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Unbalanced Economic Growth and Uneven National Income Distribution: Evidence from China*

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Abstract: This paper re-measures the labor's share of GDP of China since the reform and opening up by amending and supplementing the corresponding data during 2004 to 2007. We find that the labor's share decreases steadily after 1998. The paper also further divides labor into raw labor and human capital. By using the individual level data of UHS, we find the human capital's share has increased rapidly while the raw labor's share decreases steadily during 1988 to 2007. By using extended MRW growth framework, we find that the movement of China's national income distribution pattern is closely related to the unbalanced growth of three factors which are physical capital, human capital and raw labor. The high growth rate of physical and human capital bring upward trend of their income share, while the stagnant state of raw labor will bring its share to decrease rapidly. By using various sources of factor growth data from 1995 to 2007, we confirm the inference of the extended model. And we find that the steady growth of physical capital, the slowing down of the growth rate of human capital, and the negative growth rate of raw labor are the causes of decreasing labor's share of GDP during 1998 to 2006. Relate raw labor with minimum wage, we suggest that the unmatched economic contribution and return of rural surplus labors is the key to understand the leaning of national income distribution towards capital. And we suggest that the main approach to achieve harmonious distribution relations is to raise the labors compensation of such people.

Key words: labor's share; raw labor; human capital; factor income share; unbalanced growth

JEL Classification: O4, D33, J33, D61

I. Introduction

Income distribution has been a long lasting central focus of economic study. Classical economists such as David Ricardo (1821) consider that the study of rules of distribution among owners of land, labor, and capital during the production process should be the main subject for political economics. Marxian theory adopts the class analysis of Ricardo, asserting that the capital exploit labor by retaining the surplus value created by the labors which will arise in rival relations in income distribution between labor and capital. Neoclassical theory, distinct from the Marxian

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production relation analysis, explains income distribution in terms of technical condition of production. Thus, the distribution pattern of wage and profits is considered as a result of marginal productivity of labor and capital.

The neoclassical theory predominates because of empirical results of the constancy of labor's share in the U.S. and U.K. at the begging of the 20th century (Hicks 1932; Keynes 1939; Solow 1958). However, labor's share in industrial countries, especially European countries, experiences a significant decline since last quarter of 20th century[1]. Many studies suggest that globalization is the main cause of declining labor's share in the industrial country (Diwan 2001; Harrison 2002; Jaumotte and Tytell 2007). Their main argument is based on the neoclassical trade theory that the imported labor-intensive products from emerging markets will lower the demand of domestic labors, causing decline of labor's share in those developed countries. Cross country analysis of OECD and industrial countries provide empirical supports for HO theory for explaining the decline of labor's share, in addition with other explanatory factors such as skilled biased technology progress (Bentolina and Saint-Paul 2003) and weakening power of labor union (Guscina 2006).

However, labor's share in the emerging markets such as China has also had a decline trend which contradicts the prediction of neoclassical trade theory. According to the income approach of GDP, labor's share in China decreases from 51.9% in 1995 to 39.7% in 2007. Correspondingly, profits of firms have increased, and the capital's share of GDP increases from 34.9% in 1997 to 46.1% in 2007. It is said that the pattern of national income distribution changes from "wage erodes profits" (Dai and Li 1988) at the begging of the reform and opening up to "strong capital and weak labor" relations (Yao 2005) in the most recent decade. Therefore, the report of 17th congress of China clearly emphasizes that "the share of labors compensation in the primary distribution should be raised". And "increase the bargaining power of labor towards capital" is the hottest suggestion in the NPC & CPPCC of China.

Economists will not satisfy with the "reflexible" suggestions so that they try to explain the underlying factors in the story behind the decreasing labor's share from two perspectives. Firstly, they combine labor's share with industrial structural changes during the economic development process, indicating that the industrial structural change from the agricultural sector to non-agricultural sectors is the main reason for labor share's decreasing (Bai and Qian 2009; Luo and Zhang 2009a). Secondly, empirical studies mainly focus on the economic reasons that have impacts on the movement of labor's share. These studies show that ownership restructuring of SOEs, privatization, technical progress, raising monopoly power, international trade and entry of foreign direct investment are the main causes of decrease of labor's share (Bai and Qian 2008; 2009; Li et al. 2009; Luo and Zhang 2009b; Xiao and Zhou 2009).

Although exploring the reason of decreasing labor's share is one of the main goals of this paper, it distinguishes with previous studies from methods and perspectives. Firstly, we combine macro economic growth with national income distribution so that we can discuss the expansion and division of the economic cake dynamically. Secondly, we not only discuss the distribution pattern between capital and labor, but also divide labor into raw labor and human capital so that we can discuss the distribution pattern among physical capital, human capital and raw labor. Thirdly, we extend Mankiw, Romer and Weil's (1992) economic growth framework, and discuss

[1] Average labor's share of OECD countries falls by more than 5 points after reaching its peak in the late 1970s. Among those OECD countries, France and Germany have sharpest drops in their labor's share (Bentolina and Saint-Paul 2003).

the mutual relations of growth and distribution among above three factors during the economic growth process.

