Wage Flexibility in Chinese Labour Market[☆]

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Abstract

This paper analyses real wage adjustment over the business cycle, i.e. wage flexibility using the China Health and Nutrition Survey (CHNS) for the period 1989-2009. Real wages being flexible to business cycle means adverse shocks result in wage adjustments rather than unemployment. China has highly coordinated wage-setting institutions which might contribute to higher real wage sensitivity of the coordinated region/sector, but lower sensitivity in the region/sector with coordination failures. Using micro-data matched to local unemployment rates, wage equations are specified and empirically tested. We find the reaction of wages to local unemployment varies significantly across different regions, sectors and employee groups, suggesting disparate wage setting institutions within China. The highly coordinated public sector in urban region show significant wage flexibility. However, less flexible wages in the rural region and private sector reveal that the underlying wage-setting institutions may be inefficient. The avenues through which flexibility of the public sector in the urban region is gained may be the lagging (rural) region and (private) sector. Workers with characteristics of weak bargaining power also have less flexible wages, so easily lose their jobs. Incumbents with flexible wages are more likely to retain their jobs, while young or less educated workers with rigid wages are less likely to be hired and easily to be fired.

Moreover, accounting for selection affects measures of wage adjustment over the business cycle. Low-wage persons drop out of the workforce in recessions, and they return to it in booms. Hence, the aggregated wage statistics only measuring (employed) workers' wages may exhibit "too little variability" over the business cycle because changing composition partially offsets measured wage cyclicality. Micro panel data have the advantage of removing compositional biases from the wage measure using wage differencing approach. We apply the traditional two-step approach to avoid the composition biases and investigate the functioning of local labour markets. We also consider the selection biases of the differencing approach using micro panel data, as we restrict the sample only to those who report wages for two consecutive waves. While Heckman selection model really shows significant selectivity effects and upwards biases of OLS, the Heckman adjusted results would not change our basic conclusions.

Keywords: Wage flexibility; Local unemployment; Panel data

JEL classification: J31; J64; E32; C33

☆ The China Health and Nutrition Survey Data (CHNS) are used with the permission of the Carolina Population Centre based at the University of North Carolina at Chapel Hill. Neither the original collectors of the data nor distributors bear any responsibility for the analyses or interpretations presented here. All remaining errors are our own.

PRELIMINARY, PLEASE DO NOT QUOTE

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1. Introduction

Although how the price of labour is affected by the unemployment rate may be the oldest empirical question in economics, wage flexibility is still a big challenge and an ambiguous area for academia and policy makers, especially in a transition economy like China (Freeman, 2007). This paper aims to investigate the functioning of local labour markets in China. We analyze real wage adjustment over the business cycle, i.e. wage flexibility using the China Health and Nutrition Survey (CHNS) for the period 1989-2009. Real wages being flexible to business cycle means adverse shocks result in wage adjustments rather than unemployment. The efficient functioning of a labour market with flexible wages can help the economy recover from adverse shocks faster than a labour market with rigid wages. Using micro-data matched to local unemployment rates, we specify wage equations and empirically estimate the links between individual wages and provincial unemployment rates.

China had a regulated labour market (Kang and Peng, 2012a) which forms an instructive contrast with the more flexible economies such as the US (Devereux, 2001; Shin and Solon, 2007), the UK (Devereux and Hart, 2006) and West Germany (Peng and Siebert, 2012). In practice, China's wage-setting institutions are regarded as a dual system (Song, 1990; Peng, 1992). On the one hand, China is in the transition process of labour market (Nee, 1996). From the foundation of P.R.C to the late 1970s, China had essentially no labour market (Walder, 1986). The public sector dominates in China, and the Bureau of Labour and Personnel centrally determined and controlled the wages of all workers through a national grid system. Managers of firms had little right to hire and fire or determine pay. In 1986, the State Council issued "Temporary Regulations on the Use of Labour Contracts in State- Run Enterprises," formally introduced individual labour contracts to end the system of permanent employment (Meng and Kidd, 1997). By the early 2000s, the labour market began to determine wages and employment (Meng and Kidd, 1997; Freeman, 2007).

On the other hand, China's system of wage setting is command and market coordinated (Lin, 1995), which may result in wages being more responsive to macroeconomic shocks. In other words, the parties' gains to changing wages are higher if all change, so that there is a "strategic complementarity". Wage rigidity may be a result of coordination failure in wage adjustments (Ball and Romer, 1991; Peng and Siebert, 2008). In this paper we test whether coordination makes real wages responsive to macroeconomic shocks in China. Our aim is to provide a factual basis for inquiry, using micro panel data from the China Health and Nutrition Survey Data (CHNS).

