北大教育经济研究（电子季刊）
Economics of Education Research (Beida)
北京大学教育经济研究所主办
Institute of Economics of Education, Peking

第 10 卷
第 3 期
（总第 36 期）

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The Changes in the Mincerian Rates of Return and the Underlying Reasons in Urban China

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Abstract： Since the late 1980s, the Mincerian rates of return in urban China have shown steady and robust increase for more than a decade. However, they gradually become stable after the mid-2000s, and even have displayed a subtle decrease. Based on the data of CHNS，this study confirmed the pattern of changes of the Mincerian rates of return in urban China and explored the underlying reasons from the perspectives of the degree of marketization, changes in the labor supply and demand, and the structural changes of relevant interest groups.

Key words: the Mincerian rates of return, marketization, labor supply and demand, changes of interest patterns

1. Introduction

Since Jacob Mincer published his research on the labor force participation of married women in 1962 (Mincer, 1974), the Mincer income equation has probably been the most commonly used empirical regression model in microeconomics (Becker, 1993). For nearly half a century, Mincer income functions have found extensive application in data from various countries and regions, becoming the most widely used empirical equations in labor economics and the economics of education (Heckman, Lochner & Todd, 2005).

The Mincerian rates of return (MRRs) have both academic values and policy implications. First of all, MRRs are effective indicators to measure the role of education in economic growth. Human capital theory regards education as one kind of investment which, like physical capital investment, can bring about benefits, and the indicators can measure to what degree education plays a role in economic growth as sort of productivity in an effective manner. Secondly, MRRs serve as important indicators to judge the degree of labor marketization. The role of educational productivity is significantly influenced by the degree of the development of macro-economic environment and labor market. In a sense, MRRs can also act as important indicators to reflect the

[1]This article is part of the outputs of the program supported by National Natural Science Foundation titled the Study on the Changes of the Relationship between Education and Income Distribution. The data of the empirical analysis in the paper was from the China Health and Nutrition Survey (CHNS), an ongoing open-cohort, internationally collaborative project of the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Center for Disease Control and Prevention. Thanks to these institution for providing the data. Introductions to the authors are as follows: Ding Xiaohao is professor of the Institute of Economics of Education, Graduate School of Education, Peking University, Beijing, China. *E-mail address*: xhding@pku.edu.cn. Yang Suhong is doctoral student of the Institute of Economics of Education, Graduate School of Education, Peking University, Beijing, China.

degree of labor marketization and economic transformation. Thirdly, MRRs are powerful tools for analyzing income disparities. Though it's inconclusive as to whether education functions to stabilize or widen the income gap, there's no doubt that educational background is one of the indispensable elements when probinginto income disparities. Education plays a significant role in the process of adjustment of income distribution, and the role of education is closely associated with the gains made from education as an investment in the form of capital. Fourthly, MRRs are closely related to the perception and recognition of the public on the importance of education as well as educational selection behaviors. They are important indicators to demonstrate the value and role of education, which to a large degree dominates education investment behaviors of individuals and families, and can stimulate or undermine the demand for education by the public. Finally, they influence fiscal policies on the public education. The MRRs, as important tools for education cost-benefit analysis in education, can serve as effective bases for the development of educational fiscal policy, such as cost sharing policy in education.

This paper summarized the major estimations of MRRs in urban China, then using the data of CHNS，ascertained the pattern of changes of the MRRs in urban China, and finally explored the underlying reasons from the perspectives of the degree of marketization, changes in the labor supply and demand, and the structural changes of interest groups.

2. The Changes of the MRRs in urban China

Four major sources of data are available for comprehensive and systematic study into the changes of MRRs in urban China（Ding，et al, 2012）. The First one is China Household Income Projects (CHIPs), designed to explore the income distribution of urban and rural residents in China. The surveys were carried out in 1988, 1995, 2002 and 2007, with a slight adjustment of the sample per calendar year, and the annual survey roughly covered more than 9,000 urban households from 10 provinces and municipalities in China, with individual samples up to over 20,000. All of the survey samples had been drawn from the sampling frame of National Bureau of Statistics for conventional household survey. The questionnaires of the investigation had been designed by research groups from home and abroad, and the implementation was in the charge of the survey system of the National Bureau of Statistics. The Second database is China Health and Nutrition Survey（CHNS）, jointly established by the University of North Carolina, USA, and Chinese Center for Disease Control and Prevention (China CDC). The follow-up surveys were conducted in 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011, the annual sample of which covered roughly 4000～6000 family members from the families of China's 9 provinces and municipalities. The Third one is Chinese General Social Survey (CGSS), initiated by the Department of Sociology, Renmin University of China, in collaboration with other institutions -. The surveys were conducted in 2003, 2005, 2006 and 2008, covering over 40,000 households in 28 provinces and municipalities nationwide. Last but not least, the urban household survey data of the NBS of China is very important. This survey was carried out annually on tens of thousands of urban households in all provinces and covered income and expenditure of households. Besides, the investigations also included basic personal information of family members. It's a national household survey database which lasts the longest time and has the most extensive survey coverage.