We obtain results different from previous studies. Firstly, after dividing labor into raw labor and human capital, we find that human capital's share of GDP increases significantly and raw labor's share of GDP decreases steadily during 1998 to 2007. Secondly, by constructing and testing the extended model, we find that high growth rate of physical and human capital increase their income share of GDP, while low growth rate of raw labor bring its share to decrease dramatically. Between 1998 and 2006, the steady growth rate of physical capital, the slowing growth rate of human capital and the negative growth rate of raw labor is the reason of decreasing aggregate labor's share. Thirdly, relating raw labor with minimum wage, we suggest that the unmatched economic contribution and return of rural surplus labors is the key to understand the leaning of national income distribution towards capital. And we suggest that the main approach to increase aggregate labors compensation and achieve harmonious distribution relations is to raise labors compensation of such people. The structure of this paper is arranged as follows: section II re-measures the labor's share of GDP in China from 1978 to 2007; section III divides labor into human capital and raw labor, and examines movement of their income share combing micro and macro data; section IV utilizes extended MRW framework to discuss the mutual relations between economic growth and income distribution in China; section V echoes the results drawn from the extended model and make further discussions; section VI draws conclusions and standpoints of this paper, promotes policy implications and suggestions, and points out the direction for further study.

II. Labor's Share in National Income Distribution

In the practice of national accounting, gross domestic product is calculated from three approaches, namely production approach, income approach and expenditure approach. The income approach of GDP reflects created income during the production process. It divides the final products based on the income shares of production factors and the share which pays to the government (Zhao 2003). The income approach of GDP in China divide the value added into four parts, namely labors compensation, net taxes on production, depreciation of fixed assets, and operating surplus. However, these national accounts based on the income approach are not divided rigorously based on attribution of factor's income. Therefore, Gomme and Rupert (2004) divide GDP into four parts based on attribution of factor's income: the first is unambiguous labor's income, including wages, bonus, and welfare; the second is unambiguous capital's income, such as corporate profits, rental income, net interest income, and depreciation; the third is taxes less subsidies for the government sector. It can be attributed to neither capital income nor labor income, which can be considered as a wedge beside capital and labor; the fourth is ambiguous income of proprietors (i.e., owners of unincorporated businesses) which can not be clearly attributed to capital or labor. Because some of the income earned by self-employed workers clearly represents labor income, while some represents a return on investment or economic profit. Therefore, when we want to clearly identify the distributional relationship between labor and capital, we shall consider the impacts of government taxes and proprietors' income. And we shall not simply divide compensation of employees by gross value added where there are potential measurement problems. In addition, if the national income is divided into labor-capital dichotomy, measuring labor's share

indicates the determination of capital's share, which is one minus labor's share. Thus, herein we just discuss the measurement problems of labor's share of GDP.

1. Dealing with Net Taxes on Production

Since the net taxes on production are the wedge attributed to neither capital income nor labor income, will the labor's share excluding this part reflect the true distributional relations between labor and capital? Table 1 lists the labor's share and taxes' share of GDP in China from 1993 to 2004. We find that the proportion of net taxes on production of GDP increases from 11.7% in 1993 to 15.8% in 2003. Therefore, the increase of the proportion of net taxes will overestimate the extent of labor's share decreasing. And we deduct the net taxes on production from the GDP when estimating the labor's share. On concrete, let Y_L be labor income, Y_K be capital income, Y_T be net taxes on production collected by government, and Y be the aggregate income adding up the above three, then labor's share will be noted as:

$$\alpha_L = \frac{Y_L}{Y - Y_T} \tag{2.1}$$

Table 1 Impacts of Net Taxes on Labor's Share 1993-2004

Year	Unadjusted Labor's Share	Taxes' Share	Adjusted Labor's Share
1993	0.495	0.117	0.560
1994	0.503	0.120	0.572
1995	0.514	0.123	0.586
1996	0.512	0.129	0.588
1997	0.510	0.136	0.591
1998	0.508	0.143	0.593
1999	0.500	0.149	0.587
2000	0.487	0.153	0.575
2001	0.482	0.156	0.572
2002	0.478	0.156	0.566
2003	0.462	0.158	0.548
2004	0.416	0.141	0.484

Note: the data is calculated by authors according to *China's GDP Accounting: Historical Data 1952-2004(G)*

According to above formula, we find that after deducting the impact of the wedge, the decrease of labor's share has postponed from 1995 to 1998. And it rises from 56% in 1993 to the maximum 59.3% in 1998, and then drops to 54.8% in 2003 (see Table 1 Column 3).