This micro-econometric association between the *levels* of pay and *levels* of local unemployment is the so-called wage curve (Blanchflower and Oswald, 1990). While there is an abundance of wage curve estimations, very few contributions try to analyze differences in the slope of the wage curve across sectors and groups of workers (Nijkamp and Poot, 2005; Card, 1995). Neither do wage curve authors try to explain those differences, even though they are keys to a better understanding of the functioning of local labour markets in a transition country like China. This paper mainly stresses the heterogeneity of the wage responses to business cycle for different employee groups.

Moreover, wage curve literature does not consider the selection biases of measures of wage adjustment over the business cycle. Low-wage persons drop out of the workforce in recessions, and they return to it in booms (Heckman and Sedlacek, 1985; Heckman, 2001). Hence, aggregated statistics only measure (employed) workers' wages, and may

exhibit "too little variability" over the business cycle because changing composition partially offsets measured wage cyclicality (Bils, 1985; Solon et al., 1994). Solon et al. (1994) use wage differencing approach for micro panel data which have the advantage of removing compositional biases from the wage measure. We apply their two-step differencing approach to avoid the composition biases and investigate the functioning of local labour markets in China. Solon et al. (1994) argue that the cyclical wage effects of composition would not be accounted for by the differencing approach provided that the sample distribution of those composition factors is related to business cycle conditions. In order to correct the selection biases from restricting the sample only to those who report wages for two consecutive survey waves (Heckman, 1979; Solon, 1988), we also test the sensitivity of our results using Heckman selection model.

The remainder of this paper is organized as follows. In section 2, we present our estimation methods, and in Section 3, we describe the data. Section 4 examines the basic predictions of theoretical models by regions, sectors and workers' characteristics. We also test the robustness of our results by considering selection biases. The final section concludes.

2. Econometric methods

In the empirical literature the wage flexibility has often been specified (and estimated) as a reduced form assuming the local unemployment variable as exogenous. However, if the wage flexibility is interpreted as a structural relation, it is necessary to introduce some assumptions concerning how the long-run market equilibrium is determined. Hence, a relation written either in terms of a wage equation or in terms of a labour demand equation is necessary. Following Ammermuller et al. (2010), the model can be written as follows:

$$W_l = \phi[f(U_l),\ R_l|X_l\,] \tag{1a}$$

$$U_l = \varphi[W_l, R_l, Z_l|Y_l\,] \tag{1b}$$

where l indexes the province (R) – this means that R_l is the provincial fixed effect; W is the wage level; U is the provincial unemployment; Z is a demand shock; and X and Y are two vectors of control variables, that is, respectively, for the wage equation (1a) and the labour demand equation (1b). The identification of equation (1a) can be obtained either by assuming that only variations in Z occur (that is, idiosyncratic shocks affect only the demand), or by using instrumental variables (IV) techniques to instrument regional unemployment. Nijkamp and Poot (2005) summarize that less than 10% of the studies on wage curves use instrumental variables (IV) to control for endogeneity of the unemployment rate and employ OLS as the estimation technique instead. A further option is to consider a recursive model in which wage levels only depend on past unemployment (Ammermüller et al., 2010). In this paper, we only follow the tradition of Bils (1985) and Solon et al. (1994) to use the unemployment change of current year as the proxy of business cycle.

Blanchflower and Oswald (2005) mentioned that with segmented local labour markets, economic shocks to one province will – ceteris paribus – mainly have an impact on the level of local wages, leading to a negative relationship between wages and unemployment 'within' provinces. Empirical estimates are usually based on highly disaggregated data in order to control for heterogeneity in provincial labour markets both

in terms of workers' (that is, gender, age, education, marital status etc.) and firms' characteristics (that is, firm size, sector, location in urban and rural regions etc.). However, the unemployment rate usually refers to the region where individuals work (or firms are located). The use of variables at different levels of disaggregation may lead to biased estimates if all the individuals who work in the same province share some common factors. More precisely, the estimates of the more aggregated variable (that is, the unemployment rate) present lower standard errors. From a statistical point of view, this can overestimate the importance of provincial unemployment in influencing individual wages (Moulton, 1986; Moulton, 1990). To tackle this famous Moulton problem, there are a number of options available in which a two-step procedure has been used by Solon et al. (1994) and Blanchard and Katz (1997). In the first step, individual wages are regressed on personal and job characteristics and on province*year fixed effects, which are used as proxies for the wage at province level. Once these are estimated, they are regressed against provincial unemployment over time, province and year fixed effects. The latter variables are needed in order to seize all permanent components of the relationship between wages and unemployment and leave only the transitory components to the unemployment coefficients (Garcia and Montuenga, 2003).

