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An Econometric Model of Disequilibrium Unemployment in Urban China

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Key Words

Disequilibrium unemployment, Rigid wages, Product, Panel data analysis

1. Introduction

Even though China is in the midst of an unprecedented economic boom, the country's unemployment rate is still high. In 2006, the registered unemployment rate reported by the government was 4.1% ; however, if the 11.76 million retrenched workers[1] who are excluded from the official unemployment statistics are included, then this figure increases to 9.8%. Urban unemployment is one of the most serious problems in China.

Retrenched workers are those, who are employed but do not work ; note that this category includes workers who have been laid-off or forced to retire early. Retrenched workers are a product of the planned economy, where the government promises a job to every citizen, and at the same time, is marred with low economic efficiency. The government has tried to tackle this problem since the economic revolution in 1978. The enterprise reform that was initiated in 1986 was fully implemented in 1994. Most of the retrenched workers, who were being cushioned by the planned economy, find it difficult to get new jobs and millions of workers remain unemployed.

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This paper does not rest solely on the variability of demand and supply, but uses the market-clearing equilibrium theory and corresponding models to analyze and reveal the mechanism of the labor market. Labor demand and supply are determined by wage, non-wage income, and other factors. In a complete market, labor demand and supply stay in equilibrium with adjustable wage and other factors. However, if one of the factors — for example, real wage[2] — becomes rigid and is unable to respond to the changes in demand and supply, unemployment arises. The model describes a disequilibrium situation using a labor demand and supply curve determined by wage, non-wage income, labor productivity, and product. In the model, the wage is rigid and we find that it is significantly higher than the market-clearing equilibrium wage ; this results in unemployment, the extent of which is equal to the difference between supply and demand.

We use panel data analysis over the time period 1992－2006 of 29 provinces[3]. The organization of the paper is as follows. After discussing previous studies in Section 2, Section 3 examines official unemployment rates of China, and provides a revised estimate of real unemployment in China. Section 4 explains our model of labor demand and supply and estimated re-

sults. Section 5 discusses the impact of immigration followed by conclusion.

2. Past Studies

In China, the unemployment problem has drawn much attention. However, most of the studies in China use descriptive analysis, and provide little quantitative economic analysis. Among the few studies on quantitative analysis, Xie. G. (2008), in sociology, did regression analysis with the data collected from a survey of 4000 workers and 100 firms in six large cities. He examined the influence of human capital, political capital, age, sex, and other factors on layoff. He attributes his findings to the categorization of the unemployed into common urban resident workers, retrenched workers, and rural migrant workers, and states that the reemployment of retrenched workers is quite difficult. These findings help us to do economic analysis on the labor market in China.

Knight, J. and Song, L. (2005) considers redundancies a main cause of urban unemployment. They mention that the economic reform is a difficult and dangerous policy that greatly exacerbated the unemployment problem and threatened urban workers who had previously enjoyed much preferential treatment and protection by the state[4]. Knight and Li (2006)[5] estimated an earning function for over 300 retrenched and reemployed workers, and also illustrated the difficulties encountered during the reemployment of retrenched workers.

Those quantitative discussions highlight the situation of China's labor market. However, any formal model describing the Chinese urban labor market has not been provided in the past studies. Most of the regression analyses are based on cross-sectional data for a particular year, with few time series analysis. Moreover, the previous studies have not taken account the fact that the structural changes by the economic reforms has restricted the labor redundancy since 2004.

In addition, a most important index of unemployment condition is the unemployment rate. However, as we have already shown at the beginning of Section Introduction, the definitions of unemployment in the population census are not precise[6]. Some previous studies adjusted national-level rates, based on some unemployment surveys of a few regions and official population data. Knight, J. and Xue, J. (2006)[7] used the official statistics and a household sample survey data set (13 cities in six provinces) to estimate the national-level unemployment rates from 1993 to 2002. They showed that the national unemployment rate in urban areas exceeded 11% in 1999 and 2000. Giles, J., Park, A. and Zhang, J. (2005) also adjusted national unemployment rates of China, using urban labor survey result of five cities and population data in China's population census. Different methods and surveys lead to different results. Taking the adjusted rate of 2000 for instance, it is 11.5% in Knight, J. and Xue, J. (2006), while 10.0% in Giles, J., Park, A. and Zhang, J. (2005). Nevertheless, the common feature is that the adjusted unemployment rates are much higher than the official rates at national level. As a result, at the provincial level, it is also important to highlight the real situation of regional unemployment before examining its determinants. In the next section, we examine the regional unemployment rate and provide a panel dataset of adjusted unemployment rate, with cross section of 29 provinces and time series of 15 years.

