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China's Evolving Managerial Labor Market

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Recent reforms of Chinese state-owned enterprises strengthened a nascent managerial labor market by incorporating incentives suggestive of competitive Western labor markets. Poorly performing firms were more likely to have a new manager selected by auction, to be required to post a higher security deposit, and to be subject to more frequent review of the manager's contract. Managers could be, and were, fired for poor performance. Managerial pay was linked to the firm's sales and profits, and reform strengthened the profit link and weakened the sales link. Thus the economic reforms helped develop an improved system of managerial resource allocation responsive to market forces.

I. Introduction

In this paper we give evidence that the reforms of the 1980s in Chinese state-owned enterprises significantly strengthened a nascent

managerial labor market. We suggest that one important result of
the economic reforms was the development of an improved system
of managerial resource allocation that is responsive to market forces.
The overall objective of the reforms was to move from a system under
which enterprises obeyed detailed centralized commands to a decen-
tralized system that rewarded enterprises for improved productivity.
As a part of this effort, the reforms transformed the role of manag-
ers, requiring them to sign contracts outlining their responsibilities
and rewards, and enacting new incentives and punishments. We dem-
onstrate below that this new system was working surprisingly well by
the late 1980s: managerial efforts were being rewarded and manage-
rial resources being assigned in accordance with criteria established
by market forces.

    This is perhaps a controversial thesis. The conventional view of
China seems to be that managerial assignments in state-owned enter-
prises are still governed by bureaucratic and political considerations,
and managers are subject to rigid supervision and control. It is, how-
ever, widely appreciated that the reforms of the 1980s were directed
at improving the efficiency of enterprises by replacing direct control
from above with managerial incentives. New incentive systems such
as the "profit responsibility system" were introduced that linked re-
wards to managers to improvements in firm performance. However,
while necessary, it is not sufficient to provide incentives alone. Al-
though some managers who were appointed prior to the reforms
could be expected to welcome and respond to the new incentives,
others might be expected to have trouble adapting or, worse, be resis-
tant to change. A thoroughgoing reform must not just change the
incentive environment but also must provide a mechanism for select-
ing managers who will be responsive to the new opportunities. Ap-
propriate supervision and replacement of managers may be as impor-
tant as the provision of incentives.

    In this paper, we first examine the process of managerial turnover.
We show that managers changed jobs sufficiently frequently to sup-
port a functioning managerial labor market. We further study those
markets by analyzing two types of events. First, we analyze the circum-
stances around the most recent change of managers and show that
both the fate of the previous manager (demotion, promotion, etc.)
and the conditions of the new manager's appointment can be partially
explained by the firm's performance immediately before the change
of managers. Second, we analyze the circumstances around the most
recent managerial contract, which need not coincide with replace-
ment of the incumbent manager. Managerial contracts were the cen-
tral innovation of the managerial reforms of the 1980s. Nearly all the
managers in our sample had signed multiyear managerial contracts

that committed them to meet specified performance indicators, including profitability. We find that firm performance is again related to managerial incumbency and replacement in predictable ways. Of particular interest are the results of auctioning managerial contracts, an experimental reform that was carried out in about 14 percent of our enterprises. We also examine the relationship between managerial compensation and enterprise profits and sales. We show that Chinese managers' total compensation is positively related to both firm profits and sales and that, after a reform contract, the correlation between total compensation and profits increased, whereas that between total compensation and sales decreased. Finally, we examine the relationship between the new financial incentives given managers and the productivity of firms. We find that the direct monetary incentives given managers improved firm productivity and that this improvement was strengthened by the reforms. In short, we argue that managers were hired, fired, and paid increasingly over the decade of the 1980s in accordance with market-dominated criteria.

In assessing the managerial reforms, we are examining consequences of decisions made by two different sets of agents. One set of decisions is those made by bureaucratic superiors of the firm: (i) decisions to promote, demote, or transfer a current manager; (ii) the choice of selection method when a new manager is appointed; and (iii) the form of contract to offer the firm that governs the remuneration of managers. The other set of decisions is those made by managers in response to the incentives provided by the decision rules of their superiors.

The decade of the 1980s in China was a period of remarkable innovation and experimentation in alternative methods of economic reform (see Naughton 1995). Thus our evidence is not that the whole state-owned sector was converted at once, or even over the decade, from bureaucratic to market-driven managerial appointment methods. But by the latter part of the decade, reforms emphasizing market solutions were quite widespread. Managerial contracts and auctioning of firms were both broadly implemented for the first time during the latter part of the 1980s. The nature of our evidence does not permit direct comparison between the situation in the late 1980s and the "prereform" period before such institutions existed. But we can say that the real allocation of managerial resources displays patterns that we would expect if the reforms were successful. It is reasonable to attribute those patterns to the reform innovations that were intended to produce such an outcome.

