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Skill differentials, return to schooling, and market segmentation in a transition economy: the case of Mainland China

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Abstract

A body of existing research attributes evident underpayment of workers and low private returns to schooling in China through the mid-1990s to the persistence of labor-market monopsony. We find that rural enterprises overpay production workers relative to a monopsony profit-maximizing benchmark, while there is extreme underpayment of skilled workers relative to the monopsony profit-maximizing amount. This relatively large "exploitation" of skilled workers explains, in a proximate sense, low private returns to schooling.

JEL classification: P23; J24; J31; D33; O15
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1. Introduction

A persistent puzzle in China's economic evolution from reform through at least the mid-1990s is that wage differences by level of skill, occupation, and/or schooling remained very narrow and returns to higher education remained low in comparison with those in other countries,[2] both industrialized and industrializing, and when compared to

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[2] See, for example, Jamison and Van Der Gaag (1987), Dessi (1991), Byron and Manaloto (1990), Fleisher et al. (1996), Gregory and Xin (1995), Maurer-Fazio (1997), Maurer-Fazio et al. (1999), Psacharopoulos (1985), Wang et al. (1995), Knight and Li (1996), Li and Zhang (1998), Zax (1994), and Yang and An (1997).

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those in some smaller transition economies, including, for example, the Czech Republic (Munich et al., 2000), Slovenia (Orazem and Vodopivec, 1995), and Bulgaria (Jones and Ilayperuma, 1994). Although returns to higher education in the Russian Republic are among the lowest in the world, this can in large part be attributed to the extraordinarily high proportion of college graduates in Russia (over 20% of individuals aged 25–64 in 1995), which is nearly equal to that in the United States and higher than the average for OECD countries. (Sheidvasser and Benítez-Silva, 2000). It is difficult to attribute the low return to higher education in China to a super-abundance of college graduates, because the proportion of graduates of 4-year universities in China in the population 16 years of age and older was less than 1% in 1997 (Statistical Yearbook of China, 1998).

It is extremely unlikely that low private returns to education in China have reflected a low marginal product of labor. Although the return to schooling in the agricultural sector when measured in terms of productivity or the profit of family enterprises does appear to be relatively low (Yang and An, 1997; Yang, 2000), this is not the case in Chinese industry, and low private returns to schooling are found in both sectors. Not only have significant gaps between wages and the estimated marginal product of labor been reported in a number of studies[3], but also, and of critical importance to the main focus in this paper, the ratio of the marginal product of highly educated workers to that of other workers appears to be much higher than the ratio of their rates of pay or earnings. (Previous research showing this inequality is reported in Fleisher et al., 1996; Fleisher and Chen, 1997.)

In this paper, we address the puzzle of this differential wage gap and attempt to learn why, in a society where educated labor is relatively very scarce, its remuneration remained far below its contribution to productivity, more than a decade and a half after reforms began. The paradigm of labor-market monopsony provides a useful organizing framework for our research, because in rural China, it may exist in small labor markets dominated by one or a very few rural enterprises (Dong and Putterman, 1996). We extend previous research by tying the monopsony approach to skill- or schooling-based earnings differentials.

In Section 2 we provide evidence on the gap between the marginal product of labor and wages. We first estimate marginal products of two classes of workers: (1) production workers and (2) technical, administrative, and staff (TAS) workers in the context of a production function that allows for effort-enhancing wage payments. We then calculate wage gaps (marginal product–wage ratios) for both groups of workers. The larger wage gap for TAS workers "explains" in a proximate sense observed low returns to schooling.

Next, we explore alternative explanations of the estimated wage gaps. We find that the wage gaps cannot be simply explained in terms of profit maximization under monopsony. We then explore the relationship between the wage gaps and variables likely to be

[3] Examples include Dong and Putterman (1996), Xu (1991, 1995), Dong and Putterman (2000a,b), Parker (1999), Pitt and Putterman (1999), and Yang and Zhou (1999). See also Svejnar (1990), Hay et al. (1994), and Jefferson and Rawski (1994). Jefferson et al. (1992) report estimated nominal marginal products of labor in 1988 to be 2974 and 1648 yuan for enterprises and collectives (urban and TVE's), respectively. The China Statistical Yearbook 1991 reports average annual wages of staff and workers in state-owned enterprises in 1988 to be 1853 yuan and in urban collectives to be 1426 yuan.

associated with the degree of monopsony power and estimated firm returns to scale. The variables associated with monopsony power do not satisfactorily explain variation in the wage gaps as well as does the estimate of returns to scale. We infer that the monopsony-profit maximization hypothesis alone cannot explain the wage gaps but that some form of worker-mobility restrictions must be invoked to explain the continued "exploitation" of both production and TAS workers.

