Economics Bulletin

Volume 31, Issue 3

Firm-Size and Inter-hierarchy Wage Dispersion in Shanghai

Vinod Mishra
Monash University

Russell Smyth
Monash University

Abstract

For a sample of Shanghai firms, we find that while larger firms pay lower wages, managers in larger firms still receive higher wages. There are two reasons for this result. The wage gap between managers and non-managers is positively correlated with firm size and larger firms have a lower percentage of middle and high-level managers than small firms.

Citation: Vinod Mishra and Russell Smyth, (2011) "Firm-Size and Inter-hierarchy Wage Dispersion in Shanghai", *Economics Bulletin*, Vol. 31 no.3 pp. 2159-2166.
Submitted: Sep 29 2010. **Published:** July 21, 2011.

1. Introduction

A large theoretical literature exists which investigates hierarchy size and wages (see eg. Calvo & Wellisz, 1979). It suggests that the wages of managers are positively correlated with the size of the firm. Moreover, a number of studies suggest that firm size and wages are positively correlated (Oi & Idson, 1999). There are various possible explanations for why differences in earnings profiles between managers and workers might arise in general including skill differentials and labour turnover. In the Chinese case, an important reason is wage reform starting from 1994 and implemented gradually thereafter. Increased autonomy in setting wages and bonuses in urban enterprises has increased wage levels and widened the earnings gap between workers and managers (Knight & Li, 2005). Increased competition amongst private sector employers and the freedom to diverge from a state administered labour system since the wage reforms has led to increased job turnover and employee mobility as firms vie to attract and retain skilled staff and China's skilled workforce aim to maximize their employment opportunities. According to Speth and Doeringer (2006, p.9) employee turnover increased dramatically across all industries and cities in China following the turn of the century from a manageable 7.3 per cent in 2001 to 11.6 per cent in 2005. Length of tenure, according to a study undertaken by Mercer Human Resource Consulting for over 100 organizations in China, dropped substantially for 25-35 years olds, from an average 3-5 years in 2004, to only 1-2 years in 2005 (HR Magazine, 2006). Turnover rates have been much higher among managers than non-managers over the last decade, because among the former there is a higher proportion of people with skills in demand (Wu & Ge, 2008).

In the theoretical literature, a prominent explanation for why firm size and wages are positively correlated is hierarchy theory, which is premised on the basis that larger firms have proportionally more senior management positions than smaller firms as a result of organizational characteristics (Meagher & Wilson, 2004). A potential problem with this explanation is that previous research suggests that China, in contrast to many countries, larger firms in fact pay lower wages. (Gao & Smyth, 2011). In this paper we examine the relationship between hierarchy size and wages using a matched worker-firm dataset from Shanghai. We find that larger firms do pay lower wages in China for the sample as a whole, which is consistent with findings from existing research. However, our major finding is that the wages of middle and high level managers are still positively correlated with firm size.

2. Data and Methodology

We use a matched worker-firm data set from Minhang district in Shanghai collected by the Chinese Academy of Social Sciences (CASS) in 2007. The dataset, which contains information on 784 employees from 78 firms, was selected by Probability Proportion to Size sampling according to a list of all manufacturing firms in Minhang district whose annual sales were at least 5 million RMB. Table 1 suggests that the sample is generally representative of firms in Minhang District and Shanghai. Tables 2 and 3 provide descriptive statistics for the sample based on whether the respondent was a worker or middle/high level manager and firm size. Table 2 suggests that managers earn a higher hourly wage than workers, while Table 3 suggests that average wages are lower in larger firms. We regress log of individual gross hourly wages (including bonuses) on the log of the number of workers in the firm ('firm size'), a dummy variable for whether the respondent is a middle or high-level manager ('manager'), firm size interacted with manager and control variables. Regressions are estimated by OLS with White heteroskedastic-consistent standard errors. To address bias

stemming from the use of aggregated firm variables in an individual wage equation, we correct for common variance components within groups (see Moulton 1990).