3. Adjustment for the Provincial-Level Urban Unemployment Rate

In China, the urban unemployment rate is officially referred to as the *urban registered unemployment rate*. This rate is based on the data in the official registers pertaining to the urban unemployed (i.e., the local bureaus of labor and social security). It is defined as follows :

$$\text{Urban registered unemployment rate} = \frac{\text{Number of registered urban unemployed residents}}{\text{Total labor force of urban residents}} \times 100\%$$

However, the number of unemployed persons who have registered, does not show the total number of unemployed urban residents in China. According to the Chinese Local Unemployment Registration Regulations, one cannot register if he or she does not have proof of the termination contract. Millions of retrenched workers, who remain employed but cannot attend work, are unable to register.

The number of retrenched workers could be large, as the World Bank report (1993 : 8) cites that 25% of the employees in Chinese State-Owned Enterprises (SOEs) in the early 1990s were surplus labor[8]. The provincial-level data of retrenched workers is provided by the National Bureau of Statistics (NBS) (1993－2007a)[9]. We choose data of 29 provinces over the period of 1992－2006. Note that among the 29 provinces, Heilongjiang and Liaoning have the largest numbers of retrenched workers, while those numbers in Zhejiang, Fujian, and Guangdong are comparatively low. The reason is that Heilongjiang and Liaoning are bases of heavy industry and house many large state-owned or collective firms ; Zhejiang, Fujian, and Guangdong, which lie in eastern and southeastern China, have been wrestling with the issues of reform and openness early since 1978.

We adjusted the unemployment rate using year-end data for retrenched workers and registered unemployed persons in the following manner.

$$UR_{it}^{ad} = \frac{U_{it}^{Reg} + U_{it}^{Ret}}{LPO_{it}^{Res}} \cdot 100\%$$

$t = 1992, \cdots, 2006$ (*year*) $i = 1, \cdots, 29$ (*provinces*),

where UR_{it}^{ad} is the adjusted unemployment rate for urban residents, U_{it}^{Reg} and U_{it}^{Ret} are the numbers of registered unemployed residents and retrenched workers at the end of the year t, respectively. LPO_{it}^{Res} is the total number of urban residents in the labor market (excluding migrants).

Since there are no direct and exact data for the urban labor population, LPO_{it}^{Res} is estimated as follows :

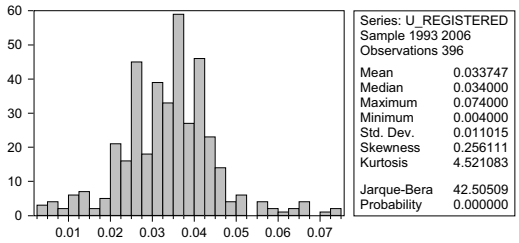
$$LPO_{it}^{Res} = \frac{U_{it}^{Reg}}{UR_{it}^{Reg}},$$

where UR_{it}^{Reg} is the registered unemployment rate for urban residents. The adjustment enable us to get a closer estimation of the real unemployment in China.

The histograms of provincial-level unemployment are shown in Figure 1 (the horizontal axis is the unemployment rate, and the vertical axis is frequency). Both of them approx-imately follow normal distributions. The registered rates are concentrated in 0.03-0.04, while our adjusted unemployment rates are concentrated in 0.07-0.12. Further, the mean, median, and maximum of the adjusted unemployment rates are about three times those of the registered rates, respectively.

It is not surprising that the adjusted unemployment rates in some regions are around 20%. In fact, by the end of 2006, the gross accumulated number of retrenched workers across the nation exceeded 40 million ; note that this figure is about 30% of the urban labor force in

(1) Registered Unemployment Rates



(2) Adjusted Unemployment Rates

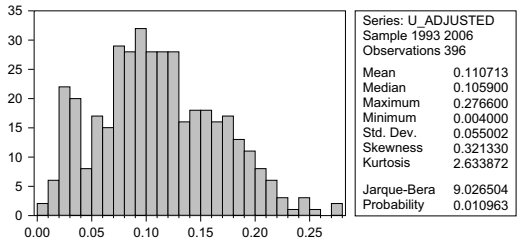


Figure 1 The Provincial-Level Samples of Registered Unemployment Rate and Adjusted Unemployment Rate (Histogram)

1992[10]. Further, the national-level of our adjusted unemployment rate in 2002, which is 14.2%, is almost the same as a survey result in Giles, J., Park, A. and Zhang, J. (2005), in which they found that the unemployment rate of urban permanent residents was 14.0% in 2002.

