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Kang, Lili and Peng, Fei

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Lili Kang [a,*], Fei Peng [b]

a *University of Birmingham Business School, Department of Management*
b *University of Birmingham Business School, CREW*

Abstract

This paper investigates the cyclical behaviour of real wages in urban China using the China Health and Nutrition Survey (CHNS) 1989-2006. Using changes in the unemployment rate as the cyclical measure, we find pro-cyclicality in the public sector and small/medium firms, but not in big firms. We also find real wages of male, high educated or ever married workers are flexible. Including bonuses increases the pro-cyclicality of regular wages.

Keywords: Real wage cyclicality; Panel data; CHNS; Coordination

JEL codes: E32; J31; J64

☆ 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 or distributors bear any responsibility for the analyses or interpretations presented here. All remaining errors are our own.

*Corresponding author. Birmingham Business School, University House, Edgbaston Park Road, Birmingham, B15 2TY, UK. Tel.: +44 121 414 2566; fax: +44 0121 414 7380.
E-mail: lxk699@bham.ac.uk

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1. Introduction

This paper analyses real wage adjustment over the business cycle using panel micro data for urban China 1989-2006. China had a regulated economy which forms an instructive contrast with the more flexible economies such as the US and the UK (see Devereux 2001 for the US; and Devereux and Hart 2006 for the UK). Our aim is to provide a factual basis for inquiry, using microeconomic panel data from the China Health and Nutrition Survey Data (CHNS).

In practice, China's wage-setting institutions are regarded as a dual system (see e.g. Song 1990, Peng 1992). On one hand, China is in the transition process of labour market (Nee, 1996). From the foundation to the late 1970s, China had essentially no labour market (Walder, 1986). The public sector dominates in the urban China, and the Bureau of Labour and Personnel centrally determined and controlled the wages of all workers through a national grid system. This heavy planning led to poor effect incentive which depressed productivity and innovation. This situation changed when China began its market reforms. In 1986, the State Council formally introduced individual labour contracts to end the system of permanent employment. By the early 2000s, the labour market began to determine wages and employment (Meng, 1997; and Freeman 2007).

On the other hand, China's system of wage setting is command/market coordinated. China's coordinated wage setting results in wages being more responsive to macroeconomic shocks, since coordination assists altering incentives, facilitating efficient bargaining, and increasing information, communication, and trust (Lin, 1995; Freeman, 2007). 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 (see more discussion in Ball and Romer, 1991; Peng and Siebert

2008) in wage adjustments. In this paper we directly test whether individual labour contracts or such command/market coordination makes real wages responsive to macroeconomic shocks in urban China

2. Data and econometric methods

The dataset used in this paper is the China Health and Nutrition Survey (CHNS). The survey employs a multistage random-cluster sampling process to draw households from nine provinces (Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong). We use seven waves of CHNS data (1989, 1991, 1993, 1997, 2000, 2004 and 2006) and concentrate on wage earning employees who work in the urban areas of the nine provinces. We exclude self-employed workers, workers in "Agriculture, forestry, animal husbandry, fishery and water conservancy" sector, and owners of private or individual enterprises because it is difficult to separate their wages from the profit income.

Real hourly wage is real annual earnings divided by annual total working hours. Nominal annual earnings, which include regular wages and bonuses from the employer, are converted into real annual earnings using corresponding deflators of provincial urban CPI (Consumer Price Index) based on year 1995, provided by the National Bureau of Statistics of China (NBSC). We use changes of the provincial urban registered unemployment rates as our cyclical indicator of local labour market, also from the NBSC.

Our approach offers two advances. First, we use data on real wage movements from a panel of individuals rather than aggregate data. Using aggregate data, most studies of real wage behaviour have concluded that real wages are at best weakly pro-cyclical in China (e.g. Sabin, 1999; Wu, 2004). However, aggregate data ignore the fact that, over the cycle, 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 5,978 workers with clear employment information. Total observation number is 15,885.

Second, we can avoid the underestimation errors of putting aggregate variable (for example provincial unemployment rates) into a regression using micro data. Moulton (1986) shows that individuals in the same year/region will share some common component of variance that is not entirely attributable either to their measured characteristics (e.g., age) or to the aggregate unemployment rate in that year. In this case, the error component in simple OLS regression will be positively correlated across people in the same year, so we will underestimate the standard error on the unemployment variable (also see Shin, 1994). Unfortunately, this problem has been ignored by authors on Chinese wage behaviour (Appleton et al., 2005). Again, such a finding might provide an insight into the working of labour market institutions in the particular case. Therefore, our empirical work uses the standard two-step estimation procedure (beginning with Solon et al., 1997) to get round the Moulton (1986) problem. In step 1 we estimate a wage change equation using individual data. This equation is given by:

$$ln\frac{W_{ilt}}{W_{il,t-s}} = \alpha_0 + \alpha_1 Age_{ilt} + \sum_{l=1}^{L}\sum_{t=1}^{T} \alpha_{lt} R_l Y_t + \varepsilon_{ilt} \qquad (1)$$

where W_{ilt} is real average hourly earnings of individual i in province l (l= Guangxi, ..., Shandong) and year t (t = 1991, ..., 2006), 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_{it} is a cubic in age, R_l denotes a province dummy, Y_t denotes a year dummy 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}.

In step 2, we then derive estimates of the wage cyclicality of workers by regressing α_{lt} on the provincial unemployment change variable (Δu_{lt}), with provincial fixed effect (R_l) and time dummies (Y_t). This equation is given by:

$$\widehat{\alpha_{lt}} = \delta_0 + \delta_1 \Delta u_{lt} + \delta_3 R_l + \delta_4 Y_t + \gamma_{lt} \qquad (2)$$

In this step, we only have time series variation for each province, reducing the number of observations – in our case 6 waves of 9 provinces (actually only 49 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 a given year. Our data cover more than one full business cycle in China.

