Protecting workers in the workers' state: Labor market tightness and unemployment insurance in Chinese industrial firms

By Johanna Rickne[1]
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Abstract

Ten years after its institution, coverage of China's unemployment insurance continues to be incomplete. A simple theoretical model is used to illustrate the prediction that firms are more likely to comply with regulation if they face more severe competition for labor. A panel of Chinese industrial firms for 2001-2005 is used to examine how unemployment and vacancies affect participation. Ambiguous evidence from the full sample estimations is reconciled when the effect is allowed to differ across ownership sectors. Private domestic firms react in accordance with theory and increase compliance when the labor market tightens. The opposite effect is found for firms with investments from outside the Chinese mainland, while participation in State-controlled sectors remains unaffected. Some tentative explanations for these preliminary results are discussed.

JEL: J64, J65, D21
Keywords: Unemployment insurance, China, Firm-level data

[1] Department of Economics, Uppsala University, P.O. Box 513, SE-75120, Uppsala, Sweden; Research Institute of Industrial Economics (IFN), P.O. Box 55665, SE-10215, Stockholm, Sweden; Email: <johanna.rickne@nek.uu.se>

1. Introduction

China's ongoing market transition has dramatically reduced the job security of urban industrial employees. Firms have gradually been allowed to hire workers on temporary contracts and to dismiss those already employed. In 1999, the concept of "unemployment" was formally recognized. Increasing the coverage of the newly created Unemployment Insurance (UI) program however proved difficult, in particular because weak enforcement of the compliance with UI regulations effectively left the participation decision in the hands of the firms (Vodopivec and Tong, 2008).

According to the annual survey conducted by China's Academy of social sciences, unemployment was the most commonly cited economic worry among Chinese urban residents in each year during the 2001-2005 period (Zhao Huanxin, 2006). Together with extending coverage of the old age and medical insurances, removing this economic worry by extending the Unemployment Insurance coverage has been viewed as essential for lowering the China's high private savings rate (Lardy, 2007; Blanchard and Giavazzi, 2005; Chamon and Prasad, 2010)[2]. Reduced household savings would, in turn, increase domestic consumption and allow a rebalancing of Chinas sources of growth away foreign demand[3].

This paper studies the effect of labor market tightness, measured by unemployment and vacancies rates, on the participation of Chinese industrial firms in the country's unemployment insurance system. A simple theoretical model yields the prediction that a tighter labor market implies increased participation. Intuitively, firms respond to more competition for workers on the labor market by providing unemployment insurance because that provision makes the firm more attractive for job-seekers.

[2] Private savings as a share of disposable income has consistently risen since the second half of the 1990s, reaching 28% in 2008 (Prasad, 2008). From a macroeconomic perspective, these increasing savings have been a main contributor to the declining share of consumption in China's GDP, alongside the declining share of household disposable income as a share of GDP, and a low level of government consumption (Lardy, 2007).

[3] as re-iterated by Premier Wen Jiaobao at the opening of the National People's Congress in 2009 (Roberts, 2009)..

The basic hypothesis is tested in a uniquely comprehensive panel of Chinese industrial firms in 2001-2005. Including all State-owned firms and all other firms with sales above a cut-off value, the firms in this dataset together account for more than 70% of China's total industrial value added in 2001, and close to 95% in 2005. Firm expenditure on unemployment insurance from this dataset is used to create a dichotomous variable for insurance participation. Along with additional firm information, the firm panel is combined with unemployment and vacancy data on the province level. A control for the enforcement intensity of regulations is constructed from geographical data for 284 cities. The geographical location of a city is expected to affect its potential to attract investment. In order not to scare off potential investors with high insurance costs, authorities in less advantageous locations are therefore expected to put less emphasis on enforcing UI compliance.

To increase coverage of the unemployment insurance system is vital to China's smooth market transition. It would facilitate the ongoing reconstruction of enterprises and give workers incentives to be more mobile and to conduct more thorough job-searches. The results in this paper do not provide a clear answer concerning the effect of labor market tightness for UI participation among China's total population of industrial firms. Allowing the effect to vary by firm ownership however sheds light on the ambiguous results found in the full sample.

In accordance with the theoretical prediction, private domestic firms are found to react to increased labor market tightness in terms of more vacancies by joining the unemployment insurance program. Firms with investments from outside of mainland China are however found to do the opposite. For these firms, a *looser* labor market in the form of higher unemployment leads to increased compliance. Finally, the results do not show any effect in the case of State-controlled industrial firms.

Three tentative explanations are offered to explain why private domestic firms and foreign-invested firms have opposite responses to increased labor market tightness. First, workers in foreign-invested enterprises could have a systematically larger sway in firms' remuneration decisions than workers in private firms. Second, stricter compliance monitoring of authorities in times of high unemployment may be more easily avoided by private than foreign-invested firms. Last, foreign employers may be more attractive in the labor market and therefore have less need to attract labor by more generous social insurance provisions when the labor market is tight.

3. Unemployment Insurance in Transitional China

In 1986, the basis for China's unemployment insurance system was created when the State Council promulgated the Interim Provisions on Unemployment Insurance of Staff of State Enterprises (Interim Provisions). This early system was intended to secure the basic needs of the temporarily unemployed workers in State-owned enterprises. Contributions were equal to 1% of total payroll of all staff, but coverage was limited to four staff categories[4]. For these individuals, insurance payments amounted to between 60-75% of the worker's average monthly wage depending on the length of service and other basic criteria. In the second year of unemployment, the rate was reduced to 50%. Rather than providing income insurance, the focus was on providing workers with assistance in job seeking, job training and referrals.