Section 3 concludes and derives implications for economic reforms and the effects of institutional rigidities on economic growth and the distribution of wages and incomes.

2. Production, labor, schooling, and wages

In order to derive estimates of the marginal product of two classes of workers, we estimate the following augmented Cobb–Douglas production function:

$$Y = K^{\alpha}\left(\prod_{j}(e_j L_j)^{\beta_j}\right)\exp(\phi Z + \epsilon) \tag{1}$$

where: Y = value added; K = net capital stock; L_j = labor of the jth group; $j = 1, 2$; e_j = effort function for the jth group of employees; Z = vector of dummy variables; ϵ = an *iid* disturbance, and α and β are elasticities of output with respect to capital and (various types of) labor.

The effort function is defined as

$$e_j = B_j\left(\frac{W_j}{W_{aj}}\right)^{\eta_j}, \tag{2}$$

where B and η are parameters controlling for baseline effort and responsiveness of effort with respect to the wage premium, respectively. W_j is the observed wage of the jth group of employees, and W_{aj} the estimated spot-market competitive wage. Details on how to obtain W_{aj} is explained later.

Augmentation of the conventional production function with an effort function serves to capture one of the key elements of Chinese labor market reform on production, namely, to break with egalitarianism and introduce material incentives. This idea is conformable with the basic notion of an efficiency wage. Our specification reflects the reality that production workers and technical workers perform different tasks in a firm. Since we distinguish these two types of workers, different efficiency wage structures can be recovered for each group.

The data set is a panel survey of 200 large rural enterprises (mostly TVEs) for the years 1984–1990.[4] The survey covers 20 enterprises in each of 10 provinces. The 10 provinces are Anhui, Hubei, Guangdong, Jiangsu, Zhejiang, Sichuan, Hebei, Liaoning, Shanxi, and Gansu. We define Hebei, Guangdong, Liaoning, Jiangsu, and Zhejiang as coastal provinces and the rest as non-coastal provinces. The survey not only includes quantitative statistics about the individual firms, but also provides important environmental statistics

[4] We are grateful to Dennis Yang, Yaohui Zhao, Xiao-yuan Dong, Isabelle Perrigne, and Gary Jefferson for their help in obtaining and using these data.

Table 1
Production function (dependent variable: ln Y[a])

Variable	Description	(1) OLS	(2) OLS	(3) IV	(4) IV
Constant		− 1.33 (− 6.35)	− 0.79 (− 3.96)	− 0.99 (− 4.20)	− 0.58 (− 2.55)
K	ln net capital stock	0.42 (13.73)	0.40 (12.68)	0.50 (15.96)	0.48 (14.69)
L	ln total employment	0.74 (16.65)	–	0.68 (13.81)	–
PW	ln production workers	–	0.49 (9.89)	–	0.46 (7.93)
TAS	ln technical/ administrative staff	–	0.30 (5.91)	–	0.31 (5.06)
MT	efficiency wage[b]	0.36 (6.21)	–	0.34 (5.53)	–
MPW	efficiency wage[b] for production workers	–	0.20 (3.17)	–	0.17 (2.50)
MTAS	efficiency wage[b] for technical/ administrative staff	–	0.17 (2.53)	–	0.20 (2.74)
YR85	year 1985 dummy	0.24 (2.06)	0.25 (2.18)	–	–
YR86	year 1986 dummy	0.03 (0.25)	0.05 (0.47)	− 0.31 (− 2.75)	− 0.28 (− 2.51)
YR88	year 1988 dummy	0.49 (4.26)	0.49 (4.27)	0.02 (0.23)	0.03 (0.28)
YR89	year 1989 dummy	0.52 (4.46)	0.51 (4.36)	0.08 (0.72)	0.07 (0.61)
YR90	year 1990 dummy	0.63 (5.48)	0.63 (5.43)	0.17 (1.56)	0.17 (1.49)
Number of observations		988	979	831	822
Adjusted R^2		0.60	0.60	0.61	0.61

