

Missing Market in Labor Quality: The Role of Quality Markets in Transition¹

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Abstract

This paper characterizes a key feature of the classic socialist economy and state-owned enterprise, namely that of missing markets in labor quality. Under the socialist regime in which students and workers are assigned to work units and the rights of managers to monitor and reward workers are limited, the exchange of labor services is characterized by the quantity of such services rather than by their quality. Wages are relatively compressed. The grant to workers of the right of job mobility, including the right to trade on skill and effort, and the emergence of firms in which managers enjoy the right and incentive to monitor labor quality create the essential elements of markets in labor quality. The establishment of asymmetric property rights, through the creation of managerial control rights in the emerging fringe but not in the established state sector, creates a problem of adverse selection. The exit of high quality workers from the state sector weakens average productivity; as relative revenue and wage growth lag, successive tiers of quality workers exit from the state-owned enterprise, causing its successive weakening and eventual demise – or reform.

By extending the principles of the Coase Theorem to the creation of a market in labor quality, this paper demonstrates the relevance of Coase’s analysis of the role of property rights in resource markets to the creation and exchange of quality in a wide range of goods. Analytically, the conditions for creating an efficient exchange of labor quality are equivalent to those for achieving efficient levels of pollution abatement and water quality. Evidence is reported which suggests that China’s state-owned enterprises suffer from the absence of markets in labor quality.

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1. Introduction

This paper argues that the critical distinction between socialist and market systems is the inability of the former to assign the property rights that are needed to establish markets in quality. The paper has two purposes. The first is to characterize the market in labor quality and demonstrate its relevance to economies in transition from planned socialism to market capitalism. The paper uses Chinese enterprise data to test the quality markets hypothesis. The paper's second purpose is more ambitious. It is to demonstrate the broad, if not universal, applicability of the Coase Theorem to the analysis of quality markets and economic efficiency.

The distinction between markets in the quantity of labor and the quality of labor. The absence of the assignment of a specific bundle of rights - the right of workers to accumulate and trade on human capital and effort and the right of managers to monitor and reward labor quality - creates a missing market in labor quality. This missing market has profound implications for efficiency, accumulation and growth, and income distribution in socialist economies. The essential feature of successful enterprise transition entails the reassignment of certain rights to workers and managers; these assignments create markets in labor quality, which raise the efficiency of labor, its complementary factors of production, and overall enterprise performance. This is the quality markets hypothesis.

In transition economies, the emergence of quality markets in some areas of the economy, such as a fringe private sector, may create a dynamic disadvantage for established enterprises in which quality markets do not exist. The disadvantage arises

from the kind of dynamic spiral that is typically associated with the problem of adverse selection. Once granted mobility to pursue employment that rewards skill and effort outside the state sector, the ability of skilled and motivated workers to exit the state sector depresses average productivity and wages in state enterprise. Lower average compensation, in turn, motivates the next tier of high quality workers to exit, and so forth. Adverse selection characterized by the successive exiting of relatively high quality labor leads to a cumulative weakening of enterprises with poorly functioning quality markets. This hollowing out phenomenon results either in the effective reform of the enterprise, i.e. the establishment of quality markets, or to its effective disappearance.

Following the introduction, the paper is organized into five sections. Section two of the paper characterizes labor markets in socialist economies. Section three describes the market in labor quality as an extension of the Coase Theorem. Section four explains how, against the backdrop of liberalization and new firm entry, missing quality markets in the state sector leads to a process of adverse selection. This section includes a simulation of this phenomenon. Section five uses Chinese enterprise data to mount an empirical test of the quality markets hypothesis. The concluding section of the paper explores certain theoretical implication of the quality markets hypothesis.

2. Labor markets in socialist economies

A dominant feature of the classic socialist economy is that property rights are embodied in the state or "all of the people". The state confers only limited rights to individuals and non-governmental entities (World Bank, 1996). This concentration of rights within the state curtails the labor market and enterprise efficiency in two important

ways. First, by retaining the right to allocate labor to work, the state exercises substantial control over the matching of human and physical capital to the workplace. Secondary school and college graduates are generally assigned to work units - factories or communes - to which their lifetime labor services are tied. While these restrictions go beyond the tax on labor income and occasional military conscription found in capitalist societies, it would be incorrect to characterize the retention of labor rights by the state as involuntary slavery or indentured servitude. Workers receive a basic wage, a range of subsidized services, and a substantial degree of security. In exchange for security in which the main requirement has been to show up for work and satisfy a common minimal standard of effort, workers face restrictions on their rights to accumulate and trade their labor services. In China, the erosion or outright abolition of elements of this system of labor allocation, dubbed the "iron rice bowl" (*tiefanwan*), has met with considerable resistance, even though it infringes on the rights of workers to control their accumulation of human capital and the intensity of its use.

