95	82.6	32.18	4.13	679.2	16.40	6.06	170.7
Plastics Products Industry	5.08	4.88	4.1	12.34	6.78	82.2	28.37	8.00	254.8	19.14	7.07	170.8
Nonmetal Mineral Products Industry	3.34	3.98	-16.0	6.23	5.42	14.9	16.73	5.00	234.8	11.00	5.07	117.0
Smelting and Pressing of Ferrous Metals Industry	13.56	5.34	154.1	20.48	5.10	301.7	38.26	5.51	594.4	25.30	5.24	382.7
Smelting and Pressing of Nonferrous Metals Industry	6.52	4.38	48.7	5.18	6.01	-13.9	62.33	5.50	1032.4	36.36	5.24	594.4
Metal Products Industry	9.21	10.00	-7.9	6.54	4.53	44.4	17.83	6.28	183.8	13.99	6.05	131.4
Ordinary Machinery Industry	6.91	5.42	27.5	4.34	5.41	-19.8	11.59	5.67	104.5	7.32	5.48	33.5
Special Purpose Equipment Industry	4.29	4.95	-13.4	3.76	4.79	-21.4	30.74	3.54	768.4	8.40	4.63	81.6
Transport Equipment Industry	6.44	6.00	7.3	14.43	8.29	74.2	45.16	9.13	394.6	17.11	7.46	129.2
Electric Equipment and Machinery Industry	14.70	11.71	25.5	9.34	6.71	39.1	24.80	12.70	95.4	14.39	9.52	51.2
Electronic and Telecommunications Equipment Industry	7.86	4.34	81.2	23.59	8.85	166.6	35.00	5.72	512.0	18.55	5.98	210.2
Instruments, Cultural and Office Equipment Industry	1.70	2.50	-32.0	3.37	3.10	8.6	14.30	6.93	106.3	9.07	5.10	78.0
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	14.57	9.23	57.8	9.89	8.19	20.7	253.12	15.20	1565.2	29.94	9.29	222.4
Running Water Production and Supply Industry	3.21	4.40	-27.1	5.15	3.56	44.6	6.08	3.87	57.1	3.81	4.23	-9.9
Average	8.08	6.13	31.8	12.03	9.54	26.2	38.37	6.07	531.8	19.10	7.37	159.2
Weighted Average	8.89	7.02	26.6	14.76	6.87	114.9	30.23	6.90	338.3	19.62	6.72	192.1

Note : MRP=Marginal Labor Products ; LCR=Labor Costs ; SVR=100*(MRP-LCR)/LCR

Appendix Table 2: Real Labor Productivity and Labor Costs (2000)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)
Food Processing Industry	9.50	4.06	134.0	37.67	70.25	-46.4	30.89	3.35	822.5	26.75	28.66	-6.7
Food Manufacturing Industry	4.98	3.45	44.5	10.52	5.87	79.1	170.27	4.17	3980.1	68.35	4.33	1479.7
Beverage Manufacturing Industry	7.08	3.10	128.1	18.79	6.91	171.9	21.20	7.13	197.1	18.40	6.55	180.8
Textile Industry	8.21	3.10	164.9	8.37	3.60	132.3	10.28	3.34	207.6	9.34	3.35	179.2
Clothing and Other Chemical Fiber Products Manufacturing Industry	10.79	8.87	21.7	1.66	4.77	-65.2	47.23	10.13	366.2	30.31	9.01	236.6
Petroleum Processing and Coking Industry	117.86	11.84	895.6	45.42	9.93	357.3	112.43	7.49	1400.6	87.98	8.95	883.0
Raw Chemical Materials and Chemical Products Industry	8.57	8.80	-2.6	14.05	6.47	117.0	54.89	5.28	939.6	26.95	6.73	300.7
Medical and Pharmaceutical Products Industry	17.96	4.93	264.4	10.03	5.81	72.5	18.98	3.98	377.4	13.82	5.24	163.8
Rubber Products Industry	10.16	8.63	17.7	14.48	6.06	139.0	19.11	4.14	361.5	14.22	6.49	119.1
Plastics Products Industry	10.52	3.45	205.1	18.56	7.85	136.4	18.53	6.13	202.1	17.20	6.26	174.9
Nonmetal Mineral Products Industry	4.15	3.40	22.0	8.06	5.40	49.2	13.30	5.08	161.7	10.19	5.04	102.0
Smelting and Pressing of Ferrous Metals Industry	37.73	12.00	214.5	23.18	5.36	332.5	33.66	5.92	468.8	27.12	5.95	355.9
Smelting and Pressing of Nonferrous Metals Industry	10.03	4.58	119.1	7.00	5.15	35.9	47.42	4.70	908.3	29.70	4.73	527.4
Metal Products Industry	9.68	10.18	-4.9	9.11	4.94	84.4	17.16	7.12	141.0	14.33	6.72	113.3
Ordinary Machinery Industry	11.24	5.75	95.5	5.46	5.78	-5.5	10.80	5.93	82.2	9.08	5.81	56.3
Special Purpose Equipment Industry	7.66	5.02	52.8	5.03	4.88	3.0	24.45	3.09	691.3	8.32	4.68	77.9
Transport Equipment Industry	9.64	6.46	49.2	19.29	7.25	166.2	47.68	12.07	295.0	20.78	7.87	164.1
Electric Equipment and Machinery Industry	13.67	11.89	15.0	14.48	6.88	110.3	18.09	13.45	34.5	15.06	9.82	53.4
Electronic and Telecommunications Equipment Industry	12.12	4.57	165.4	30.40	8.06	277.2	29.29	6.79	331.3	22.71	6.36	257.3
Instruments, Cultural and Office Equipment Industry	2.29	1.81	26.3	4.90	3.63	35.1	12.26	7.31	67.6	8.41	5.27	59.5
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	19.51	9.19	112.3	12.01	8.84	35.9	180.84	18.63	870.8	28.36	9.74	191.1
Running Water Production and Supply Industry	3.85	4.93	-21.8	16.16	9.34	73.0	7.74	4.77	62.3	5.88	5.46	7.6
Average	11.86	6.50	82.3	14.60	8.72	67.4	36.77	6.47	468.4	20.75	7.33	183.1
Weighted Average	11.53	7.27	58.7	17.60	6.53	169.6	28.44	7.60	274.3	21.38	6.95	207.6