2. Division and Revision of Proprietors' Income

However, we find the labor's share has a distinctive slump in 2004 as can be seen in the last row of Table 1. Bai and Qian (2009) consider that the statistical change of attribution of labors compensation overestimates the extent of labor's share decreasing. In order to discuss the impacts from changes of statistical caliber before and after 2004 in China clearly, we follow Gomme and Rupert (2004) to further distinguish proprietors' income with the non-proprietors' income. Let Y_{UL} be unambiguous income attributed to labors, Y_{UK} be unambiguous income attributed to capital, and Y_A be ambiguous income attributed to proprietors. Before 2004, the National Bureau of Statistics (NBS) says that "proprietors' income is considered as labors compensation" (NBS, 2003), which means that all proprietors' income is attributed to labors income. Therefore, labor's

share will be noted as:

$$\alpha_L = \frac{Y_{UL} + Y_A}{Y - Y_T} \tag{2.2}$$

After 2004, the NBS says that "labors compensation and operating profits of proprietors are considered as business profits while labors compensation only includes the compensations of employees in the proprietors' economy" (NBS, 2007). Therefore, labor's share will be:

$$\alpha'_L = \frac{Y_{UL}}{Y - Y_T} \tag{2.3}$$

The change of statistical caliber result in the a significant slump in 2004 compared in 2003, overestimating the decrease of labor's share after 2004. Bai and Qian (2009) use the operating surplus of private unincorporated enterprises (OSPUE) to adjust labor's share by *China Economic Census yearbook* in 2004. However, for un-census years, *China Statistical Yearbooks* only provide aggregate operating surplus and do not list OSPUE separately. Therefore, their adjustment can not be used to adjust labor's share after 2004. However, we can adjust labor's share in two ways resorting to employment data of unincorporated business. The first approach focuses on labors compensation of self-employed workers by utilizing employment data (Gollin, 2002; Ruiz, 2005). It is possible to get average labors compensation by dividing unambiguous labors income of incorporated enterprises by the number of employees. We can scale this up for the entire workforce by multiplying average labors compensation by the number of people in the workforce. The advantage of this approach is that it attempts to take into account of the labors compensation of self-employed people. On concrete, let L_A be the number of self-employed employees, L be the number of entire workforce, and then adjusted labor's share will be noted as:

$$\alpha_L = \frac{Y_{UL} \times L/(L - L_A)}{Y - Y_T} \tag{2.4}$$

The second approach focuses on the adjustment of aggregate operating surplus by using employment data (Bernanke and Gurkaynak, 2001). It is possible to get average operating surplus by dividing aggregate operating surplus by the number of employees. We can scale this up for the self-employed employees by multiplying average surplus. Finally, we add the operating surplus of unincorporated business with the unambiguous labors income to get aggregate labors compensation including unincorporated business. On concrete, let Y_O be the aggregate operating surplus, and we also define L_A as the number of self-employed employees, and L as the number of entire workforce, and then adjusted labor's share will be noted as:

$$\alpha_L = \frac{Y_{UL} + Y_O \times L_A / L}{Y - Y_T} \tag{2.5}$$

Both approaches have their implicit assumptions. The former assumes that average labors compensation of unincorporated and incorporated business are the same, while the latter assumes that unit capital income of unincorporated and incorporated business are the same. When there is substantial difference between unincorporated and incorporated business, both approaches will have biased results.

We adjust the labor's share after 2004 according to the above two approaches. Compared

with *China Economic Census yearbook* and *China Statistical Yearbooks*, we find a large amount of unregistered self-employed employees. For instance, the number of self-employed employees in the statistical yearbook is 45.9 million, while the number in the census yearbook is 94.2 million. Therefore, the number of unregistered employees is 48.5 million. We refer to the growth rate of registered self-employed employees during 2004 to 2007, and get the number of self-employed employees of corresponding years (see Table 2 and Column 4).

Table 2 Labor's Share Adjusted by the Employment Structure 2004-2007

Year	Total	Self-employed	#Unregistered	Unadjusted	Adjusted1	Adjusted2	Adjusted Average
2004	752	94.2	48.4	0.484	0.553	0.528	0.540
2005	758	100.7	51.7	0.482	0.556	0.528	0.542
2006	764	106.0	54.4	0.475	0.552	0.525	0.538
2007	770	112.9	58.0	0.463	0.542	0.516	0.529

Note: data from *China Statistical Yearbooks* 2005-2008; unit of employment numbers is million.

After adjustment, the two approaches increase labor's share by 6-7% and 4-5% respectively (see Table 2 Column 5-6). The extent of adjustment is consistent with that of Bai and Qian (2009), indicating the robustness of the two revisions. Because of the difficulty in choosing between two approaches, we set the adjusted average as the final results (see Table 2 Column 8).

3. Movement of Labor's Share since Reform and Opening Up

Up till now, we can get accurate measurement of labor's share of GDP after the above adjustments. Integrating data information of NBS, we get two sets of income approach of GDP. The first set is the pre-revised data, in which the time span is from 1978 to 2002; the second set is the revised data according the census yearbook in 2004, and the time span is from 1993 to 2004[2]. We combine the two data sets, revising and supplementing the data from 2004 to 2007. Therefore, we obtain comparable data series of labor's share from 1978 to 2007 (See Figure 1).

