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AND MORAL HAZARD
IN CHINESE ENTERPRISES**

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**The Coincidence of Material Incentives and Moral Hazard
in Chinese Enterprises**

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ABSTRACT

Recent empirical studies at the firm level have found a robust relationship between strengthened incentives and improved performance in Chinese industrial state-owned enterprises (SOEs) since the advent of reform. This positive microeconomic assessment contrasts sharply with the deteriorating conditions of China's SOEs in the aggregate. This paper presents new micro evidence that shows a coincidence of improvement in the effectiveness of material incentives and a worsening of moral hazard, where SOE insiders can make small gains at a large cost to the firm or to the economy. Our findings suggest that Chinese SOE reforms that have centered on the use of incentive contracts have been successful in motivating managers and employees to make and keep profits, but they have failed in preventing these insiders from passing losses and liabilities to the State. In other words there has been "privatization of assets and socialization of liabilities." If this asymmetry of incentives and consequences is left unchecked--for example, without formal ownership changes, introduction of effective internal governance mechanisms and strengthened external discipline through inter-firm competition and commercially-base creditor relationships--the rising losses and liabilities in China's state sector pose a serious threat to the country's banking system and macroeconomic stability.

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I. Introduction

Since the advent of reform in 1978 the improved performance of Chinese industrial state-owned enterprises (SOEs) has been well documented at the *microeconomic* level. Chen et al (1988) were among the earliest to find that reforms induced SOE positive total factor productivity growth (after excluding non-industrial capital in the input data). Dollar (1990) found that SOE allocative efficiency increased during the early period of reform for a sample of 20 firms. Xiao's (1991) analysis at the city level for 1985-87 revealed increased total factor productivity for SOEs, although total factor productivity in collective enterprises was found to have increased much faster. Jefferson et al (1992), also using city-level data, found a degree of convergence in the growth of total factor productivity of SOEs and collective enterprises. Based on a broad firm-level survey Groves et al (1994 and 1995), Gordon and Li (1991) and McMillan and Naughton (1992) found that, over the 1980-89 period, the use of various market incentives resulted in enhanced SOE productivity. However, some of the findings on improved productivity in SOEs have been challenged by Woo et al (1994). Sachs and Woo (1997) give a comprehensive review on the SOE productivity debate.

The *macroeconomic* data, however, paint a bleak picture of Chinese SOEs. Although as a group SOEs report operating profits, such profits have declined to an average of 1 percent of GDP in recent years (compared to at least 6 percent in the late 1980s), and the trend continues to be downward. In the third quarter of 1996 SOE profits were only one-fourth of their level the previous year. An increasing proportion of SOEs are losing money. In 1996 approximately 50 percent of SOEs incurred net losses--up from one-third just two years earlier--amounting to 1.3 percent of GDP.¹ The financial performance of SOEs is also generally lower than that of the non-state sector. In 1995 the average rate of return on assets for industrial SOEs was 6 percent; in contrast for collectives it was 8.4 percent, and for foreign funded firms it was 9.9 percent. In addition, a significant portion of SOE production capacity is lying idle. The recent industrial census reveals that for almost half of the 900 major industrial products surveyed, factory capacity utilization rates average below 60 percent. In addition to the fall in return on assets, the SOE share of China's industrial output and share of contribution to government revenue have also been declining rapidly (Table 1). Due to heavy investment, SOE labor productivity has indeed risen after reform, but the increase in real wages has been almost as fast as the increase in labor productivity (Figure 1). The SOE shares of employment, bank loans, and total assets have declined (Figure 2), but at a slower rate than output and government revenue shares.

Yet China's SOEs continue to absorb more than three-fourths of the country's domestic credit, and their borrowing comprises about 60 percent of the country's total nonfinancial public sector deficit (Figure 3). Taken together, this crowds out investment by nonstate firms, which have been the engines of China's rapid growth. It also produces a situation that undermines an already weak state-dominated banking system, where capital-asset ratios are low and declining. Indeed, if, as the government estimates, the banks' non-performing assets are equivalent to 20 percent of portfolios, the net worth of these banks is already negative. The use of bank loans to finance loss-making SOEs is a key factor in explaining recent inflation, currency depreciation, and rising domestic and foreign national debt.²

In this paper we argue that the apparent contradiction between the micro and macro assessments of China's SOEs can be resolved by examining material incentives and moral hazard within these firms. Our basic premise is that material incentives to managers and employees as provided through performance contracts have enhanced firm productivity and profitability. However, they also have hindered firm performance when conditions for moral hazard--where employees can make small gains at a large cost to the firm--have been present. We develop a set of hypotheses that are tested using

¹ Whereas the "large" SOEs are, on average, profitable, earning a 10 percent rate of return on assets in 1995, "medium" and "small" SOEs suffered negative rates of return on assets of -1 percent and -2 percent, respectively.

² See, for example, World Bank (1996).

accounting data through estimations of structural and reduced form equations characterizing firm performance and labor compensation. The valid sample covers 1200 (SOEs) and 40 urban collectives for 1980 and 1985, 40 SOEs for 1990 to 1994, and 1000 township and village enterprises (TVEs) for 1992; see Annex A.

We find that in the early period of China's reform, an enterprise with a higher level of in-kind labor compensation was likely to have a lower level of productivity and profitability; in recent years, this negative effect has weakened significantly, suggesting that reforms have strengthened the productive use of material incentives in Chinese enterprises. But the data also show that throughout the reform period, labor compensation in SOEs and urban collectives was linked *positively* with *poorly defined* and easily manipulable firm performance measures (such as profit per labor and return on industrial fixed capital), but *negatively* correlated with *properly defined* performance measures (such as labor productivity and capital productivity), suggesting a moral hazard problem. The moral hazard problem has deteriorated in recent years in SOEs but is only mild in TVEs.

These findings shed additional light on China's reform experiences and suggest directions for new policies. They demonstrate that enterprise reforms based on performance contracts have been successful in motivating SOE managers and employees to make and keep profits. But the reforms have also created opportunities for SOE "insiders" to pass enterprise losses and liabilities to the State. The "privatization" of profits and assets and "socialization" of losses and liabilities has forced the government to finance the deficit through credit creation, leading to inflation, debt, and a state banking system perilously weak. The most effective remedy for these problems is the privatization of SOEs so that the losses and liabilities, presently accumulated and concentrated in the state sector, could be properly diversified and voluntarily assumed by individuals and private firms holding the corresponding profits and assets.