Our approach offers many advances. First, we use data on real wage movements from a panel of individuals rather than aggregated data of wages. Using aggregate data, most studies of real wage behavior in China have concluded that real wages are at best weakly pro-cyclical (Sabin, 1999; Wu, 2004). However, more unskilled workers become employed in expansion and pull the aggregate average wage downwards. The converse occurs in recession. Thus, an aggregate wage series is counter-cyclically biased (Solon et al., 1994). For this research, we formed an unbalanced panel of 21,976 individuals with clear employment information. Total observation number is 75,102 (see the top panel of Table 1). The average length of time series of panel unit is about 3.5 waves. The differencing approach on each panel workers' wages can remove the composition biases of aggregated data of wages.

Second, we can avoid the underestimation errors of putting aggregate variable (local, in this paper, provincial unemployment) into a regression using micro data. As discussed above, Moulton (1986) shows that individuals in the same year/province will share some common component of variance that is not entirely attributable either to their measured characteristics (e.g., age) or to the local unemployment rate in that year. Hence, the standard error on the unemployment variable would be underestimated (Shin, 1994). Unfortunately, this problem has been ignored by most research on Chinese wage behavior (Appleton et al., 2005). Therefore, our empirical work uses the two-step estimation procedure, beginning with Solon et al. (1997). In step 1, we estimate a wage change equation using individual data. This equation is given by:

$$ln\frac{w_{ilt}}{w_{il,t-s}} = \alpha_0 + \alpha_1 Age_{ilt} + \sum_{l=1}^{9}\sum_{t=1991}^{2009} \alpha_{lt} R_l Y_t + u1_{it} \qquad (2)$$

where w_{ilt} is real average hourly earnings of individual *i* in province *l* (*l*= Guangxi, ..., Shandong) and year t (t = 1991, ..., 2009), and s equals 2, 3 or 4 according to whether the most recent interview before the year *t* interview was two, three or four years earlier. Age_{ilt} is a cubic in age, R_l denotes province dummy variables, Y_t denotes year dummy variables and ε_{ilt} is a random error term. This step gives us a panel data of wage changes for the workers in province *l* and between *t* and *t-s*, that is, α_{lt}.

This paper also considers the possible selection biases in above wage differencing approach of real wage flexibility using micro panel data. Hence, the Heckman estimates are firstly computed using Heckman's (1979) procedure. We examine the relation between workers' characteristics (age, education and marital status etc.), province*year dummies and the probability of employment in two consecutive waves by testing vector of coefficients γ in the probit estimates of the selection equation:

$$\Pr(\text{employed in two consecutive waves}|\, X_{it}) = \Phi(X_{it}\gamma) + u2_{it} \quad (3)$$

Probability of employed in two consecutive waves is given by cubic age, 5 education dummies, marital status, internal urban/rural passport ("*Hukou*")[1], family size and all province*year dummies (X_{it}). Residual errors of two equations (2) and (3) follow normal distribution with mean 0 and standard deviations of σ and 1, and are correlated each other: $u1 \sim N(0; \sigma)$; $u2 \sim N(0; 1)$; $corr(u_1; u_2) = \rho$. When $\rho \neq 0$, standard regression techniques applied to equation (2) yield biased results.

From these estimates, the non-selection hazard—what Heckman (1979) referred to as the inverse of the Mills' ratio, m_{it} —for each observation is computed as $m_{it} = \frac{\varphi(X_{it}\hat{\gamma})}{\Phi(X_{it}\gamma)}$, where φ is the normal density. The parameter estimates of equation (2) are obtained by augmenting the regression equation with the non-selection hazard m_{it}, and we obtain the additional parameter estimate on the variable containing the non-selection hazard. And then, we test regression estimates using the non-selection hazard (Heckman, 1979). Selectivity effect λ (=$\rho\sigma$) is tested to justify the Heckman selection model.

Final, we derive estimates of the wage cyclicality of workers by regressing α_{lt} on the provincial unemployment change variable (ΔU_{lt}), with provincial fixed effects (R_l) and time dummies (Y_t). This equation is given by:

$$\widehat{\alpha_{lt}} = \delta_0 + \delta_1 \Delta U_{lt} + \delta_2 R_l + \delta_3 Y_t + \gamma_{lt} \quad (4)$$

In this step, we only have time series variation for each province, reducing the number of observations – in our case 7 waves of 9 provinces (actually only 58 observations in the step 2 as the wage data of *Liaoning* are missing in 1997, *Heilongjiang* missing in 1989, 1991 and 1993). We use weighted least squares where the weights are the numbers of individuals observed in each province and year. Our data cover more than one full business cycle in China and can reflect the wage flexibility situation over the last two decades of labour market reform.

