City Size and Wage Premium

Yunpeng Lin[1, *]

[1]College of Economics, Jinan University, Guangzhou 510632, China

Abstract

Based on the data of China's household income survey (chip 2013), the sixth national census in 2010 and the fifth census in 2000, this paper studies the elasticity of wage premium between different cities in terms of urban scale and labor income by two-step regression method. The results show that as the urban scale increases by 1%, the elasticity of wage premium between different cities rises by about 70%. Even considering price factors, the impact of urban scale on the actual income of labor force is still significantly positive.

Keywords

Urban scale, wage premium, agglomeration effect, labor income, cost of living.

1. INTRODUCTION

Urbanization is the only way of modernization, the biggest potential of domestic demand and the driving force of development in China, and is of great significance for building a socialist modern country in an all-round way. The 19th National Congress of the Communist Party of China pointed out that China's urbanization rate has increased by 1.2 percentage points every year, and more than 80 million agricultural professionals have become urban residents. Until 2016, the proportion of urban resident population in China was 57.35%. Compared with 2012, the urbanization rate of urban resident population increased by 4.78 percentage points, with an average annual increase of 1.2 percentage points. The urban resident population increased by 81.16 million, with an average annual increase of 20.29 million. However, the urbanization rate of China's permanent population is far from the average level of 80% in developed countries. The most direct manifestation of the increase of urbanization rate is population agglomeration, which improves labor productivity through three micro mechanisms: wider input sharing, better matching of production factors and more learning opportunities [1], which leads to the increase of labor wage. Therefore, the lack of population concentration in China is not conducive to the exertion of agglomeration effect, the full improvement of labor productivity, and the improvement of people's living standards.

The development of urbanization will inevitably lead to the expansion of urban scale. With regard to the relationship between urban size and wage premium, a large number of foreign literatures have found that after controlling a series of control variables such as labor experience and age, there is a significant positive relationship between urban size and wage premium [2-3]. The existing research mainly gives three explanations to the high wage of labor force in big cities: first of all, the higher wage of workers in big cities may be due to the static advantages of workers working in big cities. A large number of enterprises can share infrastructure and convenient transportation. Workers can enjoy this advantage when they come to this city. Once they leave, they lose it immediately [4]. Secondly, the high wages of workers in big cities may be due to the agglomeration of more highly capable workers in big cities. It is the difference between the unobservable ability of workers that leads to the entry of high skilled workers into large cities and the entry of low skilled workers into small cities that

leads to the positive relationship between the size of cities and the wages of workers [2]; finally, the higher wages of workers in large cities may be due to the dynamic advantages of workers in large cities, and working in large cities is more conducive to workers' experience And raise their wages faster. This advantage will not be lost as workers leave [3] [5].

Although China's urbanization is in full swing, there are only a few domestic literatures on the relationship between urban size and wage premium between different cities. Chai Guojun and Deng Guoguo (2012) empirically investigated the wage premium of different scale cities based on the sample survey data of 2008 college graduates' job-hunting and working ability [6]; Ning Guangjie (2014) analyzed the wage premium of different scale cities based on the income data of rural migrant workers in 2008 [7], and discussed the internal mechanism of the wage premium; Wang Jianguo and Li Shi (201 5) based on the monitoring and survey data of migrant workers in 2011 and 2012, the impact of urban scale on the wage level of migrant workers was investigated [8]; Peng Shuhong (2016) used the data of urban residents in 2010 China comprehensive social survey to investigate the impact of urban scale on the wage of labor force [9].

However, there are three deficiencies in these studies: first, researchers usually take labor income as the explained variable, city size as the explained variable, and then add some control variables for a regression, and then most of the domestic literature does not consider the urban characteristics, such as the impact of urban industrial structure on income [10]. Or the urban characteristics are considered, but the urban characteristics may be missed. Second, some research objects are specific groups, such as migrant workers, such as college graduates. Thirdly, due to the lack of data on the cost of living in domestic cities, some researchers have to consider various alternatives to consider the impact of cost of living. Some use the minimum wage of each city to replace the local basic living expenses and price level, some use the regional virtual variables to control the impact of the cost of living, some use the provincial level price index and the prefecture level price index to replace the impact of the cost of living.

Using the data of China's household income survey (chip2013), this paper directly controls the impact of the cost of living, obtains the actual income of the labor force by balancing the nominal income of the labor force with the cost of living, and studies the relationship between the urban scale and the nominal income of the labor force, as well as the actual income of the labor force; and uses the two-step regression method to directly control the urban characteristics to examine the urban scale And the relationship between labor income and wage premium in different cities.

The remaining structure of this paper is: the second part is data and model, the third part is estimation results, the fourth part is conclusion and deficiency.