II. A Testable Theory of State Ownership of Enterprises

China's fundamental approach to reform of SOEs is to maintain state ownership of the key industrial³ enterprises but improve their performance by establishing market-oriented incentives through a combination of internal and external measures. This strategy is unlike most other countries in transition to market economic systems, which have turned to systemic privatization of SOEs. By contrast, of the 118,000 Chinese industrial SOEs, relatively few (between 2 and 5 percent) have been divested to the private sector, and these virtually all have been "small" firms. Thus in China, the State, or its agents, are carrying out "shareholder" functions otherwise being performed by private owners in market economic systems.⁴

China's reforms in state shareholding have been wide-ranging. They have included use of incentive contracting, giving SOE managers greater autonomy, SOE ownership diversification, and "corporatization" of SOEs under a new Company Law. Underlying these experiments has been the decentralization of governmental authority over SOEs, with all but about 2-3,000 of the 118,000 SOEs

³ The number of industrial firms in China (as of year-end 1995) is 7.34 million. The industrial sector is comprised of 118,000 SOEs, 1.48 million urban collectives and suburban and rural township and village enterprises, 5.7 million "individually owned" firms (with no more than seven employees), and 60,300 "other" firms (includes private firms with more than seven employees, joint ventures and fully foreign funded businesses). In 1995 SOEs accounted for 34 percent of the gross value of industrial output (GVIO); the GVIO share for collectives and TVEs was 37 percent, for individually owned it was 13 percent, and for "others" it was 17 percent. Although most collectives and TVEs are public enterprises, there are significant differences between these firms and SOEs in terms of property rights and other features; see Broadman (1995).

⁴ See World Bank (1997). Of the 118,000 industrial SOEs, 87,905 are classified by Chinese authorities as "independent accounting systems". These are the industrial SOEs on which Chinese statistical authorities systematically gather data, and they account for about 70 percent of China's industrial fixed assets. It is within this subset of industrial SOEs that Chinese statistical authorities define (on the basis of assets and employees) size categories: there are 15,668 "large and medium" industrial SOEs and 72,237 "small" industrial SOEs. The "large and medium" industrial SOEs account for about 80 percent of SOE industrial output.

placed under the supervision of *local* governments rather than under the *central* authorities in Beijing. Most recently, a multitiered organizational network of "state asset management bureaus", "state asset operating companies" and "state asset supervisory committees" has begun to emerge.⁵ At the same time, large-scale national enterprise groups, entrusted to manage directly state assets, are being established. These various entities are to be the "independent" representatives of the State as owner of SOEs, as sector line bureaus and ministries, which have been the traditional hallmarks of the planned economy, are either phased out or limited to carry out "trade association" or nonownership, governmental regulatory functions.

A fulcrum of China's strategy of the State carrying out shareholding functions has been the Contract Responsibility System, which uses contracts arranged between government supervisory agencies and the managers of SOEs. The CRS, which has covered 90 percent of SOEs since its inception in 1988, has employed five types of contracts: (a) "general quota responsibility contracts" for all types of enterprises [principally ceding to managers (and sometimes the entire workforce) control over enterprise operations, including retention of excess profits, in return for meeting profit remittance targets]; (b) "leasing contracts" for collectives and small SOEs (tying leasing fees paid by managers to various measures of enterprise performance); (c) "management responsibility contracts" for large and medium-size SOEs (tying management teams' autonomy, pay and excess profit retention to the meeting of profit and tax remittance targets); (d) "enterprise management responsibility contracts" for large and medium-size SOEs [similar to (c) but covering enterprise directors (and sometimes workers)]; and (e) "asset management responsibility contracts" for small and medium-size SOEs (tying directors' and managers' autonomy, pay and retention of excess profits to enhancement of enterprise asset value). The two most common contract forms have been (c) and (d).

The CRS approach emphasizes material incentives through various links between performance and pay for the managers and workers but overlooks the problems of moral hazard, where the managers and workers could make a small gain at a large costs to the enterprises or the economy. When the economy is booming and the enterprises are making profits, managers, workers, and the government all share in the gains. Any increased cost due to moral hazard could be easily hidden under their balance sheets when the access to state bank loans is easy during the boom. However, when state banks start to tighten credit to reduce inflation, the cost of moral hazard at SOEs shows up as enterprise losses, bad loans at the state banks, inter-firm debts, lay-offs, bankruptcy, and political instability.

No individual officials, managers, or workers would be able or willing to assume the responsibility for the loss of asset values at the SOEs. The government could fire and even punish financially the managers and workers. However, that would not recover the accumulated stock of losses since none of the individual managers and workers owns any significant private property that could be used as a hostage or a collateral for the right to use and manage the state-owned assets under the Responsibility Contract. In most cases, the punishment would not be reduced bank credit and it would be difficult to implement. Even if credible and implemented, it is difficult to imagine that it would be as large as the private gains the managers and workers could derive from (mis-) managing the state's assets--before or after the punishment. The State with its ownership of enterprise assets would be the only party that would be able and willing to assume the accumulated stock of losses and liabilities. In short, the Responsibility Contracts give the managers and workers incentives to make and keep profits but they are not able to prevent them to pass over accumulated stock of losses and liabilities to the State.

The moral hazard problem is due to a lack of private owners for an enterprise's assets. If an enterprise is owned by private owners and it becomes commercially unviable, the accumulated stock of losses would have to be assumed either by these owners when the losses are smaller than the value of the assets they own, or by the owners and debtors of the enterprise when the losses exceed the value of the

⁵ See World Bank (1997).

enterprise's assets. As long as the government does not bail out the bankrupt enterprise, the private owners and debtors have to absorb the full losses of the enterprise. Not able to avoid the accumulated losses or liabilities⁶, the private owners and debtors would have full incentives to monitor the managers and workers. To encourage effective monitoring, the private owners are given the residual profits derived from the assets they own. This notion derives from the classical theory of the privately owned firm advanced by Alchian and Demsetz (1972).

Of course when an SOE becomes commercially unviable, the State as the owner also has to assume the losses and liabilities. As a result, the State also has strong incentives to monitor the managers and workers. However, unlike the private owners, whose capacity to assume losses and liabilities is limited by the amount of assets they own, the State's capacity to assume losses and liabilities is not limited by the amount of state-owned assets. The State itself would not be subject to bankruptcy unless it is overthrown politically. The State's ability to assume unlimited liabilities⁷ before it is overthrown politically weakens greatly its incentive to monitor the managers and workers at SOEs and the state-owned banks.

Moreover, the State as an owner is fundamentally different from individual private owners with diffused shares in a corporation. To be sure, diffused private owners have much weaker incentives to monitor managers than do concentrated owners, but they assume the full cost of their absence in monitoring with their limited share value. The State, when absent or ineffective in monitoring the managers, assumes the losses and liabilities not with its limited share value but with its power and willingness to tax, to print money, to borrow domestically and externally and to sell the resources it owns. (see Sheng and Xiao 1995).

For the same reason, the relationship between the State and SOE managers is different from that between a private owner and his/her manager-agents. The problem of state-owned enterprises is not merely an efficiency problem for each individual enterprise. It is a system-wide problem for the economy. In particular, individual cases of successful state-owned enterprises and state-run sectors would not prevent an economy dominated by state-owned enterprises from generating hard state liabilities (Xiao 1997).⁸

Testable Hypotheses

Our theory of the performance of Chinese SOEs is based on the asymmetry between the privatization of profits and assets and the socialization of losses and liabilities. It provides an alternative to other theories, such as those based on the entry of nonstate enterprises (Naughton 1995 and McMillan and Naughton 1992) or on principal-agent issues (Groves etc. 1994 and 1995).

⁶ Sometimes this rigorous enforcement of liability rules under a private property economy is described as a hard budget constraint. However, individuals and firms could in principle borrow as much as they want as long as they are able and willing to observe the liability rules specified in the borrowing contract.