2.1. The Changes of MRRs in urban China between the late 20th century and the early 21st century

Based on the databases above, domestic and foreign researchers had conducted a large number

of studies on the MRRs of Chinese urban residents, as shown in Table 1. The analysis of Li Shi and Ding Sai (2003) revealed that the MRRs in urban China had shown an increasing trend between 1990 and 1999, from 2.43% in 1990, 3.64% in 1993, 4.81% in 1995, all the way to 8.10% in 1999. The MRRs in Chinese major cities estimated by Qi Liangshu (2005) based on the CHNS data showed an increase between 1991 and 1999[1], from 2.56% in 1991, 2.87% in 1993, 5.39% in 1997, rising to 6.40% in 1999. The MRRs in Chinese major cities estimated by Liu Jingming (2006) using Mincer extended model also indicated an upward trend between 1988 and 2003, from 2.76% in 1988, 3.92% in 1995, 3.51% in 1996, 4.71% in 2000, and rising to 9.26% in 2003. The MRRs to Chinese urban education estimated by Chen Xiaoyu, et al (2003), using the Chinese urban household survey data by the NBS, increased from 2.95% in 1991 and 4.66% in 1995 to 8.53% in 2000, Additionally, Wang Mingjin and Yue Changjun (2009), employed the same Chinese urban household survey data by the NBS and the results through semi-parametric estimation witnessed a rise from 2.81% in 1991, 4.46 in 1995 % to 8.64% in 2000 and 10.46% in 2004, , . In brief, since about the year of 2004, the situation that the rates of return to Chinese urban residents in the early 1990s were much lower than the international average has been basically subverted

[1] The years here means when the investigations were conducted.

Table 1 The tendencies of the MRR in Urban China between the late 20th century and the early 21st century

Sources of literature		Li Shi and Ding Sai (2003)	Qi Liangshu(2005)	Liu Jingming (2006)	Chen Xiaoyu，et al (2003)	Wang Mingjin and Yue Changjun (2009)
Sources of data		① CHIPs ② household survey data conducted by the research groups on urban poverty	CHNS	① CHIPs_1988 and CHIPs_1995 ②CGSS_1996 and CGSS_2003 ③ surveys on 10 cities supported by National Social Science Foundation led by Zheng Hangsheng	Urban household survey data collected by NBS	Urban household survey data collected by NBS
Estimation methods		Basic Mincer equation	Basic Mincer equation	Extended Mincer equation	Basic Mincer equation	Semi-parametric estimation
Estimation results	1988			2.76%		
	1989		4.56%			
	1990	2.43%				
	1991	2.64%	2.56%		2.95%	2.81%
	1992	2.91				
	1993	3.64%	2.87%			
	1994	4.30%				
	1995	4.81%		3.92%	4.66%	4.46%
	1996	5.37%		3.51%		
	1997	5.94%	5.39%			
	1998	6.51%				
	1999	8.10%				
	2000		6.40%	4.71%	8.53%	8.64%
	2003			9.26%		
	2004					10.46%

2.2. The Changes of the MRRs in urban China in the early 21st century

2.2.1 Empirical Analysis based on Urban Household Survey of the NBS

Using the Urban Household Survey data conducted by the NBS in 2002, 2004, 2006, 2008 and 2009, Ding Xiaohao, Yu Qiumei and Yu Hongxia (2012) analyzed the MRRs of Chinese urban residents as well as its tendencies since the onset of this century. The annual sample size of the data ranges from 70,000 to 100,000, with cumulative sample size of more than 430,000 for consecutive five years. The investigation chose the permanent households living in the urban areas[1] as its target objectives, selecting samples in the household frame. There're unique advantages for the study on the MRRs using the NBS urban data. Firstly, the target population was well represented due to huge sample size and wide coverage of geographical areas. Secondly, a longer time span of the data facilitated tendency analysis. Thirdly, statistical indicators of income are fairly detailed, with unified criteria (which favors the comparisons). Finally, the database required household respondents to record their income information by means of bookkeeping rather than memory recalling.

Table 2 was compiled based on the findings of Ding Xiaohao, Yu Qiumei & Yu Hongxia (2012). The figures in the table were the MRRs of Chinese urban residents. The primary extended Mincer equation included control variables such as gender, industry, types of work unit and region into the basic Mincer equation. The secondary extended Mincer equation was developed, by adding the dummy variables of years to the basic Mincer equation as well as their interaction terms with education (Model 5), while Model 6 controlled for the influences of gender, industry, types of work unit, region and other variables based on Model 5. Among the rest of the models, model 1 and Model 3 conducted the regressions with the single-year data respectively, while Model 2, Model 4, Model 5 and Model 6 were regressed with the mixed data by introducing the year dummy variables into the basic Mincer equation. The estimated MRRs s of Model 1, Model 2 and Model 5 were gross Mincerian rates of return (Gross MRRs) without controlling for the influences of other variables on the logarithm of income. While Model 3, Model 4 and Model 6 yielded relative net Mincerian rates of return (Relative Net MRRs) which controlled for the influences of the variables such as gender, industry, types of work unit and region. As shown in Figure 1, both the gross and relative net Mincerian rates of return had an apparently moderate momentum of growth from 2000, even had shown some unstable tendency especially since they peaked in 2004. The previous studies on the tendencies of the MRRs (Table 1), mostly set Mincerian equations with the single-year data respectively, even though the estimations among years could be compared in size, it was hard to determine whether the differences were statistically significant. Model 5 and 6 were regressed with

[1] The towns include urban areas like townships under the *Provisions on the Division of Urban and Rural Areas Statistically* approved by the State Council.

pooled cross-sectional data, with years and their interaction items with education as dummy variables. In so doing (adding them to the basic Mincer equations), comparisons of the estimated MRRs was readily available. Regression results in Figure 1 showed that the Gross MRRs in pooled data regression (Model 5) were very similar to the results estimated with the single-year data (Model 1), while downturn of the Relative Net MRRs (Model 6) after 2004 was more obvious than the single-year results (Model 3).

