"LABOR SUPPLY, RISK AVERSION AND ECONOMIC REFORM IN CHINA"

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Labor Supply, Risk Aversion and Economic Reform in China*

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LABOR SUPPLY, RISK AVERSION AND ECONOMIC REFORM IN CHINA

Abstract

Economic reform in China has created a small, but fast-growing private sector that has spurred rapid productivity growth. Growth of the private sector is predicated upon continued labor movements away from state-run industries and into private firms. This paper presents a theory of labor market sectoral choice demonstrating that three factors determine private sector labor supply—the difference in wages between the state and private sectors, private sector wage risk and risk aversion. Estimation of the model using survey data provides strong support for the theory. We find that the riskiness of private sector earnings has a greater effect in discouraging workers from taking jobs in private firms than the wage premium has in attracting workers.


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1 Introduction

A new wave of privatization has recently begun in China as the state cedes control of more than 10,000 firms to private ownership (Wall Street Journal (1996)). Though private and joint venture public-private companies still only account 5% of total employment in China, more than half of new entrants to the urban labor force take positions with non-state sector firms, as compared to 28% going to the non-state sector firms in 1978 (Maurer-Fazio (1995)).1 While reforms have introduced a great deal of uncertainty into the labor market, productivity gains from the increased competition have been spectacular. Li (1997) estimates that the marginal productivity of labor increased 54% from 1980 to 1989. China’s gradual reform of the state sector and concomitant growth of the private sector can be credited with a substantial portion of the productivity gains that are fueling output growth.

This paper presents a theory specifying the process through which individuals choose to supply labor to either the state sector or the private sector. Our purpose is to characterize the factors that drive private sector employment growth. Privatization increases the number of private firms, but this may not result in large numbers of private sector workers if most employees are re-absorbed into state-run firms.2 The theory developed here shows that it is not only the wage differential that determines the rate at which individuals move from the state sector to the private sector, but the wage risk inherent in private sector jobs as well as individuals’ tolerance for risk. Using a unique survey-based dataset of Chinese workers and firms, we test the theory empirically by constructing measures of the riskiness of each worker’s private sector wage and his or her risk aversion. The empirics demonstrate that the most important factor affecting the flow of employees to the private sector is wage risk.

There are two novel aspects to the present analysis. The first is that we derive a very general relationship between employment in the private sector and the first and second moments of the sectoral difference in wages. The model uses a variant of portfolio theory to determine an individual’s sectoral employment choice as a function of the expected wage differential and the variance of the private sector wage. The second novelty of this paper is the manner in which the theory is tested. We use on a survey of workers and firms as the basis for our empirical work rather than aggregated national data. The empirics substantiate the model’s prediction that private sector wage risk and an individual’s risk aversion affect the flow of workers into the private sector.

1Maurer-Fazio (1995) defines the non-state sector to include collectives, public-private ventures and private firms. In 1994, 73% of employment was in the state sector, 21.6% in collectives and 5% in private firms or joint ventures.

2Excellent discussions of the effects of reform on the Chinese labor market can be found in Korzec (1992) and Hay et al (1994).
This paper proceeds as follows. A theory of sectoral labor supply choice is set out in section 2 where empirically testable implications of the model are derived. In Section 3, the empirical methodology is described and variables are constructed that are used to test the model. This section also presents the empirical findings. Section 4 discusses the implications of the results for policy-setting and Section 5 concludes.

2 LABOR SUPPLY TO THE STATE AND PRIVATE SECTORS

In China, prior to the 1986 reforms, the government assigned almost all individuals to lifelong employment in state-owned firms. Health care and housing benefits were included in these assignations, with benefits increasing with seniority as part of the baozialai, or “taking care of everything” system.3 After reforms, a new type of job appeared, renewable term positions in the new private and hybrid public-private sectors.4 Called the “Shenzhen model,” contract jobs in the private sector have grown steadily as individuals seek higher wages than those available in the state sector. Private sector jobs generally do not include benefits, and these positions entail some risk as they do not guarantee lifetime employment and wages vary with market forces.5 An attempt at tying state-sector wages to the performance of particular work-units was briefly experimented with in 1985, but this practice soon ceased because the “iron rice bowl” system was preferred by state-sector employees (Korzec (1992)). This indicates some self-selection by workers when choosing the sector within which to work. Such self-selection is partially attributable to differences in risk tolerance.6