System reform became imminent in 1993 because of increasing competition and number of laid-off persons in the SOEs. The State Council amended the Interim Provisions in a regulation package called the Regulations on Unemployment Insurance for Staff and Workers of State-Owned Enterprises. Coverage was extended to three more SOE staff

[4] (i) the staff of an enterprise which is adjudicated bankrupt; (ii) the staff discharged in the statutory reorganization of an enterprise on the verge of bankruptcy; (iii) the staff discharged on the rescission of a labour contract or on the dissolution of an enterprise; and (iv) the staff dismissed by an enterprise (Lee, 2000).

categories[5], and payments were de-linked from individual wages. Instead, they became a function of the total amount of social relief payments stipulated by the local institutions of civil affairs. With the reform, refusing job offers twice without proper reasons now excluded workers from benefits (Vodopivec and Tong, 2008).

Firm autonomy in hiring and firing workers was gradually developed during the early 90s, and by 1994 the labor allocation decision had been transferred from the state to the individual enterprises. This new autonomy was extensively practiced in the continuing restructuring of the state-owned sector in which more than 28 million employees were laid off during the second half of the 1990s (Dong and Xu, 2009). Importantly, these workers still did not become officially unemployed. Rather, they remained with their work units as so-called job-waiters (*xiagang*), on the books of special Re-employment Service Centers established within individual SOEs.

The most recent reforms of the UI occurred in 1999 and gave the system the design of today. With these reforms, the concept of unemployment was formally introduced. Following the ILO definition, persons were defined as being unemployed if they become job-less i) as a consequence of enterprise bankruptcies, ii) by having their contracts are terminated or cancelled, iii) by being dismissed, iv) by resigning, or v) after graduating and failing to find first-time employment.

Today, firms in all ownership sectors are required to provide UI coverage to their employees[6]. The system is financed by firm contributions amounting to about 2% of total payroll, and workers who contribute 1% of their wages[7]. Provincial deviations from the 2% payment level for firms are subject to approval of the State Council (Imamura, 2003), but

[5] (v) staff and workers of enterprises closed or dissolved in accordance with relevant regulations of the State; (vi) staff and workers laid off in periods during which the enterprises ceased production in order to be streamlined in accordance with relevant regulations of the state and (vii) workers who had their employment contracts terminated or cancelled.
[6] rural locations however continued to be excluded.
[7] failure to register is penalized with a fine imposed by the immediate controlling person or other immediate staff-in-charge at the provincial Labour Protection Department. Failing to declare contributions for a particular month is subject to an overdue fine at 0.2% each day in arrears.

deviations over the 2001-2005 period are rare[8]. Payments are not subject to profit tax in the case of firms and income tax in the case of workers (Vodopivec and Tong, 2008). Funds are accumulated in specific public finance accounts with State-owned banks where they are subject to separate administration. As a last resort, insufficient funds are subsidized by local public finances.

Regarding the job-waiters generated by the restructuring of SOEs, the 1999 reforms instituted the *binggui* policy under which they were detached from their old workplaces, and pooled insurance system. After 2001, no new centers have been established and dismissed SOE workers are assigned to the UI system directly. By the end of 2005, most provinces had completed the *binggui* transfer, and only 200,000 workers remained in the Re-employment Service Centers.

A worker becomes eligible for benefits under the conditions that i) his or her enterprise has continuously paid premiums for at least one year's time[9], ii) the termination was involuntary, and iii) he or she is willing to be re-employed and is registered as unemployed (Govt. White Paper, 2004). Besides a sum of money covering the basic needs for the unemployed individual, benefits include vocational training, job referral, and a basic medical supplement. If the worker dies during the benefit period, the family of the diseased can receive funeral subsidies and a pension. Benefits are not primarily calculated based on earnings, but on the total period of continuously paid contributions. According to this principle, 1 to 5 years of contributions merits 12 months of benefits, 5 to 10 years merits 18 months, and more than ten years gives up to 24 months of benefits. The benefit level is set by governments of provinces, autonomous regions and municipalities at a level in between the

[8] namely: Beijing, 1.5% all years; Ningxia: 1% in 2001; Tibet 1% for SOEs only in 2001 and 2002, 2% for SOEs in 2003; Hebei: 1% in 2000; Hubei: 1% in 2001 and 2003; Hunan: 1% for SOEs only in 2001; Jilin: 1.5-2% except for 1% for SOEs in 2001 and 2003; Shaanxi: 1% for SOEs only in 2001 and 2002, 2.5% for all firms starting August 2003; Shanxi: 1% in 2001-2004; Sichuan: 1% in 2001, but rates down to 0.6 allowed in cities; Yunan:1% in 2001-2003 (Source: regional government home pages).

[9] note that the firm is responsible for depositing both the firm's share and the worker's share of the contributions.

minimum wage and the minimum living standard of urban residents[10]. If a household's per capita income falls below the local minimum living standard after UI benefits are received, the unemployed person can apply for the minimum living standard guarantee (*dibao*) program (Lee, 2000).

As previously noted, getting firms to join the UI program and extend coverage to their employees has been difficult, especially in the private sector (Imamura, 2003; Rickne, 2010). Vodopivec and Tong (2008) noted a decrease in the share of covered workers from 45% in 2000 to 39% in 2005. The number of benefit recipients however increased sharply from 600,000 in 2000 to 6.8 million in 2005 (Vodopivec and Tong, 2008: Table 1).