The second key feature of this model of missing markets in labor quality arises from a central feature of the socialist economy: the state owns all or most of the industrial assets. For the purpose of carrying out production plans and monitoring the use of state-owned industrial assets, the state assigns certain rights to managers and party secretaries. A key right of managers and party secretaries is to supervise the workforce to ensure that it combines the services of labor assigned to the firm with the services of the state's fixed assets and various allocations of inputs for the purpose of meeting plan targets. In practice, however, the rights of managers to monitor, reward and discipline workers are severely circumscribed. Under central planning, labor bureaus set wages for various

categories of work; bonuses either do not exist or are distributed uniformly without regard to differences in relative worker contributions. Firings are extremely infrequent. A consequence of this limited assignment of rights to individual managers in which rewards and sanctions cannot be used to motivate quality is that monitoring is conducted along the dimension of the quantity of work rather than its quality.

Since the authority to monitor and the incentive to monitor are complementary rights, it should not be surprising that weak monitoring authority should be accompanied by weak incentives to monitor. In capitalist economies where the effective monitoring of inputs is expected to raise profit, the manager's compensation frequently includes the right to capture a share of the residual. The inability of the socialist system to assign to an agent within the enterprise the right to monitor, reward, and, in turn, receive rewards for efficient monitoring results in the absence of the effective central contracting agent envisaged by Alchian and Demsetz (1972) and Jensen and Meckling (1976).

The result of this weak assignment of property rights to workers to accrue skill and exercise effort and managers to monitor and reward that same skill and effort is the absence of a market in the quality of labor services. The socialist labor market is largely limited to the quantity of labor services - compensation for being on the job daily for eight hours. The fact that workers themselves exercise limited control over the use and exchange of the quality of their labor services might be vexing but for the fact that nowhere within the system is there a market for quality labor services. The opportunity cost of diminished skill and effort is unobservable. From this vantage, the introduction of a sector that is granted the rights required to create a market for labor quality threatens the stability of the state sector.

This essay posits that the essential distinction between a socialist system and a capitalist system is the nature of rights that are allocated to individual workers and managers in the workplace. By retaining authority at the center over production targets and quantities, the state abridges the assignment of control rights to individual managers. The central plan and input-output table on which it is based is fundamentally antagonistic to technological progress and quality improvements. As the principal instrument for planning and administering production, the input-output table, constructed from a matrix of technical coefficients, creates a conveniently stable description of a national economy's production technology. Changes in the quality of inputs that alter the fixed proportions embodied in the I-O table fundamentally disrupt the exercise of central planning. In this view, extensive growth, fed by rising rates of labor force participation and savings, is preferable to the unpredictability of intensive growth driven by technical change. Extensive growth based on quantity targets requires the functioning of quantity markets; not markets that engender and reward quality differences.

To summarize, the absence of markets in labor quality carries profound and widespread implications. The condition of missing markets in labor quality is sufficient to explain the essential stylized facts of socialist economic performance. These are:

- Low efficiency. Workers are employed, monitored, and rewarded for the quantity of work, not skill and effort. Workers, particularly more skilled and energetic workers, are not efficiently employed. Poor quality in labor services further compromises the efficient use of complements to labor in production. Equipment, raw materials, technology, and other inputs that interact with labor are used inefficiently. Measures of both labor and total factor productivity are low.
- Slow growth of living standards. Production targets are met by adding to the quantity of workers and machinery, not by using inputs more efficiently. Because inputs are not used efficiently or rewarded for quality, the incentive to introduce efficiency-enhancing innovations is diminished. Since technological progress is

the principal long-run source of rising living standards, living standards tend to stagnate.

- Income is relatively equally distributed. Because time endowments are more evenly distributed than quality endowments, compensation based on the quantity of labor services is more evenly distributed than compensation which reflects differentials in skill and effort.

3. An extension of Coase

The insight of Coase, embodied in the Coase Theorem, that well-assigned property rights and transaction costs engender the efficient use of natural resources, constitutes one of the most notable innovations in economic theory.² This insight, in fact, carries broader application. In effect, all markets operate on the foundation of well-assigned property rights and low transaction costs. The analysis below demonstrates how Coase's insight regarding the efficiency effects of creating a market in water quality can be extended to the creation of a market in labor quality.

Figure 1 reviews a standard application of the Coase Theorem in which a clear assignment of property rights and zero transaction costs result in an efficient level of pollution abatement or water quality, shown at Q^* . Whenever the marginal benefit (MB) of pollution abatement for the downstream firm exceeds the marginal cost (MC) of abatement to the upstream firm, these firms will transact sales of pollution rights (or abatement rights) until they exhaust the net benefits of further transactions. Regardless of whether the upstream polluter or the downstream firm receives the right, the equilibrium settles at Q^* .³

The basic logic of the Coase Theorem can be extended to markets in labor quality. To appreciate the symmetry, we can imagine the workers occupying the upstream

² See Coase (1993), the lecture he delivered upon his receipt of the Nobel Prizes in Economics in 1992.

position. They control the level of skill and effort that they inject into the stream of production. Their skill and effort levels upstream determine the level of profits that the manager is able to capture downstream.

If workers are not motivated to accumulate human capital and provide skill and effort on the job, labor productivity will languish. Moreover, their provision of low skill and low effort labor services will diminish the marginal productivity of complementary factors. The result will be both low labor and total factor productivity and low profits downstream from which the manager might potentially capture his own reward.