Note : MRP=Marginal Labor Products ; LCR=Labor Costs ; SVR=100*(MRP-LCR)/LCR

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Appendix Table 3: Real Labor Productivity and Labor Costs (2001)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)
Food Processing Industry	8.60	5.79	48.5	61.31	66.19	-7.4	54.58	7.43	634.7	42.74	28.95	47.6
Food Manufacturing Industry	3.70	3.49	6.0	19.89	6.76	194.0	328.71	3.56	9121.6	148.93	4.14	3501.1
Beverage Manufacturing Industry	5.13	3.70	38.6	35.87	6.31	468.4	21.45	6.89	211.5	25.47	6.27	305.9
Textile Industry	6.77	3.58	89.2	12.99	4.12	215.5	13.92	3.64	282.5	12.02	3.74	221.6
Clothing and Other Chemical Fiber Products Manufacturing Industry	4.57	6.64	-31.2	2.13	4.12	-48.4	76.09	10.89	598.8	45.09	8.71	417.8
Petroleum Processing and Coking Industry	97.80	11.53	748.0	65.76	10.64	518.2	142.59	8.64	1551.2	108.18	9.75	1009.7
Raw Chemical Materials and Chemical Products Industry	7.57	8.85	-14.5	20.57	5.18	297.1	61.25	5.53	1007.1	31.23	6.37	390.2
Medical and Pharmaceutical Products Industry	17.01	4.87	249.1	27.22	8.46	221.5	21.42	4.68	357.5	21.80	5.76	278.1
Rubber Products Industry	8.09	8.15	-0.7	26.55	6.86	286.8	24.10	4.53	432.2	18.04	6.62	172.4
Plastics Products Industry	6.95	3.69	88.6	29.75	7.45	299.2	26.30	4.41	496.3	24.22	5.30	356.8
Nonmetal Mineral Products Industry	3.33	3.46	-3.8	11.94	6.24	91.3	18.08	5.15	251.1	14.02	5.43	158.2
Smelting and Pressing of Ferrous Metals Industry	21.49	10.94	96.3	48.81	6.37	666.0	39.84	6.19	543.5	44.56	6.60	575.1
Smelting and Pressing of Nonferrous Metals Industry	5.97	4.90	21.9	19.06	3.44	454.1	45.16	5.51	720.3	29.09	5.00	481.6
Metal Products Industry	10.71	13.52	-20.8	11.68	5.53	111.1	25.77	8.33	209.2	21.67	8.10	167.5
Ordinary Machinery Industry	9.57	6.45	48.3	9.11	6.16	47.9	12.28	5.74	113.8	10.14	6.15	64.9
Special Purpose Equipment Industry	8.08	6.37	26.7	8.95	5.73	56.2	24.50	3.58	584.7	11.31	5.54	104.0
Transport Equipment Industry	7.42	7.13	4.1	26.54	7.57	250.7	57.03	9.49	501.1	25.37	7.83	224.1
Electric Equipment and Machinery Industry	15.07	12.33	22.2	24.60	7.14	244.5	23.33	13.97	67.0	21.81	10.24	112.9
Electronic and Telecommunications Equipment Industry	9.85	4.81	104.8	48.86	8.74	459.0	37.10	7.82	374.6	30.36	6.93	337.8
Instruments, Cultural and Office Equipment Industry	2.68	2.90	-7.5	8.17	11.09	-26.4	13.59	7.94	71.3	9.96	7.52	32.5
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	14.14	11.35	24.6	17.50	9.63	81.7	222.39	23.65	840.4	30.22	11.62	160.1
Running Water Production and Supply Industry	2.73	5.31	-48.5	21.84	8.59	154.2	8.53	3.63	134.8	5.85	5.51	6.1
Average	9.71	7.14	36.0	24.66	9.19	168.4	51.33	6.83	651.4	29.10	7.77	274.6
Weighted Average	9.86	7.84	25.7	30.98	7.25	327.0	37.23	7.55	392.9	28.89	7.37	292.0

Note : MRP=Marginal Labor Products ; LCR=Labor Costs ; SVR=100*(MRP-LCR)/LCR

Appendix Table 4: Real Labor Productivity and Labor Costs (Three Year Average)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)	MRP	LCR	SVR(%)
Food Processing Industry	7.30	4.36	67.3	42.61	74.20	-42.6	46.07	5.28	772.7	32.65	30.84	5.9
Food Manufacturing Industry	3.97	3.35	18.4	11.76	5.95	97.5	211.98	3.76	5537.1	88.09	4.11	2044.1
Beverage Manufacturing Industry	5.84	3.51	66.7	23.33	6.54	256.5	21.26	7.10	199.7	20.38	6.42	217.2
Textile Industry	6.73	3.36	100.3	9.36	3.74	150.3	12.27	3.26	276.5	10.28	3.40	202.8
Clothing and Other Chemical Fiber Products Manufacturing Industry	6.60	7.39	-10.6	1.58	4.39	-64.1	55.48	10.35	436.2	33.81	8.65	290.9
Petroleum Processing and Coking Industry	91.10	10.59	760.4	47.63	10.93	335.6	129.50	7.90	1539.2	94.00	9.37	902.8
Raw Chemical Materials and Chemical Products Industry	8.03	8.58	-6.5	19.39	7.03	175.7	52.06	5.01	938.4	27.33	6.79	302.6
Medical and Pharmaceutical Products Industry	14.79	5.02	194.4	12.00	6.52	84.1	20.32	4.33	369.1	15.03	5.51	172.6
Rubber Products Industry	8.45	8.15	3.7	17.30	6.29	175.0	25.13	4.27	489.0	16.22	6.39	153.8
Plastics Products Industry	7.52	4.00	87.7	20.22	7.36	174.7	24.40	6.18	294.8	20.19	6.21	225.1
Nonmetal Mineral Products Industry	3.61	3.62	-0.2	8.74	5.69	53.7	16.04	5.08	215.9	11.73	5.18	126.6
Smelting and Pressing of Ferrous Metals Industry	24.26	9.43	157.4	30.82	5.61	449.4	37.25	5.87	534.3	32.33	5.93	445.1
Smelting and Pressing of Nonferrous Metals Industry	7.51	4.62	62.5	10.41	4.87	113.9	51.64	5.24	885.9	31.72	4.99	535.5
Metal Products Industry	9.87	11.23	-12.2	8.88	4.95	79.2	20.45	7.28	180.7	16.66	6.96	139.6
Ordinary Machinery Industry	9.20	5.85	57.1	6.34	5.79	9.5	11.56	5.78	100.1	8.85	5.81	52.2
Special Purpose Equipment Industry	6.68	5.45	22.6	5.90	5.13	15.0	26.71	3.42	680.0	9.34	4.95	88.8
Transport Equipment Industry	7.83	6.53	19.9	19.88	7.70	158.1	50.33	10.19	393.9	21.09	7.72	173.1
Electric Equipment and Machinery Industry	14.46	11.97	20.8	16.14	6.91	133.5	22.13	13.40	65.2	17.09	9.86	73.3
Electronic and Telecommunications Equipment Industry	9.83	4.56	115.5	35.05	8.53	311.0	33.79	6.78	398.8	23.87	6.42	271.6
Instruments, Cultural and Office Equipment Industry	2.22	2.40	-7.5	5.48	5.94	-7.8	13.38	7.39	81.0	9.15	5.96	53.4
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	16.08	9.93	62.0	13.13	8.89	47.8	218.79	19.16	1041.9	29.50	10.22	188.8
Running Water Production and Supply Industry	3.27	4.88	-33.1	14.38	7.17	100.7	7.45	4.09	82.1	5.18	5.07	2.2
Average	9.87	6.59	49.8	17.00	9.15	85.9	42.36	6.47	555.1	22.98	7.49	206.9
Weighted Average	10.12	7.37	37.3	21.03	6.89	205.5	32.11	7.36	336.0	23.34	7.01	232.8