T-statistics are in parentheses. The 1987 observations are dropped due to inadequate data. So the nominal number of observations should be 1200, the discrepancies reflect missing values. In the IV estimation lagged labor (1 year), for each group, respectively, is used as instruments. Thus, the 1984 observations are dropped. That explains the further loss of observations in the IV results.

[a] Y is value added.

[b] See footnote 4.

describing the markets in which the firms operates. For example, not only is there data on an enterprise's employment, but there is also information on total employment in the village where the firm is located. This allows us to test hypotheses on the impact of market structure on the behavior of the firm. Table 1 shows the results of estimating Eq. (1). Column (1) is based on all labor aggregated into one category, while column (2) is based on two categories of labor, production workers, and technical/administrative staff. The estimated labor and capital elasticities reported in Table 1 are close to the ordinary least squares (OLS) results reported by Pitt and Putterman (1999) and to the GLS estimates reported by Dong and Putterman (1996) using the same data set. There is evidence of unexploited scale economies. The estimated coefficient of the efficiency-wage variable is highly significant for all workers and for production and TAS workers separately.[5] Since

[5] We have defined the efficiency wage to be the deviation (in ratio form) of the worker's actual wage to the average wage paid to that type of worker (production worker or technical and administrative staff worker) in the same province. The ratio of the estimated efficiency-wage coefficients to their respective production–labor elasticities is much smaller than unity, and this is true for all workers taken together as well as for production and TAS workers separately. Taken at face value, these coefficients suggests that wage rates are set higher than their profit-maximizing level under an efficiency-wage scenario.

the employment decision is endogenous with output, we also instrument labor with its own value lagged one period; column (3) reports the IV results for aggregated labor, while column (4) reports the IV results for disaggregated labor. The estimation results are robust to the form of estimation used.

When the OLS elasticity estimates are used to calculate marginal products of labor, we find that for an intermediate year of the sample period, 1988, the average marginal product of all workers taken together was 5846 yuan, while the average rate of pay was only 1670 yuan annually, indicating a wage gap ratio of 3.50. When workers are disaggregated into production and TAS categories, the wage gaps in 1988 are 3.09 and 9.18, respectively. We proceed to investigate the reasons for these gaps.

2.1. Does monopsony power affect wage gaps?

An important hypothesis that has been proposed to explain the positive MPL-wage gap in Chinese rural industry is monopsony power. Dong and Putterman (1996) argue that monopsony power of rural employers in the presence of restrictions on intercommunity migration can explain the wage gap in rural industry. They ask how labor-supply curves facing Chinese rural enterprises can be upward-sloping when it is said that there is pervasive unemployment in rural China. They provide the following answers:

1. Wu (1993) reports that about 80% of TVEs were located in villages rather than in the town centers or municipal areas of their counties. This location strategy coupled with primitive communications and transportation infrastructure create sufficient conditions for monopsony under the assumption that there are economic and/or political limitations on the number of enterprises that locate in smaller villages.
2. The *hukou* system makes it difficult to change permanent residence, even among rural villages. Rural–urban migration is even more costly and disruptive, leaving a substantial rural–urban income gap, even for industrial workers who have left farm employment (also, see Zhao, 1995).
3. Travel from one village to another is expensive, and disruptions of family lives are psychologically costly.
4. They report that during 1986–1990, only 28.3% of workers employed in TVEs came from other villages.
5. Skilled workers are in short supply, even if "common" labor experiences considerable underemployment.