The solution can be viewed as entirely symmetric with the problem of creating water quality. By assigning the upstream party, i.e. the workers, with the right to trade on their skills and effort, the workers and manager can negotiate for the provision of greater skill and effort. To the left of Q^* , the marginal cost to workers of additional services in labor quality lies below the marginal benefit to the manager of compensating these quality services. The exchange of services for compensation continues to the point of Q^* . In effect the MC and MB curves shown in Figure 2 are nothing more or less than supply (MC) and demand (MB) schedules for services in labor quality.

A key assumption of the Coase Theorem is no transaction costs. The model assumes that both sides of the market enjoy the rights and capabilities to costlessly monitor the level of pollution. If either the upstream or downstream party buys or sells the right to pollute or abate, it can monitor the level of water quality created by the other party. The assumption of costless transactions implicitly assumes an assignment of the right to monitor and reward.

³ This result requires the further assumption that redistribution does not affect marginal values.

For the metering of labor skill and effort, the assumption of no monitoring costs seems excessively optimistic, particularly against the backdrop of well-established theories of asymmetric information and screening costs (Tirole, 1990). Within the context of the socialist enterprises, it cannot be assumed that the parties, particularly the manager, have acquired these rights. Rather than accept the implicit assumption of the Coase Theorem that both sides of the market enter the analysis with certain pre-assigned rights, these rights are explicitly incorporated into the model. Explicitly incorporating the assignment of these rights – the right to monitor labor quality and to pay and receive compensation for labor quality services – does not alter Coase's essential insight. The addition of these rights in no way affects an essential result of the Coase Theorem, i.e. that the efficient use of the resource does not depend on whether the right to pollute or abate is assigned to the upstream or downstream party.

As shown in Figure 2, absent the assignment of rights to trade on quality (skill and effort), workers provide Q_0 of effort. With the enlargement of rights to workers to accumulate and trade labor quality within and across firms and the provision of rights to managers to meter, reward, and be rewarded for successfully trading on labor quality, the equilibrium moves to Q^* .

Due to our focus on labor quality, there is one area in which the two diagrams are not entirely symmetric. This is because it is generally unlawful to assign the right of use of an individual's skill and effort to anyone other than to the individual itself. Because slavery is unlawful, managers cannot acquire control over a worker's rights to the self-determination of levels of skill and effort. Clearly any attempt by managers to exercise control over the skill and effort of workers, through force or its threat, would be futile.

While slaveholders who held these rights may have been able to induce labor services along quantity dimensions, in the absence of some degree of differential treatment, they would likely achieve little success creating initiative along the quality dimension.⁴

Creating a market in labor quality carries important implications with respect to efficiency, accumulation and growth, and distribution. These are:

(i) Efficiency. By increasing the potential rewards to workers and managers, these parties bargain until the trading in labor quality has exhausted potential gains to all parties. The allocation of work effort and skill will be efficient. Moreover, if workers are compensated for their productivity, they will want to use complements to production, including equipment, efficiently.

(ii) Accumulation and growth. When individuals acquire the right to trade on skill and effort and managers exercise the right to compensate workers for such skill and effort, the incentive to accumulate human capital increases. Rewards to complementing skilled labor with new vintages of capital rises, the incentive to innovate rises, and rates of growth of productivity and output rise. Ongoing technological progress gives rise to continuously rising living standards that result from quality markets.

(iii) Distribution. All individuals suffer under the constraint of 24 hours in the day. Moreover, most workers more or less adhere to the convention of an 8-hour day. In an economy in which labor's performance is measured and rewarded principally in terms of number of hours worked, incomes are relatively uniform. Given an unequal distribution of individual skill and effort, the creation of a market in labor quality will give rise to greater inequality.

The model predicts the key stylized features of a socialist economy - allocative inefficiency, labor shirking, patterns of extensive growth, and relative income equality.

The model also predicts key features of capitalist economies - comparative allocative efficiency, discipline in the labor force, intensive growth, and a relative skewed distribution of income.

⁴ The inability to effectively force quality from involuntarily labor may help to explain why slavery is absent from industrial societies and the relative absence of slavery in the North of the United States prior to the Civil War.

4. Asymmetric rights: the rise of adverse selection and vertical integration

The emergence of a fringe sector in which managers are allowed to monitor labor along the quality dimension and, in return, capture a share of the residual arising from comparatively high levels of productivity, may lead to adverse selection and vertical integration.

Adverse selection. Imperfect labor quality markets are vulnerable to problems of adverse selection. The adverse selection problem arises from the emergence of two forms of asymmetry in the assignment of rights. The first asymmetry, created within the firm, arises from the elimination of the labor allocation system and restrictions on labor mobility for employees in the state sector, while managerial control rights are, at best, partially reformed. The second asymmetry, created within the enterprise system, arises from the emergence of firms outside the state sector in which managers enjoy the full complement of control rights needed for effectively monitoring and rewarding labor quality.