Overall, the gains from the partial reform of China's state firms are demonstrable. Output per worker rose 67 percent (in constant prices) between 1980 and 1989 for the enterprises in our sample, and

total factor productivity rose 36 percent (Groves et al. 1994).[1] Not all
of this improvement in productivity is attributable to the particular
reforms that we investigate here. Firms also faced increased product
market discipline because of greater competition from other state
firms and from new, nonstate firms, and this was an important source
of productivity gains (McMillan and Naughton 1992). Gains also came
from granting firms autonomy in their output decisions and increas-
ing the share of profits firms were allowed to retain (Groves et al.
1994). Managerial reforms would probably not have been effective
had they not been made in conjunction with increased autonomy and
increased product market competition.

Section II describes the selection of managers and the changes in
the overall environment within which Chinese managers operate
since the reforms of the 1980s. Section III presents and interprets
the main empirical results. Section IV summarizes the findings and
presents further speculations on the process of change in China. The
Appendix provides details of our data set and the basic model speci-
fication.

II. Selection of Managers and Reforms
       of the 1980s

In the prereform Chinese command economy, enterprises are best
thought of as branch plants of a single giant firm. Enterprise manag-
ers were hired and fired by officials in the industrial bureaus, which
were in turn organized into sectoral and geographical divisions. The
entire industrial system was accountable to a national or regional
planning commission, which steered the entire system through a com-
plex system of highly specific commands that extended all the way
down the hierarchy to managers at the plant level. Authority relations
were complicated by the intrusive role of the Communist Party, which
functioned more or less as the personnel department of this enor-
mous corporation, maintaining dossiers and tracking managerial ca-
reers. Managers were rewarded for following orders and for subservi-
ence to political dogma. The inefficiency of which this system was
capable is well known.

During the 1980s, China sought to improve industrial efficiency

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[1] Production function estimates from several other data sets also show increases in
state firms' productivity. Gordon and Li (1989), using a sample of 400 state enterprises,
estimated that productivity rose by 4.6 percent annually over the period 1983–87.
Dollar (1990), using a sample of 20 state enterprises, estimated that productivity rose
by 4.7 percent annually over the period 1978–82. Chen et al. (1988), using aggregate
data, estimated that productivity rose between 1.9 percent and 2–7 percent annually
over the period 1978–83. See also Perkins (1988), Hay and Liu (1991), and Jefferson,
Rawski, and Zheng (1992).

through a multistranded program of experimental reforms. First, reformers sought to enhance the authority of enterprise managers. This involved reducing the power of Communist Party officials to intervene in enterprise decision making and giving managers legal responsibility for enterprise decisions. "Factory manager responsibility systems" were implemented in the majority of enterprises in our sample[2] by the mid-1980s and were predominant by 1988. Enhanced managerial authority also implied a reduction in the number of specific instructions given to managers by bureaucratic superiors. Second, enterprises were provided with significant incentive funds. Profit retention schemes allowed enterprises to draw funds for worker bonuses, worker welfare facilities, and enterprise investment in accordance with improvements in profitability. These schemes clearly gave the enterprise as a whole an interest in increasing productivity. They also implied a substantial increase in the economic resources over which managers had direct control. Thus the authority and control of resources by factory managers increased substantially.

A third strand of reform—the primary focus of the present paper—was to develop new mechanisms to reward managers and link managerial careers more effectively to firm performance. The most common means for doing this was long-term managerial contracts, which were in force in 92 percent of the state-owned enterprises in our sample. Contracts generally had 3- or 4-year terms, and they were signed by the enterprise manager as an individual (70 percent of firms) or by a managerial group (26 percent of firms). The contracts committed the manager to meeting certain performance indicators and established a structure of rewards and penalties. Profitability was always one of the performance indicators and was listed as the most important indicator by 72 percent of managers; 28 percent listed output targets, cost reduction, or other specific indicators as most important. In many cases, long-term contracts also committed managers to certain minimum levels of reinvestment in the enterprise.[3]

In most cases, the hierarchical structure of authority was maintained intact. Over 80 percent of the managers in our sample were appointed by industrial bureaus in the traditional way. For most managers, careers continued to be determined by the evaluations of bureaucratic superiors, and it is therefore important to examine the process by which the bureaus select and supervise managers. We argue below that there were significant changes both in the incentive

[2] See the Appendix, sec. A, for a description of the sample of 769 state-owned Chinese enterprises that constituted our data set.
[3] For additional descriptions of long-term managerial contracts, see China Enterprise System Reform Research Group (1988) and Naughton (1995).

environment facing the industrial bureaus and in the procedures they used to select managers. In some cases, reforms broke out of the traditional mold of appointment by bureaucratic superiors. The most significant was the system of selection by competitive auctions. About 14 percent of the managers in our sample were selected by competitive auctions.[4] These reforms were experimental and gained momentum in the late 1980s. Two years alone, 1987 and 1988, accounted for over half (57.4 percent) of the competitive auctions in the decade, although for only 23 percent of all managerial changes.