Table 2 Empirical results of the tendencies of the MRRs in urban China since early of the 21st century

		Mixed data	2002	2004	2006	2008	2009
Basic Mincer equations	Model 1		9.74%	10.51%	10.18%	10.27%	10.33%
	Model 2	10.24%					
Primary extended Mincer equations	Model 3		6.29%	7.72%	7.74%	7.78%	7.89%
	Model 4	7.55%					
Secondary extended Mincer equations	Model 5		9.57%	10.42%	10.16%	10.39%	10.41%
	Model 6		7.13%	8.21%	7.81%	7.36%	7.31%

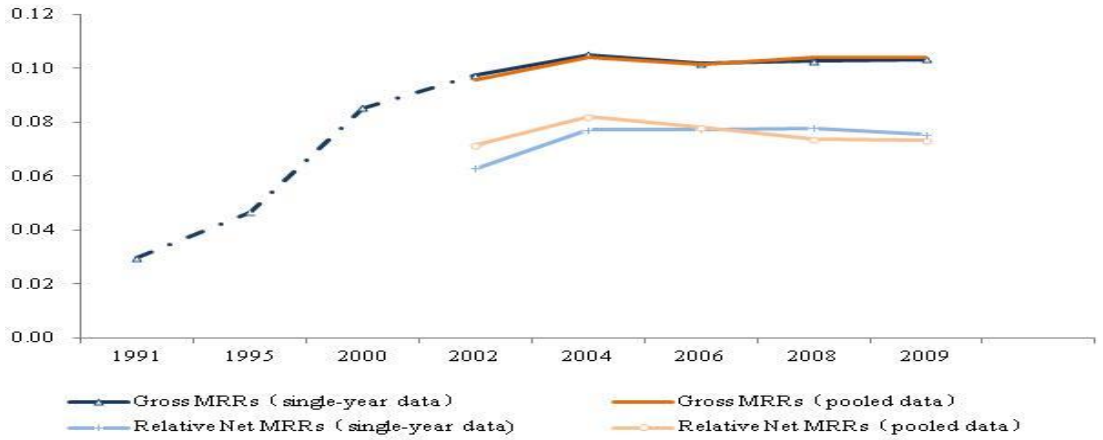

Figure 1 Temporal tendency of the MRRs in urban China (1991-2009)

Data sources: The estimations of 2002 to 2009 were compiled based on the findings of Ding Xiaohao, et al (2012), and the regression results for 1991, 1995 and 2000 were from Chen Xiaoyu, et al (2003).

Ding Xiaohao, Yu Hongxia and Yu Qiumei (2012) also used the data on Urban Household Survey by the NBS to estimate the MRRs to specific education level respectively in this century, as shown in Figure 2 and a Figure 3. At the secondary education level between 2002 and 2009, except that the junior secondary education presented rapid growth in the Gross MRRs, the rates of return to senior middle school and secondary vocational school showed a slow decline, and the Relative Net MRRs to junior middle school also began to decline after peaking in 2008. As for higher education, the MRRs to university and college education tended to be stable in the first decade of the 21st century, while that for graduate education was gradually stabilized after experiencing a big change from 2002 to 2006. On the whole, in recent years, the rates of return to education at all levels except

junior middle school failed to maintain the momentum of rapid growth as in the period from 1990s to the first five years of the 21st century, whereas the rates became gradually stabilized, even with signs of slight decline.

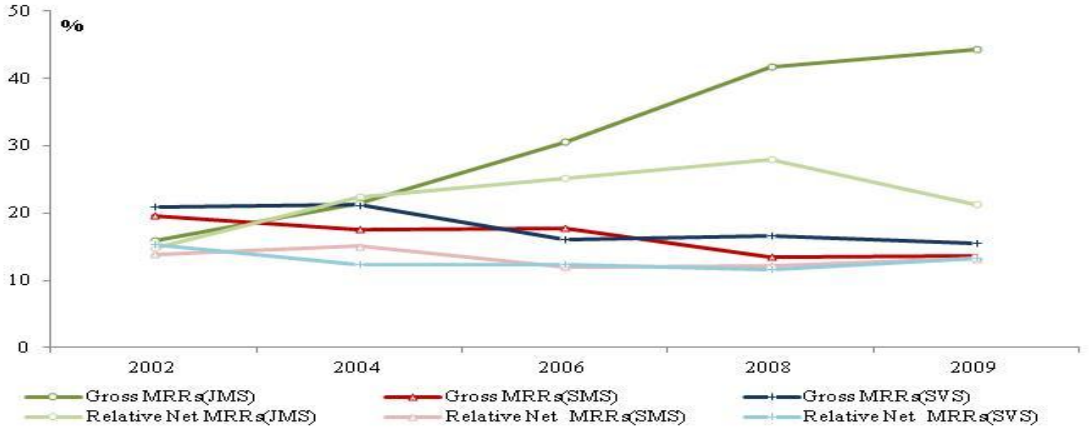

Figure 2 The MRRs to secondary education in urban China compared with lower education

Data sources: The table was compiled based on the analysis results of Ding Xiaohao, Yu Hongxia and Yu Qiumei (2012). JMS=Junior Middle School, SMS=Senior Middle School, SVS=Secondary Vocational School.