Table 1 Representativeness of the sample

	Sample	Minhang District	Shanghai
Number of Employee (person)	182.82	202.83	190.38
Sales Revenue (10 thousand RMB)	8896.69	11974.22	12445.22
Profits (10 thousand RMB)	675.27	800.10	866.94
Average Wage of Employees (RMB/month)	2145.55	2383.42	2423.25

Source: The data for Minhang District and Shanghai are from SBS (2008).

Table 2: Descriptive statistics by employee type

Variable	Workers		Managers	
	Mean	SD	Mean	SD
Hourly Wage	9.03	5.93	14.77	10.22
Years of Schooling	11.17	2.98	12.08	3.03
Experience	15.67	11.45	19.78	11.91
Male (%)	50.24	-	69.08	-
Married (%)	72.06	-	85.53	-
Speak Manadarin well(%)	65.08		61.18	
Good Health (%)	79.72	-	74.34	-
Urban Hukou (%)	55.33	-	61.18	-
Member of Communist Party (%)	7.66	-	23.03	-
Member of Trade Union (%)	33.50	-	51.72	-
Occupation (%)		-		-
Professional/Technician	21.54		23.97	
Producer/Transporter	16.86	-	52.74	-
Service Worker	15.53	-	16.44	-
Equipment Operator	46.08	-	6.85	-
Professional Certification (%)		-		-
No Title	83.55	-	57.62	-
Elementary Certification	11.66		23.84	
Junior/Senior Certification	4.79	-	18.54	-
Ownership Form of Firm (%)		-		-
State/Collective Owned Firm	8.56	-	9.21	-
Share holding/Public firm	32.01	-	30.92	-
Foreign/Taiwan/HK JV Firm	42.16	-	32.24	-
Private Firm	17.27	-	27.63	-
Number of respondents	631	-	152	-

Table 3: Descriptive statistics by firm size

Variable	ALL	Small Firms (<100 employees)	Large Firms (≥100 employees)
	Mean	Mean	Mean
Hourly Wage	10.11	10.52	9.75
Years of Schooling	11.35	11.17	11.51
Experience	16.49	17.78	15.41
Male (%)	53.83	59.61	48.94
Married (%)	74.71	77.65	72.24
Speak Manadarin well(%)	64.37	63.23	65.33
Good Health (%)	78.57	76.88	80
Urban Hukou (%)	56.39	59.38	53.88
Member of Communist Party (%)	10.65	10.70	10.61
Member of Trade Union (%)	37.01	30.61	42.50
Occupation (%)			
Professional/Technician	22.01	20.77	23.04
Producer/Transporter	23.89	19.29	27.70
Service Worker	15.70	15.43	15.93
Equipment Operator	38.39	44.51	33.33
Professional Certification (%)			
No Title	78.51	76.97	79.81
Elementary Certification	14.03	16.57	11.88
Junior/Senior Certification	7.46	6.46	8.31
Ownership Form of Firm (%)			
State/Collective Owned Firm	8.80	8.08	9.41
Share holding/Public firm	31.76	35.93	28.24
Foreign/Taiwan/HK JV Firm	40.18	27.86	50.59
Private Firm	19.26	28.13	11.76
Number of respondents	784	359	425

3. Results

Table 4 presents the results. In columns (1) and (4) we present the results for a standard earnings equation, including firm size, plus a manager dummy variable. The results suggest that for each 1% increase in the number of employees, the hourly wage rate (RMB/hour) is 0.052% to 0.054% lower, consistent with the results reported in Gao and Smyth (2011); however, managers earn 34.1% to 36.2% more than workers. In columns (2) and (5) we introduce the manager-firm size interaction. The coefficient on firm size is still negative and significant, but the returns to managers become insignificant. In columns (3) and (6) we drop the insignificant dummy variable for managers and include only the interaction term between firm size and managers. The interaction term is positive and significant in columns (3) and

(6). The results in columns (3) and (6) suggest that for each 1% increase in the number of employees, the hourly wage rate (RMB/hour) of workers is 0.068% to 0.069% lower. However, a 1% increase in firm size is associated with a 0.005% to 0.008% increase in the hourly wage of managers. The results for the control variables are consistent with expectations based on previous studies of the Chinese labour market. Specifically, the wage-experience profile follows a parabolic shape, while males, the better educated, those who are married, those with an urban *hukou* and Communist Party members receive higher wages.