There are several risks inherent in taking a job in the private sector. The first, private sector wages often depend on the profitability of the firm and to the supply and demand for various types of workers, which adds volatility to labor earnings. Second, private sector employees risk spells of unemployment when they are between contract positions or if the firm at which they work closes. Third, as mentioned above, is that one foregoes generating state-sector seniority upon which benefits are based. In an effort to determine why some workers stay in the state sector and others move to private sector, we began looking at worker characteristics in survey data of nearly

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3 For the most part, benefits are retained upon retirement.
4 For expositional simplicity, we will call private and joint public-private firms the “private sector” and collectively owned and state-run firms the “state sector”.
5 Private sector jobs may also be sought for the experience they provide which can be used to obtain future private-sector employment or to start one’s own firm.
6 We do not model the growth of the private sector here, for this see Brixiova & Kiyotaki (1997) and the references therein. Rather, we focus on the impediments to movements into the private sector at a particular point in time.
10,000 Chinese workers in 438 enterprises sampled in 26 cities collected in 1992.\(^7\)

Workers in private firms are typically younger, more educated and, on average, earn 58% more than workers in the state sector. Interestingly, workers of both types live in households in which there are, on average, about four family members with three of these being adults.\(^8\) Standard models of sectoral labor supply show that workers move among sectors until the expected wage differential (inclusive of the value of benefits) disappears.\(^9\) Yet, this does not appear to be happening in China where state sector employment is relatively ossified.

The facts above give us a clue as to the conditions that lead workers to select to work in the state sector versus the private sector. In particular, families with several adults may be able to insure the consumption of the entire household via intra-family risk-sharing. Such risk sharing permits the household as a whole to have a higher income by sending one or more household members to the private sector, while overall consumption (including benefits) is insured by other members who remain in the state *baozialai* system. Such intra-family risk-sharing is of particular importance in developing countries that lack the mechanisms (either publicly or privately provided) to insure consumption against risk.\(^10\) Rosensweig (1988) has found that spatially distributed families in rural India provide partial insurance against consumption risks. In related work, Hayashi, Altonji & Kotlikoff (1996) reject full intra-family risk-sharing in the U.S.

In this paper, we assume that families will act to reduce household consumption risk through sectoral job diversification. Under this assumption, we derive the optimal sectoral labor supply choice for family members. The choice a family makes is the distribution of its members between jobs in the state sector and the private sector in order to maximize end-of-period household wealth.

### 2.1 The Model

The labor supply decision for a household is an allocation of household members to jobs in the state and private sectors.\(^11\) Households vary by their overall earning potential because of the education, location, gender and ethnicity of its members.

\(^7\)The data are described in Section 3.
\(^8\)The income of a typical surveyed adult accounts for 45% of household labor earnings.
\(^9\)Models of sectoral employment choices are surveyed in Parsons (1986).
\(^10\)An institution called *dingti* in which state-sector workers who retire or die can “pass” their position to a family member so that benefits are retained within the family, is an incentive for young workers to stay in the state sector. Though this practice was officially banned in 1986, there is evidence that it is still being used. see Freeman (1994) and Korzec (1992).
\(^11\)An alternative view of the model, that individuals choose a division of their time between state jobs and private-sector jobs, was suggested by Renata Sahagian. Though many Chinese workers do work in both sectors, we focus here on the choice of one’s primary place of employment.
Identifying households by the index \( i \), a household of type \( i \) solves the following utility maximization problem to determine labor supply to each sector.