Zhang et al. (2002) note that Mallee (2000) and Yang and Zhou (1999) demonstrate that a number of barriers, such as land tenure arrangements and mandatory marketing delivery quotas, have increased the cost of out-migration and dampen off-farm labor market participation. It appears plausible to us that the supply of TAS workers is less elastic than that of production workers, because there is surely a smaller pool of educated workers from which to attract new hires. Moreover, the hukou system, when

Table 2
Elasticity of labor supply

	Elasticity	Profit-maximizing gap
Production Workers	0.19 (4.10)	6.26
TAS	0.30 (6.67)	4.33

T-statistic in parenthesis. Labor supply function is estimated by regressing log employment on log wage, year dummies, worker type dummies, interaction terms between wage type. On the basis of an *F*-test, we cannot reject the hypothesis that labor-supplied elasticities are constant over time for both production TAS workers. However, we can reject the hypothesis that the elasticity for production TAS workers are equal with *p*-value equal to about 0.1.

applied to educated workers, imposes relatively more severe limits on the portability of their human capital.[6]

In order to establish the role of monopsony in explaining observed wage gaps, we use as a benchmark the degree of monopsonistic "exploitation" that would occur under profit-maximizing behavior. An obvious direct test of the joint hypotheses that the wage gaps we and others have estimated reflect profit-maximizing monopsony requires knowledge of labor-supply elasticities from which profit-maximizing wage gaps can be derived.[7] Estimated labor-supply elasticities are reported in Table 2. We assume that any exogenous shifts in communities' labor-supply functions are captured by year dummy variables and their interaction with the wage regressor. A single estimated elasticity for each class of workers is reported in Table 2. The highly significant elasticities imply profit-maximizing wage-gap ratios of approximately 6.3 and 4.3 for production workers and TAS workers, respectively. Our estimation results with the complete set of year-interaction terms imply that there was no statistically significant trend in the labor-supply elasticities over time, but that there is a statistically significant difference between the labor-supply elasticity of TAS workers and that of production workers.

Comparisons of profit-maximizing with estimated wage gaps are shown in Table 3 for each year, 1985–1990, except 1987. [The magnitudes of the wage gaps reported in Table 3 are very close in magnitude to those reported by Xu (1995, p. 36), where the marginal product estimates are based on provincial aggregate data for TVEs during about the same period as the data in our sample.] In 5 of the 6 years for production workers, the estimated profit-maximizing wage gap is larger than the observed wage gap, implying that enterprises place a positive value on employment in addition to profit. Thus, the conventional

[6] Zhao (1999) reports that in a 1995 household survey conducted in Sichuan province, rural nonfarm nonmigrant workers had higher schooling levels than did those who had migrated out of their local areas, even though they contributed less to household incomes than comparable workers who migrated, implying that private benefits, at least, are greater for migrants. Zhao infers that the uncertainty of employment without hukou, transportation, lodging, and psychic costs of migration outweighed immediate economic gains. Zhao's results may not to apply to all of China, though, as she (see Zhao, 1995, 1999) does report that higher levels of schooling significantly increased the probability of obtaining a permanent hukou for migrants to Beijing. Consistent with Zhao's research, Zhu (2002) finds, based on a 1993 survey in Hubei province, that the effect of education on the income level of migrants was less than for nonmigrants. Even as late as 1995, Cai et al. (2002) view rural outmigration as a three-step process, and one that does not transcend regional boundaries.

[7] The profit-maximizing wage gap is $1 + 1/\eta$, where η is the elasticity of supply.

Table 3
Observed profit-maximizing wage gap

MPL/wage	Year	Observed[a] (MPL/wage)	Profit maximizing[b]
All workers	1984	2.56 (2553/997)	5.75
	1985	2.51 (3681/1466)	7.25
	1986	2.72 (3554/1307)	3.04
	1988	3.50 (5846/1670)	3.86
	1989	3.78 (6577/1740)	3.08
	1990	4.84 (7277/1504)	11.00
Production workers	1984	2.10 (1855/883)	5.76
	1985	1.86 (2701/1452)	8.14
	1986	2.27 (2716/1196)	3.44
	1988	3.09 (4520/1463)	4.13
	1989	3.31 (5108/1543)	4.57
	1990	3.98 (5765/1448)	11.00
TAS	1984	8.44 (12042/1427)	6.88
	1985	10.08 (17176/1704)	4.13
	1986	7.24 (16073/2220)	4.03
	1988	9.18 (23872/2600)	4.13
	1989	9.44 (25103/2659)	4.13
	1990	12.77 (27246/2134)	6.55

[a] The observed gap is the calculated marginal product of labor using the estimates from the OLS production function divided by monthly wages (shown in parentheses).