Table 4: Determinants of hourly wages

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Firm Size)	-0.054***	-0.0591***	-0.069***	-0.052***	-0.055***	-0.068***
	(-3.340)	(-3.301)	(-4.217)	(-3.055)	(-2.936)	(-3.976)
Manager	0.341***	0.233		0.362***	0.294	
	(8.024)	(1.332)		(7.482)	(1.606)	
Ln(Firm Size) × Manager		0.024	0.074***		0.015	0.076***
		(0.631)	(7.929)		(0.383)	(7.301)
Education	0.061***	0.062***	0.0626***	0.059***	0.059***	0.059***
	(7.783)	(7.799)	(7.939)	(6.764)	(6.758)	(6.786)
Experience	0.012**	0.013**	0.012**	0.0121*	0.012*	0.012*
	(2.103)	(2.087)	(2.067)	(1.954)	(1.937)	(1.887)
Experience^2	-0.00035***	-0.00035***	-0.00034***	-0.00035***	-0.00035***	-0.00034**
	(-2.693)	(-2.678)	(-2.650)	(-2.623)	(-2.608)	(-2.559)
Male	0.140***	0.139***	0.137***	0.136***	0.135***	0.132***
	(4.126)	(4.079)	(4.037)	(3.833)	(3.791)	(3.719)
Married	0.087*	0.0901*	0.095**	0.094*	0.095*	0.101**
	(1.805)	(1.849)	(1.965)	(1.864)	(1.886)	(2.000)
Good Health	-0.013	-0.013	-0.013	-0.0186	-0.018	-0.018
	(-0.621)	(-0.610)	(-0.612)	(-0.815)	(-0.811)	(-0.825)
Mandarin	0.0012	0.0023	0.0047	0.003	0.0038	0.0064
	(0.026)	(0.059)	(0.119)	(0.075)	(0.093)	(0.158)
CP Member	0.097*	0.0962*	0.0967*	0.118**	0.117**	0.117**
	(1.755)	(1.738)	(1.745)	(2.013)	(2.001)	(2.002)
Urban Hukou	0.101**	0.102**	0.102**	0.103**	0.104**	0.104**
	(2.510)	(2.525)	(2.532)	(2.456)	(2.464)	(2.458)
Union Member	0.033	0.0311	0.0278	0.0289	0.0278	0.0240
	(0.903)	(0.839)	(0.751)	(0.739)	(0.707)	(0.612)
Ownership Dummies	YES	YES	YES	YES	YES	YES
Certification Dummies	NO	NO	NO	YES	YES	YES
Occupation Dummies	NO	NO	NO	YES	YES	YES

Constant	1.339***	1.356***	1.388***	1.464***	1.478***	1.536***
	(8.918)	(8.881)	(9.198)	(8.447)	(8.337)	(8.833)
Observations	605	605	605	569	569	569
R-squared	0.370	0.370	0.368	0.385	0.385	0.382

Notes: Numbers in parenthesis are t-values. ***(**)(*) denotes significance at 10%(5%)(1%)

There are two explanations for the finding that hourly wages for the sample as a whole fall, while hourly wages of managers increase with firm size. First the inter-hierarchy wage gap between managers and workers increases with firm size. Figures 1 and 2 show the relationship between average salary and firm size and the relationship between the inter-hierarchy wage gap and firm size for the sample. As firm size increases, average salaries fall, while the inter-hierarchy wage gap increases. In Table 5 we regress ln(average salary) and ln(inter-hierarchy wage gap) on ln(firm size) and control variables at the firm level. A 1% increase in the number of employees is associated with a 0.847% to 0.896% fall in the average salary, but between a 0.148% and 0.193% increase in the inter-hierarchy wage gap.