2. METHODOLOGY

The main data used in this paper are from the urban household survey of China Household Income Survey (chips) 2013. This survey is funded by the National Natural Science Foundation and supported by the National Bureau of statistics. It is jointly completed by the China Income Distribution Institute of Beijing Normal University and experts at home and abroad. The specific survey process is implemented by the office of conventional household survey of urban rural integration of the National Bureau of statistics. The chip project team is stratified by East, middle and West, and the chip samples are extracted according to the systematic sampling method. The sample covers 18948 household samples and 64777 individual samples selected from 234 counties of 126 cities in 15 provinces, including 7175 urban household samples, 11013 rural household samples and 760 migrant workers household samples. The data content includes the basic information at the individual level of households, employment information, basic information at the family level, main income and expenditure information and some

thematic issues, covering 14 provinces except Xinjiang, including income, expenditure, personal information of household members, labor schedule in 2013, employment, household assets, demolition and land acquisition, agricultural operation, etc. This survey covers a large number of population and economic and social information at the individual level, which enables us to identify the impact of city size on labor income on the basis of controlling personal characteristics.

In this paper, we mainly analyze the wage premium generated by the change of urban scale through the city indicators based on the control of individual level characteristics. In different regression, we use the logarithm of the nominal annual income of labor force and the logarithm of the actual income of labor force as explanatory variables. The chips2013 survey contains the survey of household expenditure. I divide it by 3 and then balance it with the nominal annual income of the individual to get the actual income of the labor force. According to the analysis of some previous articles, agglomeration may improve labor productivity through three micro mechanisms: wider input sharing, better matching of production factors and more learning opportunities (Duranton and puga, 2004), so as to promote the increase of labor nominal income. However, the agglomeration of labor force and the expansion of urban scale may increase the cost of living of local people, so as to offset the impact on nominal income. Therefore, the impact of city size on the real income of labor force is uncertain. In this paper, the urban scale is measured by the urban resident population, and the relevant data are from the sixth population census of the people's Republic of China in 2010.

Based on the following individual level income determination model, we examine the impact of city size on labor income:

$$lnincome_{ic} = \sigma_c + \mu_i + \beta X_{ic} + \pi lnpop_c + \epsilon_{ic} \qquad (1)$$

Our regression samples are limited to the working age population, that is, men aged 16-60 and women aged 16-55. In addition, we also removed self-employed workers and family helpers from the regression sample, and only retained fixed employees and employees with long-term contracts. The explained variable is the natural logarithm of individual level income. In different regression, we use the annual nominal total income of the labor individual and the annual actual total income of the labor individual as the measurement.

On the left side of the regression equation, σ_c is the city index, μ_i is the individual's unobservable ability, and X_{ic} is some control variables that may affect the labor income, including gender, age, marital status, ethnic minorities, CPC members, only child, education years, health status, work experience and square. Lnpop? C is the natural logarithm of the scale of urban C permanent population. This paper focuses on the magnitude and significance of π. According to the above, the expansion of urban scale will increase the nominal income of labor force through agglomeration effect. Therefore, theoretically, we expect π to be significantly positive when we examine the impact of city size on the nominal income of labor force. However, considering that agglomeration may also lead to the rise of cost of living, when we examine the impact of urban size on the actual income of labor, the sign and significance level of π are not sure in theory.

In addition, urban characteristics, such as per capita road pavement area, urban industrial structure, may affect the relationship between urban size and labor income. Even if some previous articles add some control variables related to urban characteristics, it is difficult to control urban characteristics perfectly. In this paper, we use two-step regression method: first, we use labor income to regress a series of control variables, such as urban indicators, individual unobservable ability, experience, etc.; then, we use urban indicators to regress urban scale

(natural logarithm of urban resident population scale). In this way, it can reflect the elasticity of wage premium between different cities and solve the problem of collinearity.

3. RESULTS AND DISCUSSION

Table 1 reports the impact of changes in urban size on the nominal income of the workforce. We use two-step regression method: first, we use labor income to regress a series of control variables, such as urban indicators, individual unobservable ability, experience, etc.; second, we use urban indicators to regress urban scale (natural logarithm of urban resident population scale). It can be seen from the first column that, in the absence of the individual's unobservable ability, the nominal annual income of the male labor force is 16.4% higher than that of the female, the nominal annual income of the minority labor force is 12.9% lower than that of the Han nationality, and the nominal annual income of the labor force who is a member of the Communist Party of China is 4.9% higher than that of the non Communist Party of China. The nominal annual income of workers with only one child is 9.4% higher than that of workers without only one child. The nominal annual income of workers with good health is 9% higher than that of workers with poor health. In addition, age and experience are also positively correlated with the nominal annual income of workers. According to the second column, the city scale (natural logarithm of urban resident population scale) can be regressed by the city index. The elasticity of the nominal wage of labor force and the wage premium of urban scale between different cities is 0.705. The third and fourth columns are similar to the first and second columns. Taking the education level of mother as an alternative variable of the individual's unobservable ability, it is found that the individual's unobservable ability is added After capacity, the elasticity of wage premium between different cities is almost the same. It can be seen that the individual's unobservable ability has no effect on the elasticity of the nominal income of labor force and the wage premium between different cities.