\[
\begin{align*}
\text{Max}_{N_s, N_p} & \quad EU(a_i) \\
\text{s.t.} & \quad a_i = a_i^0 + w_i^s N_i^s + w_i^p N_i^p \\
& \quad N_i = N_i^s + N_i^p,
\end{align*}
\]  

where \( U(\cdot) \) is a strictly increasing, continuous and concave representation of preferences over \( a_i \), end-of-period wealth. In order to focus the analysis on sectoral labor supply, we model households as end-of-period wealth maximizers, disregarding consumption/savings decisions. The budget constraint (1) shows that final wealth is the sum of initial wealth, \( a_i^0 \), and income earned in both the state and private sectors. Let \( N_i \) denote the number of employed household members who are distributed among those working in the state sector, \( N_i^s \), earning \( w_i^s \), and those working in the private sector, \( N_i^p \), earning \( w_i^p \). Note that wages and the number of working members in each sector are household specific.\(^{12}\)

Employment in the state sector is considered free of earnings risk as such assignments generally guarantee lifetime employment. Conversely, we have argued above that private sector wages are fundamentally risky. By assumption, households know the distribution of wages which are (truncated) normal, with mean \( \mu > 0 \) and variance \( \sigma^2 \).\(^{13}\)

The necessary and sufficient condition for an optimum is

\[
E[U'(a_i)(w_i^p - w_i^s)] = 0. \quad (2)
\]

which is equivalent to

\[
E[U'(a_i)]E[w_i^p - w_i^s] = -\text{COV}[U'(a_i), w_i^p]. \quad (3)
\]

where \( \text{COV}[x, y] \) is the covariance between random variables \( x \) and \( y \). Applying Stein's lemma\(^{14}\) and simplifying, we can write (3) as

\[
E[w_i^p - w_i^s] = 0, \text{VAR}[w_i^p]. \quad (4)
\]

---

\(^{12}\)We also ignore the integer constraint on the choice variable for the time being.\(^{13}\)Wages must be nonnegative, but the truncation at zero can be ignored as a practical matter if \( \mu \) is sufficiently above zero and \( \sigma \) is not too large. We will proceed under these assumptions.\(^{14}\)Stein’s lemma states that for bivariate normal random variables \( x \) and \( y \) and a differentiable function \( g \), \( E[g(x), y] = E[g'(x)]\text{Cov}(x, y) \) when \( g \) satisfies standard regularity conditions. See, for example, Huang & Litzenberger (1988).
where
\[ \theta_i = \frac{-E[U''(a_t)]}{E[U'(a_t)]} \]  
(5)
is the measure of absolute risk aversion and \( VAR[u^p] \) is the variance of private sector wages.

The model above is a portfolio choice problem where one chooses between a risky and risk-free "asset", in this case, a riskless state sector job or risky private employment. Equation (4) shows that the labor supplied to the private sector depends on the difference between the expected private wage and the state wage, the variance of the private wage, and the household's level of risk aversion (which may depend on household wealth).

Assuming a competitive labor market and a large number of households, integrating equation (4) over these households produces an aggregate labor supply function for the private sector. It is straightforward to show using equation (4) that labor supplied to the private sector increases when (i) the expected difference between the private-sector wage and the state wage rises; (ii) the variance (risk) of the private-sector wage is reduced; and (iii) households become less risk adverse.

3 Empirics

If household members make labor supply decisions jointly, then each member of a household will have the same level of absolute risk aversion. To see this, suppose the household utility function has the constant relative risk aversion (CRRA) form

\[ U(a) = \frac{a^{1-\nu} - 1}{1 - \nu}, \]

for \( \nu \neq 1 \). Then, risk aversion for each household member is a function of the household's characteristics.\(^{15}\) Since the data which show that almost every worker lives in a multi-adult household, the individual will inherit the risk aversion of the household when decisions are made jointly.

The relationship between household characteristics and individual characteristics is important because the data we use surveys individuals, not households. Nevertheless, the model can be tested by examining if wage risk and risk aversion affect labor supply decisions on an individual basis. Our empirical studies will proxy risk aversion, \( \theta_i \).

\[^{15}\text{Since } u^p_t \text{ is stochastic, one can not simplify the expression in equation (7).}\]
using a number of individual-specific characteristics, including education, geographic location, gender and ethnicity which may account for variations across individuals in initial wealth $a_i^0$ and labor earnings in (7).