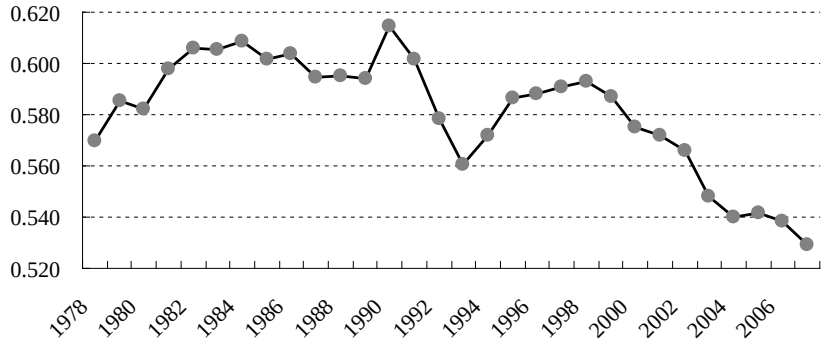

Figure 1 Movements of Labor's Share 1978-2007

Since the reforming and opening up, national income distribution undoubtedly experiences several significant changes. Labor's share increases from 57% to 60.9% during 1978 to 1984, showing the national income distribution leaning towards individuals and being consistent with the observation of Li (1992). However, different from Li (1992), labor's share experiences a small down turn during 1986 to 1989, and a big slump during 1990 to 1993[3]. The recent decrease

[2] The first set of data is from *China's GDP Accounting: Historical Data 1952-1995(G)*, and *China's GDP Accounting: Historical Data 1996-2002(G)*; the second set of data is from *China's GDP Accounting: Historical Data 1952-2004(G)*.

[3] This may be due to combining the two different sets of income approach data.

persists for the longest time span, and the labor's share decreases from 59.3% in 1998 to 52.9% in 2007, indicating the national income distribution leaning towards capital.

III. Dividing National Income into Raw Labor and Human Capital

Another important observation is that despite of the uneven distribution between labor and capital in China in recent years, the income inequality among labors experience a substantial expansion. According to World Bank (2007), the Gini coefficient reaches 0.47 in 2004. However, Gini coefficient only reflects income inequality among individuals. Our intension is to further divide the labors from the angle of functional income distribution. We know that labors compensation is closely related to the human capital possessed by particular labors. Therefore, one part of labors compensation can be considered as returns to human capital, and the rest part is the return from the physical expenditure of the labor, which we call it as "raw" labors compensation. Kreguer (1999) resorts to Mincerian earning regressions (Mincer, 1974) to distinguish raw labor and human capital:

$$\ln W_i = b_0 + b_1 S_i + b_2 X_i + b_3 X_i^2 + e_i \qquad (3.1)$$

Where, $\ln W_i$ is the natural log of labor *i*'s annual labor compensation, S_i equals years of schooling, X_i is work experience, X_i^2 is experience squared, e_i is an equation error, b_0 is the constant, and b_1, b_2, and b_3 are the coefficients of regressors. The average value of each labor's earnings attributable to "raw" labor, denoted W_0, is approximated by $W_0=exp(b_0+0.5\sigma^2)$, where σ^2 is the mean square error of the regression (Raw labor might more appropriately be called "intercept labor".). The share of labors compensation accruing to raw labor is approximated by $S_R=\sum W_0/\sum W_i$. We can obtain raw labor's share of GDP by multiplying this share with the aggregate labor's share.

$$\alpha_R = \frac{Y_L}{Y - Y_T} \frac{\sum W_0}{\sum W_i} = \alpha_L S_R \qquad (3.2)$$

We use data of Urban Household Survey (UHS) and estimate Mincerian equation by OLS regression. There are two reasons for using this survey data. Firstly, UHS is carried out by the Urban Survey Organization of China's National Bureau Statistics. It covers 146 cities, 80 towns and 25000 households. The choice of cities and towns, as well as of households, is based on the principle of random and representative sampling. Therefore, the sample can reflect the wage and income status of China's urban population. By comparing the corresponding statistics in *China Statistic Yearbook*, Zhang et al. (2005; 2008) confirm the data representativeness of UHS. Secondly, UHS provides 20 consecutive annual data from 1988 to 2007. According to the 2002 *Handbook of the Chinese Urban Household Survey*, the sampling method is consistent over all years under study. Therefore, we can consecutively estimate the distribution between raw labor and human capital within labors by using Mincerian regression.

According to UHS, labors compensation W_i consists four major components, namely, basic wage, bonus, subsidy and other labor-related income; Years of education S_i is allocated by the index of education level[4]; potential experience X_i is age minus education minus 6, and UHS also

[4] For 2002, the education level is divided as illiteracy, half-illiteracy, primary school, junior school, senior school, high school, vocational school, college, university, graduate school, and the corresponding years are 0, 3, 6, 12, 12,

provide variable as "work entry year" so that we have another measure of actual work experience as the "survey year" subtracting "work entry year"; Because the *Labor Law* sets 16 as the minimum working age, we limited our sample to workers aged 16 or over. Because most workers retire by age of 60 in accordance with China's mandatory retirement age, individuals older than 60 are also excluded. An alternative method is to set work experience below 45 years, and we can get consistent results. All regression results show expected signs of coefficients of education, experience and squared experience in Mincerian equations, all coefficients are significant at 1% level, and the explanatory power is around 12% to 30% (detailed results are listed in Appendix 1-5). Column 2-5 in Table 3 list results of distributional rate of raw labor in urban labors compensation, where column 2 and 4 are regression results for potential and actual work experience. Meanwhile, during the data processing, we find that there are outliers for wages[5], and we amend them to get robust results (See Table 3 Column 3 and 5).