3. Data Description

[1] *HuKou* policy was generated within the centrally planned economic system, and has been in operation since 1958. People inherit *HuKou* status from the previous generation. An important distinction is made between urban/non-agriculture *HuKou* and rural/agriculture *HuKou*. Wang and Moffatt (2008) point out that only urban/non-agriculture *HuKou* holder is entitled to social welfare in China, such as education, medical care, pension rights and unemployment benefits, and also has access to desirable positions in the labor market. For a rural/agriculture *HuKou* holder, a plot of land loaned from the government is the only source of social welfare; when seeking employment in urban region, they are excluded from urban social welfare and are constrained to inferior or temporary positions in the labor market. Also, they have no entitlements to unemployment benefits. Hence, *HuKou* policy which causes unemployment and wage distortions is regarded as an inefficient institutional factor in Chinese labour market (Chan and Zhang, 1999; Lai, 2001).

The data used in this paper is the eight waves (1989, 1991, 1993, 1997, 2000, 2004, 2006 and 2009) of the China Health and Nutrition Survey (CHNS) data over the last two decades. The CHNS panel data employ a multistage random-cluster sampling process to draw households from nine provinces (Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong). Figure 1 shows the geographic location of the provinces covered by the CHNS which can be broadly categorized into four big regions of the Northeast (Heilongjiang and Liaoning), the Coastal (Jiangsu and Shandong), the Interior (Henan, Hubei and Hunan) and the West (Guangxi and Guizhou).

(Figure 1 around here)

We splice the Chinese National Labour Statistics Yearbook 1994-2009 and Chinese National Statistics Yearbook 1993-2009 to build an unemployment dataset corresponding to the CHNS at provincial level. This urban registered unemployment rates may be the only official information sources of unemployment data at the provincial level over the period 1989-2009. Hence, they are used as our cyclical indicator of local labour market. In Figure 2, the regional unemployment rates are calculated by the average unemployment rates of the provinces in the region. We can find the unemployment rates were as low as around 2% in the 1980s for all four regions. After that, the unemployment rates have been increasing over the entire period and doubled to around 4% in 2009, reflecting the transition process of a labour market after the 1970s (Walder, 1986; Meng and Kidd, 1997).

Moreover, there are very different variation patterns across regions. The less developed Western provinces (Guangxi and Guizhou) have the highest unemployment rate of 5.4% in 1997, and are much higher and more volatile than other provinces before the 2000s. However, the unemployment of the provinces in the Northeast (Heilongjiang and Liaoning) dramatically increased after 1992 and peaked 5.7% in 2002. It is consistent with the reform of the state-owned enterprise (SOE) sector and the shift in industrial structure out of heavy industry over the period of 1992-2002 (Appleton et al., 2005), which affected the old industrialized provinces in the Northeast more than other provinces. As expected, the most developed Coastal provinces (Jiangsu and Shandong) have the lowest unemployment rates after 2002. These disparate patterns of unemployment alleviate our concern on that the unemployment volatility in China could have been damped by active labour market policies. Therefore, the standard deviations of Δu are likely to reflect true volatility of unemployment in Chinese local labour market.

(Figure 2 around here)

Table 1 presents descriptive statistics of variables at individual level by resident region and gender. We concentrate on two samples of micro data: 1) work force sample, including all people aged 16-65. In top panel of Table 1, the numbers of observations being resident in the rural regions nearly double the observations in the urban region for both genders. Females in the urban region have the highest average age (40.1 years old) among these 4 region/gender groups while males in the rural are a little younger (38.5 years old) than others. Males have higher educational attainment than females, and the education gaps between two genders are higher in the rural region. For both regions, the largest group of education attainment is the lower middle school, especially in the rural region (40.5% for males and 30.7% for females). About 20% males and 15% females have never been married in the workforce sample. About 66% residents in the urban region and 25% residents in the rural region have the urban *Hukou*, suggesting much

more migration from the rural to urban regions than the other direction. The average family size is 3.9 persons in urban region and 4.3 persons in rural regions, which is also consistent with former studies (Kang and Peng, 2012b).

2) Wagers sample, including all wage earning employees. We exclude self-employed workers and owners of private or individual enterprises because it is difficult to separate their wages from profit income. In the bottom panel of Table 1, urban employees have much higher probability to work in the public sector (46.7% for males and 39.2% for females) than those in the rural region (14.5% for males and 9.2% for females). Hence, males have more chances to work in public sector than females by about 6% in both regions. In the same vein, males (workers in the urban region) have more chances to work in big firms (with 100+ employees) than females (workers in the rural region).