[b] The profit-maximizing gap is 1 plus the inverse of the elasticity of labor supply. This is the "hypothetical" gap if the enterprise is indeed a profit-maximizing monopsony.

wisdom that overemployment is the rule in Chinese enterprises is supported against the standard implied by the joint hypotheses of monopsony and profit maximization.[8] On the other hand, the estimated profit-maximizing wage gap is uniformly lower than the observed wage gap for TAS, implying underemployment of this class of workers. Bearing in mind that the annual differences in the estimated profit-maximizing gaps are highly insignificant, it is interesting to note that the observed gaps tend to drift upward, implying perhaps a reduced tendency over time to "overemploy" production workers and an increased tendency to "underemploy" TAS workers.

2.2. Scale economies and the division of output

The difference between the wage gaps of production and TAS workers cannot be explained in terms of simple profit maximization under monopsony. Perhaps production workers tend to benefit from political favoritism, but we have no independent evidence that this is true. A possibly important additional consideration is suggested by the estimated production functions reported in Table 1, which indicate that the typical rural collective operates in the range of increasing returns to scale. An implication is that in the absence of a subsidy or an entrepreneur with deep pockets, it is impossible for all factors to

[8] For another approach to analyzing Chinese enterprises' goals in choosing between profits, wages, and employment, see Svejnar (1990) and Pitt and Putterman (1999).

be paid the value of their marginal products. "Underpayment" of at least some factors is a mathematical necessity. It is intriguing, therefore, to explore the extent to which the wage gaps we have estimated are associated with the severity of this "adding-up" problem.

To do this, we respecify the rural-enterprise production function in terms of gross output, with intermediate inputs included among the right-hand variables, as follows:

$$\ln\mathrm{GY} = \mathrm{Constant} + \eta_K \ln K + \eta_P \ln\mathrm{PW} + \eta_T \ln\mathrm{TAS} + \eta_R \ln\mathrm{RM} \tag{3}$$

where GY is gross output, K is net value of fixed capital, PW is number of production workers, TAS is number of technical workers, and RM is raw materials. The η's are corresponding parameters. Respecification of the production function in terms of gross output with intermediate inputs included among the regressors is appropriate because we are looking for the possible role of increasing returns to scale in explaining wage gaps, and we should not assume constant returns to raw materials. Moreover, we are searching for the ultimate "residual claimants," and the intermediate-input provider is certainly a legitimate candidate.

We then derive the ratios of marginal products to factor payments as

$$\frac{\mathrm{MP}_i}{\mathrm{WAGE}_i} = \frac{\eta_i}{S_i} \tag{4}$$

where i indexes each of the four groups of factors of production, S_i is the share of payment to this group in GY.[9] (The return to capital is defined to be the gross value of output less payments for intermediate inputs and wages. Thus, return to capital includes all reported accounting profits, taxes, and interest.) The estimated gaps are then regressed on estimated returns to scale ($\widehat{\mathrm{RTS}}$).[10] In order to obtain large enough samples to estimate reliable production-function parameters, we group the data by province and year, obtaining 60 samples within which Eq. (3) is estimated, yielding 60 estimates of each production-function parameter, which are the basis for estimating second-stage equations in which factor-payment-marginal product gaps are regressed on estimated returns to scale.

The results of the second-stage estimates are reported in Table 4. They are consistent with the following interpretation. The payment gap for intermediate inputs is not associated with estimated returns to scale. Intermediate-input providers must be paid market prices and do not receive lower payments from unprofitable enterprises. The payment gap we attribute to "capital" is weakly and negatively correlated with returns to scale. Thus, the hypothesis that providers of nonlabor inputs act as residual claimants as a group can be rejected. In contrast, the payment gaps for production and technical workers

[9] This can be verified as follows. Take production workers as example. Multiply the numerator and denominator of the right-hand side of Eq. (4) by GY/PW, then it becomes

$$\frac{\eta \dfrac{\mathrm{GY}}{\mathrm{PW}}}{S \dfrac{\mathrm{GY}}{\mathrm{PW}}}$$

The numerator now has the interpretation of the marginal product of production workers, while the denominator is average wage paid to them.