Before discussing the movement of distributional rate of raw labor S_R, we shall first examine the data quality. Firstly, we should make sure all the rates are comparable and consistent all over the estimating years. One of the main drawbacks of UHS is that it does not provide information of working hours during 1988 to 2001. Hence, labor market participation may be distributed unevenly among workers of different educational levels (Zhang et al., 2005) [6]. However, UHS provides employment months and working hours during 2002 to 2006 so that hourly wage can be estimated. Then we compared with the results of distributional rate of raw labor setting hourly and annual wage as explained variable, and results show that they are highly consist during this period. Therefore, we can infer boldly that Mincerian results by annual wage before 2001 are also robust and reliable. Secondly, we should make sure the representativeness of the data. We have already said something about random sample method for getting representative results. Meanwhile, UHS also provides weights[7] for the sample during 2002 to 2007. We find that there are little changes on the results after concerning the weights, indicating the good quality of the data. Thirdly, although the number of samples varies substantially across the survey years, the consistent trend of distributional rate of raw labor S_R shows further evidence for robustness of the empirical results[8].

Table 3 Distributional Rate of Raw Labor in Aggregate Labor 1988-2007

Year	UHS				CHNS		CHIP	
	Potential Experience	Robust Regression 1	Actual Experience	Robust Regression 2	Potential Experience	Robust Regression	Urban	Whole
1988	0.233	0.349	0.363	0.454			0.391	0.394
1989	0.233	0.342	0.363	0.435	0.571	0.325		
1990	0.236	0.338	0.359	0.422				
1991	0.255	0.369	0.383	0.450	0.684	0.535		
1992	0.229	0.339	0.359	0.414				

15, 16, 18. For other years, this is adjusted according to the minor difference of division.

[5] We find that some individuals have abnormal low wages. For example, annual wages are below 1000 RMB for some samples in 2006. This will obviously lower the intercept term and overestimate the returns to education and experience. Therefore, we use robust regression for revision, and we find substantial increase of S_R.

[6] If less educated workers are more likely to be unemployed for parts of the year or work fewer hours in recent years, we may overestimate both the level and rate of increase of the returns to education.

[7] The weights are allocated for the weighted data to reflect the picture of the overall country.

[8] Still, we can not exclude some potential problems. For instance, raw labor may be of less value to those with a level of education get high education, thus the linear skill formulation may be a poor approximation.

1993	0.259	0.337	0.362	0.396	0.628	0.616		
1994	0.189	0.244	0.278	0.305				
1995	0.205	0.284	0.297	0.352			0.313	0.337
1996	0.189	0.242	0.270	0.312				
1997	0.207	0.266	0.277	0.338	0.647	0.620		
1998	0.161	0.227	0.259	0.320				
1999	0.162	0.207	0.215	0.268				
2000	0.143	0.194	0.193	0.235	0.363	0.323		
2001	0.137	0.154	0.178	0.212				
2002	0.117	0.138	0.140	0.160			0.186	0.309
2003	0.138	0.147	0.152	0.166				
2004	0.105	0.121	0.119	0.143	0.222	0.182		
2005	0.096	0.113	0.110	0.134				
2006	0.102	0.117	0.116	0.141	0.191	0.183		
2007	0.094	0.125	0.125	0.152				

Note: Column 2 and 4 are calculated from UHS; column 2 and 4 are OLS regression results for the potential and actual work experience respectively; column 3 and 5 are robust regression excluding the impacts of outliers; during 2002 to 2006, we use hourly wage as explained variables; in other years, we use annual wage as explained variables; numbers of samples are around 25000-30000 for 1988-1992, 5300-7000 for 1993-2001, and 16000-24000 for 2002-2007 respectively; column 6 and 7 are calculated from CHNS, and are OLS and robust results for the potential work experience respectively; numbers of samples for all years are around 2000-3000; column 6 and 7 are calculated from CHIP, and are results for urban and the whole country respectively, where, the data of 2002 including the rural migration workers; numbers of samples for urban are around 11000-17000; numbers of sample for the whole country are around 20000-25000.

We choose Column 4 in Table 3 as the discussing series. We find that the distribution rate of raw labor in aggregate labor decreases steadily for the estimating years, especially after the early years of 1990s. It reaches the bottom 13% in 2005 and increases back a little bit to 15.2% in 2007. This means after the Southern Tour by Deng Xiaoping, the returns to human capital increase substantially, and the prophet of "let some people to get rich" has already come true. However, the UHS only reflects the living status of urban labors, and will it be different if we consider the non-agriculture employment for rural labors? Because data of China Health and Nutrition Survey (CHNS) includes non-agriculture employment population in the rural areas, therefore, we can re-estimate the results by using this survey data, which shows in Table 3, Column 6-7 (Mincerian regression results are listed in Appendix 6). We find that all variables have expected results except for 1993, and the distribution rate of raw labor in aggregate labor shows significant decreasing trend after 1997, indicating the returns to human capital experiencing substantial rise[9]. Although China Household Income Project (CHIP) only has data for three years, this data provide further evidence for the decreasing trend of distributional rate of raw labor in aggregate labor (Mincerian regression results are listed in Appendix 7). The results of UHS and CHIP are quite close to each

[9] The reason for the insignificance of coefficient of education before 1993 of CHNS may lies that the labor price may not be set by market price. Hence the significance of coefficient of education in the following years may indicate marketization for pricing the human capital, and not the rising of human capital return. However, this inference is contradicted with UHS data. CHNS can not provide consecutive year data and its sample size is relatively small, we supports the results of UHS that the increasing return to human capital is also due to the growth of its level.

other for the urban population, indicating the robustness of the results.