The emergence of firms that are able to compensate high quality workers more generously than their existing state employers, will, given the mobility of these workers, tend to exit from the state sector. As high productivity workers exit, they depress average productivity in state enterprises, causing average wage growth in these enterprises to lag behind that of enterprises in the fringe. The decline in relative wages can, in turn, be expected to motivate the departure of the next tier of high productivity workers. The process of deteriorating relative performance and wages in the state sector continues with successive exits of remaining high quality workers. This process of adverse selection in which workers are paid the average productivity of the work force rather than

compensated on the basis of their individual productivities creates a continuous deterioration in relative enterprise productivity. Falling profit or mounting losses require either that state-owned enterprises effective reform managerial control rights or that they increasingly accumulate fiscal subsidies or non-performing financial debt, endure shrinking market shares, or exit. Annex A presents a simulation of this latter outcome.

Vertical integration. The speed with which high quality workers exit the state sector to the emerging fringe sector depends on several factors. Among these is the growth of employment in the fringe sector relative to the total supply of high quality labor in the state sector. In the model of pollution abatement, an alternative to negotiation between the upstream and downstream firms involving the provision of side payments is vertical integration. That is, if either firm purchases the other, then a single owner can internalize the pollution (or abatement) externalities by calculating the optimal level of water quality from the perspective of the combined operations of the two firms. to resolving the efficiency problem is to integrate ownership. Integration of the downstream and upstream firms internalizes the pollution problem, so that a single owner establishes a the level of pollution that would, in principle, be identical to that established by the Coasian solution. Vertical integration can also provides a remedy for the problem of a missing market in labor quality.

For the labor market, upstream-downstream integration entails the worker at once becoming his own manager and his own worker. As with the integration of the upstream and downstream firms, the integration of worker and manager allows the worker to avoid the transaction costs of negotiating in a setting in which managers exercise poorly specified control rights or that in which the supply of high quality labor exceeds its

demand. By internalizing the labor quality market, labor acquires management and the right to meter and reward its own services. Alternatively, management acquires labor and the right to secure compensation for a higher level of skill and effort.

Viewed from either perspective, the absence of a clear assignment of rights that motivates an optimal level of skill, effort, and compensation will encourage higher quality workers to transfer to a regime in which labor quality can be exchanged and rewarded. In China, while managers in state-owned enterprises are being assigned greater rights to monitor and reward, these rights continue to be circumscribed relative to those enjoyed by managers outside the state sector. It is not surprising, therefore, to see generally the most talented workers "jumping into the sea" (*xiahai*), leaving state sector jobs for non-state jobs including self-employment. Hundreds of thousands of workers have been drawn from the state sector to newly established firms in the foreign invested sector. But many have also exited the state sector for the purpose of establishing their own enterprises. Approximately 6 million of China's nearly 8 million industrial enterprises are "individual" (*geti*) enterprises with 7 or fewer workers. Defective markets in labor quality within enterprises in China's state and collective sectors and growth of the formal fringe economy that is slow relative to the millions of high quality workers in China's publicly-owned enterprise create a fertile environment for the exit of these workers. By vertically integrating their managerial and labor skills, they proliferate huge numbers of small individual enterprises throughout China.

. State-owned firms that are increasingly motivated by profit considerations can purchase inputs to production more cheaply from outside the state sector where markets for labor quality exist than they can produce them within the firm. As more efficient

markets in labor quality develop in the non-state sector, state-owned firms can shed labor that it cannot efficiently monitor in favor of lower unit cost inputs from competitive suppliers. From this Coasian perspective (1937), it is not surprising that in 1985 there were virtually no non-state enterprises among China's largest 15,000 large and medium-size enterprises. Now with the grant of capitalist-style rights to monitor and reward labor quality well established outside state industry, nearly one-third of China's large and medium-size enterprises belongs to an ownership category outside state industry. By creating the rights needed for a market in labor quality outside the state sector, reformers are motivating a downsizing that is shrinking the boundaries of state industry

So long as state-owned enterprise is unable to resolve the adverse selection problem in labor quality that arises from its inability to effectively monitor and reward labor quality, the most productive of the remaining workers will continue to leave until the ranks of the SOE are depleted of able workers.

5. Markets in labor quality in China's enterprise sector: an empirical test

In their analysis of the efficiency wage and work incentives in Chinese enterprise, Fleisher and Wang (2001) report results that bear on the issue of the relative strength of managerial control rights in state-owned enterprises versus collective, foreign and overseas joint venture, and private enterprises. Based on their analysis of a cross-section of data collected in 1992, the authors report two results of particular interest. The first is that while enterprises of all ownership types exhibit "grossly insufficient exploitation of the profit-maximizing potential of efficiency wages," the tendency for underuse is greater among state-owned enterprises (p. 4). Fleisher and Wang further find that "shirking is

most likely to be observed (or reported) among workers in SOE's than in other ownership forms" (p. 5). These findings are entirely consistent with the labor quality hypothesis in which we expect that a weak assignment of managerial control rights will lead to under-compensation relative to the efficiency-maximizing level and consequently to a higher incidence of shirking.