(Table 1 around here)

Regarding to wage variable, real hourly wage (in 1995 prices) used here is real annual earnings divided by annual total working hours. Nominal annual earnings, which include regular wages, subsidies and bonuses from the employer[2], are converted into real annual earnings using corresponding deflators of local (provincial) urban Consumer Price Index (CPI), provided by the National Bureau of Statistics of China (NBSC). Male employees working in the urban region earn about 16% (=0.944-0.78) higher than their counterparts in the rural region, while rural female employees earn much less than other groups. Wage gender gap is as prominent as region gap. We also find that the employees in public sector earn only about 12% (=0.962-0.841) higher than their counterparts in the rural region. Region wage gap is even less for females in the public sector, only 9% (=0.803-0.711) compared with 24% (=0.685-0.450) in the private/collective sector. Hence, the region and gender wage gaps are much less in the public sector than in the private/collective sector, suggesting a more compressed or equal wage structure within the public sector.

Males working in the big firms in the urban region (1.218) can earn much more than all other groups, while female employees in the rural region who work in the private/collective sector (0.45) or small/medium firms (0.437) show miserable disadvantages in wage structure. When it comes to the annual growth rates of real hourly wages (defined as wage changes between two consecutive waves divided by corresponding number of years), most groups shows very close growth rate of wages over the last two decades (about 10% per year). However, wages of females grow faster than males in the private/collective sector and small/medium firms, being only similar in the public sector and big firms. Public sector and big firms also show a coordinated wage growth for both genders. Males working in the private/collective sector have the slowest growth rate (8% per year) among four region/gender groups. The privatization reform seems to favor females rather than males. Thus, in both sense of level and growth rate there is great wage disparity among employee groups by gender, firm ownership, firm size and urban/rural regions. The wage structure and its evolution over the period 1989-2009 suggest a segmented labour market within China.

4. Empirical results

[2] Kang and Peng (2012a) find the wage cyclicality in urban China is mainly from the bonus and subsidy components of gross wages. We focus on the average hourly rate including all basic salary, bonus and subsidy components in this paper.

The OLS two step results for the unemployment change coefficients from equation (4) are reported in Table 2. The basic result is that only wages for urban male workers are flexible. The estimated total wage flexibility is negative and significant for urban males. One point increase of the local unemployment rate could decrease the real wages by 6.197% for urban males. Wages for females in both regions are also procyclical (negative), but not significant. Males in the rural region also have insignificant results, even with wrong signs. These results are consistent with a regulated labour market in the transition process, and comparable with results from other segmented labour market such as West/East Germany and North/South Italy (Peng and Siebert, 2008; Peng and Siebert, 2012).

(Table 2 around here)

We also differentiate estimation by firm ownership, firm size and some employees' characteristics such as marital status (married and single), education levels (upper middle school and above, and below higher school) and *Hukou* status (urban Hukou and rural Hukou) and find markedly difference among sub-labour markets. We find the wage flexibility in Chinese labour market is mainly from the public sector and employee groups with bargaining power. For males in urban region, one point increase of the local unemployment rate could decrease the real wages by 7.466% (and very significant) if they work in the public sector, but only 5.537% (and less significant) in the private/collective sector. The estimated wage flexibility is negative and significant by firm size, suggesting firm size may be not the driving factors behind the flexibility.

Moreover, married and higher educated male workers in the urban region, especially with urban *Hukou* obviously have more power to bargain their wages and jobs, and have significantly flexible wages. Hence, these incumbent male workers are more likely to retain their jobs in face of adverse shock of business cycle. For example, for male workers with urban *Hukou* and working in the urban, one point increase of the local unemployment rate could decrease the real hourly wage by 6.804%. For those male workers working in the urban but without urban *Hukou*, however, their wages are totally rigid even with wrong sign as males in the rural region. Thus, *Hukou* status does matter in workers' wage flexibility, and then whether they can retain their jobs in the time of bad. That is, urban *Hukou* leads to better bargaining position for their contract on job and wages. They may have pro-cyclical and flexible wages to help their employers, so they can survive the recession of business cycle and benefit in the prosperity. Urban male workers with rural *Hukou* have only rigid wages, obviously easily to be fired in time of bad.

For other three groups of workers, we find similar wage flexibility connected with firm and employee characteristics, but much less significant maybe because of coordination failures. Wages are flexible for female workers in the public sector, whether or not they are working in the urban. It is a very strong evidence of coordination between urban and rural regions. However, males in the rural regions obviously cannot catch up with the changes and show rigid wages even with wrong signs.

A little surprising but still understandable result is that urban female workers with lower education level (under Upper middle school) rather than higher education have flexible wages. O'Mahony and Peng (2008) find similar results in European countries that unskilled females in services are complementary to information and communication technology hence have advantages in wage bargaining as a whole. If we consider those female-dominant industries such as hospitality, nurses, primary education, community caring and other services, unskilled females may have stronger bargaining power on jobs

and wages as an industry or professional trade union. Thus, it is highly possible for unskilled females to have flexible wages and try to keep their jobs over the business cycle. Urban Hukou also reflect the better bargaining power of those females working in the rural regions who may be the civil servants in local governments. These results are consistent with Kang and Peng (2012b), but obviously demand further research in the future based on industry analysis.