[10] Estimated returns to scale are the predicted values from regression of returns to scale to a vector of instrument variables. These variables include capital, two types of labor, raw material, 5-year dummies and nine-province dummies.

Table 4
Marginal product–wage gap and returns to scale ($N=60$)

	Marginal product–wage gap			
	K	PW	TAS	RM
Constant	1.154 (3.19)	−2.728 (−1.48)	−31.054 (−2.03)	0.684 (1.61)
$\widehat{\text{RTS}}$	−0.553 (−1.66)	5.103 (2.99)	45.050 (3.19)	0.100 (0.26)
Adjusted R^2	0.03	0.12	0.13	−0.02

T-statistics in parentheses. $\widehat{\text{RTS}}$ is the predicted returns to scale from regression of returns to scale on a vector of instrument variables. See footnote 9 for details.

are both positively and significantly correlated with returns to scale, with the regression coefficient for technical workers being about eight times larger than that for production workers. This is consistent with the hypothesis that both groups, particularly technical workers, are de facto residual claimants in the presence of unexploited scale economies. The sociopolitical forces that lead to this division of output are not obvious, but it is clear that this "exploitation" of labor would be impossible in the absence of restrictions on worker mobility. In other words, it is consistent with a form of monopsony wage setting.

2.3. Monopsony, scale economics, and wages

To gain further insight into determinants of the wage gaps for production and TAS workers, we regress the mean wage gap for production and TAS workers, respectively, on the following variables: estimated returns to scale, local employer-concentration ratios and available land per worker; provincial measures of foreign direct investment per worker, and unemployment.[11] We hypothesize that under monopsony, the estimated coefficients of estimated returns to scale and employer concentration will be positive and that of unemployment will be negative. The rationale is that increasing returns to scale preclude "full" payment to all factors, with labor being "exploited" under monopsony; employer concentration is an indirect measure of monopsony power; while higher unemployment will increase the elasticity of labor supply. The estimated coefficient of the land–labor ratio is uncertain under the profit-maximization-monopsony joint hypothesis, because, while more land per person should increase agricultural labor productivity, the effect on the elasticity of marginal product with respect to labor (and, hence, on the elasticity of labor supply) is ambiguous.[12] The foreign-investment variable is included to represent funds available in an environment of very imperfect financial markets. Given that estimated returns to scale is included in the regression, the estimated net relationship between FDI and the wage gap may be interpreted as the effect of "ability to pay" on wages. We take a negative coefficient for the foreign-investment variable to be consistent

[11] Land per worker is available in the local community data. Foreign investment per worker is obtained from the Statistical Yearbook of China. Unemployment estimates are reported in Liu (1997) and are based on an estimate of available labor force minus the sum of workers required to operate family farms and nonagricultural employment.

[12] Under the assumption of a Cobb–Douglas production function, an increase in the labor–land ratio shifts the labor supply function to the nonagricultural sector upward, but leaves the elasticity unchanged.

Table 5
Augmented monopsony regression

Variable	Description	Production workers	Technical/ administrative staff
Constant		−0.062 (−0.027)	−27.804 (−1.451)
MCR	ln concentration ratio[a], group median	−2.099 (−0.283)	−47.131 (−0.758)
MMPC	ln acreage per person, group median	−0.405 (−1.510)	2.409 (1.071)
MFDL/LF	foreign direct investment per labor force, group median	−0.025 (−1.385)	−0.077 (−0.500)
MUNEM	unemployment rate, group median	−4.8167 (−0.806)	73.476 (1.464)
$\widehat{RTS}$	predicted returns to scale	4.977 (2.719)	35.079 (2.282)
Number of observations		60	60
Adjusted R^2		0.13	0.13

The dependent variable is the gap between marginal product of labor–wage rates. *T*-statistics in the parentheses.
[a] This is the employment share of this enterprise among all industrial enterprises in the township or village.

with the hypothesis that capital constraints increase wage pressure in the presence of excess labor supply and monopsony power.