The use of competitive auctions for selecting managers is quite revealing of the extent to which market ideas have penetrated the Chinese state-owned enterprise system. After all, an auction is an extreme market method for allocating resources. Auctions fundamentally are devices for revealing information; an auction is used when there is much uncertainty about the value of the item being exchanged—a Picasso, an oil tract, or a shipment of eggplants (McAfee and McMillan 1987). China's managerial auctions serve to reveal information about both the potential managers' capabilities and the firms' inherent productivity, especially in the case in which the incumbent manager is bidding. In a fully functioning managerial labor market, information about potential managers comes from long-term observation of their performance in lower management jobs. In the transition economy, starting with the leftovers of the planned economy, information on past performance is unreliable or nonexistent. Auctions are an alternative source of information.

Auction procedures varied among regions in China, but certain common procedures can be described (Naughton 1995). Enterprises were generally put up for auction by municipal governments (which control most enterprises in China). In some cases, the industrial bureau acted jointly with the municipal budgetary authorities to carry out the auction. In other cases, an "evaluation commission" was established with outside experts participating as well. Before the auction, the firm's accounts were made available for inspection by any potential bidder. The most important component of the bid was a promise to turn over a specified amount of enterprise profit to municipal authorities over the following 3–5 years. Thus the auction process resembled a competitive leasing procedure. Minimum bids were often established by auction commissions. However, firms were not simply auctioned to the highest bidder. Bidders submitted management

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[4] An alternative experimental reform involved the selection of managers by workers' congresses in the enterprise, in a manner somewhat like the Yugoslav system of worker management. About 4 percent of the managers in our sample were selected by workers' congresses. The sample is too small for statistical analysis, and we have not examined this subgroup further.

plans describing investment and product development. In most cases, bidders made commitments to invest a certain minimum of enterprise retained profits in output expansion, and sometimes made commitments to reach a specified output level as well. Bidders were assessed for reliability and professional skill, sometimes through an explicit point system. The auctioneers then chose the winning bidder on the basis of promised profit delivery, the soundness of the management plan, and the characteristics of the individual bidder.

Regardless of whether firms were subjected to competitive auction or not, the top manager was generally required to sign a management contract. In many cases, the manager was required to put up a security deposit, which could be forfeited if the firm failed to perform as promised. This security deposit was substantial: the mean level in our sample was 8,500 yuan, compared to an annual average wage of 2,177 yuan in state-owned industry in 1989. There is anecdotal evidence that some managers did indeed lose some or all of their security deposit following poor firm performance: it was genuinely at risk. Like the auctions themselves, the security deposits can be interpreted as substituting for other managerial incentives found in established managerial labor markets. In the West, managers often have a stake in the firm in the form of stockholdings or stock options: security deposits similarly serve to give the manager a stake in the firm's performance.

III. Empirical Evidence of the Market Hypothesis

A. Manager and Worker Turnover

In a well-functioning market, one expects to see a relatively large number of transactions. Thus a first question to ask about the Chinese managerial labor market is whether there is evidence of much turnover. The answer is yes. Only 11 percent of managers serving at the end of the period had been appointed before 1980, and 44 percent had been appointed since 1985. Since less than a quarter (23 percent) of the current managers replaced retiring managers, turnover is occurring for other reasons. A clue can be gleaned from the observation that of the remaining group, 38 percent replaced managers who were promoted, 46 percent replaced ones who were moved laterally, and 16 percent replaced ones who were demoted.

We can compare this turnover in a rough way with average tenure lengths for American and Japanese chief executives. Kato and Rockel (1992, p. 34) report that incumbent chief executives have held their positions in the United States and Japan for an average of 7.1 and 7.7

years, respectively. This compares to the average tenure of currently serving Chinese managers in our sample of 5.5 years. Thus Chinese managerial turnover in the 1980s appears to be slightly more frequent than that of managers in the United States and Japan. Since one of the key features of an active, mature market is a high number of transactions, this evidence on turnover of managers is supportive of the idea that there is developing in China a labor market for managerial resources.

Active managerial turnover contrasts sharply with limited turnover of production workers in China. Most ordinary workers enjoy lifetime employment and almost never change jobs. For example, in our sample, in 1984, only 3.7 percent of the workers quit, were fired, or were transferred (1.3 percent retired); in 1989, only 2.8 percent quit, were fired, or were transferred (1.3 percent retired). (An average tenure for managers of 5.5 years corresponds roughly to an 18 percent yearly turnover.) It is worth stressing, then, that while ordinary Chinese workers rarely change jobs, Chinese managers in the 1980s frequently did. This activity contrasts sharply with the conventional view of a relatively rigid management structure.