4. A simple model of the firm's UI participation

Consider a firm operating in a frictional labor market where local labor market conditions influence the speed of recruitment. Employment in firm *i* changes according to

$$\dot{N}_i = H_i - \varphi N_i \qquad (1)$$

where H_i is the flow of hires and φ the exogenous separation rate. The hiring function takes the form

$$H_i = qV_i \qquad (2)$$

[10] as such, the income protection of the program is low, representing a replacement rate of 14.7% in 2005 (Vodopivec and Tong, 2008).

where q is the rate at which vacancies are filled and V_i the number of vacancies. The rate at which vacancies are filled depends on local labor market characteristics, such as the local vacancy rate (v) and the local unemployment rate (u). Assume

$$q = a\left(\frac{v}{u}\right)^{-\eta} = a\theta^{-\eta} \tag{3}$$

where $\theta = (v/u)$ is a measure of labor market tightness and a and η are positive constants. The tighter the local labor market, the more difficult to fill a vacancy.

The firm's profit function is

$$\pi_i = AN_i^{\alpha} - w(1+t)N_i - cV_i \qquad \alpha < 1 \tag{4}$$

where w is the wage rate, t a payroll tax rate, and c the cost of recruitment. The firm ignores discounting, takes the wage as given and chooses N_i and V_i to maximize steady state profits, recognizing the hiring constraint

$$a\theta^{-\eta}V_i = (1-\varphi)N_i \tag{5}$$

The first-order condition for maximum involves

$$\alpha A N_i^{\alpha-1} = w(1+t) + \frac{(1-\varphi)c\theta^{\eta}}{a} \tag{6}$$

which determines the firm's employment as a function of the wage and labor market tightness.

Suppose that the firm has the option to join an unemployment insurance system. By joining the UI system, the firm has to pay a higher wage tax, $t+dt$. Clearly, no firm would join unless the system also provided some benefits to firms, or unless nonparticipation entailed even higher costs than participation[11]. It is plausible that UI provision would improve a firm's attractiveness in the labor market and we thus assume that UI participation entails

$$q = a*\theta^{-\eta}, \qquad a* = a + da \tag{7}$$

which captures the idea that a firm can fill its vacancies at a higher rate when UI is part of the compensation package.

The firm's maximum profit can be written as $\tilde{\pi} = \tilde{\pi}(\mathrm{a}, \mathrm{w}, \mathrm{t}; \theta, \mathrm{c}, \varphi)$. Consider a firm that is indifferent between UI compliance and non-noncompliance. Indifference implies

$$\begin{aligned} &\tilde{\pi} = \tilde{\pi}_t dt + \tilde{\pi}_a da \\ &= -Nwdt + N(1-\varphi)c\theta^{\eta}a^{-2}da = 0 \end{aligned} \tag{8}$$

where we have invoked the envelope theorem to obtain $\pi_t = -wN < 0$ and $\pi_a = N(1-\varphi)c\theta^{\eta}a^{-2} > 0$. An increase in labor market tightness would imply $d\pi > 0$. The higher the vacancy rate (or the lower the unemployment rate), the more likely that the firm complies with the UI rules. To understand this implication, note that the cost of a vacancy is

$$cV = \frac{N(1-\varphi)c\theta^{\eta}}{a} \tag{9}$$

[11] The model ignores monitoring of compliance and the costs (fines) associated with non-compliance.

which means that an increase in *a* has a larger cost-reducing effect, the tighter the labor market is.

The result is perhaps surprising since one might have expected that slack labor markets with high unemployment would trigger an increase in worker demand for UI. Such mechanisms are perhaps relevant but are conditional on the existence of channels through which demand for UI carries over to actual UI provision.

5. Firm-level Data and Descriptive Statistics

The data used in this paper comes from the annual firm survey conducted by China's National Bureau of Statistics. It covers all state-owned enterprises and all other enterprises with annual sales above 5 million RMB. Coverage ranges between 70% of total industrial value added in year 2001 to 95% in 2005[12]. The final sample grows from 164,500 observations in 2001 to 255,546 in 2005. Over time, firms in the panel may change ID-codes because of restructuring, mergers or acquisitions. To correct for these changes, I use information on the firms' juridical owner's name, firm name, geographic code, industrial sector, phone number, and zip code to improve the matching of firms over time. In a basic data cleaning procedure I also drop firms with less than eight employees (following Jefferson et al., 2008) and firms that are not in operation.

Participation in the unemployment insurance system is measured by a dichotomous variable taking the value one if a firm reports some non-zero UI expenditure in a given year. The summary statistics for this variable over time, provided in Table 1, show that the share of participating firms was 37% in year 2001, declined slightly to 34% in 2003, and returned to 42% in 2005. Of course, this fairly constant share of participating firms reflects a growing

[12] calculated by dividing the total value added of the firms in the dataset with the yearly industrial GDP in China's Statistical Yearbook.

number of covered employees due to the growth of total employment in the industrial sector over the period.

Table 1 Summary statistics of Chinese industrial firms

	2001	2002	2003	2004	2005
UI coverage rate	0.37	0.35	0.34	0.38	0.42
Ownership shares of…					
HKMT and Foreign-invested	0.18	0.19	0.19	0.21	0.21
Private domestic	0.22	0.28	0.35	0.44	0.46
Collective owned	0.25	0.21	0.16	0.10	0.08
State-owned or Mixed	0.36	0.33	0.30	0.26	0.25
Share of rural firms	0.28	0.26	0.23	0.08	0.09
Average wage per worker	8.90	9.03	9.11	9.30	9.38
	(0.77)	(0.75)	(0.74)	(0.56)	(0.61)
Employment per firm	319	310	298	244	258
	(1,410)	(1,362)	(1,285)	(1,104)	(1,228)
Number of firms	164,500	170,752	190,452	267,511	255,546

Notes: The UI coverage rate is calculated as a share of the total number of firms. Average wages per employee are measured in thousands of RMB and expressed in constant year 2000 prices. Standard errors are reported in parenthesis.