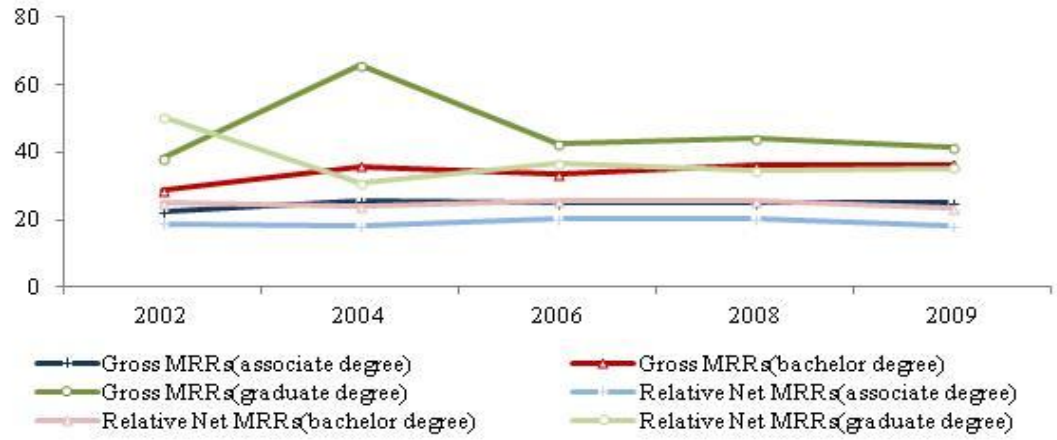

Figure 3 The MRRs to higher education in urban China compared with lower education levels

Data sources:The table was compiled based on results of the study by Ding Xiaohao, Yu Hongxia and Yu Qiumei (2012).

2.2.2 Empirical Analysis based on CHNS

CHNS is one of the household tracking surveys with long time span, which is suitable for analyzing the tendencies of the MRRs of Chinese urban residents. When estimating the MRRs, data of monthly wages including bonuses and subsidies was employed. Considering the problem of errors of self-reported income, we deleted 5 percent of the samples with the highest income for each survey year and education level. When the pooled data was used in analyses, we made adjustment to the income data for each year according to the urban consumer price index in 1988 by province. Subsequent analyses were all carried out using these censored data. In table 3, which presented the MRRs estimated by pooled data, Model 1 estimated the Gross MRRs, while Model 2 added control

variables such as gender, occupation, nature of work units and region based on Model 1, estimating the Relative Net MRRs.

The results based on CHNS showed that both Gross and Relative Net MRRs, had experienced a continuous and rapid increase for more than a decade since 1989, and after reaching the peak in 2004, both tended to be stabilized and presented a slightly downward trend. This was exactly consistent with the findings obtained by Ding Xiaohao, et al (2012) using urban household investigation data by the NBS.

Table 3 The MRRs of Chinese urban residents based on CHNS' mixed data

		Model 1	Model 2
years of education		0.0823****	0.0679****
working years		0.0170****	0.0168****
square of working years		-0.0001****	-0.0002****
Year	1989	-0.4890****	-0.5699****
	1991	-0.4793****	-0.5481****
	1993	-0.2056**	-0.2487****
	1997	-0.1668*	-0.2193**
	2000	-0.1803*	-0.2086**
	2006	0.0942	0.1356
	2009	0.4473****	0.4741****
Interaction item of year and education	1989* education	-0.0638****	-0.0618****
	1991* education	-0.0618****	-0.0608****
	1993* education	-0.0660****	-0.0665****
	1997* education	-0.0472****	-0.0469****
	2000* education	-0.0238***	-0.0245***
	2006* education	0.0024	-0.0013
	2009* education	-0.0006	-0.0014
Male			0.0885****
Occupation[1]	Specialized technicians		-0.0091
	Clerks and relevant staff		-0.0430**
	Commercial services staff		-0.1180****
	Production staff of agriculture, forestry, fishing, animal husbandry and water conservancy industries		-0.2841****
	Operators and staff members in equipment production and operations		-0.1160****
	Others		-0.1206***
Nature of work unit[2]	State-owned and collective		-0.0569****
	private		-0.0579**
Regions[3]	Eastern region		0.1363****
	Central region		0.1291****
Sample amount		5016	4932
Square of R		0.7233	0.7428

Note: p<0.1,*;p<0.05;**;p<0.01,***;p<0.001,****

[1] The person in charge serves as a reference group.
[2] Public sectors serve as a reference group. The public sectors include government agencies, state-owned institutions and research institutes. The state-owned and collective economic sectors include state-owned enterprises as well as collective enterprises. The sectors of private economy include private, individual and foreign-funded enterprises.
[3] Western region serve as a reference group.