⁷ Sometimes this unlimited liabilities is described as a soft budget constraint, especially in socialist economies. However, if the constraint is only in the budget, the government could, in principle, just tighten the budget. The fact that it is not easy to do that implies that the real constraint is not in the budget. Instead, the hard constraint lies in the government's inability and unwillingness to avoid state liabilities, such as through guaranteeing the solvency of state banks and state enterprises, providing social security and other government services.

⁸ On the other hand, in a private economy with no state-owned enterprises, the government could also assume increasing hard state liabilities through generous social security benefits etc. The resulting state asset-liability imbalance is similar to the situation in a socialist economy with dominant state-owned enterprises. However, one crucial difference between the two is that the productivity in the private economy would be much higher than in a socialist economy since private firms would not incur the cost of moral hazard due to state ownership.

The various reforms with which China has experimented on its SOEs provide us an opportunity to test this theory of state ownership of enterprises. Two broad testable hypotheses can be derived from the theory:

Hypothesis I. Privatization of Profits (Material Incentives): Managers and workers in SOEs use their autonomy obtained under the Responsibility Contract System to make and keep profits. Their pay in wages and in-kind benefits are closely linked to the performance measures specified in the contracts, although those performance measures, such as profits, can be easily manipulated by these insiders. The higher the wages and in-kind benefits, the better the performance of the firm.

Hypothesis II. Socialization of Losses and Liabilities (Moral Hazard): Due to weak monitoring by the State and easy access to loans from state-owned banks, the performance of SOEs, as measured by return on total assets, deteriorates under the Responsibility Contract System. Wages and in-kind benefits may not be closely linked to return on total assets; in particular, in-kind benefits, which are more difficult to monitor than wages, are likely to be correlated negatively with return on total assets but positively with capital and profits per labor. The fall in return on total assets leads to "bad" loans in state banks and/or socialization of SOE losses and liabilities.

III. Empirical Framework

Model Specification

To explore the interactions between enterprise performance and labor compensation in Chinese enterprises we estimate *structural equations* for enterprise performance and labor compensations as well as *reduced form* equations for labor compensation. (Detailed description of our model specification and variable definitions is in Appendix B.)

We use four different measures of enterprise performance (MEP) and three different measures of labor compensation (MLC).

Measures of Enterprise Performance

Labor Productivity [Ln(Y/L)]: Labor productivity is obtained from dividing gross output by number of employees. It is a relatively robust indicator of firm performance since it is subject to few measurement problems. But its weakness is that it does not take into account the input of capital and other assets used in production.

Profits and Taxes per Labor [F/L]: Profits and taxes per labor is an important indicator of firm performance since the Responsibility Contracts use profits as one of the key contractual terms. Moreover, profits per labor indicate the potential claims managers and workers can seek within the firm. However, profits in China are subject to various manipulations by insiders—through accounting practices; see Xiao (1995). Indeed the major problem is that the Contract Responsibility System is inconsistent with the standard accounting framework. The profits and taxes used in the contracts are usually different from the profits and taxes reported in the enterprises' standard financial accounts. Moreover, the distinction between taxes and profits is not very clear in the contracts. Worse still, up until recently tax payments made by SOEs have been a matter of negotiation with the government. In this study, we use profits and taxes as shown in the financial accounts of the enterprises.

Return on Total Assets [RA]: Return on total assets is obtained from dividing profits by the sum of gross value of industrial fixed assets, gross value of non-industrial fixed assets, and working capital. This variable is a good measure of the enterprise owner's claim on profits. Of course since reported profits are subject to manipulation, the return on total assets also has serious measurement problems.

Given the problems in measuring profits, return on total assets is thus used as a complement to profits and taxes per labor.

Return on Industrial Fixed Assets [RK]: Return on industrial fixed assets is obtained from dividing profits by the gross value of industrial capital. This may be a good variable for calculating the return on industrial investment, but it, too, is subject to manipulation since it is not unusual for firms to finance fixed capital investment through working capital loans. But it is not a proper measure of the enterprise owner's claims since non-industrial fixed capital and working capital are important inputs by the owner.

Measures of Labor Compensation

Average Wage [W]: The average wage is obtained from dividing the sum of total wages and bonuses by number of employees. This is only the cash compensation to managers and workers and is usually monitored closely by the government through the state banks. During the early years of reform wages and bonuses were controlled very tightly by the government. Gradually enterprises have gained greater autonomy in setting wage differentials among employees. However, the total wage bill is usually linked to profits through complicated formulas specified in the responsibility contracts.

Inkind Fringe Benefits Capital per Labor [Ln(FBK/L)]: This is obtained from dividing the gross value of non-industrial fixed capital by number of employees. It is the only variable available to proxy inkind labor compensation. Most of an SOE's non-industrial fixed capital is residential housing and facilities for medical care, schooling of dependents, and entertainment.⁹ Ideally, we should use the flow value of inkind services as the measure of inkind labor compensation. Hence, in addition to the rental value of the non-industrial fixed capital, the cost of manpower and materials for non-industrial activities would also count as part of the inkind compensation to employees. Unable to measure directly the flow value of inkind benefits, we assume that the non-industrial fixed capital is roughly proportional to this flow value; thus it is the proxy we use in our analysis.

Total Labor Compensation [Ln(W + FBK/L)]: This is just a simple average of wage and fringe benefits capital per labor.

Estimation Procedure

In the enterprise performance structural equation (1) in Appendix B, enterprise performance is a function of the size of the enterprise measured by employment, the capital intensity (industrial fixed capital per labor), the capital structure (the ratio of working capital to industrial fixed capital), wage, and inkind compensation. In the labor compensation structural equation (2) in Appendix B, labor compensation is a function of labor productivity, profits per labor, return on total assets, and return on industrial fixed assets. In the labor compensation reduced form equation (3) in Appendix B, labor compensation is a function of the size of the enterprise measured by employment, the capital intensity, and the capital structure.

Since enterprise performance and labor compensation are correlated, we use the two stage least squares method (2SLS) to estimate equations (1) and (2).¹⁰ The regressions in this study use pooled cross-sectional data from three separate surveys at different years (see Annex A). Also, all the variables

⁹ See Broadman (1996).

¹⁰ The instrumental variables used to estimate the first stage endogenous variables are listed in the notes to the tables which contain the regression results. The seven structural equations are just identified as a system of equations although some instrumental variables are highly correlated. The 2SLS results differ significantly from the least square results (not reported here).

are in current prices. The fixed capital variables are in gross value (no depreciation). Because of these problems, the absolute levels of each variable used in the regressions are not comparable across subsamples. To deal with this problem, all regressions include subsample dummy variables which distinguish different surveys, different ownership forms, and different years. The coefficients for these subsample dummies are not reported since they are not directly comparable. Also included in the regressions are the province dummies to take account of the large differences in enterprise performance and labor compensation across regions.

For all variables used in regressions, we exclude observations of outliers. The outliers are determined by plotting the distribution of the pooled sample for each variable and identifying an interval within which the observations have approximately normal distributions. Observations outside of the interval are defined here as outliers and are not used in regression. This method of excluding outliers reduced our sample significantly but increase the robustness of our results. The outlier observations may represent data entry problems or real economic problems such as a huge profits or losses, too small or too large enterprises, etc.