From the summary statistics provided in Table 1 we can follow the ownership diversification of China's industrial sector in the 2001-2005 period. While the share of State-owned firms and Collective owned firms declined drastically[13], the share of private domestic firms more than doubled from 22% in year 2000 to 46% in 2005. We also note the sharp reduction in the share of rural firms from 38% in 2000 to 9% in 2005[14].

Figure 1 displays the substantial variation in UI participation across four ownership sectors. Higher rates are found among firms under State- or Mixed ownership, and firms with non-mainland investment (from Hong Kong, Macao or Taiwan, or from foreign entities), than

[13] ownership categories are created by aggregating 23 ownership registration types into six broader categories, closely tracking the formal classification system currently used for reporting data on all industrial firms in China's Statistical Yearbook (see Table A2 for details). Collective-owned firms are economic entities that are registered in accordance with the *Regulation of the People's Republic of China on the Management of Registration of Legal Enterprises*, where assets are owned collectively. They include urban and rural enterprises invested by collectives, and some enterprises registered with industrial and commercial administration agency as collective units, where funds are pulled together by individuals who voluntarily give up their right of ownership (China Statistical Yearbook 2006, chapter 13).

[14] defined as the administrative control of the firm being at the county, small town, street, village, resident- or village committee level.

among Private and Collective owned firms. Additional descriptive statistics for these ownership sub-samples are placed in Table A1. Figures 1A and 2A in the Appendix show the variation in unemployment and vacancy rate among provinces[15] and over time.

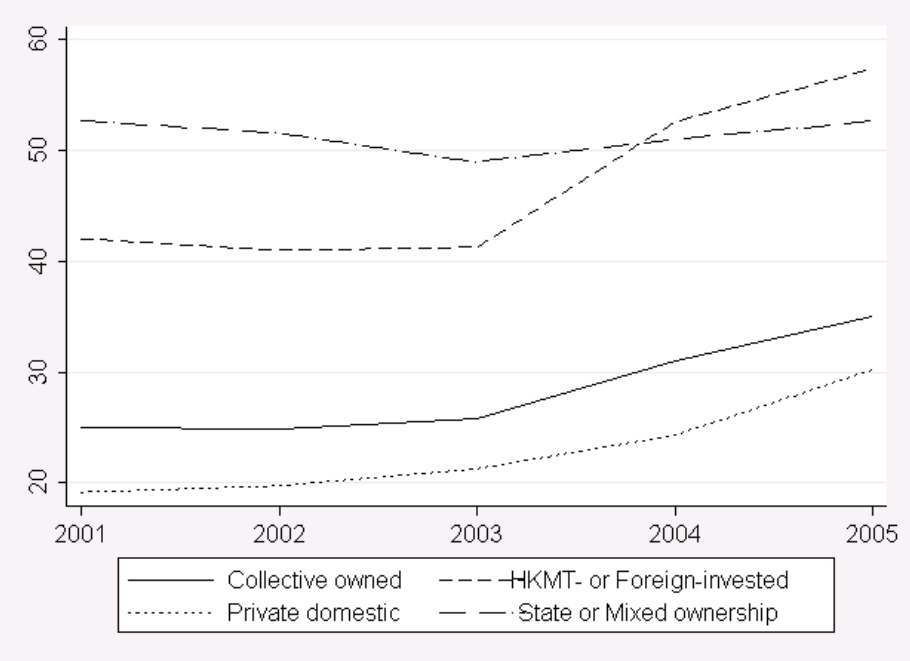

Figure 1 UI participation rate (%) by ownership sector and over time

6. Empirical Specification

Predictions from the theoretical model are tested using the following specification

$$UI_{it} = \beta_0 + \beta_1 U_{kt} + \beta_2 V_{kt} + \beta_3 \mathbf{S}'_{it} + \beta_4 \mathbf{P}'_{kt} + \beta_5 \mathbf{Z}'_{ct} + p_i + \nu_t + e_i + \varepsilon_{it} \qquad (10)$$

where UI_{it} is a dichotomous variable that takes the value one if firm i participated in the unemployment insurance program in period t. Our main variables of interest, U_{kt} and V_{kt}, are the unemployment and vacancy rates of province k over time[16].

[15] for simplicity, the term province refers to China's 22 provinces, 5 administrative regions, and 4 self-governing municipalities. Firms located in the Special Administrative Regions of Hong Kong and Macao are not included in the dataset.
[16] see section A1 in Appendix for a brief discussion of measurement issues regarding the unemployment variable.

A vector of firm-level controls $\mathbf{S}'_{it}$ includes a measure of the average wage per worker in the firm. This control is motivated by the assumption that a share of the cost of the insurance is transferred to workers in the form of lower wages. We also include a categorical variable for the tax bracket (1-6) to which the average worker in the firm would belong[17]. Because insurance benefits are tax-exempt, workers subjected to higher marginal taxes should prefer to receive a larger share of their work compensation as insurance payments. The control vector also includes measures of the firm's profits per employee, its size, ownership sector, a dummy variable capturing rural administration, and dummies indicating its industrial sector on the 2-digit level[18]. Additional controls on the province level $\mathbf{P}'_{kt}$ are the unemployment insurance cost and the share of State-owned firms in provincial employment.

A final vector of controls $\mathbf{Z}'_{ct}$ are measured for 284 cities c, providing variable values for over 85% of the total dataset each year. Two of these controls are included in an attempt to approximate the enforcement intensity of local authorities with respect to the UI participation regulations. One of them measures the distance between each city and the closest of China's three large ports: Hong Kong, Shanghai, and Tianjin. The other variable measures the distance between each city and the closest of China's 15 largest cities[19].