Table 5 presents the results, which are based on the same 60 observations as used for the regression reported in Table 4. The adjusted R^2 equals 0.13 in both the production workers and TAS regressions. The estimated regression coefficient of the concentration ratio is statistically insignificant for both production and TAS workers, which is inconsistent with the joint hypotheses of monopsony and profit maximization. The coefficient of land per worker is negative and marginally significant for production workers, but positive with little significance for TAS workers. Unless increased land per worker lowers the elasticity of supply of production workers, it is difficult to see how the estimated coefficients of the land–labor variable support the joint hypotheses of monopsony and profit maximization. The coefficient of foreign direct investment is negative, which is consistent with the hypothesis that a higher level of FDI allows firms to pay wages more closely approximating marginal product, although its *t* value is not large for production workers and is very low indeed for TAS. The coefficient of unemployment is negative and insignificant for production workers and positive and marginally significant for TAS.

Table 6
Sample statistics for enterprises ($N=200$)

	Gross output	Net capital	Employment
Unit	10,000 yuan	10,000 yuan	person
1984	336.139 (593.218)	65.183 (88.725)	298 (309)
1985	486.576 (849.214)	96.718 (132.202)	369 (354)
1986	532.570 (1025.870)	162.001 (289.581)	419 (472)
1987	624.188 (1231.110)	237.213[a] (509.598)	409 (521)
1988	631.756 (1018.180)	171.432 (277.068)	387 (439)
1989	709.366 (1262.700)	209.628 (358.718)	382 (438)
1990	757.204 (1317.700)	214.514 (353.842)	374 (481)

Standard deviation in the parentheses.
[a] Original price of fixed capital.

The coefficient of estimated returns to scale is the most significant among all the results reported in Table 5, is positive for both classes of workers, and is about five times larger for TAS than for production workers. This is consistent with the hypothesis that rural TVEs cannot fully exploit scale economies and thus cannot ''afford'' to pay employees the value of their marginal products. Workers are forced to act as residual claimants in the presence of increasing returns to scale and employer monopsony power, with the brunt of the burden borne by TAS workers. Both labor and product markets are restrained from approaching full national scope by various forms of domestic protection and regulation at the local and provincial levels. Evidence on this is widespread and is documented, among other places, in Cai et al. (2002) and in Young (2000) (Table 6).

3. Conclusion and outline for further work

We conclude that compression of wage differentials and low returns to schooling in China did not disappear during the first decade of transition to a market economy. Even though we reject profit maximization under monopsony as the sole or principal determinant of wage and employment outcomes (as do other researchers), we believe that skill–wage compression and low returns to schooling can only be understood in terms of restrictions on worker mobility along with (in rural collectives) unexploited economies of scale in production. Our analysis of rural enterprises implies that both production workers and TAS workers (the latter to a far greater degree) are de facto residual claimants. This implies that regionalism has a double impact on worker incomes; not only does it restrict freedom to seek out the highest paying jobs wherever they may be, but it also restricts product markets, thus contributing to unexploited increasing returns to scale.

On a more positive note, our empirical results so far indicate not only the ''bad news'' of immense labor-market disequilibrium (relative to a profit-maximization criterion), but also the ''good news'' of tremendous potential continued economic growth from exploitation of scale economies and the reallocation of resources toward more schooling and training of skilled workers. When these workers begin to be paid anywhere near what they seem to be worth, incentives to acquire further education will be greatly enhanced, and those with lower levels of schooling should perceive much greater incentives to advance themselves by remaining in school longer whenever economically feasible.[13] Thus, all levels of society should benefit, although the short-term impact may be to widen inequality of living standards. Exploiting these growth opportunities should be one of the greatest challenges to Chinese policy makers.

[13] There is some limited, not to say anecdotal, evidence that private returns to schooling may be approaching levels in other economies. Wang et al. (2000) report wage payments based on a small survey of workers in Harbin City that entry-level monthly wages of white-collar managers with college degrees earned 1392 yuan monthly (not including in-kind payments), while team heads who had completed high or vocational school earned 917 yuan. The implied marginal rate of return to a year of college is 13.8%, which would be an underestimate of the true private rate of return if managers receive a higher proportion of their total compensation in kind than do team heads (which the authors suggest they do).

4. Uncited references

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