Note : MRP=Marginal Labor Products ; LCR=Labor Costs ; SVR=100*(MRP-LCR)/LCR

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Appendix Table 5: Real Labor Productivity and Wage Rate (1999)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)
Food Processing Industry	3.79	2.59	46.1	28.84	85.38	-66.2	52.74	4.44	1086.8	28.48	34.22	-16.8
Food Manufacturing Industry	3.22	2.20	46.5	6.90	4.54	51.9	117.49	3.38	3377.8	46.99	3.23	1356.1
Beverage Manufacturing Industry	5.31	3.20	65.9	16.90	6.18	173.3	21.12	4.45	374.5	17.27	5.05	241.8
Textile Industry	5.21	2.34	122.8	6.72	2.60	158.5	12.61	2.30	447.4	9.48	2.38	298.2
Clothing and Other Chemical Fiber Products Manufacturing Industry	4.45	5.40	-17.5	0.94	2.85	-67.0	43.11	8.87	386.1	26.04	7.02	271.1
Petroleum Processing and Coking Industry	57.64	5.87	882.2	31.72	9.59	230.8	133.49	6.17	2065.3	85.85	7.41	1058.2
Raw Chemical Materials and Chemical Products Industry	7.94	5.98	32.9	23.21	8.11	186.3	38.85	3.34	1061.6	23.82	5.95	300.2
Medical and Pharmaceutical Products Industry	9.39	4.32	117.6	6.36	5.03	26.5	18.93	3.66	417.7	9.47	4.58	106.7
Rubber Products Industry	7.09	6.41	10.7	10.86	4.36	149.2	32.18	4.03	698.0	16.40	5.10	221.3
Plastics Products Industry	5.08	3.67	38.4	12.34	4.81	156.8	28.37	6.05	368.8	19.14	5.24	265.4
Nonmetal Mineral Products Industry	3.34	3.68	-9.3	6.23	3.66	70.1	16.73	4.05	312.9	11.00	3.85	185.5
Smelting and Pressing of Ferrous Metals Industry	13.56	5.29	156.4	20.48	3.69	454.4	38.26	4.30	788.7	25.30	3.98	535.0
Smelting and Pressing of Nonferrous Metals Industry	6.52	2.74	137.9	5.18	2.23	132.2	62.33	4.73	1218.0	36.36	3.73	874.3
Metal Products Industry	9.21	6.24	47.6	6.54	2.90	125.6	17.83	3.18	461.2	13.99	3.32	321.8
Ordinary Machinery Industry	6.91	4.27	61.9	4.34	4.04	7.4	11.59	4.12	181.0	7.32	4.16	76.1
Special Purpose Equipment Industry	4.29	3.14	36.6	3.76	3.53	6.7	30.74	2.79	1001.4	8.40	3.30	154.4
Transport Equipment Industry	6.44	4.49	43.5	14.43	6.01	140.2	45.16	7.85	475.1	17.11	5.72	199.3
Electric Equipment and Machinery Industry	14.70	9.22	59.5	9.34	5.48	70.4	24.80	10.94	126.8	14.39	7.80	84.5
Electronic and Telecommunications Equipment Industry	7.86	3.27	140.5	23.59	6.70	252.2	35.00	4.69	646.1	18.55	4.60	303.3
Instruments, Cultural and Office Equipment Industry	1.70	1.76	-3.8	3.37	2.73	23.5	14.30	5.57	156.7	9.07	4.09	121.6
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	14.57	6.99	108.5	9.89	5.84	69.4	253.12	10.88	2226.9	29.94	6.86	336.7
Running Water Production and Supply Industry	3.21	3.30	-2.8	5.15	2.64	95.0	6.08	3.24	87.7	3.81	3.21	18.6
Average	8.08	4.66	73.4	12.03	8.08	49.0	38.37	4.79	701.2	19.10	5.96	220.7
Weighted Average	8.89	5.32	67.0	14.76	5.27	180.3	30.23	5.63	436.9	19.62	5.26	273.2