In order to translate the model from the household level to the individual level, we define a new variable $z_i$ which takes the value 1 if an individual chooses a private-sector job, and 0 otherwise. Taking logs of equation (4), leads to the estimable private sector labor supply equation

$$z_i = A + \ln(E[w_i^p - w_i^s]) - \ln(VAR[w_i^p]) - \ln(\theta_i),$$

(8)

where $A = \ln \nu$. This labor supply equation forms the basis for our empirical analyses.

3.1 DATA AND ESTIMATION METHODOLOGY

The data set includes 7,884 complete survey responses from workers conducted by the Chinese Academy of Social Sciences in 1992 under supervision by a U.S. team of economists. The survey samples employees of state-owned, collective-owned and joint venture firms. As the statistics in Table 1 illustrate, the average monthly earnings (in yuan) of workers in the private sector is 58% higher than those in the state sector. The standard deviation of monthly earnings in the private sector is about twice that in the state sector. Workers in the private firms are on average younger and slightly better educated than those in the state firms, but the differences between the two groups in family size and ratio of men to women are quite small.

Before beginning the empirical analysis, it is worth pointing out several unique characteristics of this data set. First, due to the small number of private firms in China in 1992, there is little likelihood that the education decisions of interviewees were made in order to prepare for a private job and thus can be thought of as exogenous to the labor supply decision. A second feature of this dataset is that employees were interviewed: that is, there are no unemployed individuals in the sample. Thus, our analysis is conditional upon a current state of employment and does not address entry into or exit from the labor force or the risk of unemployment. Since our goal is to estimate the private sector labor supply and almost all adults worked in China in 1992, this should induce little or no bias in the results.

The theory in Section 2 shows that there are three primary factors that determine whether an individual will take a job with a state or private firm, namely the difference in expected wages, the risk of private sector wages, and the individual’s level of risk aversion. In order to test these implications of the model empirically, we augment

\footnote{16This construct restores $N^p$ to be integer-valued.}

\footnote{17A description of the data can be found in Freeman (1994).}
Table 1: Summary Statistics for State and Private Firms

<table>
<thead>
<tr>
<th>Variable</th>
<th>State Firms</th>
<th>Private Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage (Yuan)</td>
<td>280.639</td>
<td>443.626</td>
</tr>
<tr>
<td></td>
<td>487.473</td>
<td>1402.300</td>
</tr>
<tr>
<td>Education</td>
<td>6.466</td>
<td>6.709</td>
</tr>
<tr>
<td></td>
<td>2.387</td>
<td>2.417</td>
</tr>
<tr>
<td>Age</td>
<td>34.729</td>
<td>30.613</td>
</tr>
<tr>
<td></td>
<td>9.638</td>
<td>9.187</td>
</tr>
<tr>
<td>% Men</td>
<td>0.554</td>
<td>0.528</td>
</tr>
<tr>
<td></td>
<td>0.497</td>
<td>0.499</td>
</tr>
<tr>
<td>Family size</td>
<td>3.896</td>
<td>3.991</td>
</tr>
<tr>
<td></td>
<td>1.553</td>
<td>1.638</td>
</tr>
</tbody>
</table>

Table 1 shows that on average private wages are both higher and riskier than state wages. However, these are unconditional statistics estimated over the entire sample. A worker's decision regarding whether he or she will supply labor to a private firm depends on the particular (conditional) wage and risk that is specific to the individual worker. In order to estimate worker-specific wages and risks, simple wage regressions are estimated for both state firm and private firm workers.

\[
WAGE_s = \alpha_j \text{CITY}_{js} + \beta_1 \text{AGE}_s + \beta_2 \text{EXPER}_s + \beta_3 \text{EDUC}_s + \beta_4 \text{SEX}_s + \epsilon_s \quad (9)
\]

\[
WAGE_p = \omega_j \text{CITY}_{jp} + \gamma_1 \text{AGE}_p + \gamma_2 \text{EXPER}_p + \gamma_3 \text{EDUC}_p + \gamma_4 \text{SEX}_p + \epsilon_p \quad (10)
\]

where \(s = 1 \ldots N_{state}\) are state workers in the sample and \(p = 1 \ldots N_{private}\) are private firm workers. The variables \(WAGE_s, AGE_s, EXPER_s, EDUC_s\) are the logs of total wage income, age, years of work experience, and years of education for each worker. We also control for the city \(j\) where the employee works, \(CITY_j\), and the sex of the worker, \(SEX\). Using the estimated parameters \(\alpha_j, \beta_j, \omega_j, \gamma_j\) and \(\epsilon_j\), we construct an estimated state and private wage for each worker, regardless of their true place of employment. The expected wage differential facing worker \(i\) is the estimated difference between his or her state sector and private sector wages.