One shortcoming of the empirical work reported above is that it reports on average conditions within enterprises; it does not allow for differences in labor force composition in which we can distinguish the role of high quality labor in the workforce. In this section, a cross section of Chinese enterprises of various ownership forms is used to test for the relative proportions of high quality labor across ownership types and relative intensities of resources used in training the workforce. The test employs a recursive two-equation model. The first equation examines the relationship between measures of labor quality and different assignments of managerial control rights, summarized by ownership type; the second examines the impact of labor quality on enterprise productivity.

The model can be summarized as follows:

$$H/L = f_1(PR; I)\varepsilon_1, \quad (1)$$

$$Q/L = f_2(H/L; K/L; I)\varepsilon_2, \quad (2)$$

where H/L is a measure of labor quality, Q/L is a measure of labor productivity, K/L is the capital-labor ratio, I is a vector of 13 industrial branch control variables, and the ε_i are identical and independently distributed (iid) random variables. The more

conventional approach to investigating the relationship between property rights and efficiency is to estimate the reduced form version of equations (1) and (2). Because the focus of this paper is on conditions required to create a market in labor quality, this model examines the explicit role of labor quality, both as the outcome of an assignment of property rights and as a determinant of labor productivity.⁵

The production technology embodied in equation (2), i.e. f_2 , is assumed to be Cobb-Douglas in the following intensive form:

$$\ln(Q/L) = \ln A + \alpha \ln(K/L) + \beta \ln(M/L) + \gamma \ln(H/L) + \varepsilon, \quad (3)$$

where Q is gross industrial output, K is net value of fixed assets, L is the year-end number of workers, M is intermediate inputs, and A is the productivity parameter. H/L , the labor quality variable, can also be interpreted as a human capital variable where H spans various dimensions of labor quality. In this specification, the sum of α , β , γ , and ϕ , the weight on labor, is unity, i.e. the technology assumes constant returns to scale.

Productivity is generated by the process:

$$\ln A = \ln A_0 + \sum_i \delta_i I_i + \upsilon, \quad (4)$$

where A_0 is the average level of productivity within the sample and I is the vector of individual industry branches.

⁵ Equation (1) can, in turn, be interpreted as the reduced form of a labor supply and demand system in which the worker and manager optimize along certain dimensions of labor quality.

Note that, in principle, PR, the property rights variable or ownership variable, embodies measures of property rights that are assigned to both workers and managers. In practice, by the 1990s, Chinese students and workers had received a complete set of rights to make educational choices and, upon graduation, to choose their place of work. Beginning in 1987, rather than having employment assigned by the state, graduating students were given the right to search for their own employment. By the end of the decade, young Chinese regularly organized and conducted job searches upon graduating. . Therefore, the property rights vector is limited to measures of managerial control.

By the mid-1990s, China's industrial economy had established an extraordinarily heterogeneous mix of enterprise forms. The National Bureau of Statistics, which collects and reports data on ownership in 1995 reported statistical profiles for 13 ownership types, including state-owned enterprise, collective-owned enterprise, a variety of foreign and overseas-invested enterprise, individually-owned enterprise, and other forms of ownership. Each of these ownership forms represents a different form of governance and, potentially, different assignments of managerial control rights bearing on the right to monitor and reward labor for skill and effort. In principle, the greater the degree of state ownership, the more constrained or ambiguous is the assignment of control rights to a managerial entity; the more ownership is concentrated in the hands of individuals, the more clearly assigned are the relevant control rights.

Measures of labor quality include the proportion of the workforce that has received a college education and training expenditures per capita. These may either be substitutes or complements. Firms may hire in fewer expensive college graduates but compensate by providing more training; alternatively, high quality labor may require both

a college education and subsequent on-the-job training. The model does not test whether a college education and training are substitutes or complements; it does assume that both enhance labor quality. Within the context of the specification of the production function shown above, both create human capital, H , and raise the average level of labor quality, H/L .

The cross-section of 1995 enterprise data is a sample of approximately 1100 enterprises representing various ownership types (shown in Table 1) and a range of sizes drawn from Beijing. About half of these enterprises are industrial; the others are non-industrial enterprises.

The estimation results are shown in Tables 1-3. According to the results shown in Table 1, management control rights, as determined by ownership, appears to have relatively limited affect on the proportion of the college-educated workforce. Shareholding and foreign-wholly owned enterprises show weak evidence in support of the quality hypothesis. Collective enterprises may have a lower proportion of college educated workers than state-owned workers,

The apparent absence of significant disparities in educational levels across ownership types may reflect the fact that the share of college educated workers is a stock variable that adjusts only slowly over time. During the period when China's labor allocation system remained in force, many college graduates were assigned to state enterprise. Although during the 1990s relatively few college students may have joined the ranks of the state sector, in 1995 the stock of college graduates in the state sector may have persisted above the long-run equilibrium expected of the state sector.

By comparison, the results shown in the right-hand side column of Table 1 indicate that ownership has substantial affect on training expenditure per capita. Moreover, the relative ranking of the importance of ownership is highly consistent with the usual set of priors in which collectives dedicate more to training than do state-owned enterprises and overseas and foreign joint ventures train more than COEs and SOEs. Since training expenditure is a flow variable that should respond to differential managerial control rights, this finding is reassuring.