Note : MRP=Marginal Products of Labors ; WR=Wage Rate ; SVR=100*(MRP-WR)/WR

Appendix Table 6: Real Labor Productivity and Wage Rate (2000)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)
Food Processing Industry	9.50	2.98	219.4	37.67	69.55	-45.8	30.89	3.00	930.1	26.75	27.95	-4.3
Food Manufacturing Industry	4.98	2.36	111.4	10.52	4.88	115.3	170.27	4.00	4159.3	68.35	3.60	1796.2
Beverage Manufacturing Industry	7.08	2.56	176.3	18.79	6.45	191.4	21.20	4.79	342.7	18.40	5.24	251.5
Textile Industry	8.21	2.47	231.8	8.37	2.70	209.9	10.28	2.64	289.7	9.34	2.61	257.4
Clothing and Other Chemical Fiber Products Manufacturing Industry	10.79	6.68	61.7	1.66	3.05	-45.6	47.23	9.14	417.0	30.31	7.56	300.7
Petroleum Processing and Coking Industry	117.86	7.98	1376.5	45.42	7.35	517.6	112.43	6.02	1767.6	87.98	6.77	1200.4
Raw Chemical Materials and Chemical Products Industry	8.57	6.44	33.1	14.05	5.15	172.5	54.89	4.36	1159.3	26.95	5.24	413.8
Medical and Pharmaceutical Products Industry	17.96	4.20	327.8	10.03	4.71	113.1	18.98	3.75	406.5	13.82	4.39	214.5
Rubber Products Industry	10.16	6.38	59.3	14.48	4.11	252.1	19.11	3.88	392.6	14.22	4.98	185.7
Plastics Products Industry	10.52	2.98	253.0	18.56	6.21	198.7	18.53	4.57	305.0	17.20	4.85	254.3
Nonmetal Mineral Products Industry	4.15	2.98	39.1	8.06	3.65	121.1	13.30	4.11	223.9	10.19	3.80	168.1
Smelting and Pressing of Ferrous Metals Industry	37.73	10.68	253.2	23.18	4.22	449.9	33.66	4.63	626.8	27.12	4.75	471.0
Smelting and Pressing of Nonferrous Metals Industry	10.03	2.99	235.3	7.00	2.11	231.7	47.42	4.04	1075.1	29.70	3.42	768.9
Metal Products Industry	9.68	5.10	89.8	9.11	3.15	188.9	17.16	3.68	365.8	14.33	3.63	294.3
Ordinary Machinery Industry	11.24	4.50	149.7	5.46	4.34	26.0	10.80	4.48	140.9	9.08	4.44	104.4
Special Purpose Equipment Industry	7.66	3.63	111.3	5.03	3.70	35.9	24.45	2.75	787.6	8.32	3.55	134.1
Transport Equipment Industry	9.64	4.79	101.3	19.29	5.67	239.9	47.68	9.95	379.4	20.78	6.14	238.3
Electric Equipment and Machinery Industry	13.67	8.84	54.7	14.48	5.53	161.7	18.09	11.70	54.7	15.06	7.88	91.0
Electronic and Telecommunications Equipment Industry	12.12	3.41	255.9	30.40	5.99	407.6	29.29	5.77	407.7	22.71	4.89	364.6
Instruments, Cultural and Office Equipment Industry	2.29	1.39	64.7	4.90	3.00	63.4	12.26	5.92	107.0	8.41	4.26	97.1
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	19.51	6.86	184.4	12.01	5.95	101.8	180.84	12.78	1315.3	28.36	6.96	307.5
Running Water Production and Supply Industry	3.85	3.81	1.1	16.16	7.48	116.2	7.74	3.95	95.9	5.88	4.28	37.2
Average	11.86	4.86	143.8	14.60	7.24	101.5	36.77	5.14	615.4	20.75	5.84	255.1
Weighted Average	11.53	5.41	113.3	17.60	5.06	247.7	28.44	6.20	358.5	21.38	5.43	293.6

Note : MRP=Marginal Products of Labors ; WR=Wage Rate ; SVR=100*(MRP-WR)/WR

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Appendix Table 7: Real Labor Productivity and Wage Rate (2001)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)
Food Processing Industry	8.60	4.31	99.6	61.31	65.39	-6.2	54.58	7.02	677.6	42.74	28.06	52.3
Food Manufacturing Industry	3.70	2.35	57.0	19.89	5.74	246.2	328.71	3.83	8476.6	148.93	3.62	4009.6
Beverage Manufacturing Industry	5.13	3.11	65.1	35.87	5.77	521.4	21.45	4.26	403.9	25.47	4.68	444.0
Textile Industry	6.77	2.76	145.5	12.99	2.99	333.8	13.92	2.83	392.2	12.02	2.85	321.6
Clothing and Other Chemical Fiber Products Manufacturing Industry	4.57	5.69	-19.7	2.13	2.66	-20.0	76.09	9.75	680.6	45.09	7.58	495.2
Petroleum Processing and Coking Industry	97.80	8.93	995.1	65.76	8.22	700.3	142.59	6.67	2039.3	108.18	7.53	1336.6
Raw Chemical Materials and Chemical Products Industry	7.57	6.58	15.0	20.57	4.00	413.7	61.25	4.56	1242.5	31.23	4.95	530.8
Medical and Pharmaceutical Products Industry	17.01	4.12	313.0	27.22	6.36	328.3	21.42	3.52	507.7	21.80	4.46	388.9
Rubber Products Industry	8.09	6.33	27.8	26.55	4.66	469.7	24.10	3.86	524.2	18.04	5.09	254.4
Plastics Products Industry	6.95	3.21	116.4	29.75	5.69	422.4	26.30	3.27	704.5	24.22	4.07	495.5
Nonmetal Mineral Products Industry	3.33	3.00	11.0	11.94	3.90	206.5	18.08	4.17	333.4	14.02	3.94	256.0
Smelting and Pressing of Ferrous Metals Industry	21.49	10.94	96.3	48.81	4.88	899.2	39.84	4.75	738.7	44.56	5.22	753.5
Smelting and Pressing of Nonferrous Metals Industry	5.97	3.12	91.2	19.06	2.85	568.3	45.16	4.54	895.3	29.09	3.84	656.9
Metal Products Industry	10.71	7.85	36.4	11.68	3.48	235.1	25.77	4.54	467.6	21.67	4.55	376.3
Ordinary Machinery Industry	9.57	5.08	88.4	9.11	4.52	101.5	12.28	4.27	187.5	10.14	4.66	117.8
Special Purpose Equipment Industry	8.08	4.56	77.3	8.95	4.26	110.1	24.50	3.08	695.5	11.31	4.14	173.0
Transport Equipment Industry	7.42	5.22	42.1	26.54	5.80	357.8	57.03	7.79	631.9	25.37	6.01	321.9
Electric Equipment and Machinery Industry	15.07	9.34	61.3	24.60	5.81	323.3	23.33	11.18	108.8	21.81	8.11	169.0
Electronic and Telecommunications Equipment Industry	9.85	3.52	179.6	48.86	6.37	667.3	37.10	6.51	469.4	30.36	5.24	479.0
Instruments, Cultural and Office Equipment Industry	2.68	2.05	30.6	8.17	3.40	140.3	13.59	6.25	117.4	9.96	4.68	112.6
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	14.14	8.68	63.0	17.50	6.61	165.0	222.39	17.74	1153.5	30.22	8.59	252.0
Running Water Production and Supply Industry	2.73	4.01	-31.9	21.84	8.11	169.4	8.53	2.82	203.0	5.85	4.37	33.7
Average	9.71	5.40	79.8	24.66	7.45	230.8	51.33	5.35	860.1	29.10	6.12	375.7
Weighted Average	9.86	5.89	67.5	30.98	5.56	457.5	37.23	5.95	526.2	28.89	5.70	407.2

Note : MRP=Marginal Products of Labors ; WR=Wage Rate ; SVR=100*(MRP-WR)/WR

Appendix Table 8: Real Labor Productivity and Wage Rate (Three Year Average)