IV. Empirical Evidence

Descriptive Statistics: Performance of Sample SOEs vs. Sample Nonstate Firms, and SOEs Overall

Tables 2 contains descriptive statistics for our sample of SOEs and nonstate firms--both urban collectives and rural collectives, or township and village enterprises (TVEs). On average the SOEs are much more capital intensive than their nonstate counterparts, measured by either industrial fixed capital per worker or working capital per labor, and this capital intensity has increased over the reform period. Average wages and (especially) inkind benefits paid by SOEs are generally higher relative to those paid by urban collectives, but much higher than those paid by TVEs. Wages and especially inkind benefits increased much more than labor productivity in SOEs.

Although SOEs display about the same level of labor productivity as do urban collectives, SOE labor productivity is much higher than that of TVEs--due to SOEs' high capital intensity. Profit per labor in SOEs is also about the same as in urban collectives, but is lower than in TVEs. But in terms of return on total assets and return on industrial fixed capital, SOE performance is below that of both types of nonstate firms.

Table 3 shows how the performance of the SOEs in our sample has varied over 1980-1994 relative to the general population of SOEs in China. The rise in average wages and labor productivity in our sample is more moderated than that of the typical Chinese SOE; in general the level of wage payments made by the sample SOEs is below that of SOEs overall, but there is not much difference in the levels of labor productivity.

The sample SOEs are much less profitable than SOEs overall, whether measured in terms of return on total assets or return on fixed capital. Both groups have experienced a similar decline in these returns over time.

Regression Results

Table 4 contains the regression results for the determinants of enterprise performance, and reveals that the model yields intuitive results and provides support for Hypothesis 1. In particular, the data show that an increase in *firm size* (as measured by number of workers), leads to lower labor productivity, profits per labor, and return on fixed capital. They also show that the higher the firm's *capital intensity*, the higher its labor productivity and profit per labor, but the lower its return on both industrial fixed capital and total assets.

The strength of the material incentive hypothesis is borne out by the fact that the data show that the more *working capital* there is relative to industrial fixed capital, the higher is the firm's labor productivity, profits per labor and return on industrial fixed capital, but the lower is the firm's return on total assets. On the other hand, the data show that the higher the *inkind labor compensation*, the lower the firm's labor productivity, profits per labor, return on total assets, and return on fixed assets. But the negative effect of inkind labor compensation on firm performance in SOEs weakened mildly in 1985 and significantly during 1990-1994. Moreover, the negative effect of inkind labor compensation on firm performance in TVEs is much weaker than in SOEs.

Wage compensation had little effect on labor productivity, profits per labor, and return on total assets, although it had a positive effect on return on industrial fixed capital. While the effect of wage compensation on labor productivity became positive during 1990-1994 for SOEs, the effect of wage compensation on profits per labor at SOEs became more negative during 1990-1994. During 1990-1994, wage compensation at SOEs had little effect on industrial fixed capital return and total assets return. Compared to SOEs, TVEs had a stronger positive effect of wage compensation on labor productivity and negative effect of wages on profits per labor, return on total assets and return on industrial fixed capital.

Table 5 shows the regressions for the determinants of labor compensation, and suggest the strength of Hypothesis II. *Inkind compensation* is linked positively with profits per labor and return on industrial fixed capital, but is linked negatively with labor productivity and return on total assets. For SOEs, these linkages, which existed at the beginning of reform, strengthened significantly during 1990-1994. Equally important, these linkages are generally more significant for urban collectives and TVEs than for SOEs.

Wage compensation is linked negatively with profits per labor and return on industrial fixed capital but positively with labor productivity and return on total assets. For SOEs, these linkages, which existed at the beginning of reform, weakened significantly during 1990-1994. Equally important, these linkages are generally more significant for TVEs than for SOEs.

Finally, Table 6 shows that with increases in firm size (as measured by employment) or capital intensity (as measured by industrial fixed capital per labor), labor compensation in wages and inkind benefits rises. For SOEs, the data show that the effect of capital intensity on wages, which existed at the beginning of reform, strengthened during 1990-1994.

The ratio of working capital to labor had little effect on labor compensation in wage and in inkind benefits, although in recent years the higher this type of capital intensity, the lower the wage in SOEs and the higher the wage in TVEs

V. Conclusion

China's experiments in improving the incentives SOEs face reflect a serious commitment to reform. Indeed many of these experiments have been ingenious. But while some of them have been helpful, few have directly tackled the fundamental issues of SOE reform with which virtually all other transition economies wrestle--namely bona fide separation of the enterprises from government through ownership change.

At the same time, new problems within China's SOE reform program have arisen. The local decentralization of SOEs has eroded the old system of central oversight of SOEs, but in the absence of market-based institutions and structures taking its place, a corporate governance vacuum has emerged, giving rise to agency problems, insider control and asset stripping. It is also leading to opportunistic collusion between local governments and SOE managers regarding tax revenues and other resources.

The result is privatization of profits and the socialization of losses.

Asset stripping is indeed widely reported, with insiders (managers and workers) taking SOEs' good assets and leaving debt-ridden shells.¹¹ SOEs' explicit and implicit liabilities left with the state banking system and government. SOE payroll tax avoidance or diversion is also widely reported, especially as regards contributions to unemployment insurance or pension pools. These programs are essential elements to establishing a social safety net. Undermining their fiscal support could jeopardize progress of China's overall reform effort.

The evidence we marshal in this article supports a theory of state ownership of enterprises that we believe better explains the observed problems in China's state sector than do alternative theories, including those based on the entry of nonstate enterprises or on principal-agent issues. Our findings suggest that Chinese SOE reforms that have centered on the use of incentive contracts have been successful in motivating managers and employees to make and keep profits, but they have failed in preventing these insiders from passing losses and liabilities to the State. In other words there has been "privatization of assets and socialization of liabilities." If this asymmetry of incentives and consequences is left unchecked—for example, without formal ownership changes, introduction of effective internal governance mechanisms and strengthened external discipline through inter-firm competition and commercially-based creditor relationships—the rising losses and liabilities in China's state sector pose a serious threat to the country's banking system and macroeconomic stability.

¹¹ World Bank (1997)

Appendix A: Description of Data Sets:

The sample firms and their financial data used in this study are drawn from three separate surveys: (1) China's 1985 National Industrial Census; (2) China's State Statistical Bureau 1993 survey of 3000 township and village enterprises; and (3) The World Bank's 1994 Survey of 156 SOEs in five cities. We use only about a dozen standard financial accounting variables from the sample firms. In particular, we include the information about non-industrial fixed capital, which is used for employee in-kind fringe benefits such as housing. This information is usually ignored in many other surveys of Chinese enterprises. The three surveys used here are the only data sets that we know of that include systematic information on non-industrial fixed capital.

The 1985 industrial census collected detailed information from about 360,000 Chinese enterprises, among which 8285 are large and medium-sized with a 53.6% share of national net industrial output. Within these 8285 large and medium-sized enterprises, about 1708 enterprises and their key financial data were selected and published in *Materials of 1985 Industrial Census in People's Republic of China: Brief of Large and Medium-Sized Industrial Enterprises* in 1987 by the Office of Leading Group for the 1985 National Industrial Census. The 1708-enterprises sample includes firms in 32 out of the total 47 industries of the Chinese two-digit industry classification and covers firms from all provinces and major cities. Although the quality of the 1708-enterprises sample is the best among the three surveys, it contains only about a dozen key financial variables for each firm in the year 1980 and 1985.