B. Manager Selection and Contract Terms

Both before and after the reforms, the managers of Chinese state-owned firms were selected by the industrial bureau charged with regulating the firm. There is a classic principal-agent relationship between the industrial bureau and the manager. The agent—the prospective or current manager—has some relevant information that is not known by the principal—the industrial bureau. This information may concern the manager's own abilities or the firm's potential productivity. Either kind of information can generate adverse selection. In addition, the manager may take actions that affect the firm's productivity and cannot be directly observed by the industrial bureau: moral hazard is present. The bureau cannot know whether poor performance by the firm is attributable to (a) inherently low productivity of the firm, (b) managerial incompetence, (c) managerial decisions that pursue goals other than productivity, or (d) bad luck.[5]

The selection of a new manager provides an opportunity to observe the principal's actions designed to motivate the agent. For example, the treatment of the former manager should be related to firm per-

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[5] Thus a model of the firm similar to that of Laffont and Tirole (1986) applies here. As outside analysts, we can be expected to be at least as ill informed as the industrial bureau, with one exception, namely, the benefit of hindsight: a firm's ex post performance tells us something about its ex ante potential.

formance, with managers of poorly performing firms being demoted more frequently than other managers. Moreover, we would expect both the method of selecting a new manager and the terms of the new managerial contract to be related to the principal's evaluation of the existing situation in the enterprise. We examine two main methods for selecting a new manager—appointment by superior and competitive auctions—and attempt to explain the choice of appointment method made by the industrial bureaus. Since the choice between these two methods is made by the industrial bureau, the basic principal-agent relation is unchanged by the choice of managerial selection and should be seen as a choice made by the principal (the industrial bureau) in order to elicit the desired behavior from a class of potential agents.

Auctions, as noted above, serve to reveal information. Imagine that the industrial bureau, seeing that a firm is performing poorly, does not know whether the poor performance is due to bad management or to features of the firm beyond the manager's control. Then it might decide to use an auction, for the bidding process will reveal the identities of alternative potential managers, and the bids will reveal their various estimates of the firm's potential. Thus we might expect that the industrial bureau will tend to opt for auctions for firms that are performing poorly and appointment for firms that are performing well.

In addition, the structure of the new type of contracts offered managers under the reforms might be expected to reflect the performance of the firm. Poorly performing firms might be put on a "shorter leash" by the industrial bureaus. In particular, larger security deposits might be required of new managers taking over such firms and shorter contract terms offered. Security deposits generate incentives for the manager, and they are needed more in poorly performing firms. A shorter contract term for poorly performing firms also serves both principal (bureau) and agent (new manager). It heightens the scrutiny of the manager and enables the bureau to dump poorly performing managers after a shorter time. But a shorter contract also reduces the risk for a new manager by not locking him for a longer time into a firm that was performing poorly because of firm-specific reasons.

1. Test of Relation of Performance to Contract
    Terms and Manager Selection

To test whether or not Chinese bureaucrats in charge of selecting firm managers were influenced by the performance of the firms under their managers, we estimated the relationship between various

TABLE 1

MANAGER SELECTION EFFECTS

Y_i	X_{1i}	X_{2i}	Sample Size
	Model I: $Y_i = \alpha + \gamma'X_i + u_i$		
Term	.1596*	−.0881	645
	(2.014)	(−1.708)	
Security deposit	−395.4*	−109.1	612
	(−2.310)	(−.980)	
	Model II: $P[Y_i = 1 \mid X_i] = G(\alpha + \gamma'X_i)$		
Auction	−.2769**	−.2467**	645
	(−7.485)	(−7.584)	
Demotion	−.1123	−.0763	645
	(−1.882)	(−1.106)	

NOTE.—See sec. B of the Appendix for detailed specifications. X_{1i} is relative firm performance, X_{2i} is relative firm size, and G is the standard normal cumulative distribution function. t-statistics are given in parentheses for the first two variables; χ^2-statistics are given for the remaining two variables. The χ^2 cutoff for a 10 percent level of significance for our degrees of freedom is 2.71; for a 5 percent level, 3.84; for a 1 percent level, 6.64; and for a 0.1 percent level, 10.83.
* Significant at the 5 percent level.
** Significant at the 1 percent level.

characteristics of the new managers' contracts and the fate of the previous manager on the one hand and the performance of the firm prior to the new contract on the other. Specifically, we considered four dependent variables: (1) the term of the new managerial contract, (2) the size of the security deposit, (3) the use (or not) of an auction for selecting the firm's top management position, and (4) the demotion (or not) of the firm's previous manager. Each of these variables was regressed on a measure of relative firm performance over the period immediately prior to the new contract. (See secs. B and C of the Appendix for a description of the estimated models and procedures.) The results for all four dependent variables are given in table 1.[6]

Table 1 shows the effect on managerial choice of poor performance (measured by the firm's output per worker relative to the industry) that is observable ex ante. Low performance of the firm prior to a change in manager is significant in explaining the use of an auction to select a new manager. Not only were poorly performing firms disproportionately subject to auctions, they were also associated with a larger security deposit and also with a shorter management contract. Thus the industrial bureaus were more willing to allow poorly

[6] The sample of firms reported in table 1 is the full sample of 769 firms (see sec. A of the Appendix) for which there was a change of manager recorded during the sample period and for which the amount of security deposit was given or the length of the new manager's contract.

performing firms to be auctioned off, but also subjected them to more frequent review and larger security deposits. Conversely, good performers were given more autonomy, in the sense of having longer-term managerial contracts and smaller security deposits. However, it is interesting to note that poorly performing firms by this measure did not have a disproportionate number of their managers demoted: poor performance was not a significant explanatory variable in explaining demotions.