Note that our results not only adjust national-level rates in some particular years, but also provide a series of provincial-level adjusted unemployment rates, which covers 29 provinces of China over the period of 15 years. Furthermore, the series of adjusted unemployment rates enable us to conduct a regression in the last part of this paper, which hitherto was only marginally possible in the case of China.

This section examined the official Chinese urban unemployment data and provided the new adjusted provincial unemployment rates. The adjusted provincial-level result indicates that the true unemployment situation in China is much more serious than the official rates. The next section will discuss the determinants of the unemployment rates.

4. Determinant of Urban Unemployment — The Labor Market Disequilibrium Approach

4-1. Labor Demand and Supply in China

In China, the labor supply has risen rapidly in recent years. Since the number of people aged between 16 and 64 has increased greatly, and the rate of labor participation remains high. This leads to a large quantity of readily available labor.

In spite of the rapidly increasing labor supply, the labor demand for urban residents is insufficient. Even though the high economic growth has been the norm for a long time, the urban employment rate has been continuously decreasing, and the gap between labor supply and demand, as presented in Figure 2, is large. The findings may lead us to conclude that high economic growth does not mean high urban employment. In order to explain the relationship between labor demand and supply, analyses of employment elasticity (to economic growth) are often used. Yang, C. (2008) examined employment elasticity in China during the period 1979－2000, and concluded that the employment elasticity and the need for labor in production have been declining, especially during the period 1987－2000[11].

The fact that labor supply exceeds demand is considered by most studies to be an important reason behind unemployment in China. However, it is necessary to look beyond this apparent conclusion and understand the real reasons for this phenomenon. The next subsection discuss-

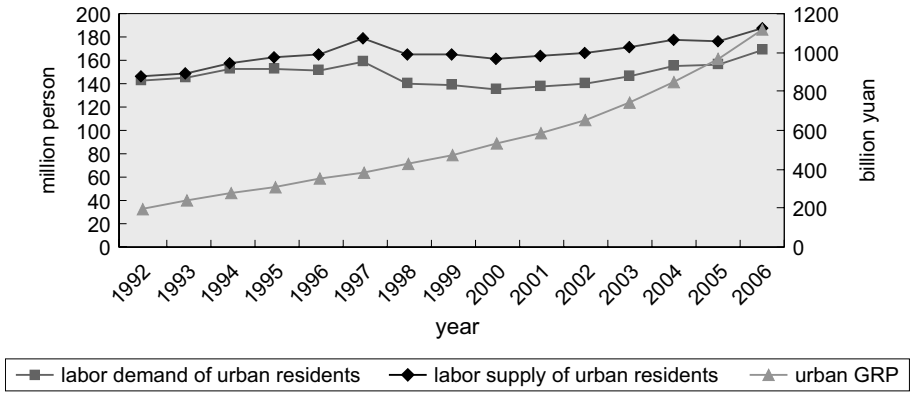


Figure 2 Urban Gross Regional Product (GRP), Resident Urban Labor Supply, and Resident Urban Labor Demand

Sources : Urban resident labor demand and supply are estimated from NBS (1993－2007a) (see details in 4-3. Data). Urban GRP is real and has been calculated using total GRP, real GRP growth, and the weight of secondary and tertiary industries. The original data are from NBS (1993－2007b).

es a model construction.

4-2. Model

In the labor demand and supply approach, we get that $U_{it}^{\mathrm{Re}} = LS_{it}^{\mathrm{Re}} - LD_{it}^{\mathrm{Re}}$. LS_{it}^{Re} and LD_{it}^{Re} denote the social labor supply and demand for a province, but not a particular individual or enterprise. Therefore, the main determinant is the average wage in each province. Besides, LS_{it}^{Re} is also determined by non-wage income[12], and LD_{it}^{Re} by Gross Regional Product (GRP)[13], and w_{it}/LPR_{it}, where w_{it} is current wage, and LPR_{it} is labor productivity[14]. Thus, we set

$$\ln LS_{it}^{\mathrm{Re}} = \rho + \alpha \ln w_{it} + \beta \ln R_{it} + \varepsilon_{it}^{s},$$

$$\ln LD_{it}^{\mathrm{Re}} = \psi + \delta \ln \frac{w_{it}}{LPR_{it}} + \lambda Y_{it}^{T} + \varepsilon_{it}^{d},$$

where R_{it} is the non-wage income, and Y_{it}^{T} is the urban GRP. ε_{it}^{s} and ε_{it}^{d} are random terms reflecting the unobserved social labor supply and demand, respectively. Theoretically, labor supply decreases when wage decreases and non-wage income increases, and labor demand increases when wage decreases and the urban GRP grows[15], which indicates that $\alpha>0$, $\beta<0$, $\delta>0$, and $\lambda>0$.