A third city-level control variable uses data from 2004 and 2005 to approximate the average total social security cost faced by firms. The importance of this control variable rests with the fact that even though the UI program in itself is not expensive to the firm as a share of wages, participation in the UI makes it more difficult for the firm to avoid the costs of other social insurance schemes. For firms in each city, average ratios of the total insurance

[17] the sum of one year's deductibles of 500 RMB per month is deducted from the firm's undeflated average wage per worker and matched to six tax brackets.

[18] wages and profits are deflated to constant 2000 prices using ex-factory price index deflators from China's Statistical Yearbook.

[19] Beijing, Taiyuan, Shenyang, Harbin, Tianjin, Nanjing, Wuhan, Guangzhou, Chengdu, Xi'an, Dalian, Shanghai, Chongqing, Changchun, and Shanghai. Local authorities may strike deals with firms in order to attract investment to their region, deals that may including social insurance rebates. Assuming that firms want to locate close to ports and large cities, localities further from those commercial hot-spots should be more prone to leniency toward investors.

costs as a share of wages are calculated for firms that participate in all major schemes, namely those for pensions, medical insurance, and housing accumulation funds[20]. Lastly, equation (10) includes province fixed effects p_i, year fixed effects ν_i, and firm fixed effects e_i.

7. Results

The results from the main specification are presented in Table 2. Columns (1)-(3) contain estimated marginal effects from using a probit specification and column (4) contains the coefficients from using OLS. All standard errors are clustered on the province level to reflect the level of measurement for the unemployment and vacancy rate variables.

Our theoretical model predicted that a tighter labor market (lower unemployment and more vacancies) should make UI participation more likely. The results in Table 2 are ambiguous regarding this prediction. In the specification using both time and province fixed effects (column 1), we find that the coefficient on unemployment is positive and significant, meaning that a tigher labor market decreases participation. On the contrary, and in accordance with the theoretical prediction, the specification without fixed effects for provinces shows a positive and significant effect of the vacancy rate on participation.

The seemingly contradictory estimation result for the different specifications of the test equation in Table 2 may be the result of some aspect of firm heterogeneity that causes different groups of firms to respond differently to labor market tightness. In a transition economy like the Chinese, ownership is an important marker of firms' interactions with their workforces and with the regulating authorities. For instance, State-controlled firms can be expected to maintain a stronger client-agent relationship with government representatives on various administrative levels than firms in other ownership groups. Meanwhile, private and foreign-invested enterprises have been allowed to operate on more deregulated labor markets

[20] the cost levels of these programs may vary at the prefecture-city level.

and with harder budget constraints. Contrasting firms within the private sector, it is likely that firms with investments from outside of mainland China are under closer scrutiny by the regulators than domestic private firms.

Table 2 Effects of provincial unemployment and vacancy rates on UI program participation. The dependent variable is one for firms reporting some non-zero insurance payment in a given year, otherwise zero. Unbalanced panel data from 2001-2005. Columns (1)-(3) report marginal effects from Probit estimations and column (3) contains OLS results.

	(1) UI	(2) UI	(3) UI	(4) UI
Unemployment rate	0.014**	0.000	0.002	0.009
	(0.007)	(0.012)	(0.006)	(0.008)
Vacancy rate	0.002	0.004**	0.002	0.002
	(0.003)	(0.002)	(0.004)	(0.004)
Constant				0.237
				(0.282)
Fixed effects:				
Time	Yes	Yes		Yes
Province	Yes		Yes	Yes
Firm				Yes
Observations	873,084	873,084	873,084	873,082
R-squared				0.646

Notes: (1) *** p<0.01, ** p<0.05, * p<0.1. (2) Robust standard errors, clustered on the province level, in parenthesis

Interaction variables between ownership sector dummies and the unemployment and vacancy rates variables are added to test equation (10). This corresponds to testing whether the effect of labor market tightness on the UI participation decision of firms varies systematically with firm ownership. Interactions are constructed for the three sectors of 1) HKMT- or Foreign-invested firms, 2) Private domestic firms, and 3) Collective owned firms. By doing so, we let the coefficients on the non-interacted unemployment and vacancy rate variables capture the estimated effects for firms under State or Mixed ownership.

The results presented in Table 3 show some interesting preliminary findings. Two of the estimated coefficients are highly significant and robust across specifications. First, it is found that firms with investment from entities located outside of mainland China are more likely to

participate in the UI when the unemployment rate is higher. The size of the coefficient $(\beta = 0.027)$ indicates that a 1% rise in the unemployment rate makes UI participation 3% more likely among these firms.

The second robust and significant parameter shows that private domestic firms react to increased vacancies in accordance with the prediction of the theoretical model: higher vacancy rates are positively correlated with their likelihood of joining the UI program. In this case, the size of the coefficient $(\beta = 0.007)$ means that a 1% higher vacancy rate is associated with a 0.7% higher likelihood of UI participation for private firms. These results are robust to balancing the firm panel so that only data firms in operation during each of the five time-periods are used for estimation (see Table A3).

What factors could explain the ownership diverse effects of labor market tightness on firms' UI provision? First, we consider the observation that state-controlled firms: SOEs, COEs and many of those with Mixed ownership[21], do not have UI participation rates that are affected by our measures of labor market tightness. As these sectors have closer ties to the authorities, it is possible that their UI participation is a function of institutional relationships rather than labor market conditions. In contrast, private, foreign- and HKMT-invested firms generally operate on more flexible labor markets than the other ownership categories. Their remuneration practices are therefore more likely to be affected by changes in the relative difficulty to hire workers.

Second, consider the opposite reactions of private firms on the one hand and FIE and HKMT-invested firms on the other. Regarding the effect of unemployment on the non-mainland invested firms, we may hypothesize that the institutional setting of this group of firms matters. When unemployment increases in a region, monitoring of UI participation is likely to increase as well. Possibly, the increase in monitoring is biased toward Foreign and

[21] the results in Table 3 are robust to dividing the category of State and Mixed ownership firms into two separate control groups.

