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Full and Partial Privatization in China: The Labour Consequences

By

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Abstract

This paper is the first paper to present findings evaluating the consequences for employees of full and partial privatization using difference-in-differences combined with propensity score matching. We find: (1) partial privatization causes job creation in contrast to full privatization, which destroys jobs, (2) full privatization causes higher labor productivity improvement than partial privatization, (3) wage increases occur only in partially privatized firms and (4) there are small increases in labor quality investment in both cases. The results suggest partial privatization exploits market discipline to induce labor productivity whilst simultaneously providing welfare improvements for labor. This is the 'win-win' outcome predicted by the 'helping hand' theory of government. Our results suggest that governments are likely to gain wider support for a program of partial privatization rather than full privatization.

Outline

Non-Technical Summary

Two dominant views seek to explain the robust empirical evidence that state-owned firms are less efficient than private firms. First, the "political view" contends that the state promotes social and political objectives that might be in conflict with the profit-maximization objective. Second, the "managerial view" emphasizes the existence of agency problems in SOEs and the absence of any effective mechanism to attenuate managers' non-profit-maximizing behavior. Both views impute that aggregate welfare would be maximized if ownership and control rights in SOEs are privatized and firms' decision processes totally depoliticized.

Firms in the private sector also have their corporate governance problems. The agency theory of the firm recognizes that managers might be seeking to maximize an objective function that includes, inter alia, firm size and the consumption of perquisites rather than maximize firms. In light of this problem, some level of political ownership and control will mitigate managerial agency costs because politicians do not want the resources over which they have influence to be diminished. In addition, the "helping hand" theory of government argues that a certain level of state ownership may have beneficial effects on stakeholders' welfare. In the context of a developing economy, proponents of this view argue that the government-firm relationship can be a means of circumventing problems associated with market failures; such as the lack of secure property rights, institutional discrimination against private investors, poor corporate governance mechanisms and managerial incentive problems. This "helping hand" view of political control therefore contrasts with the view of political control as a source of inefficiency.

This paper provides a systematic analysis of the causal effects of different degrees of privatization – minority private, majority private and wholly private – on labor welfare. In the analysis, we consider four aspects of labor welfare: employment, wages, productivity and training. Using data from the recent full and partial privatization experience of Western China we find that full privatization causes the highest labor productivity improvements but also causes job losses. Moreover, the insignificant effect of full privatization on wages suggests employees do not share in the rents generated by labor productivity improvements. This might reflect the manner in which post-privatized enterprises address the pre-privatization legacy of extra-marginal wage payments and effectively reduce wages. Therefore, exposing former SOEs to the full force of market discipline and incentives creates both winners and losers. In contrast, the results for partial privatization are particularly striking in that we find evidence of labor productivity improvements, job creation and wage improvements. This is the 'win-win' scenario predicted by "helping hand" theory. Market discipline and incentives are driving labor productivity improvements whilst a government "helping hand" simultaneously protects labor welfare via job creation and higher wages.

1. INTRODUCTION

The economy of China's western regions lags behind eastern regions in terms of economic development and it is still dominated by state owned enterprises (SOEs). As part of the Western Development Strategy (WDS), the Chinese government has sought to establish a modern corporate governance system and reduce its share of state capital in SOEs. This has involved a program of full and partial privatization – majority and minority private ownership – of SOEs. Such a program is a rare event which we exploit in order to determine and quantify the causal effects of full, majority and minority privatization on productivity, employment, wages and labor training. Whilst there is an extant empirical and theoretical literature examining privatization (see Megginson and Netter (2001) for a review), there is a paucity of research concerning the consequences of partial privatization. Gupta (2005) is a notable exception, finding that partial privatization where the government remains the controlling owner has a positive impact on productivity.

Two dominant views seek to explain the robust empirical evidence that SOEs are less efficient than private firms (e.g. Megginson and Netter, 2001). First, the "political view" contends that the state promotes social and political objectives that might be in conflict with the profit-maximization objective (Boycko et al., 1996; Shleifer and Vishny, 1994). Second, the "managerial view" emphasizes the existence of agency problems in SOEs and the absence of any effective mechanism to attenuate managers' non-profit-maximizing behavior (Fama, 1980 and Vickers and Yarrow, 1990). Both views impute that aggregate welfare would be maximized if ownership and control rights in SOEs are privatized and firms' decision processes totally depoliticized.