Further, the urban unemployment rate can be obtained as follows :

$$UR_{it}^{\mathrm{Re}} = \frac{LS_{it}^{\mathrm{Re}} - LD_{it}^{\mathrm{Re}}}{LPO_{it}^{\mathrm{Re}}},$$

where $LPO_{it}^{\mathrm{Re}} = LS_{it}^{\mathrm{Re}}$.

LPO_{it}^{Re} is the number of urban residents participating in the labor force, which is equal to the labor supply.

From the relationship above, we finally obtain the unemployment equation as follows.

$$UR_{it}^{\mathrm{Re}} = 1 - \left(\frac{w_{it}}{LPR_{it}}\right)^{\delta} w_{it}^{-\alpha} R_{it}^{-\beta} e^{\lambda Y_{it}^{T} + \psi - \rho},$$

where $\alpha>0$, $\beta<0$, $\delta<0$, $\lambda>0$, and

$$0 < \left(\frac{w_{it}}{LPR_{it}}\right)^{\delta} w_{it}^{-\alpha} R_{it}^{-\beta} e^{\lambda Y_{it}^{T} + \psi - \rho} < 1.$$

The theoretical model indicates that in an economy where labor supply exceeds labor demand, a higher level of average wages leads to higher unemployment rate, and increases of output level or non-wage income decreases unemployment rate.

4-3. Data

The annual data for labor supply, demand, wage, and Gross Regional Product (GRP) are obtained from NBS (1993－2007a) ; these data cover 29 provinces of China over the time period 1992－2006. The urban labor supply is the total labor population of urban residents, and consists of three factors : urban residents employed in *urban units* and other workplaces such as individual enterprises, registered unemployed urban residents, and retrenched residents. The method used to estimate labor supply is as the same as that used for estimating total labor population of urban residents in the previous section[16]. Urban labor demand is equal to the number of employed urban residents, which is calculated by excluding unemployed residents (both registered unemployed residents and retrenched residents) from the total labor population of residents, and the data includes all the urban residents who are employed in *urban units* and other workplaces. Wage (*yuan*) and GRP (100 million *yuan*) are deflated by GDP deflator.

Labor productivity data (*yuan*) are directly taken from the *Statistical Database of China Economic Information Network*. These data represent the labor productivity in the manufacturing industries[17]. Macro data for non-wage income are difficult to gather. In this paper, we choose the taxes on interest earned and the dividend from shares per capita as the proxy variable of non-wage income (*yuan*) ; these are available in the State Administration of Taxation (2001－2006). Although these are not the actual values, the provincial-level data are able to show the differences in non-wage income between regions so that non-wage income effect can be controlled.

4-4. Results and Discussion

We use fixed-effect model for estimation. We ran Redundant Fixed Effects Test (likelihood ratio), and found that F-statistic is 268 (p-value is 0.0000), and Chi-square statistic is 607 (p-value is 0.0000), which strongly reject the null hypothesis that the cross-section effects are redundant. Thus we prefer fixed-effect estimation to ordinary least squares (OLS) estimation. Furthermore, because the observations of our study are the 29 provinces of China, the individual effect could be specific to the individual cross-sectional unit. Thus in this study, we do not make strong assumptions that the individual effect is a random group specific disturbance, which is required by random effect models[18].

Table 1 shows the estimated result of urban labor supply. Equation 1 introduces all the possible variables, while Equation 2 only includes wage.

The results show that wage has a statistically significant positive effect on labor supply, and that non-wage income has a significant negative effect on labor supply ; this confirms the labor supply theory. The coefficient of wage in Equation 1 (0.23) is about three times larger than that in Equation 2 (0.06) ; this indicates that when non-wage income is controlled, the effect of wage becomes more obvious.

Estimates of urban labor demand are shown in Table 2[19]. Similar to the estimation of labor supply, Equation 1 introduces all the possible variables and Equation 2 only includes wage.