HKMT-invested sectors because they are more accessible to government agencies. They may also be less likely than private domestic firms to be equipped with the institutional connections to receive lenient treatment from the monitoring authorities.

Table 3 Effects of provincial unemployment and vacancy rates on UI program participation by ownership. The dependent variable is one for firms reporting some non-zero insurance payment in a given year, otherwise zero. Unbalanced panel data from 2001-2005. Columns (1)-(3) report marginal effects from Probit estimations and column (4) contains OLS results.

	(1) UI	(2) UI	(3) UI	(4) UI
Unemployment rate	0.008	-0.008	-0.003	0.000
	(0.007)	(0.010)	(0.006)	(0.007)
Vacancy rate	0.000	0.001	-0.000	-0.002
	(0.003)	(0.002)	(0.003)	(0.003)
FIEs*Unemployment rate	0.027*	0.031**	0.027*	0.027***
	(0.015)	(0.015)	(0.015)	(0.007)
FIEs*Vacancy rate	-0.001	-0.000	-0.000	0.006*
	(0.002)	(0.002)	(0.002)	(0.003)
PIE*Unemployment rate	-0.009	-0.007	-0.010	0.008
	(0.009)	(0.011)	(0.009)	(0.006)
PIE*Vacancy rate	0.007***	0.007***	0.007***	0.004**
	(0.001)	(0.001)	(0.001)	(0.002)
COE*Unemployment rate	0.004	0.007	0.005	0.003
	(0.006)	(0.007)	(0.006)	(0.004)
COE*Vacancy rate	0.002	0.003	0.002	0.003*
	(0.002)	(0.002)	(0.002)	(0.001)
Constant				0.327
				(0.288)
Fixed effects:				
Time	Yes	Yes		Yes
Province	Yes		Yes	Yes
Firm				Yes
Observations	873,084	873,084	873,084	873,082
R-squared				0.647

Notes: (1) *** p<0.01, ** p<0.05, * p<0.1. (2) Robust standard errors, clustered on the province level, in parenthesis. Interaction variables include dummies for ownership sectors: Foreign-Invested Enterprises (FIE) which also includes firms with investments from Hong Kong, Macao or Taiwan, Private-Invested Enterprises (PIE), and Collective Owned Enterprises (COE). The intercept unemployment and vacancy rate variables represent State-owned firms and firms with Mixed ownership forms (see Table A2).

For FIEs and HKMT-invested enterprises, we may have more reasons to question the theoretical assumption that workers lack influence over the firm's UI decision than we do for private domestic firms. One indication of this could be the difference in the share of skilled

workers between the two sectors. Data from the firm census in 2004 shows that the average share of workers with more than high school education was 21% in firms with investment from outside of mainland China, but only 12% in the private domestic enterprises. A second indication could be the shares of firms with labor unions: 42% for the non-mainland invested firms and 36% for the private domestic sector. Both a higher share of skilled workers and a higher share of firms with trade unions could signal greater worker influence over firms' remuneration decisions. Because higher unemployment is expected to increase workers' demand for UI, it would therefore be expected yield a positive effect on UI provision in the Foreign- and HKMT-invested sectors rather than for private domestic firms.

Next, we consider a hypothesis of why private firms were shown to be more likely to provide UI when the vacancy rate is higher. As argued in the theoretical setup of this paper, a tighter labor market implies more competition between firms for the available labor. With more vacancies on the market, firms therefore want to offer UI benefits as part of their compensation package to in order to attract workers. Possibly, private domestic firms are less attractive employers than foreign-invested firm, and hence become more affected by a squeeze of the available workforce. For example, the descriptive statistics in Table A1 of this paper show that private domestic firms are both smaller in size and offer on average lower wages than the firms with investment from Foreign- and HKMT-invested firms.

A final tentative hypothesis focuses on migrant labor. As noted above, firms are not responsible for providing UI for temporary workers. However, increased difficulties for firms in finding new hires give the temporary workers increased influence over firms and improve their changes of receiving permanent contracts. In turn, a larger share of permanent workers in the firms' workforces should make it more difficult for them to avoid complying with UI regulations. In sum, if private domestic firms hire more migrant labor than other sectors, this

mechanism could explain why we find a positive correlation between the regional vacancy rate and UI participation for these firms.

8. Conclusions

Increasing worker coverage of China's Unemployment Insurance (UI) program is of great economic importance not only to Chinese workers. The country's trading partners also stand to gain when a lower household saving rate translates into more demand for imported goods and a reduction of China's dependence on foreign demand as a source of growth.

In this paper, I used a simple model of the firm's decision to participate in the UI system to show that a tighter labor market is associated with a higher participation rate. Empirical analysis of firm-level panel data for 2001-2005 did however provide ambiguous evidence when testing this prediction for the total population of firms. This ambiguity could be reconciled by allowing the effect of unemployment and vacancy rates on UI participation to vary with firm ownership.

In accordance with the theoretical prediction, the results showed that a higher vacancy rate increased the likelihood of UI participation among private domestic firms, a sector that accounted for 46% of the total sample in 2005.

In contrast to the theoretical prediction, the results for the group of firms with investments from entities in foreign countries, or entities in Hong Kong, Macao or Taiwan, showed that a *looser* labor market in the form of higher unemployment increased the likelihood of compliance with UI regulations. These firms might be more attractive employers than firms in other ownership sectors. As a consequence, they would be in less need to boost their competitiveness on a tighter labor market by offering unemployment insurance to potential workers than firms in the less attractive private domestic firms. One possible explanation of the inverted relationship between labor market tightness and UI participation

could be a greater influence of workers over remuneration decisions in these firms. It could also stem from a greater difficulty in avoiding increased monitoring activity following hikes in the unemployment rate. Attempting to account for heterogeneity in such institutional connectedness and worker influence could constitute possible avenues for further research.