3. Empirical results

The results for the unemployment change coefficients from equation (2) are reported in Table 1. The estimated total wage cyclicality (whole sample, column 1) is negative and significant. One point increase in the local unemployment rate would decrease the real wage by 6%. We differentiate between the public and private sector and find markedly different labour markets. Real wages of workers in the public sector exhibit significant and highly pro-cyclical movements (10.1%), which are also significant and highly pro-cyclical in small/medium firms (fewer than 100 employees, 9.6%). However, wages in the private sector and big firms are rigid. It appears as though coordinated response to economic shock increase wage flexibility in the public sector, but the coordination fails in the private sector. Put in another way, for the public sector which is coordinated by

command and market, the benefits of coordination are real. However, these benefits do not extend to the disadvantaged economic agents in private sector. Big firms may have more internal resources to smooth out the business cycle. Workers in small/medium firms can have flexible wages by using individual labour contract while they are less command/market coordinated. We also find real wages of male, high educated or ever married workers are more flexible than others.

(Table 1 around here)

Next, we present three sensitivity tests for our results. Firstly, since we work with annual earnings for hourly wage, we require a measure of annual hours. Errors in reporting of hours can give rise to spurious cyclicality of wages. In particular, workers may report contract hours rather than actual hours worked, causing reported hours to remain overly steady from year to year. Such understatement of the cyclicality of hours will give an overstatement of the cyclicality of hourly wages. Hence, we present the sensitivity test for the annual earnings in column 2, which show very similar cyclicality pattern as hourly wage. Thus, we take it that the bias from misreporting of hours is not large for our data.

Secondly, column 3 gives the consequences of nominal hourly wage. While the effect of unemployment rate becomes insignificant for the whole sample and males, there is not much change in the significant and positive coefficients for workers in the public sector and small/medium firms, as well as those high educated and ever married workers. Hence, our results do not show a significant negative association between the CPI and unemployment rate in urban China, i.e. the Philips curve.

Finally, Table 1 presents the cyclicality of regular wage (excluding bonuses). Bonuses are associated with employers' profit hence should be more flexible than regular wage.

Excluding bonuses from our wage variable may decrease the pro-cyclicality. The final column reveals insignificant coefficients for the whole sample and most sub-groups, but the pro-cyclicality of real wages of workers in the public sector and small/medium firms are still robust.

4. Conclusions

This paper investigates the cyclical behaviour of real wages in urban China using the CHNS 1989-2006. Using changes in the unemployment rate as the cyclical measure, we find real wages of workers in the urban areas to be pro-cyclical. We find robust pro-cyclicality in the public sector and small/medium firms.

The results suggest that real wages are not sticky in the public sector, suggesting a successful process of command/market coordination. The lagging private sector seems unable to catch up with the changes. These sticky wages in the private sector are from the coordination failure, which cannot help workers keep their jobs as the local labour market is tight, as well as get more benefit of economic growth as the local labour market is loose. The small/medium firms are also sensitive to the local labour market condition, consistent with the development of labour market based on individual contract. However, we might argue that big firms prefer the rigid wage setting. The policy conclusion seems to be that the coordinated wage-setting institutions give flexible wages in the public sector hence urban China. The development of labour market also helps small/medium firms to set up flexible individual contracts. However, for lagging private sector and big firms, rigid wage may delay recovery.

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Table 1 Wage and unemployment changes, by workers' characteristics, sector and firm size (coefficients on Δu_t from wage change equation 2)

	Real hourly Wage (Regular wage + Bonus)	Real annual Earning (Regular wage + Bonus)	Nominal hourly Wage (Regular wage + Bonus)	Real hourly Wage (only Regular wage)
All	-0.060**	-0.055*	-0.048	-0.049
	(0.028)	***(0.029)***	***(0.033)***	***(0.035)***
Public	-0.101***	-0.097***	-0.094***	-0.102***
	(0.031)	***(0.030)***	***(0.031)***	***(0.033)***
Private	-0.032	-0.023	-0.005	-0.004
	(0.039)	***(0.044)***	***(0.048)***	***(0.051)***
Small/Medium firms (<100)	-0.096***	-0.073**	-0.074*	-0.073*
	(0.036)	***(0.037)***	***(0.041)***	***(0.044)***
Big firms (>100)	-0.042	-0.036	-0.029	-0.025
	(0.031)	***(0.038)***	***(0.042)***	***(0.042)***
Male	-0.069**	-0.054*	-0.047	-0.052
	(0.030)	***(0.031)***	***(0.035)***	***(0.039)***
Female	-0.040	-0.048	-0.036	-0.035
	(0.035)	***(0.036)***	***(0.040)***	***(0.040)***
High school +	-0.075**	-0.069**	-0.065*	-0.056
	(0.035)	***(0.033)***	***(0.039)***	***(0.039)***
High school -	-0.027	-0.030	-0.014	-0.030
	(0.038)	***(0.031)***	***(0.039)***	***(0.042)***
Married	-0.065**	-0.059**	-0.054*	-0.054
	(0.030)	***(0.029)***	***(0.033)***	***(0.035)***
Single	-0.018	-0.035	-0.014	-0.020
	(0.053)	***(0.048)***	***(0.061)***	***(0.067)***

Notes: Standard errors are in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels for two-tail tests. There are 3,951 individual observations (2,317 in the public sector) in the first step, and 49 region*year weighted observations for the second step.