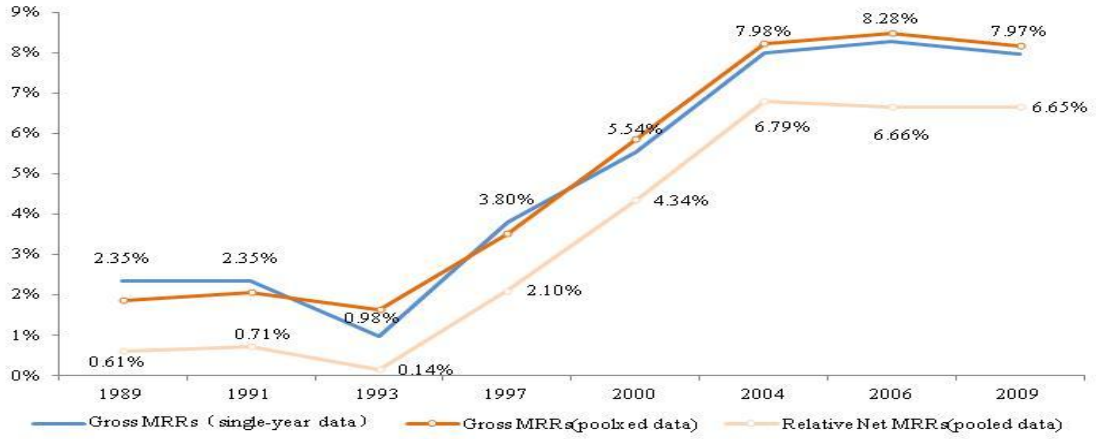

Figure 4 The MRRs of Chinese urban residents

Data source: Estimated from CHNS.

2.3. Tendencies of the MRRs in urban China

In this study, based on the analyses of CHNS data and those by Ding Xiaohao, et al (2012) using Urban Household Survey data from the NBS, a common finding is obtained, i.e., since the late 1980s, the rates of return to education has shown a steady and robust increase among China's urban residents for more than a decade, and it gradually becomes stable after the mid-2000s, even presents signs of a subtle decrease. The tendencies were rarely reported in existing literatures on MRRs. He Yiming (2009), Zhou Jinyan and Zhong Yuping (2010) mentioned the decline of MRRs, and called for further studies. This study focused on Chinese urban residents, which was significantly different from that of He Yiming (2009) whose concern was higher education, as well as that of Zhou Jinyan, et al (2010) which estimated the MRRs using national samples. Furthermore, the study extended the interval of examination to the year of 2009, which made the tendencies since 2004 more clear.

3. Analysis on the reasons for the changes of the MRRs in urban China

In recent years, the MRRs in urban China have not maintained the momentum of rapid increase as in the period from the late 1980s to the mid-2000s, but gradually levelled off or slightly declined instead. Though the decline tendency is to be verified as to whether they can be extrapolated to a forthcoming period of time, the findings do deserve highlights to some degree. There may be complex and profound reasons underlying the changes of the MRRs. It may implicate feedback of the improvement on efficiency of resource allocation caused by market-oriented reforms, or reflect the changes between labor market supply and demand, or act as a sign of changes in social perception on the production function or -signal function of education. It may also be an outcome of competition among different interest groups in the process of social transition, or may even act as a barometer of the reform of the income distribution mechanism. The following part of the paper

starts with marketization and extends to the analysis on the underlying reasons for the tendencies of the MRRs in urban China.

3.1. Determinism of Marketization

What is marketization? How does the degree of marketization affect the relationships between income and education? As an index of education's impact on income distribution, how does MRR change along with the marketization process?

Li Shi and Ding Sai (2003) carried out a study for ascertaining the role of education in promoting labor productivity in China. According to their findings, the productive function of education had to do with the degree of competition among -proprietary units, economic sectors and regions. In an environment with weaker competition and lower degree of marketization, the wage system was in a large part depended on seniority, and the role of education in enhancing labor productivity was difficult to exhibit through income. By contrast, in the competitive environment with higher degree of marketization, income and labor productivity were closely linked, the role of education could be significant. Therefore, the value of MRR would be high. Similar analyses were all based on the fact that market mechanism provided a rational and efficient means of resource allocation where resources were allocated according to the productivity of workers rather than, say, their political loyalty. Therefore, under such a logical framework, market segmentation and lack of mobility restrained the impact of the abilities of the educated to be in full play. What's more, MRRs would be oppressed because of egalitarianism and demonetization in distributing national income. With the deepening of market-oriented reforms, the labor market gradually shifted from segmentation towards unification, which enabled the productive effects of education to be released and the value of the ability to deal with disequilibria to be realized. As a consequence, in areas and sectors with a larger degree of marketization, the values of MRRs would be higher.

One of the most popular indicators of marketization can be the ownership structures of the work units in China's urban labor markets. As shown in figure 5, during the past 30 years from 1978 to 2009, the proportion of employees in private units expanded rapidly, and especially since 2005 it has exceeded the size of employment in the state-owned units. In contrast, the size of labor in the state-owned or collective units presented a dramatic and significant reduction during the past 30 years. This reflected that the degree of marketization in China was gradually increased since 1978 when the reform and opening-up policies began to be implemented.