\[
WDIFF_i = (\omega_j - \alpha_j) \text{CITY}_{ji} + \sum_{k=1}^{4} (\Gamma_k - \beta_k) \Gamma_k
\]  

where \(\Gamma_k\) corresponds to the explanatory variables from the wage regressions (9) and (10) and \(i = 1 \ldots N_{total} = N_{state} + N_{private}\).

In estimating private sector wage risk, we take the dispersion of each individual's (actual or implicit) state sector wages as the base "risk-free" dispersion and derive the (actual or implicit) private sector wage variance as the measure of private sector wage risk. This is done by estimating the wage regressions (9) and (10) again. The
error term from these regressions is squared and a second set of regressions are run regressing the squared error terms against the same set of explanatory variables, again allowing the estimated coefficients to vary by whether the individual works for a state or private firm.

\[
\hat{e}_s^2 = \phi_j CITY_{js} + \rho_1 AGE_s + \rho_2 EXPER_s + \rho_3 EDUC_s + \rho_4 SEX_s + \nu_s \tag{12}
\]

\[
\hat{e}_p^2 = \chi_j CITY_{jp} + \theta_1 AGE_p + \theta_2 EXPER_p + \theta_3 EDUC_p + \theta_4 SEX_p + \nu_p. \tag{13}
\]

The estimated regression coefficients to are used to generate a predicted \( \hat{e}^2 \) for both a private firm wage and a state firm wage for each worker. The private wage risk, \( RISK_i \), is thus calculated for each worker as,

\[
RISK_i = (\hat{\chi}_j - \hat{\phi}_j)CITY_{ji} + \sum_{k=1}^{4}(\theta_k - \hat{\theta}_k)\Gamma_k. \tag{14}
\]

That is, we estimate the private sector wage risk for workers in both the state and private sectors in order to determine risk both types of workers face if there are in. or are considering moving to, the private sector.

Next, we turn to risk aversion, \( \theta_i \). Although each individual's level of risk aversion is unobserved, we can proxy for this variable with a number of measures of the worker's taste for risk. The first of these proxy variables is \( MOVED \) which takes the value 1 if a worker has moved into the city from elsewhere, and 0 otherwise. A second proxy variable is \( TURN \), for turnover, which is constructed by dividing the number of job changes an individual has experienced by the number of years he or she has been in the workforce. A third proxy variable is \( TRAIN \) which takes the value 1 if a worker has engaged in self-financed technical training, and 0 otherwise.

Finally, we consider the role of family size which may influence a worker's risk aversion via the ability to diversify risk across household members in the labor force. A larger number of family members may make it easier to insure consumption. In order to test this hypothesis we include a variable for family size, \( FAMSIZE_i \), in the regression.\(^ {18}\)

### 3.2 Empirical Findings

Table 2 presents the results of six probit regressions estimated the augmented private labor supply equation (8), while Table 3 summarizes the predictive capability of each regression and log-likelihood of the each.

\(^{18}\)Alternative measures of family size, including the number of working adults and the dependency ratio had less explanatory power and no discernable effects on the estimation. As a result, we limit our reported results to the family size variable described in the text.
The dependent variable of the probit regressions in Table 2, \( z_i \), takes the value 1 if a worker is employed by a private-sector firm and 0 otherwise. In all six regressions we have included among the regressors a full set of city dummies (suppressed in the table to save space but available upon request) to control for city-specific effects. The regressions are also used to estimate coefficients for the constructed variables \( WDIFF \) and \( RISK \), and at least one proxy variable for the worker's level of risk aversion. Regression (1) includes only family size (\( FAMSIZE \)) as a proxy for risk aversion. As predicted by the theory, the higher the risk premium (\( RISK \)) for private wages, controlling for the difference between expected wage levels, the less likely that worker will take a job with a private firm. Also, the larger the family size the more likely the worker will be employed with a private firm, although this effect is statistically insignificant. Likewise, while the difference in wages has the expected positive sign (the greater the difference between the expected private wage and the state wage the more likely a worker is to take the private job), this coefficient is not statistically significant.