The results indicate that both wage (here, the term wage stands for wage per unit of labor productivity) and Gross Regional Product (GRP) are statistically significant. Labor demand declines when wage rises, and increases when GRP rises. As shown in Equation 2, if GRP factor is excluded, it is obvious that there

Table 1 Estimates of urban labor supply

Dependant Variable : $\ln LS_{it}^{\mathrm{Re}}$
Fixed effect of cross-section

	Equa. 1		Equa. 2	
	Coef.	t-stat.	Coef.	t-stat.
$\ln w_{it}$	0.23	4.54	0.06	5.20
$\ln R_{it}$	−0.09	−2.24		
intercept	14.30	26.15	14.88	151.44
Adj. R.	0.99		0.98	
F-statistic	413.8		798.6	
Sample (adjusted)	2001−2004		1992−2006	
Cross-section included	29		29	
Total number of panel (unbalanced) observations	115		423	

Table 2 Estimates of urban labor demand

Dependant Variable : $\ln LD_{it}^{\mathrm{Re}}$
Fixed effect of cross-section

	Equa. 1		Equa. 2	
	Coef.	t-stat.	Coef.	t-stat.
$\ln \frac{w_{it}}{LPR_{it}}$	−0.16	−4.28	−0.23	−6.77
Y_{it}^{T}	3.40×10^{-5}	4.00		
intercept	14.80	203.50	14.70	188.54
Adj. R.	0.983		0.982	
F-statistic	441.2		424.0	
Sample (adjusted)	1998−2005		1998−2005	
Cross-section included	29		29	
Total number of panel (unbalanced) observations	230		230	

will be a misspecification.

Finally[20], substituting the above estimates into the model, we obtain the following unemployment equation :

$$UR_{it}^{\mathrm{Re}} = 1-\left(\frac{w_{it}}{LPR_{it}}\right)^{-0.16} w_{it}^{-0.23} R^{0.09} e^{3.40\times10^{-5}Y_{it}^{T}+0.5},$$

$$\text{where } 0<\left(\frac{w_{it}}{LPR_{it}}\right)^{-0.16} w_{it}^{-0.23} R^{0.09} e^{3.40\times10^{-5}Y_{it}^{T}+0.5}<1.$$

The above equation indicates that unemployment is determined by wage, non-wage income, and GRP. Unemployment rate increases when wage rises, and decreases when non-wage income or GRP increase.

Furthermore, unemployment will not disappear unless the following condition is satisfied :

$$LD_{it}^{\mathrm{Re}} \geq LS_{it}^{\mathrm{Re}}.$$

Actually, non-wage income, labor productivity, and GRP can not be changed easily by policies in the short run. We assume that they are fixed. In such cases, unemployment is determined by wage. By substituting the estimated result into the above condition, we obtain the following condition :

$$w_{it} \leq \left(LPR_{it}^{0.16} R^{0.09} e^{3.4\times 10^{-5} Y_{it}^{T} + 0.5}\right)^{2.56}.$$

In other words, unemployment will arise if the wage is higher than the market-clearing equilibrium wage, which is

$$w_{it}^{*} = \left(LPR_{it}^{0.16} R^{0.09} e^{3.4\times 10^{-5} Y_{it}^{T} + 0.5}\right)^{2.56}.$$

We calculate that market-clearing wage at provincial level over the period 1998－2006, and compare it with the current wage, using the equation $w_{it}^{ratio} = w_{it}^{*} / w_{it}$. The result of w_{it}^{ratio} is shown in Figure 3（the horizontal axis is the rate of w_{it}^{*} / w_{it}, and the vertical axis is frequency）.

In Figure 3, the observations of w_{it}^{ratio} are significantly over one. It is indicated that the current wages of the 29 provinces during observed period[21] are higher than the market-clearing wages. Accordingly, for a certain rate of economic growth, labor productivity, and non-wage income, the reason for urban unemployment in China is that the current wages, which have a downward rigidity, exceed the market-clearing wages.

5. Urban Dual Labor Market and Influence of Rural Migrants

5-1. Dual Labor Market in Urban Areas

In this section we shed light on the structure of the Chinese urban labor market. In the previous studies, the Chinese dual labor market was considered to be segmented into the labor markets of urban and rural areas. However, as the inflow of rural migrants into urban areas has increased greatly, a dual labor market in urban areas has enlarged. This dual labor market comprises a labor market for urban residents with high wages, permanent jobs, government protection, and a labor market for rural migrants with low wages, temporary jobs, less skills, and limited social welfare.