The State Statistical Bureau's survey of 3000 township and village enterprises was expanded on a much smaller survey on about 300 enterprises conducted by the Development Research Center of the State Council and the World Bank in the late 1980s. Starting from 1992, the 3000 TVEs survey has been conducted annually. The TVE survey includes TVEs from all provinces and industries and contains comprehensive information about TVEs financial accounts and other local economic and social conditions. In this paper, we only use about a dozen financial variables from the TVE data set in order to be comparable with the data drawn from the 1985 industrial survey.

The World Bank survey contains detailed information (about 2500 variables for each firm) on 156 large and medium-sized industrial state-owned enterprises in Shanghai, Wuhan, Chongqing, Shenyang, and Harbin for 1990 to 1994. The firms are those chosen by municipal governments as participants in "comprehensive reform" programs and thus are not randomly selected (see Broadman 1995 and World Bank 1996). The survey questions were designed by one of the authors of this article, in consultation with experts in and outside of China. The survey was carried out during December-January 1994 by a team of Chinese consultants with the support from the State Economic and Trade Commission, under the direction of both of this article's authors. For this article we only use about a dozen financial variables from the World Bank data set in order to be comparable with the data drawn from the 1985 industrial survey.

Appendix B: Model Specification and Definition of Variables

(1) Enterprise Performance Equation:

$$\begin{aligned} \text{MEP}_q^i = & a_q + a_{q1} \text{Ln}(L^i) + a_{q2} \text{Ln}(K^i/L^i) + a_{q3} \text{WK}^i/K^i \\ & + (a_{q41} + \sum_{j=2,M} a_{q4j} S_j^i) \text{Ln}(\text{FBK}^i/L^i) \\ & + (a_{q51} + \sum_{j=2,M} a_{q5j} S_j^i) \text{Ln}(W^i) \\ & + \sum_{j=2,M} a_{q6j} S_j^i + \sum_{g=2,Q} a_{q7g} P_g^i + \mu^i; \quad i = 1, \dots, N; \end{aligned}$$

(2) Labor Compensation Equation:

$$\begin{aligned} \text{MLC}_v^i = & b_v + (b_{v11} + \sum_{j=2,M} b_{v1j} S_j^i) \text{Ln}(Y^i/L^i) \\ & + (b_{v21} + \sum_{j=2,M} b_{v2j} S_j^i) \text{Ln}(F^i/L^i) \\ & + (b_{v31} + \sum_{j=2,M} b_{v3j} S_j^i) \text{Ln}(\text{RA}^i) \\ & + (b_{v41} + \sum_{j=2,M} b_{v4j} S_j^i) \text{Ln}(\text{RK}^i) \\ & + \sum_{j=2,M} b_{v5j} S_j^i + \sum_{g=2,Q} b_{v6g} P_g^i + \mu^i; \quad i = 1, \dots, N; \end{aligned}$$

(3) Reduced Form Labor Compensation Equation:

$$\begin{aligned} \text{MLC}_v^i = & c_v + c_{v1} \text{Ln}(L^i) \\ & + (c_{v21} + \sum_{j=2,M} c_{v2j} S_j^i) \text{Ln}(K^i/L^i) \\ & + (c_{v31} + \sum_{j=2,M} c_{v3j} S_j^i) \text{Ln}(\text{WK}^i/L^i) \\ & + \sum_{j=2,M} c_{v4j} S_j^i + \sum_{g=2,Q} c_{v5g} P_g^i + \mu^i; \quad i = 1, \dots, N; \end{aligned}$$

Definition of Variables:

L : number of employees in the firm.

K/L : industrial fixed capital per employee (1000 yuan).

WK/L : working capital per employee (1000 yuan).

W : wage per employee per year (1000 yuan).

FBK/L : fringe benefits (non-industrial) industrial fixed capital per employee (1000 yuan).

Y/L : gross industrial output per employee per year (1000 yuan).

F/L : profits and taxes per employee per year (1000 yuan).

RA : return on total assets [= F/(K + WK + FBK)].

RK : return on industrial fixed capital [= F/K].

MEP_q : measure of enterprise performance; q = 1, ..., 4; MEP₁ = Ln(Y/L); MEP₂ = F/L; MEP₃ = RA; MEP₄ = RK.

MLC_v : measure of labor compensation; v = 1, ..., 3; MLC₁ = Ln(FBK/L); MLC₂ = Ln(W);

MLC₃ = Ln(FBK/L+W).

S_j : subsample dummy; S_j = 1 if the observation is from subsample j; S_j = 0 otherwise; j = 1, ..., M; M = total number of subsamples.

P_g : province dummy; P_g = 1 if the observation is from province g; P_g = 0 otherwise; g = 1, ..., Q; Q = total number of provinces.

μ : random error variable;

a_{qxy}, b_{vxy} and c_{vxy}: parameters to be estimated.

i: firm i in the sample, i = 1, ..., N.

N : number of firms in the combined sample after eliminating missing data and outliers.

Figure 1. Wage and Labor Productivity in China's State Owned Enterprises: 1978-1994