(Table 3 around here)

Next, Table 3 shows a sensitivity test on wage and unemployment changes after the Heckman adjustment. The top panel presents the results of selection equation (3) of the Heckman selection model. We can see that elder workers are more likely to be employed in two consecutive waves, especially for females. Workers with higher education have more possibility to be employed for longer time. As for age, education levels have the highest positive and significant effects on female workers. Married males and single females are more likely to be employed. And for both genders, the single status has more effect in rural region maybe because the jobs in the rural region are more labor-intensive. Urban *Hukou* can increase the employment chance dramatically, especially in rural region. Hence, as many authors such as Wang and Moffatt (2008) points out, urban *Hukou* reflects the advantages on social welfare and better job chances. Finally, the higher family size, the lower possibility to be hired. It may just reflect the family background is bad for education and job as poor family is more likely to have more children and large family size (Kang and Peng, 2012b).

The middle panel is the test for selectivity effect. From the inverse mills ratio tests, the selection biases exist for all groups except females in the rural region. It suggests that the selection process of females in the rural region may be just random and would not bias the OLS results. LR chi2 test for independence of selection and wage equation show similar results that these two equations are significantly correlated except the females in rural. Hence, the Heckman adjustment is necessary for males and females in the urban, but not for females in the rural.

The bottom panel of Table 3 presents the Heckman adjusted results for all workers. The wage flexibility does not change its pattern across groups after the Heckman adjustment. Only male workers in the urban region have flexible wages. One point increase of the local unemployment rate could decrease the real hourly wage by 6.048% which is a little less than the OLS results in Table 2. Wages for females in both regions are still insignificantly procyclical, while males in the rural region have insignificant results with wrong signs. These insignificant results are also a little smaller than OLS results. Hence, we find upwards selection biases of OLS results, but selection biases would not change our basic results. We can conclude our results are robust after Heckman adjustment.

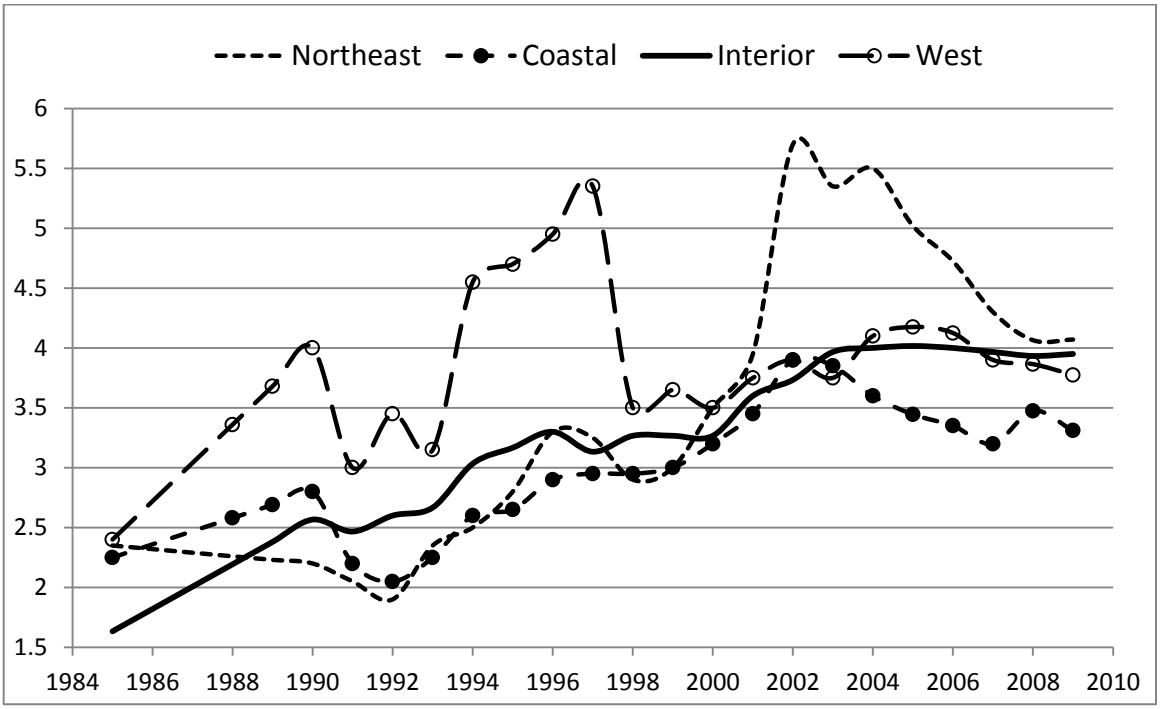
5. Conclusions

This paper investigates the wage flexibility in Chinese labour market. Using changes in the unemployment rate as the cyclical measure, we find flexible wages connected with the firm and employee characteristics with coordination and bargaining power. The results suggest that real wages are flexible in the public sector with a successful process of command and market coordination. The lagging private sector and rural region seem unable to catch up with the changes. Less flexible wages in the private sector, rural