In conclusion, tests of the labor quality market hypothesis indicate that management control rights, as summarized by the form of ownership, does not appear to significantly affect the propensity to recruit and retain college educated labor. It does, however, appear to substantially affect the willingness of managers to invest in training the workforce.

Table 2 reports on the results of tests of the impact of labor quality on productivity. The results show a robust relationship between labor quality, measured in terms of college education and training expenditure, and labor productivity. The combined value of the estimated output elasticities for college education and training expenditure is 0.28; while the estimate of the contribution of college education exceeds that of training, its statistical significance is less.

Finally, Table 3 shows the results of estimates of the reduced form equation in which Equation (1) is substituted into Equation (2). The reduced form shows the impact of managerial control rights, as shaped by ownership, on enterprise productivity. The results indicate that foreign joint ventures, which also in Table 1 demonstrated the

greatest commitment to training, exhibit the highest level of productivity. No other ownership form exhibits a distinct productivity advantage over state-ownership.

A possible explanation of this finding is, as suggested above, that the stock of college graduates that remained in state-owned enterprise in 1995 was larger than warranted by the character of the market in labor quality in that sector. As the proportion of college graduates in the state sector falls relative to that in the non-state sector, the predicted productivity differentials will become more apparent.

6. Conclusion

In the lecture he delivered when he received the Nobel Prize, Coase predicted that “recognition (of the role of the institutional structure of production) will lead to a change in the way we analyze the working of the economic system....” (1993, p. 713). This paper extends Coase’s analysis of the role of property rights in creating efficient resource use to the realm of markets in quality generally. Viewed from Coase’s perspective, we see that motivation for the creation and exchange of the quality of labor services, and in principle all other goods and services, depends critically on the assignment of property rights.

This essay argues that the essential difference between a socialist system and a capitalist system lies in the assignment of the complement of property rights that bear on the ability of workers and managers to effectively trade on labor quality. In the course of transition, in the absence of a clear assignment of managerial control rights in the traditional state sector, through a process of adverse selection entailing the exit of high quality workers, state-owned enterprises are successively hollowed out. Once workers

acquire right to trade on their human capital and intensity of work effort and restrictions on new firm entry are eliminated, high quality workers will migrate to the fringe, either accepting employment in the formal fringe sector or vertically integrating to form their own individual enterprises.

A review of the empirical evidence generally yields support for this conclusion in the cross section. The evidence shows that in relation to other ownership forms, in SOEs wage incentives are used less, shirking is more pervasive, and expenditures on upgrading labor quality are proportionately small. Because the data we review are cross-section data, we are not able to observe the dynamic process of adverse selection involving the successive exit of high quality labor and progressive decline in enterprise performance. Such an investigation will require a balanced panel mixed ownership enterprise data, which are presently not available for China.

Table 1
Impact of Managerial Control (Ownership) on Labor Quality

	% of college grads in the workforce [natural log (NL)]	Training expenditure Per capita (NL)
Constant	-0.472 (17.210)	-0.036 (0.318)
Collective	-0.067 (1.696)	0.457 (2.896)
Overseas cooperative	0.147 (0.508)	1.178 (1.273)
Overseas joint venture	-0.018 (0.229)	0.832 (2.848)
Overseas wholly- owned	0.132 (0.983)	1.031 (2.019)
Foreign cooperative	-0.046 (0.658)	-0.130 (0.470)
Foreign joint venture	0.007 (0.059)	0.962 (4.103)
Foreign wholly owned	0.011 (1.064)	1.380 (3.675)
Private enterprise	0.167 (0.751)	0.534 (0.583)
Shareholding enterprise	0.079 (1.523)	0.285 (1.244)
Industry dummies (statistically significant)	13 of 17	1 of 17
R ²	0.130	0.083
Adj R ²	0.102	0.044
Observations	1029	649

*The references intercepts are state-owned enterprise; figures in parentheses are t-statistics.