In addition to examining the firms' ex ante performance relative to industrial averages and relating this performance to various managerial selection variables, we compared each firm's performance before and after the change of manager. Significant improvement of firm performance after a managerial change can provide information about the former manager's performance that is not apparent by looking directly at the performance of the firm under the former manager. Poor performance of a firm, relative to the industry, for example, may be the result of bad luck or poor market conditions, a poor physical plant, low-quality labor and other inputs, or poor management. However, an improvement in performance may reveal the existence of unfulfilled potential of the firm prior to the managerial change. Thus ex post improvement is potential evidence of ex ante poor managerial performance. While ex ante poor performance may not be observable by outside observers (such as ourselves) viewing only simple indicators of performance, it is plausibly observable by industrial bureaus, which have significant local knowledge of their firms (though presumably less than the firm managers themselves). Thus it is reasonable to suppose that an improvement in performance accompanying a change of manager is perhaps partly the result of the bureau's observance that the firm is performing poorly, relative to its potential (as perceived by the bureau), and then the appointment of a more competent or energetic manager.

However, since a managerial change, as we measure it, is accompanied by a new managerial contract, a significant improvement in performance might also be expected when the old manager is reappointed or even promoted, since managerial incentives are presumably improved under the new contract.

Thus, although ex ante poor performance is not associated with demotion, if the hypothesis is true that managers were demoted because their performance was poor relative to their firm's potential, then we would expect to see performance improve after the change of managers for these firms. This hypothesis is not contradicted by our data. Table 2 shows that a significant increase in performance occurred under a new manager if the previous manager was demoted. In fact, relative performance increased under a new manager

<div align="center">TABLE 2</div>

<div align="center">PERFORMANCE SHIFT TESTS FOLLOWING MANAGER MOVEMENT</div>

<div align="center">Model: $Y_{it} = \alpha_i + \beta_t + \gamma_j X_{it} + u_{it}$</div>

Category (j)	γ_j	N_j	R^2
1. Demoted	.1635***	816	.90
	(3.60)		
2. Not demoted†	.0777***	7,410	.79
	(4.40)		
3. Promoted	.1195*	1,933	.72
	(2.43)		
4. Moved laterally or retired	.0767**	3,762	.76
	(3.26)		

NOTE.—See sec. C of the Appendix for detailed specifications. $Y_{it} = R_{it}/R_{St}$ (defined in sec. B of the Appendix) is relative firm performance for firm i in year t; $X_{it} = 1$ if date t is after the appointment of firm i's new manager, and 0 otherwise; and $N_j \approx n_j T$ is the effective total sample size, where n_j is the number of different firms in category j.
  * Significant at the 5 percent level.
  ** Significant at the 1 percent level.
  *** Significant at the 0.1 percent level.
  † Includes the categories promoted, moved laterally, or retired plus "other" (nonresponses and other nonspecific responses).

in all cases—as suggested by the improved managerial incentives under the new contract—but the magnitude of improvement was several times greater if the previous manager had been demoted. Furthermore, the increase in performance was less significant if, in contrast, the previous manager had been promoted, suggesting that there might be less opportunity for the new manager to improve on the previous managers' performance, even with improved incentives. Thus demotion and promotion of managers appear to be closely related to firm performance relative to potential under that manager.

In contrast with the group of managers who were demoted, the group of auctioned firms as a whole did not show such a dramatic improvement in performance. However, closer analysis reveals a difference in postauction performance between firms in which the incumbent manager won the auction (55 percent of the auctioned firms) and those for which a new manager won. Table 3 shows that firms in which the new manager won experienced no significant improvement in performance, but those in which the incumbent won did. This result suggests a type of adverse selection mechanism at work (exactly as in the models of Engelbrecht-Wiggans, Milgrom, and Weber [1983] and Hendricks and Porter [1988]).[7] Given a group of auctioned firms that look roughly the same to an outsider, these firms will attract roughly equivalent bids from outsiders. However, incum-

[7] The Engelbrecht-Wiggans et al. and the Hendricks and Porter models predict that the incumbent wins at least 50 percent of the time; in our data the incumbent won 55 percent of the auctions.