The National Bureau of Statistics（2006c）reported that in 2005, the outflow of rural migrant workers was about 125.8 million persons ;

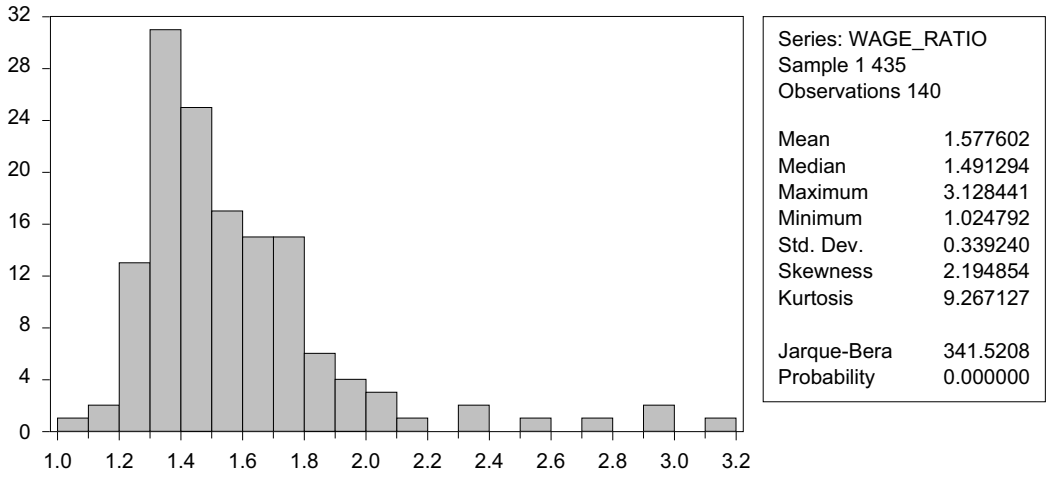


Figure 3 Ratio of Current Wage to Market-Clearing Wage（Histogram）

of this, 95.4% was into the urban areas[22]. That is to say, there are 120.0 million rural migrants working in urban areas, compared to the 156.2 million resident urban workers. Of the rural migrant workers, 83.3% have an education level below junior middle school. Due to their limited education and urban experience, jobs for rural migrants are limited and their wages are much lower than those of the urban residents. Of the rural migrant workers, 34.5% work in the manufacturing industry, 20.2% in the construction industry, and 16.2% in the hospitality industry. The average per capita wage for rural migrants is 10332 yuan ; this is about 60% of the average per capita wage for urban residents.

Contrary to urban residents, the demand for rural migrants exceeds supply. The reason is because the relatively low labor costs of rural migrants translate into higher profits and many firms expand their operations cashing in on these benefits. Since 2004, the shortage of rural migrant workers has attracted much attention in China. It has been reported that in 2005, the shortage of rural migrant workers in the Guangdong province was about 10 million while the Fujian province is also short of around 10 million rural migrants[23]. As a result, the demand for rural migrants exceeds supply.

Figure 4 describes the urban dual labor market of China. The horizontal axis is labor force of rural migrants and urban residents. Labor market of rural migrants is measured rightward from the origin O, and labor market of urban residents is measured leftward from the origin O'. LD^{Mi}, LS^{Mi}, w^{Mi}, and r^{Mi} are labor demand, labor supply, current wage, and reservation wage of rural migrants, respectively ; LD^{Re}, LS^{Re}, w^{Re}, and r^{Re} are labor demand, labor supply, current wage, and reservation wage of urban residents, respectively. In the horizontal interval of rural migrants, the labor demand curve of rural migrants is downward-sloping and lies above the

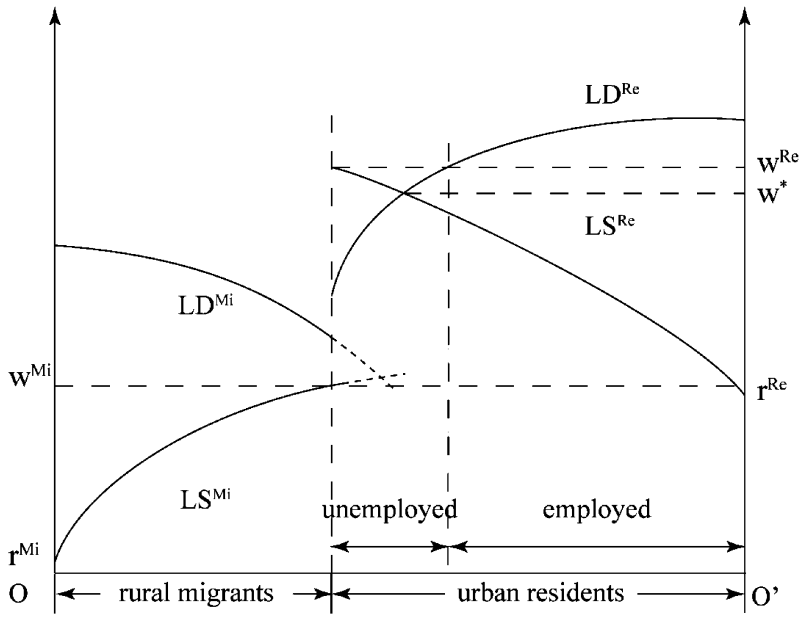


Figure 4 Model of the Chinese Urban Dual Labor Market

labor supply curve ; while in the horizontal interval of urban residents, the current wage is over the marker-clearing wage w^* so the part of unemployment arises.