Regression (2) adds additional set of control variables measuring the worker's ethnicity. There are four primary ethnic groups in China—the majority of the country is Han, with the primary minority groups being Mongols, Hui (Muslims) and Tibetans. Among the ethnic groups (Han is the control group), only the Hui have a statistically significant (and reduced) probability of taking a private-sector job; all other ethnic identifiers are insignificant. In regression (2), \( WDIFF \) is statistically significant and positive. However, in regression (3) we also control for whether a worker is married (\( MARRY \)) as an additional proxy for risk aversion. Married individuals are consistently less likely to take jobs in the private sector which may be attributed to their higher aversion to consumption risk. In this regression, the statistical significance of \( WDIFF \) disappears. In regressions (4), (5) and (6) we include an expanded set variables to proxy for risk aversion, \( MOVED, TURN \) and \( TRAIN \). Agents who have moved to new cities, have higher job turnover rates or have self-funded technical training exhibit behaviors that suggest that they are less risk adverse than those who do not engage in these activities. In all three regressions these variables are statistically significant and carry the expected positive sign. In other words, the less risk averse an individual’s behavior has been in the past, the more likely they are to choose a job with a private-sector firm.

In addition to the proxy risk aversion variables, several other control variables are included in the regressions. These include \( MAN \) (1 for male, 0 otherwise), \( AGE \), and