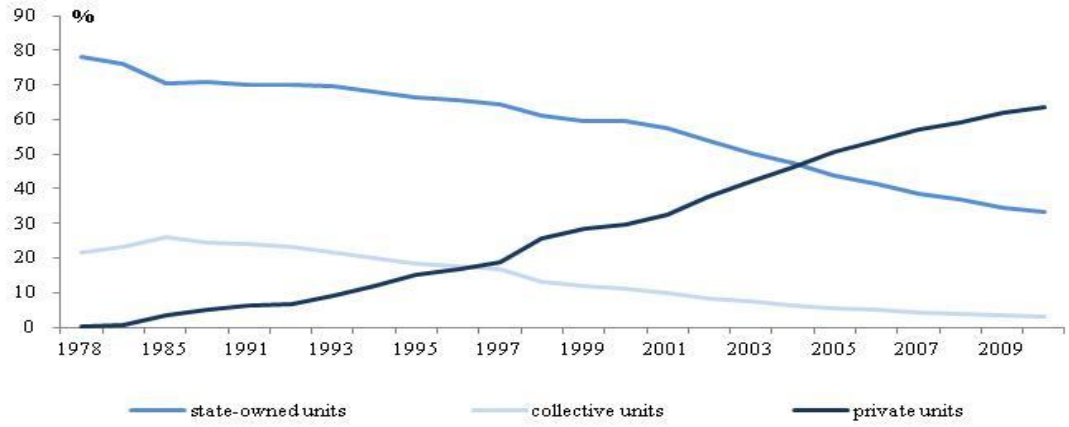

Figure 5 Ownership structures in China's urban labor market[1]

Date source: China Statistics Yearbook 2011.

However, why the MRRs of Chinese urban residents had a downward trend recently in the context of growing marketization? Theoretically, compared with public sectors and state-owned or collective enterprises, the private economic sectors tend to be more readily influenced by state regulatory forces, so they ought to have higher degree of marketization and relatively larger MRRs. What's more, the state-owned or collective enterprises are apt to be more influenced by market forces compared with public sectors, so the former should have higher MRRs (relative to the public sectors). Nevertheless, these inferences were only partially verified by the results in Figure 6. Specifically the MRRs began to change moderately after a continuing rise in public sectors including government agencies, state-owned institutions and research institutes since the year 2004, while for state-owned or collective enterprises, the rates showed a rising trend out of large fluctuations during the period from 1989 to 2004 before a gradual decrease since 2004. Compared with state-owned or collective enterprises, the private enterprises had been in an upward trend (with large fluctuations) in a recent decade. What's more, the MRRs of state-owned or collective enterprises were largest in most years, while the MRRs of private economic sectors were left to be the lowest, which has actually weakened the explanatory power of marketization theory. Overall, deepened marketization can explain the increased MRRs to a great extent, but fails in interpreting the stablized or even decreased MRRs, and the structural differences between sectors.

[1] Private units include private enterprises, investment units funded by Hong Kong, Macao, Taiwan and abroad as well as individuals.

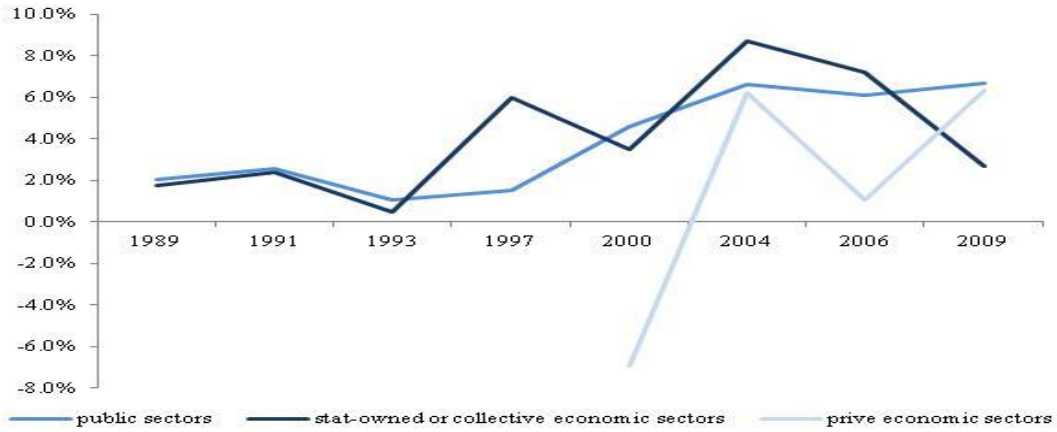

Figure 6 Changes to the MRRs among various sectors

3.2. Demand -Supply Determinism

Marketization is one attempt to explain the trend of changes in the MRRs. Another interpretation can come from the perspective of labor market demand and supply. According to Jan Tinbergen's theory on "race between education and technology" (Tinbergen, 1975)， when the growth in demand for high-skilled labor exceeds the expansion in education scale, the MRRs will be in a growing trend, and vice versa. The MRRs will remain unchanged when the high-skilled labor demand and supply are equal in size. However, since macroeconomic data that can give an relatively accurate reflection of the demand and supply relationship in the labor market is not available, it's only a theoretical speculation trying to explain the tendencies of the rates of return directly from the change in the demand and supply relationship, and it is difficult to be verified from an empirical point of view. As an alternative, this study, by comparing the average monthly wages between the groups receiving higher education and those only with senior secondary degrees, examined changes in demand and supply of the two groups in order to explain the tendencies of the MRRs to higher education in recent years. The cohort effects based on empirical inference are displayed in Figure 7. With the expansion of higher education in scale, compared with the older cohorts such as the first generation of college graduates after the "reform and opening-up" (who entered the labor market earlier), the comparative advantages in higher education of the other cohorts, the second and third generations, should be undermined due to the late entry. However, the findings from empirical analysis using CHNS data were totally opposite to this intuitively conceived logic. As shown in Figure 8, the group with a later entry into the labor market, persons born in the 1970s or later, had more obvious comparative advantage in higher education. The seemingly unbelievable findings were highly credible if interpreted from the perspective of the labor demand and supply. Along with the expansion of higher education in scale, high-skilled labor supply would be substantially increased, and on the premise of the same quantity demand for labor,