Figure 1: Average salary and firm size

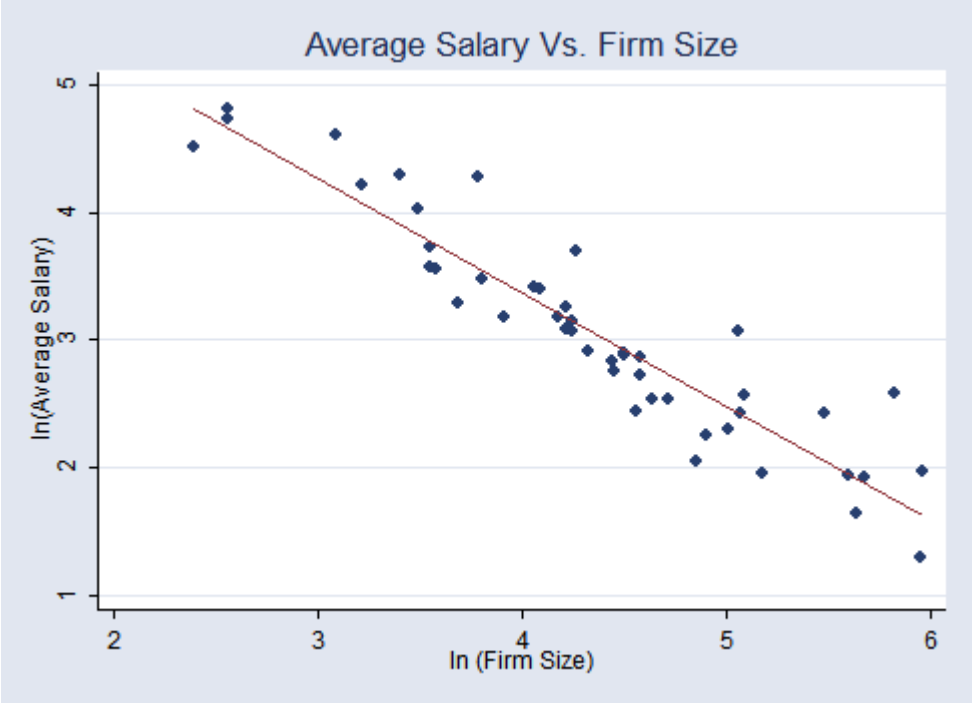

Figure 2: Salary gap and firm size

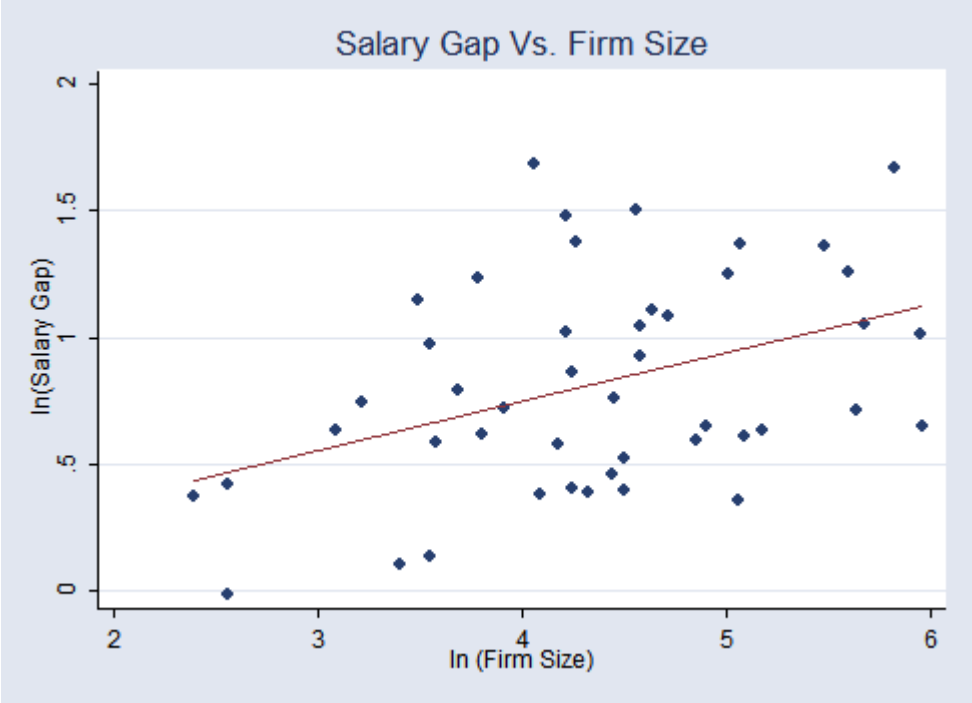

Table 5: Determinants of average salary and salary gap

	DV = ln(Average Salary)			DV = ln(Salary Gap)		
	(1)	(2)	(3)	(1)	(2)	(3)
Ln(FirmSize)	-0.896***	-0.847***	-0.875***	0.193***	0.178**	0.148**
	(-17.21)	(-17.30)	(-17.09)	(2.957)	(2.598)	(2.144)
Female		-0.141	-0.195		0.0476	0.0670
		(-0.676)	(-0.920)		(0.163)	(0.233)
Profit		0.566	0.696*		0.614	0.717
		(1.616)	(1.953)		(1.251)	(1.486)
Blue collar worker ratio		-0.803***	-0.714**		0.401	0.428
		(-2.919)	(-2.530)		(1.042)	(1.122)
Ownership Dummies	NO	NO	YES	NO	NO	YES
Constant	6.961***	7.338***	7.324***	-0.0251	-0.315	-0.350
	(30.03)	(28.19)	(20.72)	(-0.0863)	(-0.865)	(-0.732)
R-squared	0.871	0.903	0.913	0.166	0.215	0.346

Notes: Numbers in parenthesis are t-values. ***(**)(*) denotes significance at 10%(5%)(1%)

Second, large firms have a smaller proportion of middle and high-level managers. For the sample as a whole the percentage of middle and senior managers in small firms was 18.7%, while the corresponding figure in large firms was 11.84%. This is different from what is typically observed in Anglo-American companies. Independent verification that this is a

more general phenomenon in Shanghai or other cities in China is difficult to obtain. There does not appear to be aggregate statistics on this point at the national level. However, in a separate survey conducted by CASS of 5000 firms in Beijing in 2005 the same phenomenon is apparent. In 2647 large firms (employees≥100) the percentage of managers was 12.78%, while in 2195 small firms (employees<100) the corresponding number was 21.54%.

4. Conclusion