Industry	Un-reformed SOEs			Reformed SOEs			Non-SOEs			Total		
	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)	MRP	WR	SVR(%)
Food Processing Industry	7.30	3.29	121.7	42.61	73.44	-42.0	46.07	4.82	855.7	32.65	30.07	8.6
Food Manufacturing Industry	3.97	2.30	72.2	11.76	5.00	135.4	211.98	3.74	5573.6	88.09	3.48	2429.7
Beverage Manufacturing Industry	5.84	2.96	97.5	23.33	6.15	279.2	21.26	4.49	373.8	20.38	4.99	308.4
Textile Industry	6.73	2.52	166.7	9.36	2.77	238.5	12.27	2.59	373.8	10.28	2.62	293.1
Clothing and Other Chemical Fiber Products Manufacturing Industry	6.60	5.92	11.5	1.58	2.85	-44.8	55.48	9.25	499.7	33.81	7.39	357.8
Petroleum Processing and Coking Industry	91.10	7.59	1099.6	47.63	8.39	468.0	129.50	6.28	1961.0	94.00	7.24	1199.1
Raw Chemical Materials and Chemical Products Industry	8.03	6.33	26.7	19.39	5.82	232.9	52.06	4.11	1166.2	27.33	5.38	407.8
Medical and Pharmaceutical Products Industry	14.79	4.21	251.2	12.00	5.16	132.3	20.32	3.60	464.0	15.03	4.48	235.6
Rubber Products Industry	8.45	6.37	32.6	17.30	4.38	295.1	25.13	3.92	540.4	16.22	5.06	220.7
Plastics Products Industry	7.52	3.29	128.6	20.22	5.57	262.8	24.40	4.63	426.8	20.19	4.72	327.7
Nonmetal Mineral Products Industry	3.61	3.22	11.9	8.74	3.73	134.1	16.04	4.11	290.2	11.73	3.86	203.7
Smelting and Pressing of Ferrous Metals Industry	24.26	8.97	170.4	30.82	4.26	622.7	37.25	4.56	716.5	32.33	4.65	594.9
Smelting and Pressing of Nonferrous Metals Industry	7.51	2.95	154.3	10.41	2.40	334.3	51.64	4.43	1064.6	31.72	3.66	765.5
Metal Products Industry	9.87	6.40	54.2	8.88	3.15	181.7	20.45	3.83	434.4	16.66	3.83	334.6
Ordinary Machinery Industry	9.20	4.60	99.9	6.34	4.30	47.4	11.56	4.29	169.5	8.85	4.42	100.3
Special Purpose Equipment Industry	6.68	3.77	76.9	5.90	3.83	54.1	26.71	2.88	826.4	9.34	3.67	154.9
Transport Equipment Industry	7.83	4.83	62.1	19.88	5.83	241.2	50.33	8.49	492.7	21.09	5.96	253.9
Electric Equipment and Machinery Industry	14.46	9.13	58.4	16.14	5.61	187.7	22.13	11.27	96.5	17.09	7.93	115.5
Electronic and Telecommunications Equipment Industry	9.83	3.39	189.7	35.05	6.33	454.0	33.79	5.66	497.3	23.87	4.91	386.2
Instruments, Cultural and Office Equipment Industry	2.22	1.74	28.1	5.48	3.04	80.1	13.38	5.91	126.3	9.15	4.35	110.4
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	16.08	7.51	114.1	13.13	6.13	114.2	218.79	13.80	1485.5	29.50	7.47	295.1
Running Water Production and Supply Industry	3.27	3.71	-11.9	14.38	6.07	136.8	7.45	3.34	123.3	5.18	3.96	30.9
Average	9.87	4.97	98.6	17.00	7.59	124.0	42.36	5.10	731.1	22.98	5.97	284.8
Weighted Average	10.12	5.53	82.9	21.03	5.30	297.1	32.11	5.93	441.4	23.34	5.46	327.3

Note : MRP=Marginal Products of Labors ; WR=Wage Rate ; SVR=100*(MRP-WR)/WR

Appendix Table 9: Nominal Labor Productivity and Relative Redundant Rate (1999)

Industry	Nominal Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)	
	Un-reformed SOEs	Reformed SOEs	Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	-7.46	-17.95	65.35	-11.42	-27.47	111.4	127.5
Food Manufacturing Industry	2.69	16.62	24.16	11.15	68.78	88.8	31.2
Beverage Manufacturing Industry	14.86	52.51	32.04	46.40	163.90	53.6	-63.9
Textile Industry	5.37	9.37	6.53	82.28	143.51	17.7	-43.5
Clothing and Other Chemical Fiber Products Manufacturing Industry	6.67	3.33	16.25	41.05	20.47	59.0	79.5
Petroleum Processing and Coking Industry	31.95	47.13	165.11	19.35	28.54	80.7	71.5
Raw Chemical Materials and Chemical Products Industry	12.93	51.02	18.30	70.63	278.76	29.4	-178.8
Medical and Pharmaceutical Products Industry	12.20	20.83	9.30	131.15	223.87	-31.1	-123.9
Rubber Products Industry	15.09	37.35	13.78	109.49	271.08	-9.5	-171.1
Plastics Products Industry	9.38	16.73	21.13	44.38	79.17	55.6	20.8
Nonmetal Mineral Products Industry	9.32	3.31	12.77	72.99	25.92	27.0	74.1
Smelting and Pressing of Ferrous Metals Industry	14.89	32.04	25.95	57.36	135.78	42.6	-35.8
Smelting and Pressing of Nonferrous Metals Industry	5.08	-3.90	25.94	19.60	-15.05	80.4	115.0
Metal Products Industry	10.25	13.74	12.48	82.14	110.14	17.9	-10.1
Ordinary Machinery Industry	7.79	11.71	17.62	44.19	66.49	55.8	33.5
Special Purpose Equipment Industry	4.59	8.71	82.35	5.57	10.58	94.4	89.4
Transport Equipment Industry	8.50	28.87	31.05	27.38	92.97	72.6	7.0
Electric Equipment and Machinery Industry	9.96	20.55	33.40	29.80	61.51	70.2	38.5
Electronic and Telecommunications Equipment Industry	9.42	37.26	22.23	42.39	167.61	57.6	-67.6
Instruments, Cultural and Office Equipment Industry	5.85	10.87	24.72	23.68	43.98	76.3	56.0
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	41.38	47.13	662.71	6.24	7.11	93.8	92.9
Running Water Production and Supply Industry	9.84	13.88	6.45	152.59	215.26	-52.6	-115.3
Total	12.41	23.12	32.82	37.82	70.43	62.2	29.6
Total by Weight	11.92	28.00	28.94	41.19	96.75	58.8	3.2

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 10: Nominal Labor Productivity and Relative Redundant Rate (2000)