advanced diploma should be devaluated, and the results in Figure 7 could occur. But in fact, the expansion of higher education in scale is usually associated with technological advances as well as economic and social development. In this way, while the supply of the highly skilled labor is increased, the demand rises as well. In addition, the labor market positions that supposedly belonged to senior secondary graduates are likely to be occupied by graduates of higher education, which will force the secondary education graduates to seek for much lower positions in the labor market. The changes above in comparative advantage of higher education reflected the demand and supply relationship in the labor market, which led to the formation of new different interest groups, and in turn the tendencies of the MRRs shown in figure 7..

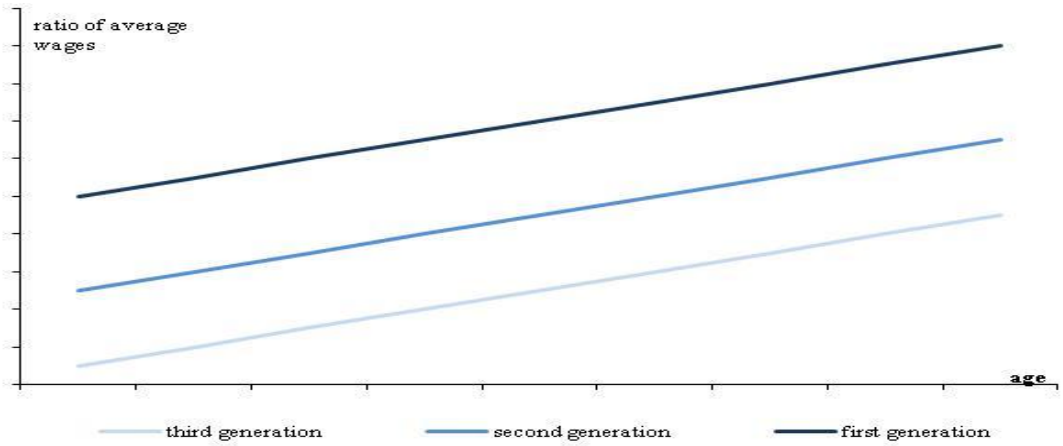

Figure 7 The cohort effects based on intuition

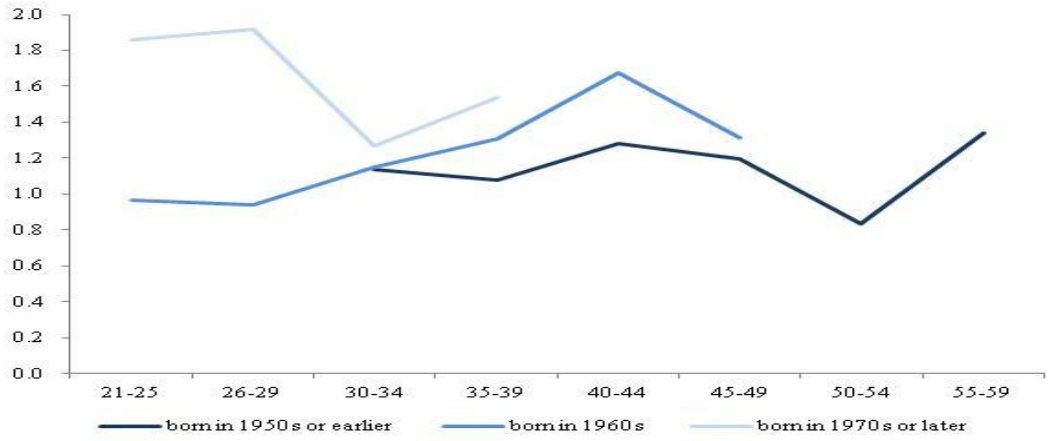

Figure 8 The cohort effects from empirical evidences on the ratio of the average wages

3.3. Changes of Income Distribution Structure

In addition to exploring the tendencies of the MRRs from the perspective of marketization and changes in the demand and supply relationship of labor market, the study also subdivided the groups from dimensions such as gender, working years, occupation, etc., and further examined the comparative advantages of higher education using ratio of average monthly wages between the

groups receiving higher education and those with senior secondary degrees, in an attempt to probe into the changes in income distribution patterns of different groups (seen in Figures 9 and Figure 10). Concretely, the relative income advantages of the higher education group were noticeable for both men and women, with no significant gender gap, and the longer the working years, the more noticeable in relative income advantages for the higher education group. As can be seen from Figure 11, relative income gaps between specialized technicians and persons in leader's position changed little within higher education groups, while the average wages of persons in leader's position were significantly higher than that of clerks and relevant personnel.