5-2. Effect of Rural Migrant Employment

What is the influence of rural migrants to urban residents in the dual labor market? We use reduced-form estimation to examine the effect of rural-urban immigration. The estimation equation is as follows.

$$UR_{it} = \beta_1 E^{Mi}_{it-1} + \beta_2 Y^G_{it} + \beta_3 \frac{w_{it}}{LPR_{it}} + \beta_4 R_{it} + \beta_0 + \varepsilon^{ur}_{it}$$

UR_{it} is the unemployment rate of urban residents of region i in the year t. $E^{Mi}_{i,t-1}$ is rural-urban migrants in the previous year. Y^G_{it}, w_{it}, LPR_{it}, and R_{it} and are controlled variables of economic growth, rigid wages, labor productivity, and non-wage income, respectively.

Our panel data cover the time period 1993－2006 of 29 provinces. We use adjusted unemployment rates, which have been obtained in Section 3, for data of UR_{it}. The economic growth data has been deflated by GDP deflator. Data for w_{it}, LPR_{it}, and R_{it} are the same as we used in the previous section. We use panel OLS with fixed-effect specification[24].

The results are reported as follows (T-statistics are in parentheses ; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively).

$$UR_{it} =$$

$$\underset{(-2.43)^{***}}{-5.44\times10^{-8}E^{Mi}_{it-1}} \underset{(-2.18)^{**}}{-0.003Y^G_{it}} \underset{(2.61)^{***}}{+0.39\frac{w_{it}}{LPR_{it}}} \underset{(-1.85)^{*}}{-7.75\times10^{-7}R_{it}} \underset{(6.15)^{***}}{+0.16}$$

$$(Adj.\,R. = 0.90)$$

The results show a statistically significant negative effect of E^{Mi}_{it-1} on UR^{adj}_{it} [25]. All the coefficients of controlled variables are significant and consistent with the theoretical model. Hence, it is indicated that rural-urban immigration could decrease unemployment rate of urban residents due to the increased demand for rural migrants.

Why does rural-urban immigration not lead to unemployment of urban residents in China? The reason could be that some of the jobs taken by migrants are complementary, and moreover, rural migrants' work accelerates GDP growth and increases total labor demand. Rural migrants contribute to GDP growth in two ways. First, the low labor cost and low labor distribution rates of rural migrants translate into high profits, as these provide competitive advantages in the world market in the form of low production costs. Using the data for migrants and residents in *urban units* for the year 2006, labor distribution rate of rural migrants is estimated to be 8.9% while that of urban residents is, 13.2%. Further, with regard to the contribution of consumption to economic growth, the services provided by rural migrants increase the scope consumption by urban residents. Indeed, the consumption of 100 million rural migrants itself is a nonnegligible part of urban consumption. Consequently, although migrants might take up jobs that otherwise would have gone to urban residents, the increase of immigration could contribute to the economic growth, which on the contrary expand labor demand of urban residents.

6. Conclusion

This paper examined the actual unemployment situation in China, and tried to find its determinant using the labor market disequilibrium approach. The paper also explored certain structural aspects of the Chinese urban labor market.

The fact that labor supply exceeds labor de-

mand has been observed in some previous studies. In this paper, we looked beyond this apparent conclusion and examined the real reasons for this phenomenon, based on labor economics theory. An unemployment model, incorporating the factors of real wage, labor productivity, Gross Regional Product (GRP), and non-wage income, is constructed. Unemployment rate increases with wage, and decreases when non-wage income or GRP increase. During the time period 1992－2006, in urban China, the wages for the urban residents were higher than the market-clearing equilibrium wage ; this led to unemployment.

Effects of rural migrants were examined in the last part of this paper. We found out a widened gap of the dual labor market in urban areas, which consists of the labor market for urban residents with high wages, permanent jobs, government protection, and the labor market for rural migrants with low wages, temporary jobs, less skills, and limited social welfare. An increase in rural migrants might decrease the employment opportunities for urban residents ; however, rural migrants' work could also accelerate economic growth and increase total labor demand. In China, we found that rural-urban immigration does not contribute to urban unemployment. The result could lead to reconsideration of immigration restriction in China.