Industry	Nominal Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)	
	Un-reformed SOEs	Reformed SOEs	Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	4.90	19.08	74.43	6.58	25.63	93.4	74.4
Food Manufacturing Industry	2.78	18.08	28.10	9.89	64.35	90.1	35.7
Beverage Manufacturing Industry	14.91	56.99	42.86	34.80	132.97	65.2	-33.0
Textile Industry	7.99	9.52	6.19	129.14	153.85	-29.1	-53.8
Clothing and Other Chemical Fiber Products Manufacturing Industry	18.90	3.71	19.36	97.62	19.16	2.4	80.8
Petroleum Processing and Coking Industry	21.45	63.51	152.77	14.04	41.57	86.0	58.4
Raw Chemical Materials and Chemical Products Industry	10.57	22.17	65.44	16.15	33.87	83.8	66.1
Medical and Pharmaceutical Products Industry	16.27	22.16	14.26	114.15	155.43	-14.1	-55.4
Rubber Products Industry	16.79	47.60	17.88	93.89	266.18	6.1	-166.2
Plastics Products Industry	11.40	24.86	15.26	74.73	162.98	25.3	-63.0
Nonmetal Mineral Products Industry	8.20	13.31	21.46	38.21	61.99	61.8	38.0
Smelting and Pressing of Ferrous Metals Industry	37.68	31.48	32.34	116.51	97.34	-16.5	2.7
Smelting and Pressing of Nonferrous Metals Industry	3.42	-11.20	30.92	11.06	-36.24	88.9	136.2
Metal Products Industry	7.46	14.68	17.61	42.37	83.36	57.6	16.6
Ordinary Machinery Industry	13.77	10.28	23.86	57.71	43.07	42.3	56.9
Special Purpose Equipment Industry	8.18	9.09	106.30	7.69	8.55	92.3	91.5
Transport Equipment Industry	9.63	29.72	65.20	14.77	45.57	85.2	54.4
Electric Equipment and Machinery Industry	4.47	21.43	24.58	18.18	87.19	81.8	12.8
Electronic and Telecommunications Equipment Industry	13.87	39.41	21.62	64.16	182.29	35.8	-82.3
Instruments, Cultural and Office Equipment Industry	4.00	10.09	29.30	13.66	34.44	86.3	65.6
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	48.12	51.48	331.61	14.51	15.53	85.5	84.5
Running Water Production and Supply Industry	9.95	42.23	12.25	81.19	344.62	18.8	-244.6
Total	15.12	24.57	38.87	38.90	63.21	61.1	36.8
Total by Weight	13.08	27.84	34.52	37.90	80.64	62.1	19.4

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 11: Nominal Labor Productivity and Relative Redundant Rate (2001)

Industry	Nominal Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)	
	Un-reformed SOEs	Reformed SOEs	Non-SOEs Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	5.06	24.70	113.27	4.47	21.81	95.5	78.2
Food Manufacturing Industry	2.43	15.18	15.05	16.15	100.88	83.9	-0.9
Beverage Manufacturing Industry	15.61	68.26	43.84	35.61	155.71	64.4	-55.7
Textile Industry	4.56	7.93	10.00	45.58	79.27	54.4	20.7
Clothing and Other Chemical Fiber Products Manufacturing Industry	8.89	4.21	17.67	50.31	23.79	49.7	76.2
Petroleum Processing and Coking Industry	24.28	72.91	141.87	17.11	51.39	82.9	48.6
Raw Chemical Materials and Chemical Products Industry	14.15	24.08	45.71	30.95	52.68	69.0	47.3
Medical and Pharmaceutical Products Industry	13.68	19.34	22.18	61.70	87.21	38.3	12.8
Rubber Products Industry	17.05	61.31	61.08	20.94	75.28	79.1	24.7
Plastics Products Industry	6.60	39.79	22.46	29.37	177.16	70.6	-77.2
Nonmetal Mineral Products Industry	8.31	3.02	27.06	30.71	11.15	69.3	88.9
Smelting and Pressing of Ferrous Metals Industry	15.53	36.38	30.93	50.22	117.59	49.8	-17.6
Smelting and Pressing of Nonferrous Metals Industry	5.95	-1.54	27.15	21.93	-5.69	78.1	105.7
Metal Products Industry	20.38	11.87	32.27	63.15	36.79	36.8	63.2
Ordinary Machinery Industry	14.51	11.09	18.71	77.52	59.24	22.5	40.8
Special Purpose Equipment Industry	13.22	11.87	64.59	20.47	18.37	79.5	81.6
Transport Equipment Industry	10.40	29.04	60.99	17.06	47.62	82.9	52.4
Electric Equipment and Machinery Industry	14.51	22.55	22.72	63.84	99.26	36.2	0.7
Electronic and Telecommunications Equipment Industry	25.17	39.77	24.79	101.53	160.42	-1.5	-60.4
Instruments, Cultural and Office Equipment Industry	8.67	14.14	27.04	32.04	52.27	68.0	47.7
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	39.91	43.88	306.65	13.02	14.31	87.0	85.7
Running Water Production and Supply Industry	11.39	35.78	10.89	104.56	328.62	-4.6	-228.6
Total	16.38	25.43	38.86	42.16	65.45	57.8	34.5
Total by Weight	15.43	29.51	34.45	44.79	85.65	55.2	14.3

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 12: Nominal Labor Productivity and Relative Redundant Rate (Three Year Average)