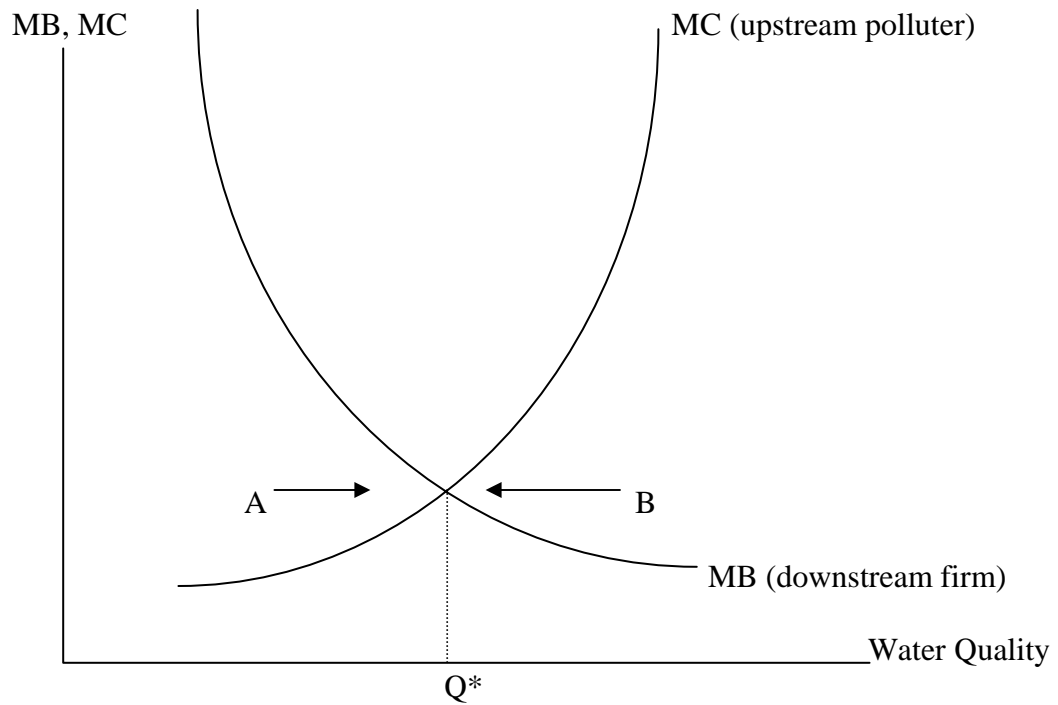
Table 2
Impact of Labor Quality on Productivity
(dependent variable = natural log of gross value of industrial output/labor)

Constant	2.438 (21.586)
Capital/labor (NL)	0.034 (1.254)
Intermediate/labor (NL)	0.447 (18.964)
College educated per capita (NL)	0.197 (2.157)
Training expenditure per capita (NL)	0.085 (3.055)
Industry dummies	6 of 17 stat. signif.
R ²	0.442
Adjusted R ²	0.423
Observations	647

Table 3
 Reduced form: Impact of Managerial Control (Ownership) on Productivity
 (dependent variable = natural log of GVIO/labor)

Constant	2.323 (26.302)
Capital-labor ratio (NL)	0.034 (1.590)
Intermediate-labor ratio (NL)	0.464 (26.709)
Ownership:	
Collective	-0.012 (0.566)
Overseas cooperative	1.009 (1.531)
Overseas joint venture	0.100 (0.566)
Overseas wholly owned	0.303 (0.982)
Foreign cooperative	-0.170 (1.081)
Foreign joint venture	0.418 (3.111)
Foreign wholly owned	0.140 (0.588)
Private	-0.284 (0.559)
Shareholding	0.002 (0.015)
Industry dummies	5 of 17 are stat. signif.
R ²	0.461
Adjusted R ²	0.446
Observations	1034

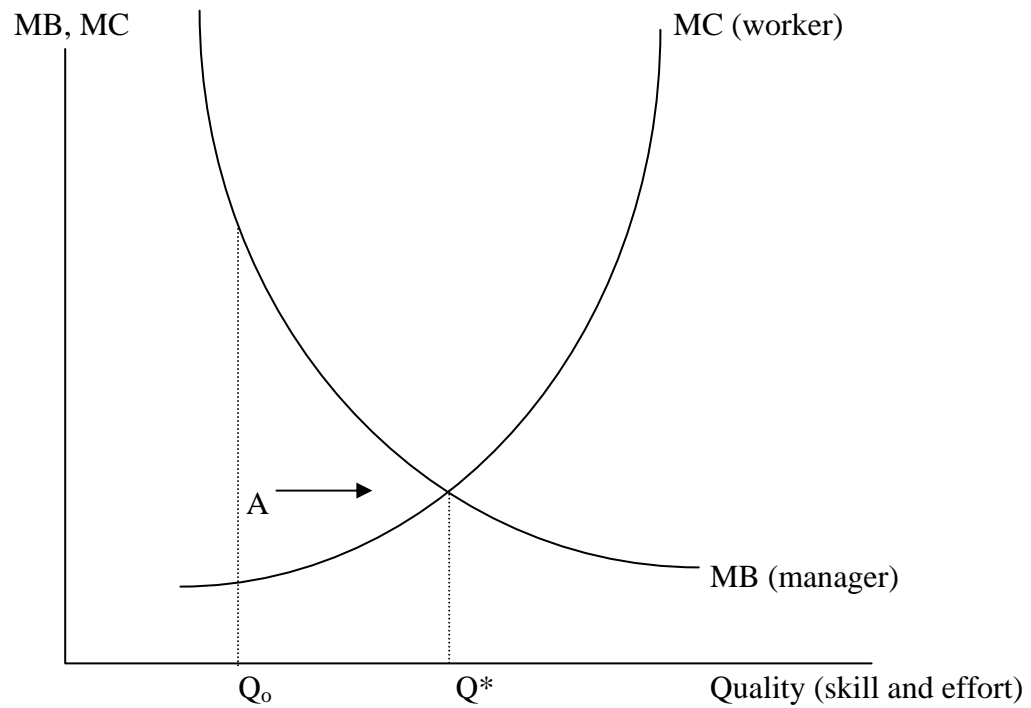
Figure 1: Market for Water Quality



A: Rights are assigned to the upstream polluter; the downstream firm purchases pollution rights from the upstream firm; by not using these rights, the downstream firm improves water quality to Q^* .