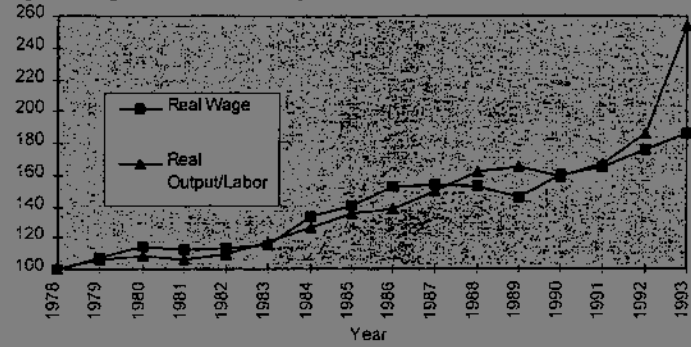


Figure 2. Aggregate Statistics of Chinese State-Owned Enterprises: 1978-1994

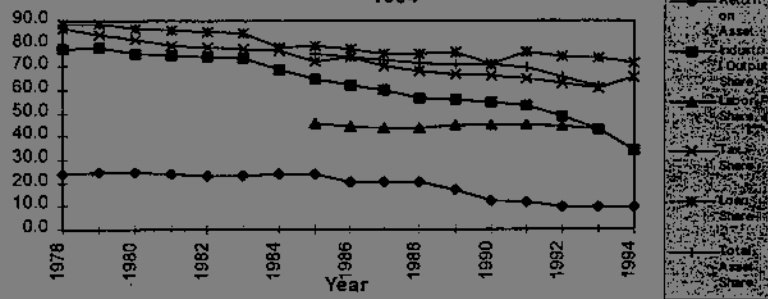


Figure 3. Key Macro Statistics of Chinese Economy: 1978-1994

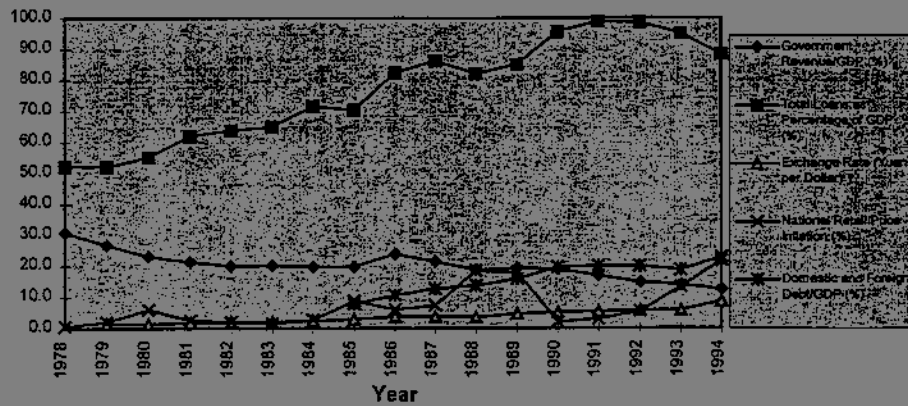


Table 1. Aggregate Statistics for the Chinese Economy and State-Owned Enterprises

Year	SOE Real Wage Index	SOE Labor Productivity Index	SOE Return on Total Assets (%)	SOE Share of Labor Output (%)	SOE Share of Gross Industrial Output Value (%)	SOE Share of Total Tax Revenue (%)	SOE Share of Total Assets (%)	SOE Share of Total Bank Loans (%)	Government Revenue/GDP (%)	Total Loans as Percentage of GDP (%)	Exchange Rate (Yuan per Dollar)	National Retail Price Inflation (%)	Domestic and Foreign Debt/GDP (%)
1978	100.0	100.0	24.2	77.6	86.8	88.9	88.9	30.9	52.3	1.56	0.7	2.0	
1979	107.4	106.4	24.8	78.5	83.7	88.4	88.4	26.7	52.2	1.50	6.0	2.4	
1980	113.9	108.5	24.8	76.0	82.0	86.4	86.4	23.1	55.2	1.71	2.4	1.9	
1981	112.4	106.6	23.8	74.8	78.8	85.9	85.9	20.1	63.7	1.99	1.5	2.8	
1982	113.5	109.0	23.4	74.4	78.7	85.4	85.4	19.9	71.4	2.40	8.8	7.9	
1983	115.1	117.2	23.2	73.4	77.7	84.5	84.5	19.8	70.3	2.97	6.0	10.7	
1984	133.9	126.4	24.2	69.1	77.0	78.3	78.3	24.0	82.3	3.72	7.3	12.7	
1985	140.4	135.5	23.8	64.9	72.0	76.0	76.0	21.5	86.2	3.72	18.5	13.7	
1986	152.9	138.8	20.7	62.3	74.5	74.2	74.2	19.3	85.1	4.72	17.8	15.9	
1987	153.7	149.8	20.3	59.7	70.3	72.8	75.6	16.9	98.9	5.41	2.9	20.1	
1988	152.6	162.2	20.6	56.8	68.4	71.7	75.6	14.7	98.6	5.80	5.4	20.0	
1989	145.6	164.6	17.2	56.1	66.8	70.7	76.3	13.9	95.1	5.81	13.2	18.6	
1990	159.8	167.5	12.4	54.6	66.4	70.6	70.7	12.4	88.3	8.62	21.7	22.7	
1991	164.9	175.4	11.8	52.9	64.5	69.7	76.3	12.4	88.3	8.62	21.7	22.7	
1992	176.4	195.9	9.7	48.1	62.8	65.5	74.4	12.4	88.3	8.62	21.7	22.7	
1993	186.4	266.9	9.7	43.0	60.6	61.7	73.3	12.4	88.3	8.62	21.7	22.7	
1994	202.5		9.8	34.1	65.7	71.6	71.6	12.4	88.3	8.62	21.7	22.7	

Note: all statistics in this table are from various official issues of Statistical Yearbook of China (SYC), Almanac of China's Finance and Banking (ACFB), China Economic News (for some 1994 figures) or articles by officials from Chinese State Statistical Bureau. The detailed sources are noted below:

1. SOE Real Wage Index is calculated from average annual wage of the state-owned units (SYC 1995, page 113) divided by the Urban Consumer Price Index (SYC 1995, page 233).
2. SOE Labor Productivity Index is from SYC 1993, page 431; SYC 1994, page 397.
3. SOE Return on Total Assets is from SYC 1993, page 437; SYC 1994, page 401; SYC 1995 page 405.
4. SOE Share of Gross Industrial Output Value is from SYC 1995, page 377; The 1994 share does not include about 6% GIOV produced by joint stock companies with dominant state-owned shares.
5. SOE Share of Tax Revenue is from SYC 1995, page 215 and 217.
6. SOE Share of Bank Loans is calculated from the balance sheets of all state banks, urban and rural credit cooperatives. The loans to the non-state enterprises include all loans from urban and rural credit cooperatives and the loans extended by the state banks to urban collectives, individual business, agriculture, and others.
7. SOE Share of Labor and Total Assets are from an article by Qiu Xiao Hua and Zheng Jingping of the State Statistical Bureau in Economic Highlights No. 107, January 21, 1995, page 2.

Table 2. Means and Variation Coefficients of Key Variables by Sub-Sample

Subsample	SOE80	SOE85	COL80	COL85	SOE90	SOE91	SOE92	SOE93	SOE94	TVE92
N*	1708	1708	56	56	156	156	156	156	156	2998
N	1145	1271	35	41	45	39	29	22	23	945
L	5684	6311	1157	1571	5340	4548	4801	6354	7042	210
c.v.	1.87	1.81	0.48	0.41	1.49	1.70	1.87	1.70	1.48	1.28
K/L	12.38	14.91	5.18	9.11	18.16	18.30	21.16	24.17	25.41	10.35
c.v.	0.73	0.64	0.42	0.41	0.60	0.66	0.59	0.45	0.38	0.80
WK/L	5.88	7.81	4.70	8.69	24.87	26.01	29.51	35.82	35.69	12.82
c.v.	0.68	0.76	0.62	0.57	0.57	0.58	0.56	0.49	0.45	0.84
W	0.88	1.24	0.76	1.26	2.11	2.04	2.42	2.17	2.02	1.66
c.v.	0.14	0.16	0.12	0.26	0.39	0.42	0.35	0.32	0.26	0.42
FBK/L	2.17	3.11	0.68	1.56	4.28	4.63	5.05	5.85	6.26	1.51
c.v.	0.71	0.63	1.03	0.73	0.80	0.91	0.90	0.52	0.48	1.18
Y/L	14.19	21.23	12.70	29.34	35.42	36.73	43.16	26.40	27.00	25.21
c.v.	0.78	0.77	0.67	0.53	0.65	0.76	0.71	0.59	0.55	0.94
F/L	2.89	4.05	1.82	5.27	0.88	0.90	1.28	2.03	0.89	1.33
c.v.	0.96	0.73	0.91	0.53	2.67	2.37	1.73	1.21	2.22	1.61
RA	16%	17%	18%	28%	2%	2%	2%	3%	1%	6%
c.v.	0.94	0.71	0.78	0.39	2.50	2.50	2.00	1.33	3.00	1.50
RK	29%	33%	36%	60%	5%	4%	4%	10%	4%	15%
c.v.	0.97	0.79	0.83	0.45	2.60	3.50	3.00	1.30	2.00	1.40

Note:

1. See variable list for definition of variables.
2. N* is the number of observations (firms) in the original data sets before the observations with missing and extreme values for $\ln(L)$, $\ln(K)$, $\ln(WK)$, $\ln(FBK)$, $\ln(W)$, $\ln(Y)$, F/L , F/A , F/K , WK/K , or FBK/K are eliminated.
3. c.v. = Coefficient of Variation = standard deviation/mean.