Firms in the private sector also have their corporate governance problems. The agency theory of the firm recognizes that managers might be seeking to maximize an objective function that includes, *inter alia*, firm size and the consumption of perquisites rather than maximize firms' profits (e.g. Williamson, 1964; Jensen and Meckling, 1976). In light of this problem, some level of political ownership and control will mitigate managerial agency costs because politicians do not want the resources over which they have influence to be diminished (Brada, 1996). In addition, the "helping hand" theory of government argues that a certain level of state ownership may have beneficial effects on stakeholders' welfare (Che and Qian, 1998; Qian, 2003). In the context of a developing economy, proponents of this view argue that the government-firm relationship can be a means of circumventing problems associated with market failures; such as the lack of secure property rights, institutional discrimination against private investors, poor corporate governance mechanisms and managerial incentive problems. This "helping hand" view of political control therefore contrasts with the view of political control as a source of inefficiency.

To our knowledge, economic theory does not offer guidance on the trade-off between the political "helping hand" and agency costs theories of government ownership. In other words, what is the optimal political involvement in order to minimize agency costs? Privatization is a key process in the depoliticization of an economy and there is concern as to its impact on stakeholders' welfare. This is particularly important if the government is to gain support for its program of reform via privatization. Assessing the welfare effects is ultimately an empirical issue and contingent on whose welfare is being examined e.g. labor, managers, private investors or government. This paper is concerned with the welfare of labor.

The issue of evaluating the causal impact of privatization is beset by selection problems in that the incidence of privatization is not randomly determined across the population of firms. A novelty of the paper is the application, for the first time in this context, of a multiple treatments propensity score matching method (Imbens, 2000 and Lechner, 2001) combined with difference-in-differences analysis. Multiple treatments propensity score matching ensures that estimates are free from selection bias into privatization schemes whilst difference-in-differences controls for enterprise-specific effects as well as time effects that are contemporaneous with privatization.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 discusses the empirical methodology employed to isolate the causal effects of different degrees of privatization on labor. Section 4 describes the data set used in the paper. Section 5 discusses the main findings from the analysis. Section 6 concludes.

2. BACKGROUND

A theoretical objection to partial privatization is that government will interfere in order to pursue its objectives. Such objectives include, *inter alia*, the pursuit of employment (Boycko et al., 1996). There is also the suggestion that employees in government-controlled enterprises receive extra-marginal wage payments (Bhaskar et al., 2006). Such political pressures lead to under-performance and the inefficient allocation of resources (Shleifer and Vishny, 1994). In the context of Shleifer and Vishney's (1994) model, politicians would pursue the partial privatization of

enterprises when it allows them to extract more employment and wages from private owners. Thus, politicians are privatizing cash flows and exploiting the market incentives in which managers operate in order to achieve more of their social objectives through partial privatization than through state ownership.

The government might partially privatize and retain an ownership stake in order to indicate to investors that it will not implement policies detrimental to the interests of the firm (Perotti, 1995). If the government takes a passive role and does not use its ownership stake to wield influence, partial privatization can be motivated by government desire to impose market discipline on managers. Indeed, Gupta (2005) reports significant improvements in the labor productivity of Indian firms following partial privatization. If inefficiencies are a consequence of over-employment and extra-marginal wage payments, managers will be motivated to improve performance by reducing employment and wage levels. Moreover, Boycko et al. (1996) argue that it is harder for politicians to influence managerial behavior when firms are not state owned because subsidy to pay for over-staffing is transparent i.e. the government will have to make subsidies known.

From an agency theory perspective, agency problems will exist when ownership and control are separate, even if government seeks to maximize the value of SOEs (Mengistae and Xu, 2004). Agency theory predicts weak corporate governance will allow managers to pursue sub-optimal levels of over-employment (Williamson, 1964). Indeed, the SOE ownership structure means that there is no individual with financial incentives to monitor and discipline managerial under-performance. In addition,

market discipline from the product market is problematic since SOEs are often subject to soft budget constraints.