According to the distributional rate of raw labor in aggregate labors compensation in Table 3, we combine the micro and macro data together, and get the estimation results of raw labor's share of GDP, and the value of raw labor and human capital compensation (see Table 4). We find that the human capital's share of GDP increases significantly after further dividing the national income system. It increases from 32.5% in 1988 to 44.9% in 2007. Correspondingly, raw labor's share of GDP decreases from 27% in 1988 to 8% in 2007. For the real value, it shows that drastic rise for the human capital compensation and relatively low increase for the raw labors compensation.

Table 4 Divide National Income into Raw labor and Human Capital

Year	Labor's Share in GDP	Human Capital's Share in GDP	Raw Labor's Share in GDP	Human Capital Compensation (Billion Yuan)	Raw Labor Compensation (Billion Yuan)
1988	0.595	0.325	0.270	406.5	337.7
1989	0.594	0.336	0.258	474.5	365.0
1990	0.614	0.355	0.259	566.7	413.9
1991	0.601	0.331	0.270	607.0	495.8
1992	0.578	0.339	0.240	759.8	537.3
1993	0.560	0.338	0.222	1022.5	670.9
1994	0.572	0.398	0.175	1586.6	696.3
1995	0.586	0.380	0.206	1917.4	1042.3
1996	0.588	0.405	0.183	2388.8	1081.6
1997	0.591	0.391	0.200	2579.1	1316.4
1998	0.593	0.403	0.190	2854.5	1341.6
1999	0.587	0.430	0.157	3227.9	1180.3
2000	0.575	0.440	0.135	3668.7	1129.1
2001	0.572	0.451	0.121	4126.7	1108.5
2002	0.566	0.475	0.091	4834.1	923.6
2003	0.548	0.457	0.091	5360.6	1066.5
2004	0.540	0.463	0.077	6666.8	1113.9
2005	0.542	0.469	0.072	7973.8	1229.8
2006	0.538	0.462	0.076	9125.8	1503.6
2007	0.529	0.449	0.080	10628.5	1898.4

Note: Results are calculated by authors according to formula (3.2).

On one side, the evolution of national income pattern indicates the increasing economic returns to human capital of labors after reform and opening up. On the other side, the decrease of raw labor's share of GDP indicates that labors income of those who have little education and experience endure a stagnant growth. We suggest that the rapid decrease of raw labor's share will hinder the growth of aggregate labors compensation so that the aggregate labor's share of GDP will decrease from 1998. In the following section, we try to combine the economic growth with national income distribution to confirm such inference.

IV. Extended MRW Growth Model

Mankiw, Romer and Weil (1992) extend Solow (1956) growth model into a widely cited

theoretical and empirical framework (MRW framework) including human and physical capital. Hereon, we begin by briefly reviewing the MRW framework and pointing out its implications. Assuming a constant-returns-to-scale Cobb-Douglas production function:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} \left(A(t)L(t)\right)^{1-\alpha-\beta} \tag{4.1}$$

Where, the output $Y(t)$ is obtained by the inputs of physical capital $K(t)$, human capital $H(t)$, labor $L(t)$ and technology $A(t)$. Meanwhile, L and A are assumed to grow exogenously at rates n and g:

$$L(t) = L(0)e^{nt} \tag{4.2a}$$

$$A(t) = A(0)e^{gt} \tag{4.2b}$$

Using lowercase letters to denote per-worker quantities, e.g., $y=Y/L$. Therefore, we can rewrite the production function (4.1) and the physical and human capital accumulation equations in a standard way as:

$$y(t) = A(t)^{1-\alpha-\beta} k(t)^{\alpha} h(t)^{\beta} \tag{4.3}$$

$$\dot{k}(t) = s_k y(t) - (n+g+\delta)k(t) \tag{4.4a}$$

$$\dot{h}(t) = s_h y(t) - (n+g+\delta)h(t) \tag{4.4b}$$

Let s_k be the fraction invested in physical capital and s_h be the fraction invested in human capital. In addition, we are assuming that human capital depreciates at the same rate δ as physical capital. Then the growth rate of output per worker can be expressed by the growth rate of all input factors from formula (4.3):

$$\frac{\dot{y}(t)}{y(t)} = (1-\alpha-\beta)\frac{\dot{A}(t)}{A(t)} + \alpha\frac{\dot{k}(t)}{k(t)} + \beta\frac{\dot{h}(t)}{h(t)} \tag{4.5}$$