region and employee group with disadvantageous bargaining positions may arise from coordination failures, which neither help workers keep their jobs as the local labour market is tight, nor get more benefit of economic growth as the local labour market is loose. Similar to the public sector, employees with favorable skill (higher education males and lower education for females) and urban Hukou can have flexible wage and have more chances to keep their jobs. Firm size seems not so important in wage setting which is consistent with the development of labour market based on individual contract. This paper finds some interesting points that those incumbents are more likely to retain their jobs, but workers with less bargaining power are less likely to be hired and easily to be fired (Lazear, 1990). Studies based on more accurate industry and employment movement analysis is demanded for the future research (Heckman and Sedlacek, 1985; Devereux and Hart, 2006).

Figure 1 Geographic graph of provinces in CHNS

Figure 2 Unemployment rates in China, 1985-2009



Data source: Chinese National Labour Statistics Yearbook 1994-2009;
Chinese National Statistics Yearbook 1993-2009

Table 1 Means and Standard Deviations, the CHNS 1989-2009 (Standard deviations are in parentheses)

Variables	Urban		Rural	
Workforce sample (age:16-65)	**Male**	**Female**	**Male**	**Female**
Age (mean)	39.8	40.1	38.5	39.0
Education attainment = primary school (%)	14.6	15.2	25.3	23.8
Education attainment = lower middle school (%)	35.3	30.2	40.5	30.7
Education attainment = upper middle school (%)	20.8	18.0	14.5	9.2
Education attainment = vocational degree (%)	8.7	8.8	3.6	3.1
Education attainment = college or above (%)	9.4	6.1	1.9	1.0
Marital status = single (%)	20.8	15.6	22.4	16.3
Hukou = urban (%)	67.1	66.3	26.0	24.5
Family size (mean)	3.9	3.9	4.3	4.4
Total number of panel individuals	3,692	4,056	6,727	7,501
Average number of observations each year	1,450	1,524	3,207	3,207
Total number of observations	11,603	12,192	25,652	25,655

Variables	Urban		Rural	
Wage earner sample (age:16-65)	**Male**	**Female**	**Male**	**Female**
Employees working in public sector (%)	46.7	39.2	15.0	9.3
Employees working in big firms (>=100, %)	29.5	26.0	10.9	8.7
Mean real wage, 1995 prices (lnW):				
Overall	0.944	0.753	0.780	0.538
	(0.911)	*(0.894)*	*(0.899)*	*(0.887)*
Working in public sector	0.962	0.803	0.841	0.711
	(0.941)	*(0.927)*	*(0.934)*	*(0.948)*
Working in collective/private sector	0.915	0.685	0.748	0.450
	(0.855)	*(0.830)*	*(0.872)*	*(0.827)*
Working in big firms (>=100)	1.218	0.989	1.060	0.900
	(0.872)	*(0.837)*	*(0.841)*	*(0.786)*
Working in small/medium firms (<100)	0.783	0.620	0.710	0.437
	(0.894)	*(0.898)*	*(0.899)*	*(0.887)*
Real wage annual changes (ΔlnW)*:				
Overall	0.100	0.101	0.093	0.102
	(0.239)	*(0.225)*	*(0.278)*	*(0.260)*
Working in public sector	0.110	0.104	0.106	0.100
	(0.226)	*(0.208)*	*(0.234)*	*(0.242)*
Working in collective/private sector	0.080	0.095	0.080	0.107
	(0.264)	*(0.253)*	*(0.315)*	*(0.273)*
Working in big firms (>=100)	0.107	0.098	0.098	0.108
	(0.224)	*(0.203)*	*(0.216)*	*(0.230)*
Working in small/medium firms (<100)	0.095	0.103	0.092	0.100
	(0.249)	*(0.240)*	*(0.296)*	*(0.269)*

Total number of panel individuals	3,020	3,106	5,982	6,346
Average number of observations each year	1,077	991	2,661	2,408
Total number of observations	8,618	7,931	21,290	19,263

Notes: *****Wage changes are for all paid employees. Annual wage changes are wage changes ($\Delta \ln W_{it}$) in the equation (2) divided by corresponding number of years, that is, divided by 2 for wage changes over the periods of 1989-1991, 1991-1993 and 2004-2006, divided by 3 for wage changes over 1997-2000 and 2006-2009, and divided by 4 for wage changes over 1993-1997 and 2000-2004.