Partial privatization creates an event for distinguishing between political and agency perspectives (Gupta, 2005). With full privatization it is not known whether post-privatization effects are a consequence of less political interference or better information on managers' performance. With partial privatization, the state often retains control but if the firm becomes publicly listed it will reveal more information. This makes it easier to make comparisons between state and privately owned firms. When such comparisons are possible, the government will use information on private sector firms in order to constrain the over-staffing behavior of state firms (Bhaskar et al., 2006). Partial privatization might curb government enthusiasm for over-staffing and extra-marginal wage payments if financial incentives from its ownership stake outweigh political objectives leading to over-staffing. It is not clear, however, whether government control attenuates the potential gains from exposing SOEs to market forces. Boubraki et al. (2005) find that government relinquishment of control is an important determinant of performance improvements, while Gupta (2005) finds that the government does not need to relinquish control for partial privatization to have a positive impact on performance.

China's privatization program was initiated by central government's decentralization program during the 1980s. The aim was to create a functioning market that would replace central planning in the allocation of resources to productive activity. In 1993, partial privatization was allowed to take place and involved selling a minority stake in SOEs to private individuals. This was part of a wider corporatization program that

required SOEs to establish western-style governance structures that included shareholders, a board of directors and a chair of the board and CEO posts (Aivazian et al., 2005). At this initial stage, the sale of a majority controlling stake to private investors was prohibited, largely for ideological reasons (Fan et al., 2007).

Pressure for restructuring arose due to the accumulation of non-performing loans, the South East Asian financial crisis potentially causing problems due to the relationship between SOEs and state owned banks (SOBs) (i.e. soft budget constraints were supported by SOBs), and central government's desire to join the WTO (Rawski, 2002; Jefferson and Su, 2006). The Chinese government initiated three industrial restructuring policies: furlough, conversion of most SOEs, and intensification of the shareholding program (Rawski, 2002; Jefferson and Su, 2006). Under the popular slogan "retain the large, release the small", a large number of SOEs and collective-owned firms were on the list of formal conversion in the following years. This conversion, along with other measures, was intended to achieve former Premier Zhu Rongji's three year schedule to turn loss-making SOEs to profit-making ones. According to some scholars, the shareholding system was made a centerpiece in the Chinese Communist Party's 15th Party Congress in 1997 of the enterprise restructuring. This shift towards the corporatization and privatization of SOEs provided incentives for managers to improve firm performance (Aivazian et al., 2005; Jefferson and Su, 2006).

3. MODELING FRAMEWORK

In this paper, each firm can be thought of as being under any of four treatments or schemes: no restructuring, minority privatization, majority privatization and full

privatization, denoted as S^0, S^1, S^2 and S^3 respectively. We denote the status of firm i as $S_i^j = 0$ or $S_i^j = 1$, for j=0, 1, 2 and 3. Thus, for example, $S_i^1 = 1$ indicates that firm i has undergone a minority privatization, 0 otherwise. We denote the potential outcomes associated to each of the treatments as y_{i0}, y_{i1}, y_{i2} and y_{i3}, where y denotes the outcome variable of interest (e.g. wages). The problem is estimating the causal effect of one treatment j relative to another treatment k,

$$\delta_{jk} = y_{ij} - y_{ik} . \tag{1}$$

Since each firm is subject to only one of the treatments and the remaining two potential outcomes are unobserved, the problem of estimating δ_{jk} is tantamount to estimating missing data. Thus to make the problem tractable, we concentrate on identifying the average effect of treatment S^j relative to treatment S^k,

$$\Delta_{jk} = E\left\{ y_{ij} - y_{ik} \mid S_i^j = 1 \right\} = E\left\{ y_{ij} \mid S_i^j = 1 \right\} - E\left\{ y_{ik} \mid S_i^j = 1 \right\} \tag{2}$$

Causal inference relies on the construction of the counterfactual for the last term in equation (2), which is the outcome participants of treatment S^k would have experienced, on average, had they participated in treatment S^j. This is estimated by the corresponding average value of the outcome variable for the participants of treatment S^k

$$E\left\{ y_{ik} \mid \delta_{ik} = 1 \right\} . \tag{3}$$

An important feature in the accurate construction of the counterfactual is the selection of a valid group of firms with which to estimate expression (3). In this respect any estimation method has to overcome the problem of selection bias. In our case, firms that are targets for privatization or partial privatization are likely to have different

characteristics than firms that experienced no restructuring. The approach we take here is to employ propensity matching techniques originally proposed for the binary treatment case by Rosenbaum and Rubin (1983) and extended to the multiple treatments case by Imbens (2000) and Lechner (2001). The method of matching seeks to control for all those observable variables, say X, that are responsible for selection bias. In this paper X consists of quadratic functions of three observable characteristics that are hypothesized to impact on the probability of a firm being subject to privatization or partial privatization. These are the pre-restructuring size, age and productivity.