In this paper we find that while larger firms pay lower wages, managers in larger firms receive higher wages than non-managers in Shanghai. This result reflects the fact that inter-hierarchy wage dispersion is positively correlated with firm size and that larger firms have a lower percentage of middle and high-level managers than small firms in Shanghai. The reasons for this result could reflect China's socialist heritage. First, in contrast to large Anglo-American firms, large firms in China have a higher proportion of blue collar workers, which is the reason why larger firms pay lower wages (Gao & Smyth, 2011). Second, our results suggest that hierarchies in large state-owned firms in Shanghai are relatively flat compared with large Anglo-American firms. The reason for this may be that basically all large firms in China have traditionally been state-owned and, as such, reflect the Maoist emphasis in the state-owned sector on the pre-eminence of the worker and egalitarian principles.

References

Calvo, G. and Wellisz, S. (1979) "Hierarchy, ability and income distribution" *Journal of Political Economy* **87**, 991-1010.

Gao, W. and Smyth, R. (2011) "Firm size and wages in China" *Applied Economics Letters* **18**, 353-357

HR Magazine (2006) "Companies in China struggle to keep staff" *HR Magazine,* October, p.16.

Knight, J. and Li S. (2005) "Wages, firm profitability and labor market segmentation in urban China" *China Economic Review* **16**, 205-228.

Meagher, K.J. and Wilson, H. (2004) "Different firm size effects on wages for supervisors and workers" *Economics Letters* **84**, 225-230.

Moulton, B. (1990) "An illustration of a pitfall in estimating the effects of aggregate variables on micro units" *Review of Economics and Statistics* **72**, 334-338

Oi, W.Y. and Idson, T.L. (1999) "Firm size and wages" in *Handbook of Labour Economics 3*, by Ashenfelter, O. and Card, D. Eds., North Holland, Amsterdam, pp. 2166-2244.

Shanghai Bureau of Statistics (2008) *Shanghai Statistical Yearbook* 2008. Shanghai: Chinese Statistical Press.

Speth, M. and Doeringer, C. (2006) "Key talent retention in China" *Benefits & Compensation International* **36**, 1-4.

Wu, A. and Ge, W. (2008) "The impact of managerial turnover on employees' specific investment" *Journal of Donghua University* **34**, 243-248.