19 The negative sign on the Hui does not have a clear interpretation as Hui are historically traders and might therefore be better suited to work in the private sector. According to Harrell (1995), the Hui have had long-standing conflicts with the other ethnic groups in China so that the Hui may choose not to work with the majority Han in private-sector firms or may be discriminated against in hiring.
**Table 2: Probit Regression Results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.6333</td>
<td>-.5177</td>
<td>-.0845</td>
<td>-.4156</td>
<td>-.2730</td>
<td>-.4209</td>
</tr>
<tr>
<td></td>
<td>(-5.7***</td>
<td>(-4.6***</td>
<td>(-.69)</td>
<td>(-3.2***</td>
<td>(-2.0**)</td>
<td>(-2.7***</td>
</tr>
<tr>
<td>AGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0191</td>
<td>(2.44**)</td>
</tr>
<tr>
<td>EDUC</td>
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<td></td>
<td></td>
<td></td>
<td>0.0163</td>
<td>(1.60)</td>
</tr>
<tr>
<td>MAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.1652</td>
<td>(3.40***</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>0.2361</td>
<td>(4.17***</td>
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<td>MARRY</td>
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<tr>
<td></td>
<td>(-10***</td>
<td>(-8.1***</td>
<td>(-8.7***</td>
<td>(-5.6***</td>
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<td>MONGOL</td>
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<td>-.0421</td>
<td>-.0097</td>
<td></td>
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<tr>
<td></td>
<td>(-.25)</td>
<td>(-.15)</td>
<td>(-.14)</td>
<td>(-.11)</td>
<td>(-.03)</td>
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<tr>
<td>HUI</td>
<td>-2.751</td>
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<td>-1.870</td>
<td>-1.998</td>
<td>-3.707</td>
<td></td>
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<tr>
<td></td>
<td>(-7.6***</td>
<td>(-6.7***</td>
<td>(-5.0***</td>
<td>(-5.3***</td>
<td>(-4.7***</td>
<td></td>
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<td>-.1166</td>
<td>-.0883</td>
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<tr>
<td></td>
<td>(-.01)</td>
<td>(-.11)</td>
<td>(-.09)</td>
<td>(-.12)</td>
<td>(-.09)</td>
<td></td>
</tr>
<tr>
<td>FAMSIZE</td>
<td>0.0149</td>
<td>0.0135</td>
<td>0.0089</td>
<td>0.0010</td>
<td>-.0006</td>
<td>-.0022</td>
</tr>
<tr>
<td></td>
<td>(1.26)</td>
<td>(1.13)</td>
<td>(0.75)</td>
<td>(0.08)</td>
<td>(-.05)</td>
<td>(-.19)</td>
</tr>
<tr>
<td>MOVED</td>
<td>0.1486</td>
<td>0.1490</td>
<td>0.1541</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.48***</td>
<td>(3.48***</td>
<td>(3.59***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TURN</td>
<td>0.6706</td>
<td>0.6205</td>
<td>0.4445</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.21***</td>
<td>(7.48***</td>
<td>(4.09***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAIN</td>
<td>0.3024</td>
<td>0.3063</td>
<td>0.3113</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.95*)</td>
<td>(1.97**)</td>
<td>(2.02**)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WDIFF</td>
<td>0.0005</td>
<td>0.0034</td>
<td>0.0009</td>
<td>0.0011</td>
<td>-.0008</td>
<td>-.0008</td>
</tr>
<tr>
<td></td>
<td>(0.54)</td>
<td>(3.58***</td>
<td>(0.91)</td>
<td>(1.06)</td>
<td>(-.71)</td>
<td>(-.68)</td>
</tr>
<tr>
<td>RISK</td>
<td>-.7.797</td>
<td>-1.633</td>
<td>-1.383</td>
<td>-1.086</td>
<td>-1.116</td>
<td>-2.096</td>
</tr>
<tr>
<td></td>
<td>(-7.6***</td>
<td>(-10***</td>
<td>(-8.6***</td>
<td>(-6.7***</td>
<td>(-4.8***</td>
<td></td>
</tr>
</tbody>
</table>
EDUC (level of education achieved). Men are more likely to take a private-sector job, while married workers are less likely to take a job with a private firm, even after controlling for age and education level. Once wage differentials, risk aversion, sex and education have been controlled for, older workers are more likely to take a private job than younger workers\(^20\) Lastly, education enters with a positive, but insignificant coefficient.

Throughout regressions (1) through (6) several variables are consistently statistically significant. The negative and significant coefficient estimate on RISK is extremely robust to different specifications. WDIFF is not robust, but carries the correct sign in two thirds of the regressions. In addition, except for family size, all of the measures of low risk aversion (MOVED, TURN and TRAIN) are statistically significant and carry the expected positive signs.

Table 3 provides some indication of model performance by reporting the log-likelihood and predictive power of each regression. As Table 3 reports, there are 6,117 workers in state jobs (77.6% of the sample) and 1,767 workers in private firms (22.4% of the sample) in the data set. Of those workers who are employed in state jobs, regression (6) correctly predicts that 5,793 will be in state firms, and incorrectly predicts that 324 of them will take private jobs. The model has a more difficult time accurately predicting the behavior of workers who have taken private sector jobs. Of those individuals who are actually employed in private firms, regression (6) incorrectly predicts that 1,031 of them will be in state firms (or 58.4% of the private workers) and correctly predicts that 736 (41.6% of private workers) of them will be in private firm jobs. This suggests that there are some important characteristics of private firm workers that motivated their labor supply choice that are not captured in the model. Note, however, that 41.6% is still almost twice the rate of the occurrence of private sector workers in the total sample.

4 Discussion

The theory, with strong support in the empirics, show that an important impediment to movement of labor from the state sector to the private sector is the risk inherent in private sector employment.\(^21\) Though this result is intuitive, the present paper is the first to the authors' knowledge to demonstrate that the second moment affects labor supply decisions both in theory and by constructing explicit risk mea-

\(^{20}\)Note that this positive conditional relationship is the opposite of the unconditional negative relationship between age and private sector jobs seen in Table 1.