The fundamental assumption of the method of matching is that conditional on X, the distribution of the counterfactual outcome y_{ik} in the group receiving treatment S^j is the same as the observed distribution of y_{ik} in the group receiving treatment S^k. In this case, the average outcome of the matched firms in non-treated cases constitutes the correct sample counterpart for the missing information on the outcomes that the treated would have experienced, on average, if they had not been treated. This assumption therefore ensures that the counterfactual is accurately estimated using data from suitable firms that have not been subject to the relevant treatment. Under this assumption, matching based on the propensity score ensures the balancing of the observable characteristics X in the two groups that are being compared (i.e. j and k). The propensity score for firm i, P_{ijk}, is defined as the probability of receiving treatment S^j relative to the probability of receiving treatment S^k

$$P_{ijk} = \frac{P(S_i^j = 1 \mid X)}{P(S_i^k = 1 \mid X)} \qquad (4)$$

where the probabilities are predicted from ordered probit regressions given that the treatments (no, minority, majority and full privatization are naturally ordered).

In general the matching estimator of the causal effect of treatment S^j relative to treatment S^k can be written as

$$\hat{\Delta}_{jk} = \sum_{l \in S^j} \left(y_l - \sum_{i \in S^k} g(P_{ijk}) y_i \right) \tag{5}$$

where g(.) is a function assigning the weights to be placed on the comparison firms in treatment group S^k used as matches for participant of treatment S^j.

When there are repeated observations for the same set of participants over time (indexed by t), it is arguably more reliable to base the evaluation analysis on the difference between the variable of interest at a year s after the treatment year (viz. y_{it+s}) and its value in the year prior to the treatment (viz. y_{it-1}), that is $\Delta y_{it+s} = y_{t+s} - y_{t-1}$ (e.g. Blundell and Costa Dias, 2000). In this case the combined differences-in-differences and matching estimator is defined as

$$\hat{\Delta}_{jk} = \sum_{l \in S^j} \left(\Delta y_{lt+s} - \sum_{i \in S^k} g(P_{ijk}) \Delta y_{it+s} \right) \tag{6}$$

Here we evaluate the effects of privatization at the year of privatization and the first two post-restructuring years, that is for $s=0,1,2$ and 3. Throughout we impose the so-called common support condition in the matching algorithm. This involves dropping firms belonging to treatment group S^j whose propensity score is higher than the maximum or less than the minimum propensity score of firms in the comparison group S^k.

The different matching estimators proposed in the literature (such as the nearest neighbors and kernel estimators) differ from each other in the choice of the weighting function they employ. However, they share the same property of being consistent estimators of the treatment effect under consideration. Nevertheless, they can exhibit substantial small sample differences. In this paper we discuss results from the nearest neighbor matching estimators, but we have also experimented with different weighting schemes, including local linear regression matching.

4. DATA

For our econometric analysis we use the Annual Report of Industrial Enterprise Statistics compiled by the National Statistical Bureau of China (NSB) spanning the period 1999-2005. The report covers the population of state-owned enterprises and all non-state firms with an annual turnover of over five million Renminbi (just above US$600,000). It is estimated that the firms contained in the dataset account for 85-90 percent of total output in most industries. The NSB performs several tests to ensure the accuracy of the information in the report. These include identifying and eliminating illogical data points (e.g. negative sales and implausible growth rates) and ensuring the consistency of the reported figures. In view of the objective of this paper, the econometric work is confined to domestic-owned enterprises in Western China that started with no private investment (i.e. wholly state-owned enterprises) , some of which subsequently registered private capital participation.

The NSB assigns to each firm in the database a categorical variable indicating its ownership status. Nevertheless, using the database, it is also possible to construct a continuous measure of private ownership composition by looking at the fraction of

paid-in capital by private investors. This is the key variable in this paper since it helps us identify whether the firms are wholly or partially (minority/majority) privatized.

Table 1. Sample frequency distribution of privatized firms by year

Type of privatization	Calendar year				
	2000	2001	2002	2003	Total
Non-privatized					1,634
Minority private	90	58	16	16	180
Majority private	107	63	21	9	200
Wholly private	109	60	44	30	243
Total					2,257

NOTE: The sample spans the period 1999-2005, guaranteeing that all firms have at least one year of pre-privatization and two years of post-privatization observations.