Industry	Nominal Labor Productivity (LPR)			Non-SOE LPR=100			Redundant Rate(%)		
	Un-reformed SOEs	Reformed SOEs	Total	Un-reformed SOEs	Reformed SOEs	Total	Un-reformed SOEs	Reformed SOEs	Total
Food Processing Industry	0.83	8.61	84.35	0.99	10.20	31.78	99.0	89.0	89.8
Food Manufacturing Industry	2.64	16.76	21.98	11.99	76.26	12.96	88.0	23.7	23.7
Beverage Manufacturing Industry	15.13	58.86	39.77	38.04	148.00	45.48	62.0	-48.0	-48.0
Textile Industry	5.98	8.94	7.58	78.89	118.05	7.52	21.1	-18.0	-18.0
Clothing and Other Chemical Fiber Products Manufacturing Industry	11.49	3.75	17.76	64.67	21.10	13.34	35.3	78.9	78.9
Petroleum Processing and Coking Industry	25.89	61.18	153.25	16.90	39.92	102.81	83.1	60.1	60.1
Raw Chemical Materials and Chemical Products Industry	12.42	33.02	43.93	28.28	75.17	31.13	71.7	24.8	24.8
Medical and Pharmaceutical Products Industry	14.05	21.08	17.56	80.04	120.06	18.11	20.0	-20.1	-20.1
Rubber Products Industry	16.31	48.75	30.91	52.76	157.70	29.29	47.2	-57.7	-57.7
Plastics Products Industry	9.13	27.13	19.62	46.52	138.29	20.37	53.5	-38.3	-38.3
Nonmetal Mineral Products Industry	8.61	6.54	20.43	42.14	32.03	13.46	57.9	68.0	68.0
Smelting and Pressing of Ferrous Metals Industry	22.70	33.26	29.74	76.32	111.82	31.53	23.7	-11.8	-11.8
Smelting and Pressing of Nonferrous Metals Industry	4.82	-5.55	28.00	17.21	-19.82	15.71	82.8	119.8	119.8
Metal Products Industry	12.70	13.57	21.20	59.90	64.04	18.59	40.1	36.0	36.0
Ordinary Machinery Industry	11.94	11.01	20.06	59.51	54.89	13.86	40.5	45.1	45.1
Special Purpose Equipment Industry	8.66	9.94	82.42	10.51	12.05	19.06	89.5	87.9	87.9
Transport Equipment Industry	9.51	29.21	52.87	17.99	55.26	25.67	82.0	44.7	44.7
Electric Equipment and Machinery Industry	9.46	21.51	26.71	35.40	80.53	19.37	64.6	19.5	19.5
Electronic and Telecommunications Equipment Industry	15.77	38.93	22.88	68.92	170.12	25.35	31.1	-70.1	-70.1
Instruments, Cultural and Office Equipment Industry	6.17	11.70	27.02	22.85	43.30	18.98	77.2	56.7	56.7
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	43.14	47.50	433.66	9.95	10.95	59.22	90.1	89.0	89.0
Running Water Production and Supply Industry	10.39	30.63	9.86	105.35	310.55	12.85	-5.3	-210.5	-210.5
Total	14.61	24.37	36.90	39.59	66.05	25.37	60.4	34.0	34.0
Total by Weight	13.44	28.45	32.65	41.16	87.13	27.20	58.8	12.9	12.9

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 13: Real Labor Productivity and Relative Redundant Rate (1999)

Industry	Real Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)	
	Un-reformed SOEs	Reformed SOEs	Non-SOEs Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	3.79	28.84	52.74	7.18	54.69	92.8	45.3
Food Manufacturing Industry	3.22	6.90	117.49	2.74	5.87	97.3	94.1
Beverage Manufacturing Industry	5.31	16.90	21.12	25.17	80.02	74.8	20.0
Textile Industry	5.21	6.72	12.61	41.32	53.31	58.7	46.7
Clothing and Other Chemical Fiber Products Manufacturing Industry	4.45	0.94	43.11	10.32	2.18	89.7	97.8
Petroleum Processing and Coking Industry	57.64	31.72	133.49	43.18	23.76	56.8	76.2
Raw Chemical Materials and Chemical Products Industry	7.94	23.21	38.85	20.45	59.76	79.5	40.2
Medical and Pharmaceutical Products Industry	9.39	6.36	18.93	49.60	33.58	50.4	66.4
Rubber Products Industry	7.09	10.86	32.18	22.04	33.76	78.0	66.2
Plastics Products Industry	5.08	12.34	28.37	17.91	43.52	82.1	56.5
Nonmetal Mineral Products Industry	3.34	6.23	16.73	19.98	37.25	80.0	62.8
Smelting and Pressing of Ferrous Metals Industry	13.56	20.48	38.26	35.44	53.52	64.6	46.5
Smelting and Pressing of Nonferrous Metals Industry	6.52	5.18	62.33	10.46	8.30	89.5	91.7
Metal Products Industry	9.21	6.54	17.83	51.65	36.69	48.3	63.3
Ordinary Machinery Industry	6.91	4.34	11.59	59.61	37.49	40.4	62.5
Special Purpose Equipment Industry	4.29	3.76	30.74	13.95	12.25	86.1	87.8
Transport Equipment Industry	6.44	14.43	45.16	14.26	31.95	85.7	68.0
Electric Equipment and Machinery Industry	14.70	9.34	24.80	59.28	37.66	40.7	62.3
Electronic and Telecommunications Equipment Industry	7.86	23.59	35.00	22.46	67.39	77.5	32.6
Instruments, Cultural and Office Equipment Industry	1.70	3.37	14.30	11.87	23.54	88.1	76.5
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	14.57	9.89	253.12	5.76	3.91	94.2	96.1
Running Water Production and Supply Industry	3.21	5.15	6.08	52.79	84.68	47.2	15.3
Total	8.08	12.03	38.37	21.07	31.36	78.9	68.6
Total by Weight	8.89	14.76	30.23	29.40	48.81	70.6	51.2

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 14: Real Labor Productivity and Relative Redundant Rate (2000)

Industry	Real Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)	
	Un-reformed SOEs	Reformed SOEs	Non-SOEs Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	9.50	37.67	30.89	30.76	121.95	69.2	-22.0
Food Manufacturing Industry	4.98	10.52	170.27	2.93	6.18	97.1	93.8
Beverage Manufacturing Industry	7.08	18.79	21.20	33.41	88.63	66.6	11.4
Textile Industry	8.21	8.37	10.28	79.88	81.48	20.1	18.5
Clothing and Other Chemical Fiber Products Manufacturing Industry	10.79	1.66	47.23	22.86	3.52	77.1	96.5
Petroleum Processing and Coking Industry	117.86	45.42	112.43	104.83	40.39	-4.8	59.6
Raw Chemical Materials and Chemical Products Industry	8.57	14.05	54.89	15.61	25.59	84.4	74.4
Medical and Pharmaceutical Products Industry	17.96	10.03	18.98	94.63	52.86	5.4	47.1
Rubber Products Industry	10.16	14.48	19.11	53.18	75.78	46.8	24.2
Plastics Products Industry	10.52	18.56	18.53	56.77	100.17	43.2	-0.2
Nonmetal Mineral Products Industry	4.15	8.06	13.30	31.20	60.60	68.8	39.4
Smelting and Pressing of Ferrous Metals Industry	37.73	23.18	33.66	112.09	68.87	-12.1	31.1
Smelting and Pressing of Nonferrous Metals Industry	10.03	7.00	47.42	21.14	14.77	78.9	85.2
Metal Products Industry	9.68	9.11	17.16	56.39	53.09	43.6	46.9
Ordinary Machinery Industry	11.24	5.46	10.80	104.09	50.58	-4.1	49.4
Special Purpose Equipment Industry	7.66	5.03	24.45	31.34	20.56	68.7	79.4
Transport Equipment Industry	9.64	19.29	47.68	20.21	40.44	79.8	59.6
Electric Equipment and Machinery Industry	13.67	14.48	18.09	75.59	80.03	24.4	20.0
Electronic and Telecommunications Equipment Industry	12.12	30.40	29.29	41.39	103.78	58.6	-3.8
Instruments, Cultural and Office Equipment Industry	2.29	4.90	12.26	18.70	39.98	81.3	60.0
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	19.51	12.01	180.84	10.79	6.64	89.2	93.4
Running Water Production and Supply Industry	3.85	16.16	7.74	49.75	208.85	50.2	-108.9
Total	11.86	14.60	36.77	32.24	39.69	67.8	60.3
Total by Weight	11.53	17.60	28.44	40.56	61.89	59.4	38.1