TABLE 3

PERFORMANCE SHIFT TESTS FOLLOWING A NEW CONTRACT

Model: $Y_{it} = \alpha_i + \beta_t + \gamma_j X_{it} + u_{it}$

Category (j)	γ_j	N_j	R^2
	Nonauction Firms		
1. Incumbent reappointed	.0567	4,253	.82
	(1.74)		
2. New manager	.0986*	1,111	.88
	(2.42)		
	Auction Firms		
1. Incumbent reappointed	.2636**	527	.80
	(3.01)		
2. New manager	−.0108	422	.86
	(−.22)		

NOTE.—See sec. C of the Appendix for detailed specifications. $Y_{it} = R_{it}/R_{St}$ (defined in sec. B of the Appendix) is relative firm performance for firm i in year t; $X_{it} = 1$ if date t is after the appointment of firm i's new manager, and 0 otherwise; and $N_j \approx n_j T$ is the effective total sample size, where n_j is the number of different firms in category j.
* Significant at the 5 percent level.
** Significant at the 1 percent level.

bents, presumably with superior information, will know which of these firms has better than average potential for improvement. Less promising firms will be disproportionately captured by outsiders. This result does not depend in any way on irrational or naive behavior by outsiders. They can take their disadvantageous informational position into account and still will be overrepresented as winners among the poorer firms.

In the large majority of firms whose managers were selected by superiors, managers were also required to sign management contracts (including specification of profit remittances). As shown in table 3, an improvement in performance was observed for those firms whose new contract coincided with a new manager, whereas no such improvement was detected for managers when a new contract was administered by an incumbent manager. This should be expected since, as noted above, a disproportionate number of firms whose previous manager was demoted are in the group of firms with new managers. On the other hand, firms whose new contract is administered by incumbent managers would include firms whose performance was sufficiently good neither to call for a demotion of the current manager nor to put the firm up for auction.[8]

[8] Another possible explanation of the ex post improvement of firms whose managers were selected by auction is that auctioning is a better mechanism for selecting managers who are responsive to the new incentives than appointment by superiors. This explanation cannot, however, tell us why firms whose previous managers were demoted were

TABLE 4

EXPLANATION OF MANAGERIAL WAGES: FULL-SAMPLE PERIOD

Model: $Y_{it} = \alpha_i + \beta_t + \gamma'X_{it} + u_{it}$
$(N = 4{,}044; R^2 = .93)$

X	Profit	Sales
γ	.0123	.1179***
	(1.95)	(6.66)

NOTE.—See sec. C of the Appendix for detailed specifications. Y_{it} is the manager's nominal wages for firm i in year t, deflated by the consumer price index (CPI), in logs; X_{it} is firm i's nominal profit or sales, deflated by CPI, in logs; and $N \approx nT$ is the effective total sample size. The CPI is obtained from the State Statistical Bureau, *Statistical Yearbook* (1990).
*** Significant at the 0.1 percent level.

C. Incentive Effects of Managers' Wages

We have argued that managers are demoted (promoted) following poor (good) performance relative to firm potential. Thus the threat of demotion and the chance of promotion do appear to work as incentives for the manager. Other, more direct, incentives come from linking a manager's pay to the firm's performance.

To explore our hypothesis that the reforms gave managers significant individual incentives to improve their firms' profitability, we investigated the relationship between profits, sales, and managers' wages. Our results are summarized in table 4.

The model shows that sales are significant in explaining wages over the full sample period but that profits are just insignificant (the cutoff is 1.96 at the 5 percent level). Since we are using a panel data model with fixed firm effects, these results are not merely a reflection of the fact that bigger firms pay more. Rather, they imply that when a particular firm increased its sales (and perhaps its profits as well), the manager's pay increased.

We next examined how these relationships might have changed after the main managerial reforms were implemented. That is, we considered whether the dependency of wages on profits and sales became greater after a firm was given one of the new managerial contracts. Again, the survey of enterprises gives some reported indirect evidence on this question. Nearly three-quarters of the managers reported that their income increased since enterprise contracting was implemented, and on average their income was 37.4 percent higher

more likely to have their successor selected by auction, nor why those whose managers retired are more likely to have their new manager selected by superiors. These phenomena must reflect the incentives facing the industrial bureaus, i.e., the principals in our principal-agent analysis.

TABLE 5

EXPLANATION OF MANAGERIAL WAGES: PRE- AND POSTREFORM

Model: $Y_{it} = \alpha_i + \beta_t + \gamma'X_{it} + u_{it}$ ($N = 3,770$; $R^2 = .93$)

X	Profit	d_{it} Profit	Sales	d_{it} Sales
γ	−.0065	.0726***	.1227***	−.0398***
	(−.94)	(6.80)	(6.81)	(−5.09)

NOTE.—See sec. C of the Appendix for detailed specifications. Y_{it} is the manager's nominal wage for firm i in year t, deflated by the CPI, in logs; X_{it} is firm i's nominal profit or sales, deflated by CPI, in logs; $d_{it} = 1$ if firm i is under a postreform contract in year t, 0 if firm i is under a prereform contract; and $N \approx nT$ is the effective total sample size.
*** Significant at the 0.1 percent level.

than it would have been without the reform contract. We tested this by checking for a regime shift or testing the significance of a composite variable defined by profits (or sales) times a dummy variable that is zero prior to the new firm contract and unity during the postcontract period. Results are given in table 5.