Our methodology relies on controlling for pre-treatment characteristics via the propensity score. It is therefore necessary to have some information in the year preceding the receipt of private finance. Furthermore, a realistic evaluation of post-treatment growth effects requires the availability of at least two years data after acquisition. For these reasons, we only consider full and partial privatizations that took place between 2000 and 2003. In the final analysis, a total of 2257 firms are available for the analysis. We ascertain that 623 of these firms received some private investment for the first time between 2000 and 2003. Table 1 gives the frequency distribution of the privatizations by degree of privatization and by year.

5. MAIN FINDINGS

Table 2. Ordered probit coefficient estimates and marginal effects of the determinants of privatization

	Coefficients	Marginal effects at mean values of regressors			
		Non privatised	Minority private	Majority private	Wholly private
Size	0.950***	-0.298***	0.067***	0.096***	0.135***
	(6.862)	(-6.974)	(6.014)	(6.291)	(6.837)
Size squared	-0.066***	0.021***	-0.005***	-0.007***	-0.009***
	(-6.114)	(6.162)	(-5.509)	(-5.683)	(-6.035)
Labor productivity	0.330**	-0.103**	0.023**	0.033**	0.047**
	(2.406)	(-2.421)	(2.356)	(2.384)	(2.426)
Labor productivity squared	0.007	-0.002	0.000	0.001	0.001
	(0.535)	(-0.534)	(0.534)	(0.534)	(0.534)
Age	-0.003	0.001	-0.000	-0.000	-0.000
	(-1.248)	(1.248)	(-1.242)	(-1.244)	(-1.247)
Age square	0.0001	-0.0001	0.0001	0.0001	0.0001
	(1.762)*	(-1.762)*	(1.744)*	(1.751)*	(1.759)*
Size*age	-0.000	0.000	-0.000	-0.000	-0.000
	(-0.943)	(0.943)	(-0.941)	(-0.941)	(-0.942)
Size*Labor productivity	-0.014	0.004	-0.001	-0.001	-0.002
	(-0.783)	(0.784)	(-0.781)	(-0.782)	(-0.785)
Threshold 1	4.278***				
	(7.870)				
Threshold 2	4.579***				
	(8.410)				
Threshold 3	5.021***				
	(9.195)				
Observations	2257				
Pseudo R-square	.0901				
Log likelihood	-1828.277				

NOTE: (i) t-statistics in parentheses; (ii) all regressions include provincial dummies, (iii) * significant at 10%; ** significant at 5%; *** significant at 1%.

The results from the ordered probit regressions of the determinants of privatization are reported in Table 2. We find that the most important determinants of privatization in Western China between 2000 and 2003 are firm size (number of employees) and labor productivity (log of output per worker). In particular, there is an inverted U-shaped

relationship between firm size and its likelihood of being fully or partially privatized. Furthermore, higher SOE labor productivity is associated with a higher probability of being fully privatized. It appears, therefore, that the government is not instigating full privatization in order to induce performance improvements as a consequence of being exposed to the market mechanism. Rather, those firms that do not require a "helping hand" and with the best chances of survival are being fully privatized. We also find some weak evidence that relatively younger SOEs are more likely to be privatized.

As far as the matching method is concerned, the most important issue is to ensure that the propensity score obtained from the ordered probit regressions are successful in controlling for firm-specific differences in the pre-privatization period. It is therefore important to test whether the covariates in the ordered probit regressions are balanced in all treatment pairs of interest, two tests of balancing are performed to this end. First, for each covariate in the ordered probit regressions, we test for equality of means across treatment pairs using standard t-tests. These tests are reported in Table 3.1 and indicate support for our matching approach. Second, we test whether the cross-treatment group differences of the covariates can be taken as *jointly* insignificant. This test is known as Hotelling's T-squared test. It has the flexibility of being based either on all observations or for separate segments of the sample defined by the propensity score estimates. In this study we divide the sample into four equal parts (i.e. by propensity score quartile), and conduct Hotelling's T-squared test within each part. The results of these balancing tests are reported in Table 3.2 and it is reassuring to confirm that the covariates are balanced in all treatments pairs, providing further support for the validity of our approach.