Table 3. A Comparison of Sample and National Averages of Key Variables for SOEs

	1980	1985	1990	1991	1992	1993	1994
Average wage of the SOE sample (W)	0.88	1.24	2.11	2.04	2.42	2.17	2.02
Average wage in the SOE sector	0.80	1.21	2.28	2.48	2.88	3.53	4.80
Labor productivity of the SOE sample (Y/L)	14.19	21.23	35.42	36.73	43.16	26.40	27.00
Labor productivity in the SOE sector	12.08	15.08	30.84	32.30	36.08	49.15	
Return on total assets of the SOE sample (RA)	16.0%	17.0%	2.0%	2.0%	2.0%	3.0%	1.0%
Return on total assets in the SOE sector	24.8%	23.8%	12.4%	11.8%	9.7%	9.7%	9.8%
Return on industrial fixed assets of the SOE Sample (RK)	29.0%	33.0%	5.0%	4.0%	4.0%	10.0%	4.0%
Return on fixed assets of the SOE sector	24.3%	22.4%	12.9%	13.3%	12.4%	12.9%	12.5%

Note:

1. See variable list for definition of variables.

2. The national average for wage, labor productivity, return on total assets and return on fixed assets are from various issues of the Statistical Yearbook of China.

Table 4. The Impact of Labor Compensation on Enterprise Performance: 2SLS Regressions

Dependent Variable	Ln(Y/L)			F/L			RA			RK						
	Coeff.	T	Sig T	Coeff.	T	Sig T	Coeff.	T	Sig T	Coeff.	T	Sig T				
Ln(L)	a11	-0.107	-2.67	0.01	a21	-0.186	-1.10	0.27	a31	-0.007	-0.94	0.35	a41	-0.058	-3.75	0.00
Ln(K/L)	a12	0.560	11.13	0.00	a22	1.662	7.84	0.00	a32	-0.022	-2.34	0.02	a42	-0.127	-6.53	0.00
WK/K	a13	0.394	18.72	0.00	a23	0.478	5.40	0.00	a33	-0.022	-5.55	0.00	a43	0.031	3.77	0.00
Ln(FBK/L)	a141	-0.204	-7.14	0.00	a241	-1.708	-1.68	0.09	a341	-0.099	-2.16	0.03	a441	-0.231	-2.48	0.01
Ln(FBK/L)*SOE85	a142	0.064	1.83	0.07	a242	0.107	0.72	0.47	a342	0.011	1.61	0.11	a442	0.022	1.64	0.10
Ln(FBK/L)*COL8085	a143	0.105	1.08	0.28	a243	0.274	0.67	0.50	a343	0.015	0.83	0.41	a443	0.014	0.38	0.70
Ln(FBK/L)*SOE9094	a144	0.158	2.18	0.03	a244	0.654	2.15	0.03	a344	0.064	4.66	0.00	a444	0.122	4.40	0.00
Ln(FBK/L)*TVE92	a145	0.179	5.26	0.00	a245	0.329	2.30	0.02	a345	0.052	8.12	0.00	a445	0.101	7.71	0.00
Ln(W)	a151	0.281	0.42	0.67	a251	0.015	0.01	1.00	a351	-0.063	-0.49	0.62	a451	0.601	2.34	0.02
Ln(W)*SOE85	a152	-0.301	-1.25	0.21	a252	4.051	1.07	0.28	a352	0.166	0.98	0.33	a452	0.607	1.76	0.08
Ln(W)*COL8085	a153	1.535	1.72	0.09	a253	-5.245	-2.43	0.02	a353	0.010	0.11	0.92	a453	0.144	0.73	0.47
Ln(W)*SOE9094	a154	1.528	2.98	0.00	a254	-2.794	-2.84	0.00	a354	0.004	0.10	0.92	a454	0.033	0.37	0.71
Ln(W)*TVE92	a155	1.509	6.45	0.00	a255	-0.607	-5.03	0.00	a355	-0.055	-10.05	0.00	a455	-0.093	-8.46	0.00
R Square		0.440				0.304				0.324				0.312		
Sample Size		3595				3595				3595				3595		

Note: This table reports only the results of the second stage regressions of the 2SLS. Also, the coefficients for the constant, eight subsample dummies and twenty-three province dummies are not reported here. The instrumental variables for estimating the endogenous variables Ln(FBK/L) and Ln(W) in the first stage regression include Ln(L), Ln(K/L), Ln(WK/L), Ln[(K+WBK)/L], WK/K, and FBK/K, in addition to the constant, eight subsample and twenty-three province dummies. The R Square here is not adjusted for 2SLS bias.

Table 5. The Linkage from Enterprise Performance to Labor Compensation: 2SLS Regressions

Dependent Variable	Ln(FBK/L)			Ln(W)			Ln(FBK/L + W)					
	Coef.	T	Sig T	Coef.	T	Sig T	Coef.	T	Sig T			
Ln(Y/L)	b111	-3.356	-12.32	0.00	b211	0.888	6.39	0.00	b311	-1.045	-7.11	0.00
F/L	b121	1.481	12.85	0.00	b221	-0.408	-6.93	0.00	b321	0.485	7.78	0.00
RA	b131	-33.477	-19.18	0.00	b231	4.812	5.40	0.00	b331	-14.918	-15.83	0.00
RK	b141	7.472	11.47	0.00	b241	-2.302	-6.92	0.00	b341	2.299	6.53	0.00
Ln(Y/L)*SOE85	b112	0.008	0.05	0.96	b212	-0.005	-0.06	0.95	b312	0.000	0.00	1.00
Ln(Y/L)*COL8085	b113	-1.847	-4.34	0.00	b213	-0.171	-0.79	0.43	b313	-0.881	-3.83	0.00
Ln(Y/L)*SOE9094	b114	-2.533	-3.85	0.00	b214	-0.758	-2.26	0.02	b314	-2.136	-6.02	0.00
Ln(Y/L)*TVE92	b115	-1.532	-8.27	0.00	b215	0.486	5.14	0.00	b315	-0.407	-4.07	0.00
(F/L)*SOE85	b122	0.048	0.69	0.49	b222	0.033	0.92	0.36	b322	0.045	1.19	0.23
(F/L)*COL8085	b123	0.521	3.15	0.00	b223	0.080	0.95	0.34	b323	0.245	2.74	0.01
(F/L)*SOE9094	b124	0.994	4.01	0.00	b224	0.319	2.53	0.01	b324	0.823	6.16	0.00
(F/L)*TVE92	b125	0.591	7.78	0.00	b225	-0.118	-3.04	0.00	b325	0.170	4.14	0.00
RA*SOE85	b132	-0.532	-0.40	0.69	b232	-0.970	-1.41	0.16	b332	-0.601	-0.83	0.41
RA*COL8085	b133	-7.378	-2.10	0.04	b233	-1.795	-1.00	0.32	b333	-2.176	-1.15	0.25
RA*SOE9094	b134	-15.979	-3.49	0.00	b234	-3.408	-1.46	0.14	b334	-12.769	-5.17	0.00
RA*TVE92	b135	-9.470	-6.40	0.00	b235	3.545	4.70	0.00	b335	0.498	0.62	0.53
RK*SOE85	b142	0.556	1.07	0.28	b242	0.301	1.14	0.26	b342	0.315	1.13	0.26
RK*COL8085	b143	0.874	0.62	0.53	b243	0.938	1.31	0.19	b343	0.436	0.58	0.56
RK*SOE9094	b144	1.586	1.12	0.26	b244	-0.428	-0.59	0.55	b344	1.205	1.58	0.11
RK*TVE92	b145	0.310	0.55	0.58	b245	-0.832	-2.90	0.00	b345	-0.420	-1.38	0.17
R Square		0.656				0.445				0.668		
Sample Size						3595				3595		