This model shows that, although sales were a strong factor and profits were a weaker factor in explaining managerial wages (table 4), profits became a much stronger factor after the new contracts were signed with the firms, whereas sales became significantly less important.

These results between pay and performance are similar to what has been estimated for Western and Japanese firms (except that stock market value is usually used as an explanatory variable instead of profits). In studies of executive compensation in the United States, United Kingdom, and Japan, top-manager pay has been found to be significantly related to both profits and sales (Murphy 1985; Rosen 1990; Kato and Rockel 1992). The coefficients found in those studies are roughly similar to those in table 5, although differences in model specification make comparisons difficult.

IV. Conclusion

We have given evidence that, by the end of the 1980s, China had developed a managerial labor market that incorporated many of the incentives present in Western managerial labor markets, albeit in different forms. Managers could be, and were, fired for poor firm performance; here the industrial bureau did the job of a Western firm's board of directors. A manager's pay was linked to the firm's sales and profits, and this link was significantly strengthened by the reforms (i.e., postcontract). Managers were, in many cases, selected by auction; arguably the auction process was a device for revealing information about potential managers that, in a market economy, would come

from long-term observation of the potential managers' performance. Managers were often required to post a security deposit, to be forfeited if the firm performed abnormally poorly, effectively giving them a stake in their firm's performance analogous to a Western manager's stock options.

These results are particularly important since it is increasingly recognized that, in any of the formerly planned economies of Eastern Europe, the former Soviet Union, and Asia, managers in state-owned firms must be monitored during the transition to a market economy. Because privatization is a difficult, long-term process, the incentives, monitoring, and capital market constraints that shape state firm behavior in the period before privatization have a crucial impact on the overall trajectory of the transitional economy (see Pinto, Belka, and Krajewski 1993). It appears inescapable that state bureaucrats must provide some monitoring of firms for an intermediate period. The alternative of immediate abolition of bureaucratic oversight leaves the situation ripe for plundering of public assets by existing managers in the period before privatization can be carried out. The Chinese evidence suggests that it is possible for bureaucratic superiors to provide reasonably effective monitoring during this transition.

Why were bureaucrats in China willing to change their oversight of enterprise managers to encourage market-conforming behavior? We cannot directly answer this question since our sample has not provided us with any opportunity to directly observe the incentives or behavior of industrial bureaus other than their activity in the selection of enterprise managers. However, because the question is important, it may be worth entertaining some speculations. Three factors may be important. The first was the removal—or at least significant downgrading—of the Communist Party and "political correctness" criteria from the sphere of managerial evaluation. The second was the growth of product market competition. Bureaucrats had strong incentives to reward effective managers since they were increasingly unable to shield ineffective managers from the impact of competition. The competitive survival and profitability of their industrial systems thus depended on employing effective managers. The third factor is the degree of decentralization in the Chinese industrial system. After reforms, rather than being managed as a single national corporation as in the unreformed Soviet model, Chinese firms have been predominantly managed at the regional and municipal levels. These smaller industrial systems are more likely to have "hard" budget constraints than a nationally integrated system (which is close to a credit creation mechanism). Regional corporations may be above optimal size, but they are still subject to some of the evolutionary pressures created by market competition.

Our results should not be interpreted to mean that a bureaucratic economy can simulate the benefits of a market economy simply by introducing more rational managerial selection and reward procedures. Rather, we argue that in the context of a broad program of marketization, such as the one that China undertook in the 1980s, improved managerial selection can occur under the aegis of the bureaucratic system. As such, the development of nascent managerial labor markets can play an important subsidiary role in the overall transition to a market economy. There is evidence that this has been happening in China.

Appendix

Data and Model Specification

A. Description of Data Set

Our data consist of a sample of 769 state-owned enterprises over the years 1980–89. Questionnaires were designed and implemented in collaboration with the Economics Research Institute of the Chinese Academy of Social Sciences. The survey instrument was divided into two parts. The first part was directed to the factory manager personally; it included 70 questions on personal history, personal views on management of the firm, and details of the management system. The second part was directed to the firm accountant. Over 300 detailed quantitative questions were asked of each firm for each year from 1980 to 1989. The central government directly managed 9 percent of the sample firms, provincial governments controlled 10 percent, municipal governments controlled 72 percent of the firms, and county governments controlled the remaining 9 percent. The sample is broadly representative of the large-scale, state-owned urban manufacturing sector in China. Relatively few small-scale state firms are included (they are disproportionately rural), and almost no extractive industry.