Table 1. Urban scale and nominal income of labor force

	lnincome	cityindicator1	lnincome	cityindicator2
lnpop2010		0.705***		0.703***
city indicator	yes	[0.000]	yes	[0.000]
mother_edu	no		yes	
sexual	0.164***		0.168***	
	[0.000]		[0.000]	
age	0.008***		0.008***	
	[0.000]		[0.000]	
married	0.043*		0.031	
	[0.089]		[0.225]	
nation	-0.129***		-0.122***	
	[0.000]		[0.000]	
party	0.049***		0.046***	
	[0.002]		[0.003]	
onlychild	0.094***		0.088***	
	[0.000]		[0.000]	
edu	0.056***		0.053***	
	[0.000]		[0.000]	
health	0.090***		0.090***	
	[0.000]		[0.000]	
experience	0.011***		0.010***	
	[0.000]		[0.000]	
c.experience	-0.000***		-0.000***	
	[0.002]		[0.005]	
N	3946	3946	3946	3946
adj. R-sq	0.185	0.996	0.193	0.996

Then, the collected information is uploaded to the PC; at the same time, processing software running on PC processes the acquired information and calls the target tracking algorithm to obtain the coordinate position of moving target. Moreover, the trajectory of moving target is real-time rendered to the display interface for monitoring the working state of each sensor node. The overall structure of the system is designed as shown in Figure 4.

We have examined the wage premium between different cities in terms of the nominal income of the labor force and the size of the city. However, as we pointed out earlier, the role of city size in promoting nominal income can only explain the existence of agglomeration effect, but can not fully reflect the changes in the living standards of labor. With the expansion of urban scale, the local price level will rise with the rise of local consumption demand, which will lead to the rise of local labor cost of living. The rising cost of living will offset the promoting effect of agglomeration economy on nominal income. Therefore, when considering household consumption expenditure, the wage premium elasticity between the actual income of labor force and the size of cities is difficult to judge.

Table 2 reports the impact of changes in urban size on the real income of the workforce. The actual income of the labor force is the nominal income of the labor force minus the average household consumption expenditure of the labor force in the region divided by three. The same two-step regression method was used. It can be seen from the first column that, in the absence of personal unobservable ability, the actual annual income of male labor force is 33.1% higher than that of female labor force, which is about twice the gap between men and women in the nominal annual income of the former labor force, reflecting that in terms of consumption expenditure, women are far greater than men. Whether or not to marry has no significant influence on the actual income of labor force and the size of city, especially in the third column, the coefficient turns negative. This phenomenon may be due to the fact that the married labor force needs to bear certain family responsibilities, and the corresponding expenditure will increase, thus affecting the elasticity coefficient of the urban scale and the actual expenditure of labor force between different cities. The actual annual income of ethnic minority labor force is 29.5% less than that of Han nationality, and the actual annual income of the labor force who is a party member of the Communist Party of China is 10.1% higher than that of the non party members. The actual annual income of the labor force in good health condition is 17% higher than that of the labor force in poor health condition, which is much larger than the gap of 9% of the previous nominal annual income. This is likely due to the fact that the expenditure on health care of the labor force in poor health condition is much larger than that of the labor force in good health condition, resulting in the increase of the elasticity coefficient between the city scale and the actual income of the labor force in different cities. The actual annual income of the single child labor force is 6.4% higher than that of the non single child labor force. In addition, experience and age are also positively related to the actual annual income of workers. It can be seen from the third and fourth columns that, after the individual unobservable ability is added, the elasticity coefficient of the actual annual income of the labor force and the city scale in different cities does not change much, so it can be said that the individual unobservable ability has no effect on the actual income of the labor force and the elasticity of the city scale in different cities. Comparing the elasticity coefficient of labor income and urban scale in Table 2 and table 3, we can find that with the expansion of urban scale, the existence of agglomeration effect makes the nominal income of labor increase rapidly. At the same time, the expansion of urban scale also leads to the rise of local price level and the increase of local labor cost of living. However, the increase of living cost only offsets the promotion of part of the agglomeration economy on the nominal income, and the urban scale and the actual income of labor force still show a significant positive relationship.