Table 3.1. Balancing test 1. Average values of pre-treatment characteristics in

matched and unmatched samples

Variable	Sample	Minority private vs. Non-privatized			Majority private vs. Non-privatized			Wholly private vs. Non-privatized		
		Treated	Control	t-stat	Treated	Control	t-stat	Treated	Control	t-stat
Size	Unmatched	5.6705	5.2104	3.89	6.0141	5.2104	7.2	5.6817	5.2104	4.69
	Matched	5.6705	5.6452	0.16	6.0141	5.8753	1.03	5.6817	5.8405	-1.41
Size squared	Unmatched	34.473	29.406	3.9	38.089	29.406	7.06	33.601	29.406	3.82
	Matched	34.473	33.721	0.41	38.089	36.039	1.25	33.601	35.505	-1.44
Productivity	Unmatched	3.7785	3.2385	5.72	3.9345	3.2385	7.8	4.09	3.2385	10.47
	Matched	3.7785	3.6406	1.12	3.9345	3.8493	0.8	4.09	4.0942	-0.04
Productivity Squared	Unmatched	15.546	11.948	5.92	16.559	11.948	7.83	17.713	11.948	10.71
	Matched	15.546	14.524	1.24	16.559	15.883	0.79	17.713	17.916	-0.25
Age	Unmatched	60.339	34.782	2.75	48.71	34.782	1.69	44.613	34.782	1.31
	Matched	60.339	36.933	1.08	48.71	47.495	0.06	44.613	50.605	-0.32
Age squared	Unmatched	62535	10208	2.91	39736	10208	1.83	32858	10208	1.55
	Matched	62535	21672	0.97	39736	37527	0.06	32858	47617	-0.4
Size * Age	Unmatched	321.32	184.41	2.94	305.95	184.41	2.68	242.04	184.41	1.58
	Matched	321.32	227.96	0.78	305.95	219.11	0.92	242.04	283.2	-0.44
Size * productivity	Unmatched	21.583	16.922	7	23.377	16.922	10.34	23.056	16.922	10.82
	Matched	21.583	20.723	0.91	23.377	22.517	1.11	23.056	23.74	-0.98

Table 3.2. Balancing test 2. Hotelling test of joint significance of pre-treatment

characteristics by propensity score quartiles

Propensity score quartile	Minority private vs. non privatised		Majority private vs. non privatised		Wholly private vs. non privatised	
	F-stat	p-value	F-stat	p-value	F-stat	p-value
1	0.1549	1.6312	1.6312	0.1549	0.9754	0.5136
2	0.1303	1.6659	1.6659	0.1303	1.4415	0.219
3	0.0749	1.8919	1.8919	0.0749	0.9055	0.5151
4	0.4136	1.0334	1.0334	0.4136	1.2823	0.253

Table 4. Difference-in-differences analysis combined with nearest neighbour matching

	Time lag	Employment		Wages		Labor Productivity		Labor training	
		estimate	t-value	estimate	t-value	estimate	t-value	estimate	t-value
Minority private									
	0	0.026	0.528	0.091	1.366	0.284***	2.742	0.027***	4.692
	1	0.123**	2.117	0.14*	1.877	0.203**	2.073	-0.026	-1.373
	2	0.079	1.032	0.127	1.267	0.284**	2.131	-0.007	-0.386
Majority private									
	0	0	-0.008	-0.005	-0.095	0.158***	2.302	0.02***	3.453
	1	0.15***	2.533	0.146**	2.043	0.186**	2.032	0.001	0.108
	2	0.218***	2.928	0.162*	1.793	0.288***	2.625	0.015	0.63
Wholly private									
	0	-0.075*	-1.927	0.03	0.584	0.27***	3.517	0.022**	2.233
	1	-0.103**	-2.271	0.039	0.53	0.346***	4.31	-0.025	-1.061
	2	-0.043	-0.764	0.065	0.765	0.404***	3.185	-0.009	-0.393

We now turn to the discussion of the causal effects of the various degrees of privatization on the welfare of labor. Table 4 reports the labor market effects of privatization based on the difference-in-differences nearest neighbor matching analysis and several points are noteworthy. First, full privatization leads to detrimental employment effects. A year after being fully privatized, erstwhile SOEs employ on average 10 percent less people compared to equivalent firms that are otherwise state owned. By contrast, firms with a mixed private-state ownership structure generate statistically and economically significant jobs. Minority privatization causes employment to increase by about 12% the year following the restructuring and employment is about 22% higher for majority private enterprises two years after partial privatization. Second, full privatization does not appear to benefit workers in the form of higher wages. In comparison, partial privatization leads to about 14% and 16% increase in workers' remuneration for minority and majority private enterprises,

respectively. Thus our findings on the employment and wage effects of partial privatization accord with both the "helping hand" theory of government (Qian, 1996, 2003) and with politicians to exploiting market incentives to generate cash flows that can be used to pursue social objectives.