For simplicity, we can rewrite (4.5) as:

$$g_y = (1-\alpha-\beta)g + \alpha g_k + \beta g_h \tag{4.6}$$

According to above model, MRW further consider that growth rate of output per worker is the same as the growth rate of all input factors, namely $g_y=g=g_k=g_h$, along the Balanced Growth Path (BGP). What's more, the physical and human capital's shares of GDP, which are α and β, are relatively constant over time when the economy are operating along the BGP. Therefore, the constancy of the factors' share is an alternative term for a BGP of this economy. However, the human capital's share β is relatively hard to obtain. Therefore, we normally discuss the constancy of physical capital's share α, and most studies discuss from the angle of labor's share ($1-\alpha$) alternatively. From Great Depression till now, labor's share of national income remain somewhere between 75% and 80% in the U.S. (Solow, 1958; Kruger, 1999; Young, 2006). Therefore, popular textbook on economics often expresses this as one of the well-known stylized facts of economic growth, most closely associated with the pioneering work of Nicholas Kaldor (1956; 1961). After considering the proprietors' income, Bernanke and Gurkaynak (2001) and Gollin (2002) also suggest that there is no systematic tendency for country labor's shares to vary with real GDP per

capita or the capital-labor ratio. Indeed, most estimated labor shares lie in range of 65% and 80%.

Therefore, many economic growth literatures assume the economy operating along the BGP. Thus empirical test of economic growth model based on MRW framework will first calculate the growth of human and physical capital investment, and then estimate the size of each factor's share as parameters. However, China, as a developing country, shows a distinctive transitional feature, which may bring the fluctuation of factor's share. Thus to act in an opposite way, we first estimate the factor's share and then discuss the growth of each factor input. Before that, we should extend the MRW framework in need of discussing this problem.

After adding human capital accumulation into the Solow model, MRW still put the entire Labor L into production function, which may overlap human capital and labor conceptually and empirically. In fact, from the discussion in section III, we divide the aggregate labor L into raw labor R and human capital H. This division can potentially alter either the theoretical modeling or the empirical analysis of economic growth. At the theoretical level, properly distinguishing raw labor and human capital may change one's view of the nature of the growth process. Firstly, unlike to include human capital directly, this division avoids overlapping conceptually and empirically. Secondly, including raw labor helps us to discuss further about the mutual relations between economic growth and income distribution. The Cobb-Douglas production function is transformed after breaking the aggregate labor:

$$Y(t) = A(t)K(t)^{\alpha} H(t)^{\beta} R(t)^{1-\alpha-\beta} \tag{4.7}$$

We mainly alter the formula (4.1) into two aspects. Firstly, we consider technology $A(t)$ separately, and still assume its exogenous growth rate. Secondly, we break aggregate labor $L(t)$ into raw labor $R(t)$ and human capital $H(t)$, thus the extended MRW model is consistent with the Solow model. We can rewrite the production function (4.3) by denoting per-worker quantities.

$$y(t) = A(t)k(t)^{\alpha} h(t)^{\beta} r(t)^{1-\alpha-\beta} \tag{4.8}$$

Where, $r(t)$ is raw labor per worker unit. As the MRW framework, labor L and technology A are still assumed to grow exogenously at rates n and g. The accumulations of physical and human capital are the same as formulas (4.4a) and (4.4b). The economic growth rate is as:

$$\frac{\dot{y}(t)}{y(t)} = \frac{\dot{A}(t)}{A(t)} + \alpha\frac{\dot{k}(t)}{k(t)} + \beta\frac{\dot{h}(t)}{h(t)} + (1-\alpha-\beta)\frac{\dot{r}(t)}{r(t)} \tag{4.9}$$

For simplicity, we can rewrite (4.9) as:

$$(g_y - g) = \alpha g_k + \beta g_h + (1-\alpha-\beta) g_r \tag{4.10}$$

According to MRW framework, we can get $(g_y\text{-}g)=g_k=g_h$, and relatively stable factor's share α and β along the BGP of the economy. Therefore, we can infer that the growth rate of raw labor per worker is the same as the growth rate of output and other factors per worker, namely $(g_y\text{-}g)=g_k=g_h=g_r$. However, the decrease of China's labor's share of GDP has obviously contradicted with the Kaldor stylized facts, which let us to relate unbalanced economic growth with the national income distribution. The overall economic growth has steadily increased from 1988, around 10% per year. However, the contribution and distribution of each factor for maintaining the economic growth is not consistent with each other. From the perspectives of functional distribution, physical capital's share α increases steadily from 1998 (see Figure 1).

Human capital's share β presents an increasing trend from 1988, thus the raw labor's share (1-α-β) presents a decrease trend from 1988 (see Table 4). We know that when the accumulation of physical and human capital are accelerating (g_k and g_h increase quickly), their share of GDP will have an increasing trend (α and β increase steadily). And the decrease of raw labor's share of GDP (1-α-β) means that the growth rate of raw labor per worker g_r is relatively low. In other words, the unbalanced feature of economic growth will lead to the uneven distribution among factors. Thus we dynamically relate economic growth with income distribution from theoretical point of view. For better testing the inference, we need to estimate the level and growth rate of physical capital, human capital and raw labor.