Acknowledgements

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Note

1) National Bureau of Statistics, PRC (2007a)
2) Both real wage rigidity and nominal wage rigidity are observed in previous empirical studies, for instance, Babecky, J. etc (2009). We choose real wage rigidity in this study. In China during 1992－2006, the annual consumer price increases 5.3% on average, especially in 1994 and 1995, it increases 24.1% and 17.1%, respectively (Data come from NBS (2007b)). As a result, workers have to focus on the real wages rather than nominal wages. Even the nominal wages keep constant or grow a bit, workers' everyday lives are affected by the rapidly-growing price level, so they request nondecreasing *real* wages. Since 1990s, news that workers demand higher wages as the price keeps going up have attracted much social attention.
3) Provincial level administrative regions, including Beijing, Shanghai, Tianjin, Chongqing, and so on. Due to data constraints, Hong Kong, Macao, Tibet, Xinjiang, and Taiwan are excluded.
4) Knight, J. and Song, L. (2005), p.128.
5) Knight, J. and Song, L. (2005), p.126.
6) Knight, J and Xie, J. (2006) examines definitions of unemployment in population census and found that they do not tally precisely.
7) Knight, J. and Xue, J. (2006), pp.91-107.
8) Knight, J. and Song, L. (2005), p11.
9) The dataset referred to retrenched workers are called *Fuyurenyuan* (surplus workers) in the yearbook of 1993－1997, and the name is changed into *Buzaigangzhigong* (non-posted workers) since 1998.
10) National Bureau of Statistics, PRC (1993－2007a)

11）Yang, C.（2008）, p.170.

12）Cahuc, P. and Zylberberg, A.（2004）, p.9. “an increase in non-wage income increases the reservation wage, and thus has a disincentive effect on entry into labor market”.

13）The formula is based on the labor demand theory, which minimizes cost subject to an output constraint. Thus the regional product, Y_{it}^{T}, is also included as an explanatory variable. See Cahuc, P. and Zylberberg, A.（2004）, pp.177-178 or Mas-Colell. A., Whinston, M.D., and Green, J.R.（1995）, p.139.

14）The term w_{it}/LPR_{it} stands for wage per unit of labor productivity. Furthermore, if we consider labor productivity separately, in labor economic theory labor productivity growth has opposing effects on labor demand. As the referee commented, on one hand, it favors employment by creating opportunities for profit, on the other hand, it implies labor saving thus often accompanies lay-off. The former is called capitalization effect, and the latter is usually described as creative destruction. The total impact of labor productivity growth on employment is discussed by empirical studies, and it depends on the actual situation of the economy. See detailed analysis in Cahuc, P. and Zylberberg, A.（2004）, chap.10.

15）See Cahuc, P. and Zylberberg, A.（2004）, Chap.1 and Chap.4.

16）We do not use direct data on urban employment because it only includes the people employed in *urban units*（*danwei* in Chinese）, i.e., state-owned enterprises（SOEs）, collective enterprises, foreign enterprises, and other ownership enterprises, and does not include most self-employed business and small-scale private enterprises.

17）Labor productivity data are available for only eight years.

18）See Greene, W.（2008）, p.200.

19）Redundant fixed effects are strongly rejected by the test.

20）Further, we examined the robustness of the estimated results by two methods. The first method is that we exclude ten observations which have extreme values（five highest values and five lowest values）for labor supply data and labor demand data, respectively. The results are almost the same as the origin estimation : for labor supply equation, the coefficients of ln w_{it} and ln R_{it} are 0.27^{***}（6.9）and -0.07^{*}（−1.7）, respectively ; for labor demand equation, the coefficients of ln (w_{it}/LPR_{it}) and Y_{it}^{T} are -0.14^{***}（−3.8）and $3.81\times10^{-5***}$（4.13）, respectively（t-statistics are in parentheses, and ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.）. Further, we also examine the robustness by excluding four observations which have extreme values of residuals. All the coefficients are consistent with the original model, and most of them become even more significant. As a result, we conclude that our results are robust.

21）The adjusted period is four years（2001−2004）because data of non-wage income per capita are available only during that period.

22）National Bureau of Statistics, PRC（2006c）, p9.

23）Sina Finance, February 2005, http://finance.sina.com.cn/nz/farmworker.

24）We have run the endogenous test and found that the null of exogeneity can not be rejected（Chi-Squared statistic of the Durbin test is −18.8, and F-statistic of Wu-Hausman test is −8.0）. Further, we examined fixed effects and found that redundant fixed effects are strongly rejected by the test. As a result, the panel OLS with fixed-effect specification is preferred.

25）We have confirmed the robustness by excluding the two observations which have extreme values of residuals.

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