Third, irrespective of the degree of privatization, labor productivity consistently exhibits a dramatic improvement following enterprise restructuring. For majority and wholly private enterprises, labor productivity constantly increases during the three post-restructuring periods under study. Additionally, labor productivity improvements are maximized when the enterprise is wholly privatized. This result supports the view that government ownership is not conducive to profit maximization (Boycko et al., 1996; Shleifer and Vishny, 1994). It is worth noting that this robust increase in labor productivity does not appear to be fully translated into wage increases, perhaps reflecting that employees were awarded extra-marginal wage payments while being employed by the state.

Finally, we find some evidence that privatization leads to an increase in the quality of labor, as reflected by the amount of labor training received by workers. Almost identically across the various degrees of privatization, managers of newly privatized enterprises have spent just above 2 percent more on the training of each worker. This suggests that our reported increases in labor productivity cannot be accounted for by increases in labor quality, but rather by managers of newly privatized enterprises adopting practices that improve labor utilization.

Table 5. Difference-in-differences analysis combined with local linear regression matching

	Time lag	Employment		Wages		Labor Productivity		Labor training	
		estimate	t-value	estimate	t-value	estimate	t-value	estimate	t-value
Minority private									
	0	0.018	0.57	0.049	1.017	0.213***	3.116	0.026***	4.203
	1	0.117***	3.685	0.166***	3.59	0.202***	2.988	-0.015	-1.485
	2	0.057	1.04	0.103	1.591	0.251***	3.104	0.001	0.102
Majority private									
	0	-0.021	-0.671	-0.035	-0.992	0.137***	2.433	0.021***	4.330
	1	0.005	0.137	0.047	1.067	0.19***	3.093	-0.007	-0.711
	2	0.032	0.662	0.031	0.561	0.282***	4.304	0.015	0.832
Wholly private									
	0	-0.059**	-2.249	0.03	0.784	0.234***	4.842	0.022***	2.400
	1	-0.083**	-2.336	0.007	0.132	0.314***	6.119	-0.017	-0.811
	2	-0.038	-0.903	0.027	0.504	0.397***	4.865	-0.018	-0.924

Table 5 gives results based on the difference-in-differences linear regression matching analysis. While, the nearest neighbor method matches each privatized firms with exactly one non-privatized firm that is most similar to it, linear regression matching uses a weighted average of several control group observations leading to more efficient estimators. However, this potential efficiency gain comes at the expense of increasing estimator bias since inexact matching can occur as one widens the matching region. In any case, it is reassuring to note that the findings discussed above do not change significantly when this alternative weighting scheme is employed.

6. CONCLUSIONS

The privatization literature has largely neglected the issue of partial privatization. The purpose of this paper is to contribute to the privatization literature by providing a systematic analysis of the causal effects of different degrees of privatization – minority private, majority private and wholly private – on labor welfare. In the analysis, we consider four aspects of labor welfare: employment, wages, productivity and training. We treat the privatization decision as endogenously determined and use multiple treatments propensity score matching to ensure that estimates are free from selection bias. This is combined with a difference-in-differences approach to control for enterprise-specific effects as well as time effects that are contemporaneous with the privatization event.

Using data from the recent full and partial privatization experience of Western China we find that full privatization causes the highest labor productivity improvements but also causes job losses. Moreover, the insignificant effect of full privatization on wages suggests employees do not share in the rents generated by labor productivity improvements. This might reflect the manner in which post-privatized enterprises address the pre-privatization legacy of extra-marginal wage payments and effectively reduce wages. Therefore, exposing former SOEs to the full force of market discipline and incentives creates both winners and losers. In contrast, the results for partial privatization are particularly striking in that we find evidence of labor productivity improvements, job creation and wage improvements. This is the 'win-win' scenario predicted by "helping hand" theory. Market discipline and incentives are driving labor productivity improvements whilst a government "helping hand" simultaneously protects labor welfare via job creation and higher wages. Creating a 'win-win'

situation is important if the government is to create vested interests that support a program of privatization reform.

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