Note: This table reports only the results of the second stage regressions of the 2SLS. Also, the coefficients for the constant, eight subsample dummies and twenty-three province dummies are not reported here. The instrumental variables for estimating the endogenous variables Ln(Y/L), F/L, RA, and RK in the first stage regression include Ln(L), Ln(K/L), Ln(WK/L), Ln((K+WBK)/L), Ln((K+FBK+WK)/L), WK/K, and FBK/K, in addition to the constant, eight subsample and twenty-three province dummies. The R Square here is not adjusted for 2SLS bias.

Table 6. The Impact of Firm Size and Firm Asset Scales on Labor Compensation: LS Regressions

Dependent Variable Variable	Ln(FBK/L)			Ln(W)			Ln(FBK/L + W)					
	Coeff.	T	Sig T	Coeff.	T	Sig T	Coeff.	T	Sig T			
Ln(L)	c11	0.079	6.58	0.00	c21	0.064	13.06	0.00	c31	0.077	11.94	0.00
Ln(K/L)	c121	0.597	15.99	0.00	c221	0.033	2.16	0.03	c321	0.395	19.57	0.00
Ln(K/L)*SOE85	c122	-0.059	-1.10	0.27	c222	0.034	1.57	0.12	c322	0.000	0.00	1.00
Ln(K/L)*COL8085	c123	-0.222	-0.95	0.34	c223	-0.047	-0.49	0.62	c323	-0.185	-1.46	0.14
Ln(K/L)*SOE9094	c124	-0.155	-1.21	0.23	c224	0.248	4.77	0.00	c324	-0.020	-0.30	0.77
Ln(K/L)*TVE92	c125	0.003	0.05	0.96	c225	0.031	1.36	0.17	c325	-0.094	-3.09	0.00
Ln(WK/L)	c131	0.055	1.46	0.14	c231	-0.011	-0.70	0.49	c331	0.049	2.41	0.02
Ln(WK/L)*SOE85	c132	-0.022	-0.45	0.65	c232	0.026	1.32	0.19	c332	-0.016	-0.60	0.55
Ln(WK/L)*COL8085	c133	-0.245	-1.36	0.17	c233	0.081	1.10	0.27	c333	-0.089	-0.91	0.36
Ln(WK/L)*SOE9094	c134	0.201	1.65	0.10	c234	-0.134	-2.70	0.01	c334	0.070	1.07	0.28
Ln(WK/L)*TVE92	c135	0.054	1.04	0.30	c235	0.058	2.72	0.01	c335	0.030	1.05	0.29
R Square		0.454				0.439				0.473		
Sample Size		3595				3595				3595		

Note: The coefficients for the constant, eight subsample dummies and twenty-three province dummies are not reported here.

REFERENCES

- Alchian, Armen A. and Demsetz, Harold. "Production, Information Costs, and Economic Organization." *American Economic Review*, December 1972: 777-795.
- Broadman, Harry G. *Meeting the Challenge of Chinese State Owned Enterprise Reform*. The World Bank, April 1995
- Broadman, Harry G. ed., *Policy Options for Reform of Chinese State Owned Enterprises*. The World Bank, June 1996.
- Broadman, Harry G. and Xiaolun Sun, "The Distribution of Foreign Direct Investment in China." *The World Economy*. (in press).
- Chen, Kuan; Wang, Hongchang; Zheng, Yuxin; Jefferson, Gary H.; and Rawski, Thomas G. "Productivity Change in Chinese Industry: 1953-1985." *Journal of Comparative Economics* 12 (December 1988): 570-91.
- Dollar, David. "Economic Reform and Allocative Efficiency in China's State-Owned Industry." *Economic Development and Cultural Change*. 38 (October 1990): 89-105.
- Gordon, Roger, and Li, Wei. "Chinese Enterprises under the Reforms." *American Economic Review Papers and Proceedings*. 81 (May 1991): 202-6.
- Groves, Theodore; Hong Yongmiao; McMillan, John; and Naughton, Barry. "Autonomy and Incentives in Chinese State Enterprises." *Quarterly Journal of Economics* 109 (February 1994): 183-209.
- Groves, Theodore; Hong, Yongmiao; McMillan, John; and Naughton, Barry. "China's Evolving Managerial Labor Market." *Journal of Political Economy* 103, No.4 (1995): 873-892.
- Jefferson, Gary H.; Rawski, Thomas G.; and Zheng, Yuxin. "Growth, Efficiency, and Convergence in China's State and Collective Industry." *Economic Development and Cultural Change* 40 (January 1992): 239-66.
- McMillan, John, and Naughton, Barry. "How to Reform a Planned Economy: Lessons from China." *Oxford Review of Economic Policy* 8 (Spring 1992): 130-43.
- Sachs, Jeff and Wing Thye Woo, "Understanding China's Economic Performance." Discussion Paper No. 206. School of Economics and Finance, University of Hong Kong. 1997.
- Sheng, Andrew and Xiao, Geng. "Property Rights and Economic Transition Revisited: The Case of China." manuscript, June 1995.
- Woo, Wing Thye, Wen Hai, Yibiao Jin, and Gang Fan, "How Successful Has Chinese Enterprise Reform Been? Pitfalls in Opposite Biases and Focus." *Journal of Comparative Economics*, June 1994.
- World Bank. *China: Reform of State Owned Enterprises*. Report No. 14924-CHA. June 1996
- World Bank. *China's Management of Enterprise Assets: The State As Shareholder*. March 1997

Xiao, Geng. "Managerial Autonomy, Fringe Benefits and Ownership Structure: A Comparative Study of Chinese State and Collective Enterprises." *China Economic Review*, 2 (1991): 47-73.

Xiao, Geng. "Financial Implications of Extensive Employee Fringe Benefits at State-Owned Enterprises in China: A Case Study." manuscript, November 1995, a paper prepared for an UNDP project.

Xiao, Geng. *Chanquan yu Zhongguo de Jingji Gaige (Property Rights and Economic Reform in China)*, Beijing: China Social Science Press. 1997.

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