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 15: Real Labor Productivity and Relative Redundant Rate (2001)

Industry	Real Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)		
	Un-reformed SOEs	Reformed SOEs	Non-SOEs	Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	8.60	61.31	54.58	42.74	15.76	112.32	84.2	-12.3
Food Manufacturing Industry	3.70	19.89	328.71	148.93	1.12	6.05	98.9	94.0
Beverage Manufacturing Industry	5.13	35.87	21.45	25.47	23.93	167.23	76.1	-67.2
Textile Industry	6.77	12.99	13.92	12.02	48.67	93.34	51.3	6.7
Clothing and Other Chemical Fiber Products Manufacturing Industry	4.57	2.13	76.09	45.09	6.00	2.79	94.0	97.2
Petroleum Processing and Coking Industry	97.80	65.76	142.59	108.18	68.59	46.12	31.4	53.9
Raw Chemical Materials and Chemical Products Industry	7.57	20.57	61.25	31.23	12.36	33.58	87.6	66.4
Medical and Pharmaceutical Products Industry	17.01	27.22	21.42	21.80	79.40	127.08	20.6	-27.1
Rubber Products Industry	8.09	26.55	24.10	18.04	33.59	110.18	66.4	-10.2
Plastics Products Industry	6.95	29.75	26.30	24.22	26.43	113.10	73.6	-13.1
Nonmetal Mineral Products Industry	3.33	11.94	18.08	14.02	18.43	66.04	81.6	34.0
Smelting and Pressing of Ferrous Metals Industry	21.49	48.81	39.84	44.56	53.94	122.52	46.1	-22.5
Smelting and Pressing of Nonferrous Metals Industry	5.97	19.06	45.16	29.09	13.23	42.20	86.8	57.8
Metal Products Industry	10.71	11.68	25.77	21.67	41.57	45.32	58.4	54.7
Ordinary Machinery Industry	9.57	9.11	12.28	10.14	77.96	74.17	22.0	25.8
Special Purpose Equipment Industry	8.08	8.95	24.50	11.31	32.97	36.54	67.0	63.5
Transport Equipment Industry	7.42	26.54	57.03	25.37	13.02	46.54	87.0	53.5
Electric Equipment and Machinery Industry	15.07	24.60	23.33	21.81	64.59	105.42	35.4	-5.4
Electronic and Telecommunications Equipment Industry	9.85	48.86	37.10	30.36	26.56	131.73	73.4	-31.7
Instruments, Cultural and Office Equipment Industry	2.68	8.17	13.59	9.96	19.74	60.09	80.3	39.9
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	14.14	17.50	222.39	30.22	6.36	7.87	93.6	92.1
Running Water Production and Supply Industry	2.73	21.84	8.53	5.85	32.04	255.95	68.0	-156.0
Total	9.71	24.66	51.33	29.10	18.92	48.05	81.1	51.9
Total by Weight	9.86	30.98	37.23	28.89	26.47	83.19	73.5	16.8

Note : Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR

Appendix Table 16: Real Labor Productivity and Relative Redundant Rate (Three Year Average)

Industry	Real Labor Productivity (LPR)			Non-SOE LPR=100		Redundant Rate(%)	
	Un-reformed SOEs	Reformed SOEs	Total	Un-reformed SOEs	Reformed SOEs	Un-reformed SOEs	Reformed SOEs
Food Processing Industry	7.30	42.61	46.07	15.84	92.48	84.2	7.5
Food Manufacturing Industry	3.97	11.76	211.98	1.87	5.55	98.1	94.5
Beverage Manufacturing Industry	5.84	23.33	21.26	27.48	109.71	72.5	-9.7
Textile Industry	6.73	9.36	12.27	54.87	76.32	45.1	23.7
Clothing and Other Chemical Fiber Products Manufacturing Industry	6.60	1.58	55.48	11.90	2.84	88.1	97.2
Petroleum Processing and Coking Industry	91.10	47.63	129.50	70.35	36.78	29.7	63.2
Raw Chemical Materials and Chemical Products Industry	8.03	19.39	52.06	15.42	37.25	84.6	62.8
Medical and Pharmaceutical Products Industry	14.79	12.00	20.32	72.75	59.04	27.2	41.0
Rubber Products Industry	8.45	17.30	25.13	33.62	68.84	66.4	31.2
Plastics Products Industry	7.52	20.22	24.40	30.81	82.86	69.2	17.1
Nonmetal Mineral Products Industry	3.61	8.74	16.04	22.50	54.52	77.5	45.5
Smelting and Pressing of Ferrous Metals Industry	24.26	30.82	37.25	65.12	82.74	34.9	17.3
Smelting and Pressing of Nonferrous Metals Industry	7.51	10.41	51.64	14.54	20.17	85.5	79.8
Metal Products Industry	9.87	8.88	20.45	48.25	43.41	51.8	56.6
Ordinary Machinery Industry	9.20	6.34	11.56	79.60	54.90	20.4	45.1
Special Purpose Equipment Industry	6.68	5.90	26.71	24.99	22.07	75.0	77.9
Transport Equipment Industry	7.83	19.88	50.33	15.56	39.51	84.4	60.5
Electric Equipment and Machinery Industry	14.46	16.14	22.13	65.34	72.92	34.7	27.1
Electronic and Telecommunications Equipment Industry	9.83	35.05	33.79	29.08	103.70	70.9	-3.7
Instruments, Cultural and Office Equipment Industry	2.22	5.48	13.38	16.62	40.93	83.4	59.1
Production and Supply of Electric Power, Steam and Supply of Electric Power, Steam and Water Industry	16.08	13.13	218.79	7.35	6.00	92.7	94.0
Running Water Production and Supply Industry	3.27	14.38	7.45	43.82	193.03	56.2	-93.0
Total	9.87	17.00	42.36	23.30	40.14	76.7	59.9
Total by Weight	10.12	21.03	32.11	31.53	65.51	68.5	34.5

Note: Redundant Rate=100* (Non-SOEs LPR-Unreformed SOEs or Reformed SOEs LPR)/Non-SOEs LPR