Table 2 Wage and unemployment changes, by sector, firm size and workers' characteristics (coefficients on Δu_t from equation 4)

Two step OLS	Urban		Rural	
	Male	Female	Male	Female
all	-6.197**	-5.462	2.27	-4.081
	(2.644)	*(5.016)*	*(2.376)*	*(4.621)*
Public	-7.466**	-7.031*	2.798	-5.737*
	(3.115)	*(3.856)*	*(3.646)*	*(3.512)*
Collective/Private	-5.537*	0.021	-0.705	-6.76
	(3.549)	*(6.853)*	*(4.286)*	*(7.861)*
Big firms(>=100)	-5.950*	-3.937	-3.622	-4.686
	(3.231)	*(4.65)*	*(4.267)*	*(7.042)*
Small/medium (<100)	-5.8*	-4.48	4.755	-6.885
	(3.659)	*(6.437)*	*(3.091)*	*(4.904)*
Married	-7.295**	-4.133	2.296	-0.633
	(2.991)	*(5.786)*	*(2.317)*	*(5.106)*
Single	-6.02	-6.614	3.274	-10.144
	(5.678)	*(6.79)*	*(6.436)*	*(7.241)*
Upper middle school +	-6.007*	-4.778	6.102*	0.805
	(3.581)	*(5.464)*	*(3.331)*	*(9.275)*
Upper middle school -	-4.527	-6.416*	-0.499	-5.895
	(3.822)	*(4.039)*	*(3.609)*	*(5.458)*
Urban Hukou	-6.804**	-4.694	2.967	-5.834*
	(2.932)	*(4.049)*	*(3.062)*	*(3.77)*
Rural Hukou	3.694	-12.426	-2.582	-5.001
	(6.814)	*(8.749)*	*(5.029)*	*(6.395)*

Notes: Standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels for two-tail tests. There are 9,556 individual observations (2,802/2,091 males/females in the urban region; 3,016/1,647 males/females in the rural region) in the first step equation (2), and 58 province*year weighted observations for the second step equation (4).

Table 3 Wage and unemployment changes, Heckman adjustment model (coefficients from equations 2-4)

	Urban		Rural	
	Male	Female	Male	Female
3a. Selection equation (3), dependent variable = employment in two consecutive waves				
Age	0.171***	0.455***	0.158***	0.446***
	(0.047)	*(0.061)*	*(0.039)*	*(0.055)*
Age2	-0.001	-0.007***	-0.002**	-0.008***
	(0.001)	*(0.002)*	*(0.001)*	*(0.001)*
Age3	-0.012	0.025*	0.001	0.041***
	(0.009)	*(0.013)*	*(0.008)*	*(0.012)*
Primary	0.334***	0.474***	0.372***	0.528***
	(0.075)	*(0.078)*	*(0.056)*	*(0.062)*
Lower middle school	0.562***	0.829***	0.598***	0.846***
	(0.069)	*(0.070)*	*(0.054)*	*(0.059)*
Upper middle school	0.736***	0.995***	0.775***	1.022***
	(0.073)	*(0.074)*	*(0.058)*	*(0.066)*
Vocational degree	1.084***	1.487***	1.282***	1.527***
	(0.082)	*(0.083)*	*(0.075)*	*(0.085)*
College or above	1.160***	1.615***	1.207***	1.280***
	(0.080)	*(0.091)*	*(0.087)*	*(0.120)*
Single	-0.159**	0.236***	-0.297***	0.475***
	(0.067)	*(0.077)*	*(0.057)*	*(0.073)*
Urban Hukou	0.846***	0.894***	1.031***	1.022***
	(0.044)	*(0.052)*	*(0.028)*	*(0.036)*
Family size	-0.050***	-0.060***	-0.019**	-0.022*
	(0.014)	*(0.016)*	*(0.009)*	*(0.012)*
Province*Year dummies	Yes	Yes	Yes	Yes
N	10,065	10,535	22,694	22,844
3b. Inverse mills ratio tests				
Lambda	-0.136***	-0.067***	-0.104***	-0.016
	(0.031)	*(0.030)*	*(0.025)*	*(0.033)*
LR test of indep. eqns. (rho = 0, chi2 test):	13.84 ***	4.79**	25.15***	1.34
3c. Heckman adjusted wage equation (4)				
All	-6.048**	-5.673	3.051	-3.892
	(2.733)	*(5.054)*	*(2.346)*	*(4.418)*
Province dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
N	2,620	1,951	2,852	1,527

Notes: Standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels for two-tail tests. There are 66,138 individual observations (10,065/10,535 males/females in the urban region; 22,694/22,844 males/females in the rural region) in the selection equation, 8,950 individual observations (2,620/1,951 males/females in the urban region; 2,852/1,527 males/females in the rural region) in the first step of wage equation and 58 province*year weighted observations for the second step.

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