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Appendix

Table A1 Descriptive statistics by ownership sector

	State	Mixed	Collective	Private	FIE	HKMT
UI coverage rate	0.61	0.43	0.27	0.25	0.51	0.46
Share of rural firms	0.01	0.20	0.59	0.07	0.12	0.14
Empoloyment	646	323	197	140	317	323
	(3,052)	(1,026)	(465)	(228)	(816)	(645)
Average wage per worker	9.06	9.19	8.97	9.13	9.61	9.41
	(0.90)	(0.62)	(0.67)	(0.59)	(0.73)	(0.62)
Number of firms	140,539	162,241	154,236	383,575	98,440	109,730

Notes: The UI coverage rate is calculated as a share of the total number of firms. Average wages per employee are measured in thousands of RMB and expressed in constant year 2000 prices. Standard errors are reported in parenthesis.

Table A2 Aggregation of registration-based classification of firms into ownership categories

Registration-based classification (since 1998)	Categories under which data on all industrial enterprises are reported in the Statistical Yearbook
Domestic enterprises	
SOEs	State
COEs	Collective
Employee shareholding company	Collective
Joint operation enterprises	
State-owned	State (1)
Collective owned	Mixed
State- and collective owned	Mixed (2)
Other joint operation enterprises	Mixed (2)
Limited liability companies	
Solely state-owned	State
Others	State or Mixed (3)
Stock companies	State or Mixed (3)
Private enterprises	
Private sole proprietorships	Private
Private partnerships	Private
Private limited liability company	Private
Private stock companies	Private
Other enterprises	Mixed
HKMT-invested enterprises	
Joint equity ventures (JVEs)	HKMT or State (2)
Contractual joint ventures (CJVs)	HKMT or State (2)
Wholly HKMT-owned	HKMT
HKMT stock companies	HKMT or State (2)
Foreign-invested enterprises	
Chinese-foreign JEVs	Foreign or State (2)
Chinese-foreign CJVs	Foreign or State (2)
Wholly foreign-owned	Foreign
Foreign-invested stock company	Foreign or State (2)

Notes: The table details the ownership aggregation of registration-based firm classification system into six broader categories when reporting data on all industrial firms in the China Statistical Yearbook. Departures from the CSY aggregation method are reported in footnotes (1)-(3) below. Information about the CSY aggregation methodology is contained in Holz and Lin (2001).

(1) Unlike in the Statistical Yearbook, this category is not double-counted as "Mixed".

(2) When ownership-disaggregated statistics are reported per ownership in the Statistical Yearbook, a proportion of the statistic is double-counted in the "State" category. This proportion corresponds to the aggregate share of the sum of state capital to the sum of total paid-in capital minus individual capital in the registration-based classification category. I instead count an individual firm as State-owned if the state's share in total capital is greater than 50%.

(3) This category is counted as "State" in the Statistical Yearbook for firms that are under absolute state control (guoyou juedui konggu) or relative state control (guoyou xiahgdui konggu). The first implies that the state account for more than 50% of total capital. The second that the state holds less than 50% of total capital but that i) its share is relatively large compared to the shares of other ownership categories, or ii) even though one or more other ownership categories have a larger capital share, the state in effect holds the control right s by agreement (Xiyi kongzhi). In this paper, only absolute state-controlled firms may be identified, and these are moved from the "Mixed" to the "State" category.

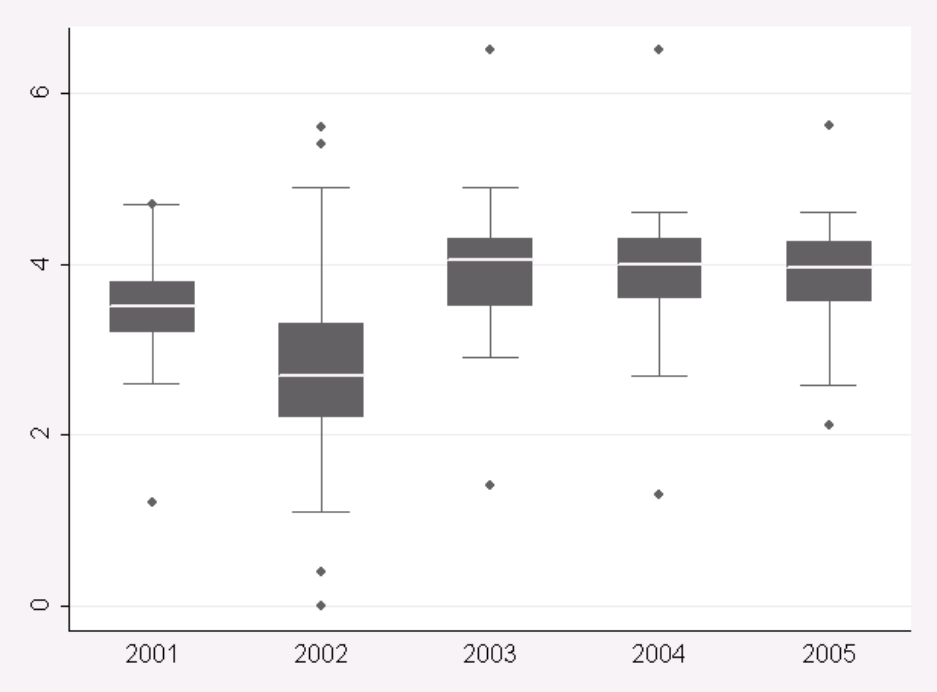
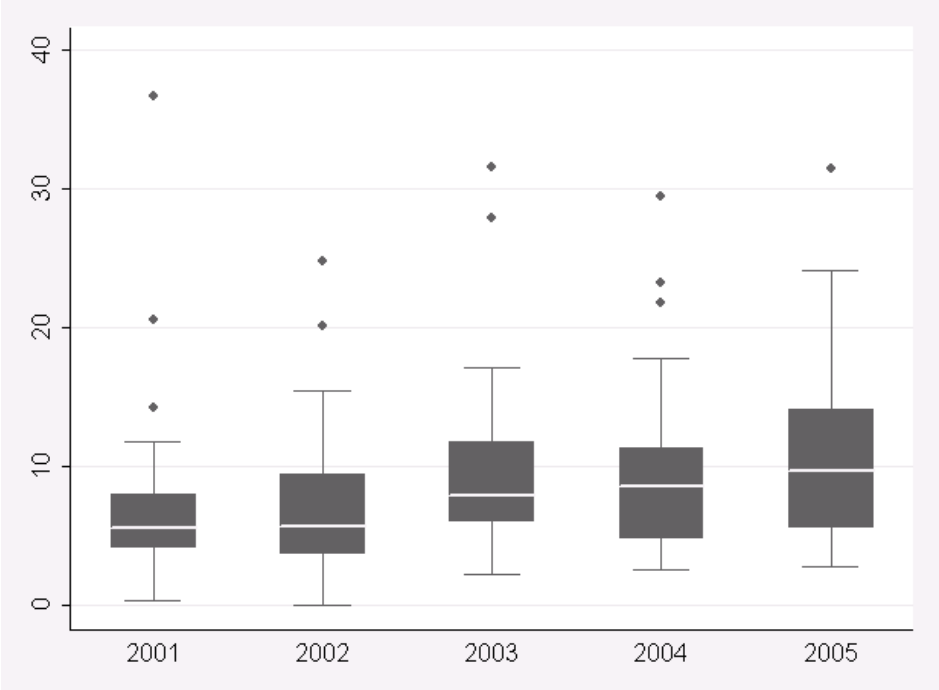