\(^{21}\)This result would be quantitatively larger if our dataset measured wage variance due to unemployment.
Table 3: Summary statistics for probit regressions

<table>
<thead>
<tr>
<th>Actual</th>
<th>Total</th>
<th>Predicted</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6117</td>
<td>5806 311</td>
<td>5816 301</td>
<td>5807 310</td>
<td>5803 314</td>
<td>5792 325</td>
<td>5793 324</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1767</td>
<td>1114 626</td>
<td>1125 642</td>
<td>1084 683</td>
<td>1043 724</td>
<td>1035 732</td>
<td>1031 736</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6947 937</td>
<td>6941 943</td>
<td>6891 993</td>
<td>6846 1038</td>
<td>6827 1057</td>
<td>6824 1060</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-3040</td>
<td>-3009</td>
<td>-2960</td>
<td>-2916</td>
<td>-2910</td>
<td>-2908</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

sures from the data. One reason we were able to do this was the availability of high quality data.

There are several policy lessons to be drawn from this analysis. The first is that labor flows to the private sector could be hastened by extra-familial risk-reducing institutions such as unemployment insurance or modern employment offices. Freeman (1994), using the same dataset, finds that only 27% of the labor force obtain jobs through modern methods (e.g., through employment agencies). Risk reduction institutions are particularly important in light of the empirical evidence in Dunn (1996) showing that U.S. workers appear to exhibit the phenomenon of loss aversion, as described by Kahneman & Tversky (1979), where, for equivalently sized income losses and gains, losses induce a larger reduction of utility than the utility increases from gains. If this were true in China, the least risk-averse agents (or risk lovers) will enter the private sector first, followed by less risk-averse agents. The remaining state-sector employees are unlikely to move to the private sector because of a strong aversion to consumption risk. If the size of the state sector in China is to be reduced through market incentives, state employees will have to be induced to move to the private sector. Institutions that reduce private sector wage risks are an important policy tool that can accelerate the reform of the state sector.

A second implication shown by the empirics is that intra-family insurance of household consumption is imperfect in China. If it were possible to perfect insure one’s consumption, the estimated coefficient on the risk variable would be zero. Rather, the estimated coefficient on risk ranges in value from -0.78 to -2.10 in regressions (1) to (6), dominating almost every other variable in the regressions. Using U.S. data, Hayashi, Altonji & Kotlikoff (1996) also find imperfect intra-family risk-sharing by examining consumption data. The results here are also consistent Rosensweig (1988), who finds that spatially distributed rural families in India provide partial insurance against consumption risks.

A third implication of our analysis is that variations in risk aversion will lead some
individuals into the higher wage private sector while others remain in the low wage state sector. As the private sector grows, this will produce a Kuznet's inverted U in the distribution of income. Zak (1997a,b) shows that a widening of the distribution of income increases socio-political instability (i.e., demonstrations, strikes, and the destruction of property). The gradual pace of privatization in China may be one reason that movements of employees to the private sector have had fewer socio-political impacts than in other reforming countries, such as Russia.

5 CONCLUSION

This paper has presented a model of labor supply to the growing private sector in China. We show that the supply of individuals working in private firms depends not only on the expected wage differential between the private sector and the state sector, but on the risk of private sector wages and an individual's level of risk aversion. The rationale behind this result is that households seek to insure their consumption by diversifying working members of the household between the state and private sectors. An innovation of the theory is that we derive the relationship between labor supply and both the first and second moments of the sectoral wage differential.

The hypotheses gleaned from the model were tested using a rich survey dataset of workers in 26 cities throughout China. After constructing individual specific measures of the expected private-state wage differential and the wage risk, we quantify the impact of earnings risk and the level of individual risk aversion on private-sector labor supply. We find that agents who are less risk averse, face less wage risk, are more educated, have larger families, are not members of the Hui ethnic group and are older are more likely to work in the private sector. Interestingly, we find that the riskiness of private sector earnings has a greater effect in discouraging workers from taking jobs in private firms than the wage premium has in attracting workers. This suggests that institutions that reduce the consumption risk will facilitate the flow of workers to the private sector. The lack of extra-familial risk-reducing institutions may be one reason why the pace of reform of the state sector in China is slow, even when private sector wages exceed state wages.
REFERENCES