Table 2. Urban scale and real income of labor force

	lnrealincome	indicator1	lnrealincome	indicator2
lnpop2010		0.590***		0.588***
city indicator	yes	[0.000]	no	[0.000]
mother_edu	no		yes	
sexual	0.331***		0.337***	
	[0.000]		[0.000]	
age	0.007***		0.008***	
	[0.000]		[0.002]	
married	0.012		-0.006	
	[0.812]		[0.911]	
nation	-0.295***		-0.285***	
	[0.000]		[0.000]	
party	0.101***		0.097***	
	[0.001]		[0.002]	
onlychild	0.064*		0.053	
	[0.089]		[0.157]	
edu	0.086***		0.082***	
	[0.000]		[0.000]	
health	0.170***		0.170***	
	[0.000]		[0.000]	
experience	0.030***		0.029***	
	[0.000]		[0.000]	
c.experience	-0.001***		-0.000***	
	[0.000]		[0.000]	
N	3946	3796	3796	3796
adj. R-sq	0.149	0.995	0.153	0.995

In order to test the stability of the above regression results, this paper uses the data of the fifth national census in 2000 instead of the data of the sixth national census as a measure of the city size, and examines the elasticity of the city size, the nominal income of labor force and the real income of labor force in the wage premium between different cities. It is found that the regression results are similar to the above results, so it can be considered that the regression results in this paper are robust.

4. CONCLUSION

Based on the data of China's household income survey (chip 2013), the sixth national census in 2010 and the fifth national census in 2000, this paper examines the elasticity of urban size and labor income in wage premium between different cities. It is found that the elasticity of wage premium between different cities increases with the expansion of urban scale. For every 1% expansion of urban scale, the elasticity coefficient of wage premium between different cities increases by 70%. This kind of city scale will not be completely offset by the rising cost of living brought by the expansion of city scale. Even considering the impact of cost of living, the relationship between urban size and real income of labor force is still significantly positive. When using the nominal annual income of labor force to reduce the cost of living as the actual annual income of labor force, the elasticity coefficient of wage premium between different cities increases by 59% for every 1% expansion of urban scale.

In today's China, there is a wide debate in the academic circles about which urbanization development path to take, whether to give priority to the development of large cities or small towns. Theoretically, the optimal size of a city should be determined by the agglomeration effect and congestion effect. However, due to the excessive attention of policy makers to the crowding effect, they often ignore the benefits brought by the agglomeration effect, so as to limit the

expansion of the city scale through household registration system and other measures. In recent two years, the decline of the growth rate of the resident population in the first tier cities, such as Beijing, Shanghai, Guangzhou and Shenzhen, is a good example, especially the negative growth of the resident population in Shanghai in recent two years. Various measures to limit the expansion of urban scale have not only failed to solve the problems of urban diseases such as traffic and environment, but also resulted in the concentration of urban population far lower than that of China's industry, and lower than that of other countries at different levels of development, leading to significant loss of effect. This paper studies the relationship between urban scale and wage premium of labor force in different cities, which provides support for urbanization and urban development mode. The wage premium of urban size and labor income between different cities has not been completely offset by the rising cost of living. Therefore, from the perspective of labor force, relaxing the restrictions on household registration and promoting the further expansion of urban scale are conducive to improving people's living standards and efficiency.

REFERENCES

[1] G. Duranton and D. Puga(2004). Microfoundations of Urban Agglomeration Economies. J. V. Henderson and J. F. Thisse, eds.,Handbook of Regional and Urban Economics. Amsterdam: North Holland.

[2] P.P. Combes, G. Duranton and L. Gobillon(2008). Spatial Wage Disparities:Sorting Matters. Journal of Urban Economics, no.63, p.723-742.

[3] J. J. D. L. Roca and D. Puga(2017). Learning by Working in Big Cities. Review of Economic Studies, no.84. p.106-142.

[4] D. Puga(2010). The Magnitude and Causes of Agglomeration Economics. Journal of Regional Science, no.50, p.203-219.

[5] G. Duranton and D. Puga(2001). Nursery Cities: Urban Diversity, Process Innovation, and the Life Cycle of Products. American Economic Review, no.91,p.1454-1477.

[6] G. J. Cai and G. Y. Deng (2012). City size and wage premium of university graduates. Southern Economy, no.10, p.162-172.

[7] G. J. Ning (2014). Are wages high in China's big cities: evidence from rural migrant workers. Economics (quarterly), no.10, p.1021-1046.

[8] J. G. Wang and S. Li (2015). Is the wage level of migrant workers in big cities high?. Management World, no.1, p.51-62.

[9] H. S. Peng (2016). City size and wage premium. Contemporary Finance & Economics, no.3, p.3-12.

[10] H. Gao (2014). Urban population size and labor income. World Economy, no.10, p.145-164.