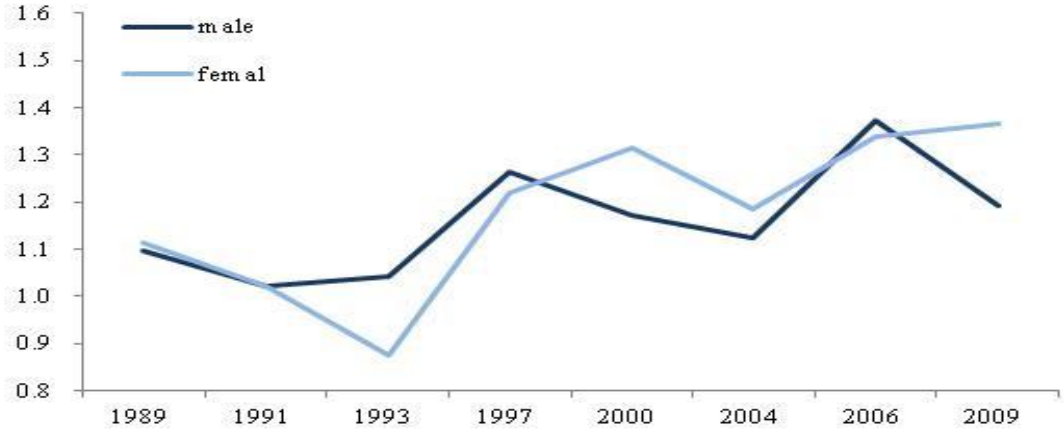

Figure 9 Changes in ratio of average wages between higher education and senior secondary level

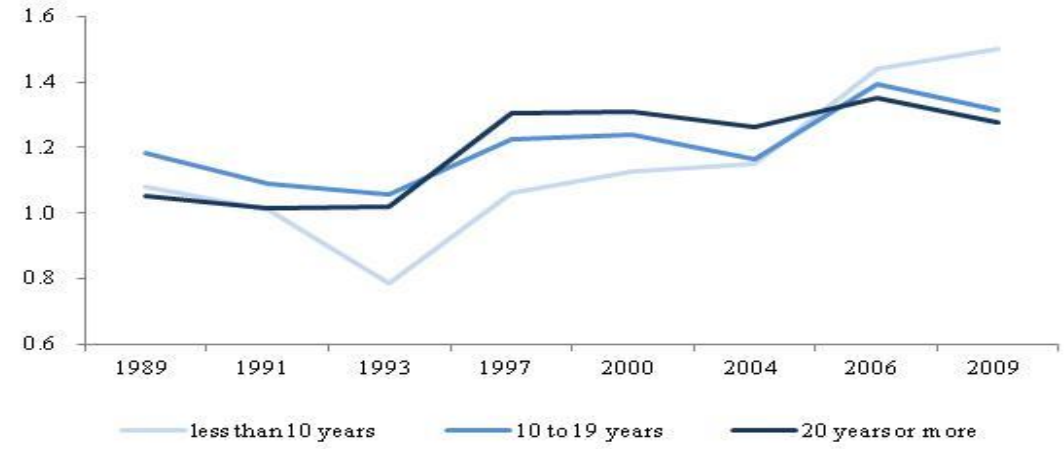

Figure 10 Changes in ratio of average wages between higher education and senior secondary level

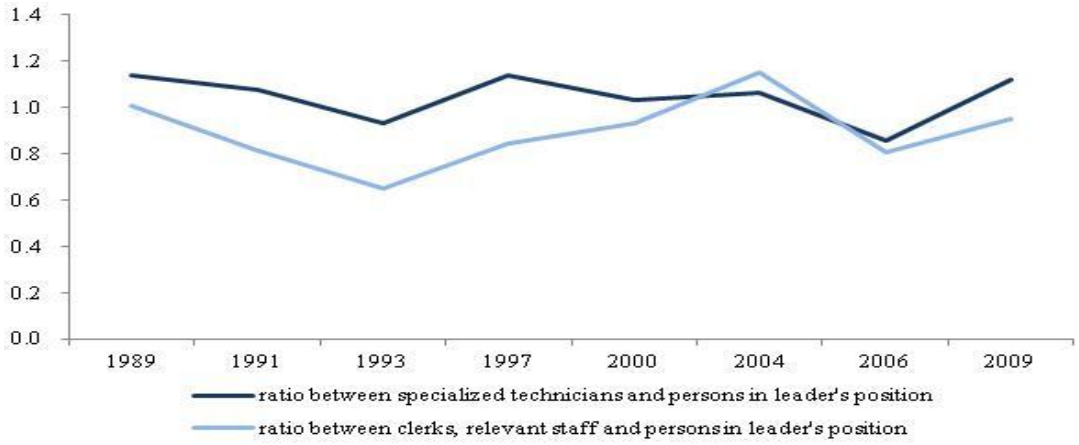

Figure 11 Changes in ratio of average wages between different occupations in higher education

Summary

Since the late 1980s, the MRRs has had a steady and robust increase among China's urban residents for more than a decade, and it gradually becomes stable after the mid-2000s, even has shown signs of a subtle decrease. This study attempts to explore the underlying reasons for the tendencies from several different perspectives. We argue what's important is not only the degree of marketization, but also other underlying reasons, such as the structural changes in the labor market supply and demand as a result of the education expansion, as well as the structural changes of social interest groups in the process of complicated political and economic reforms. All of the points above need further verifications with the empirical data.

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