Firms were surveyed in four provinces that together contribute about 20 percent of China's industrial output. One province (Jiangsu) is more industrialized than China as a whole and grew more rapidly over the 1980s; the other three (Jilin, Shanxi, and Sichuan) are slightly less industrialized than China as a whole and grew slightly less rapidly over the 1980s. By most measures, the surveyed firms are close to Chinese averages. Total profit and tax per unit of capital in our sample was 22.6 percent in 1980, compared to 24.9 percent for all state industry nationwide. In 1989, a year of recession, profit and tax per unit of capital in the sample was 17.3 percent, compared to 17.2 percent for all state industry nationwide. The sample is quite typical of the Chinese state industrial sector.[9]

[9]Other studies that have used this data set include Gordon and Li (1991), McMillan and Naughton (1992), and Groves et al. (1994).

B.   Model Specification for Manager Selection Effects: Table 1

For estimating the relation of performance to contract terms and manager selection, we considered four dependent variables, Y_i: (1) the term of the new managerial contract, (2) the size of the security deposit, (3) the auction (or not) of the firm's top management position ($Y_i = 1$ if auctioned, and zero otherwise), and (4) the demotion (or not) of the firm's previous manager ($Y_i = 1$ if demoted, and zero otherwise). For the first two dependent variables, we specified a cross-sectional model:

$$Y_i = \alpha + \gamma' X_i + u_i, \quad i = 1, 2, \ldots, n,$$

where $X_i = (X_{1i}, X_{2i})'$, X_{1i} denotes a measure of firm performance prior to the new contract, X_{2i} denotes a measure of firm size, u_i is an unobservable random variable, and n is the number of firms in our sample. We construct X_i as follows: let Q_{it} and L_{it} be the output (in 1980 constant prices) and the number of employees of firm i in year t, respectively. Then $R_{it} = Q_{it}/L_{it}$ is firm i's output per worker in year t, and $R_{St} = \Sigma_{i \in S} Q_{it}/\Sigma_{i \in S} L_{it}$ is the industry average output per worker for sector S in year t. We define firm i's relative performance in year t as its relative output per worker R_{it}/R_{St} and define the firm's relative performance prior to a new managerial contract as the 3-year average of the relative performance in years preceding the change in manager; that is,

$$X_{1i} = \frac{1}{3} \sum_{t_0 - 3 \le t \le t_0} \frac{R_{it}}{R_{St}},$$

where t_0 is the date of the change of manager. For a measure of firm size, we use $X_{2i} = L_{it_0}/\Sigma_{i \in S} L_{it_0}$, the size of the worker force of firm i at date t_0 of the new contract, relative to industry. The inclusion of X_{2i} is included to capture firm-specific effects. The ordinary least squares procedure was used to estimate parameters (α, γ').

Because the last two dependent variables are binary, we specify the following probit model:

$$P[Y_i = 1 | X_i] = G(\alpha + \gamma' X_i),$$

where G is the standard normal cumulative distribution function and the X_i are defined above. The parameters (α, γ') were estimated by the method of maximum likelihood. Because we assume that all the information in X_i about Y_i can be summarized by a single index $\alpha + \gamma' X_i$, a positive sign on a component of γ will indicate a positive correlation between the component of X_i and the likelihood that either the manager's job will be auctioned or the previous manager has been demoted, depending on the dependent variable under consideration.

C.   Model Specification for Tables 2–5

Let X_{it} represent a state of firm i or action taken by the firm in year t, and let Y_{it} represent the result of firm i's state or action at time t, $i = 1, 2, \ldots,$ n and $t = 1, 2, \ldots, T$, where T is the number of time periods. To examine

the effects of X_{it} on Y_{it}, we use the following program evaluation model:

$$Y_{it} = \alpha_i + \beta_t + \gamma_j' X_{it} + u_{it}, \quad i = 1, 2, \ldots, n; j = 1, 2, \ldots, J; t = 1, 2, \ldots, T.$$

This is a standard fixed-effects panel data model. The coefficients, α_i, are the same for a given firm over time but differ across firms; examples are technology of firm i and the attributes of firms i's management. The coefficients β_t, the time dummies, are the same for all firms in the same period but change over time; examples are prices and interest rates that are the same for all firms, technological progress, and government policies that are common to all firms. The coefficients $\gamma_j = \gamma + \hat{\gamma}_j d_j$ are the same for firms that belong to category j, where the dummy variable $d_j = 1$ and $d_j = 0$ otherwise; for example, j may represent categories of firms whose previous manager was promoted, was demoted, retired, or moved to the same job in another firm. The u_{it} are unobservable random effects that are peculiar to both firms and time periods. We estimate the model using ordinary least squares procedures. The sample may be unbalanced because some observations may be missing for some years for some firms. As a result, the total effective sample size N may be only *approximately* equal to nT.

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