B: Rights are assigned to the downstream firm; the upstream polluter purchases pollution rights from the downstream firm; the upstream polluter uses these rights to create less water quality, as shown at Q^* .

Figure 2: Market for Labor Quality



A: Rights to accumulate and negotiate the exchange of labor quality are assigned to workers; rights to monitor and reward labor quality are assigned to managers.

Annex A

Simulation exercise for the missing market in labor quality model.

The SOE produces with three kinds of inputs. These are low-quality labor (L_L), high-quality labor (L_H), and a set of complementary non-labor inputs (Z). Also, by definition, for comparable bundles of complements, Z and L_i , the value of L_H 's marginal productivity is always greater than that of low-quality labor, i.e. $L_H = \theta L_L$, where $\theta > 1$.

The production technology is:

$$Y = (L_L)^\alpha (L_H)^\beta (Z)^{1-\alpha-\beta}. \quad (1)$$

With competitive markets for complementary inputs, the Z factors are compensated according to the value of their marginal productivities. Hence, $(1-\alpha-\beta)Y$ is paid out to Z in compensation.

Managerial control rights are defined along the interval $0 < \Phi < 1$. Where $\Phi = 1$ implies a complete set of managerial control rights, in the Alchian and Demsetz sense, including the authority and incentive to monitor labor and provide a reward equivalent to the value of its marginal product. When $\Phi = 0$, the manager has no control rights; unable or unwilling to monitor and reward productivity differences, he pays a uniform wage out of the total wage bill.

Therefore, for $\Phi = 1$, $w_L = \alpha Y/L_L$ and $w_H = \beta Y/L_H$, whereas for $\Phi = 0$, $w_L = w_H = w^* = (\alpha Y + \beta Y)/(L_L + L_H)$. For intermediate values of Φ ,

$$w_H/w_L = \Phi[(\beta L_L / \alpha L_H) - 1] + 1. \quad (2)$$

Labor's rights are defined by the parameter ρ , which lies in the interval $0 < \rho < 1$. The value $\rho = 0$ represents the case in which labor is subject to outcomes that are determined by the state labor allocation system and over which it has no control. The value $\rho = 1$ represents the state of the world in which labor exercises full control over its labor services. Specifically, when $\rho = 1$ labor is fully free to move and trade on the quality of its services.

The technology of the non-state sector is the same as the state sector, except that all workers are high quality, i.e. $Y = (L_H)^\sigma (Z)^{1-\sigma}$, where $\sigma = \alpha + \beta$. Like the state sector, the non-state sector operates in the context of a competitive Z market. Unlike the state sector, the assignment of managerial control rights is complete, i.e. $\Phi = 1$, so that w_H , the wage for high-quality labor in the non-state sector is $\sigma(Y/L_H)$.

Finally, although labor may enjoy a full set of labor rights, i.e. the right to trade on the quality of its services and the right of mobility, it faces transaction costs. These include search costs such as acquiring and processing information regarding employment opportunities in the non-state sector. We define labor's response function as γ , which

also lies in the interval $0 < \gamma < 1$, where $\gamma = 0$ represents the case of total rigidity and $\gamma = 1$ the case of total flexibility.

The fraction of high-quality workers that migrate out of the state sector in any period is defined by:

$$(M/L_H)_t = \min\{\gamma\rho[(w_H'/w_H)_t - 1], 1\},$$

where w_H satisfies equation (2), the wage differential constraint, and $w_H L_H + w_L L_L = (\alpha + \beta)Y$, the wage bill constraint.

We simulate various paths based on different sets of parameter values. The simulations are computed under the assumptions that the state sector is initially endowed at $t = 0$ with $L_L = 1,000$, $L_H = 500$, and $Z = 1,000$; also, $\alpha = \beta = 1/3$. At $t = 0$, the emerging non-state sector is endowed with one unit of high-quality labor and two units of Z . In each period, Z is distributed between the state and non-state sectors so as to equalize the value of its marginal product.

For the extreme case in which $\Phi = 0$, $\theta > 1$, and $\gamma = \rho = 1$, the exit of high quality labor from the state sector is complete and instantaneous. Figure 1 shows the paths in which $\Phi = 1/2$, $\theta = 2$, and $\gamma\rho = 1/2$. The latter parameter values might arise from the response function, γ , valued at $1/2$ or it might result from parameter values in which $1/2 < \gamma$, $\rho < 1$.

Using these parameter values, simulate values of w_H and w_H' and prepare a graph that shows their evolution over time.

Case II: Effort is endogenous. For the high-quality labor, effort is endogenous. With full effort, one unit of $L_H = \theta$ units of L_L , where $\theta > 1$. However, the actual work effort is $\Phi(\theta - 1) + 1$.

Investigate the effect that various Φ values have on the productivity of Z (e.g. capital, technology, intermediate inputs).

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