Figure 1A Distribution of regional unemployment rates (%), 2001-2005

Figure 2A Distribution of regional vacancy rates (%), 2001-2005



A1. Criticism of China's official unemployment statistics

Unemployment figures provided by regional statistical offices may be unreliable for several reasons. Underestimation of true unemployment may occur because of i) exclusion of unemployed workers above the required age of retirement which is 45 years for women and 50 year for men (Imamura, 2003); ii) exclusion of those college and high school graduates who have graduated in the last six months; iii) exclusion of job-waiters (*xiagang*); and finally but perhaps most importantly, iv) exclusion of workers without work contracts[22]. At least according to the official view, excluded unemployment based on migrant labor may pose less of a problem if these individuals have self-selected into employment and often return to their rural villages when the urban labor market becomes tighter (Fox and Zhao, 2002)

Overestimation of the unemployment statistic is also a possibility if i) migrant workers without city residence permits are left out of the employment count, and ii) low UI benefit levels, and weak enforcement of eligibility criteria, contribute to hidden employment as workers receive benefits and work in the informal sector simultaneously.

[22] "Farmers-turned-contract-workers are however exempt from the individual premiums (Govt. White Paper). Using data from the second round of the China Urban Labour Survey (CULS 2005), Du, Cai and Wang (2006) find that 32.5% of native urban residents and 84.3% of migrants did not have formal labor contracts in 2005.

Table A3 Effects of provincial unemployment and vacancy rates on UI program participation. The dependent variable is one for firms reporting some non-zero insurance payment in a given year, otherwise zero. Standard errors are clustered on the province level. Balanced panel data from 2001-2005. Columns (1)-(4) report marginal effects from Probit estimations and column (5) contains OLS results.

	(1) UI	(2) UI	(3) UI	(4) UI	(5) UI
Unemployment rate	0.010	-0.004	-0.009	-0.009*	-0.006
	(0.007)	(0.006)	(0.011)	(0.005)	(0.005)
Vacancy rate	-0.000	-0.003	-0.001	-0.001	-0.003
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
FIEs*Unemployment rate		0.036***	0.041***	0.036***	0.032***
		(0.013)	(0.014)	(0.013)	(0.008)
FIEs*Vacancy rate		0.002	0.002	0.003	0.006**
		(0.002)	(0.003)	(0.002)	(0.003)
PIE*Unemployment rate		0.002	0.004	0.002	0.007
		(0.008)	(0.010)	(0.008)	(0.005)
PIE*Vacancy rate		0.010***	0.009***	0.011***	0.005***
		(0.002)	(0.002)	(0.002)	(0.001)
COE*Unemployment rate		0.004	0.003	0.004	0.003
		(0.008)	(0.008)	(0.007)	(0.004)
COE*Vacancy rate		0.004	0.005	0.004	0.002
		(0.003)	(0.003)	(0.003)	(0.002)
Constant					2.145***
					(0.572)
Fixed effects:					
Time	Yes	Yes	Yes		Yes
Province	Yes	Yes		Yes	Yes
Firm					Yes
Observations	213,423	213,423	213,423	213,423	213,423
R-squared					0.565

Notes: (1) *** p<0.01, ** p<0.05, * p<0.1. (2) Robust standard errors, clustered on the province level, in parenthesis. Interaction variables include dummies for ownership sectors: Foreign-Invested Enterprises (FIE) which also includes firms with investments from Hong Kong, Macao or Taiwan, Private-Invested Enterprises (PIE), and Collective Owned Enterprises (COE). The intercept unemployment and vacancy rate variables represent State-owned firms and firms with Mixed ownership forms (see Table A2).