VI. Distribution Pattern along the Unbalanced Growth Path

Before estimating the growth rate of each factor, we need to estimate the level of each factor's stock first. The estimation of physical capital stock is base on the perpetual inventory system created by Goldsmith (1951). He (1992), Chow (1993), Huang et al. (2002), Zhang and Zhang (2003), Zhang et al. (2004), and Bai et al. (2007) use this approach to estimate China's aggregate, provincial and industrial physical capital stock. We use the newest estimation results by Shan (2008), and choose a sub-period series between 1995 and 2007[10]. We get the physical capital per worker k and its growth rate g_k by dividing employment number (see Table 5 Column 2-3). The estimation of human capital stock is rather difficult. Chen et al. (2004) and Yao and Zhang (2008) use regional average education level as the proxy for human capital. However, this approximation is criticized for several potential problems such as the narrow empirical range, the uncertainty of measuring index, and the inconsistent caliber (Qian, 2005) [11]. Qian et al. (2008) use perpetual inventory system to estimate the human capital stock which is comparable and consistent with the physical capital. We make use of their results and obtain the series of human capital stock between 1995 and 2005, and we also get human capital per worker h and its growth rate g_h (see Table 5 Column 3-4). In addition, we consider that raw labors compensation itself is a stock concept. Thus we divide this by employment number to get unit raw labor r and its growth rate g_r[12]. Where, all data are calculated by the constant price of 1995.

Table 5 Unit Stock Level of Factors and Their Growth Rate

Year	g_y	k	g_k	h	g_h	r	g_r
1996	0.062	15845	0.123	1761	0.066	1442	-0.059
1997	0.063	17548	0.107	2284	0.297	1681	0.166
1998	0.063	19326	0.101	2386	0.045	1703	0.013
1999	0.065	21168	0.095	2642	0.107	1502	-0.118
2000	0.087	23159	0.094	3971	0.503	1412	-0.060
2001	0.083	25277	0.091	4217	0.062	1359	-0.038

[10] The original paper only have data till 2006, the data of 2007 is calculated by authors according to the method of that paper.

[11] The authors also calculate the average education level between 2002 and 2007 by using the Population Census data according to *China Population Statics Yearbook*. We find that the annual growth rate of this variable is only around 1%, which contradicts with the increasing return to human capital obtained in this paper.

[12] In fact, the unit raw labor calculated by employment number is consistent with what Kruger called Intercept Labor W_0. Therefore, we also use UHS data to estimate W_0 directly, and find the latter is higher than the former. However, two series are highly consistent with correlation reaching 0.97, indicating good matching of the micro and macro data together.

2002	0.098	27898	0.104	4545	0.078	1133	-0.167
2003	0.108	31282	0.121	5315	0.169	1284	0.134
2004	0.128	35125	0.123	5709	0.074	1285	0.001
2005	0.119	39757	0.132	4714	-0.174	1385	0.078
2006	0.131	45062	0.133	5752	0.220	1656	0.195
2007	0.153	50943	0.131			1985	0.199
1996-1997	0.063	0.1152		0.1813		0.0536	
1998-2006	0.0980	0.1106		0.1205		0.0043	

Note: All unit factors' level are calculated by the constant price of 1995; unit of value of human capital and raw labor compensation: Yuan; the last two rows are the average growth rate of each factor during 1996-1997 and 1998-2006 respectively.

Table 5 clearly shows the unbalanced feature of China's economic growth. Firstly, the aggregate economy shows an increasing trend, and the economic growth rate is from 6.2% in 1996 to 15.3% in 2007. Secondly, unit physical capital shows a rapid growing trend, and the growth rate stabilizes between 10% and 13%. Thirdly, although the growth rate of human capital fluctuates a little bit, it still has rapid growth rate, some years are as high as 30% to 50%[13]. In contrast, the growth rate of unit raw labor between 1999 and 2002 is negative, and it only recovers during 2006 to 2007. Considering the fluctuation of the economy itself and instability of the data, we estimate the average growth rate of each factor. During 1996 to 1997, we find that the rapid growth rate of human capital offsets the low increase of raw labor thus the aggregate labor's share has an increasing trend. However, during 1998 to 2006, we find that the physical capital still keep steady growth rate, the human capital slows its growth rate, and the raw labor presents a negative growth rate. Therefore, it is no wonder that we find the rising physical capital's share α and dropping labor's share (1-α). This is consistent with the prediction for the extended MRW model.

In the above analysis, we find the decrease of labor's share of GDP is closely related to the stagnant and negative growth rate of unit raw labor. But what is the story behind the movement of raw labor? Up till now, we don't fully discuss the economic meaning of the unit raw labor *r*. In section III, we divide labors compensation into human capital and raw labors compensation, where raw labors compensation means the residual part after explaining the human capital. If we examine raw labors compensation directly, this means the compensation for an uneducated and inexperienced worker entering the labor market (Mulligan and Martin, 1997; Young and Zuleta, 2008)[14]. In real life, minimum wage is set for those uneducated and inexperienced workers by government, thus has the closest relations with raw labor[15]. The stagnant and negative growth of the unit raw labor means that life of those who get minimum wage don't have significant improvement of life under such rapid economic growth rate.

In China, a large amount of rural surplus labors migrate to the urban areas, forming the world

[13] This may caused by the biased calculation of human capital.

[14] It is noted that unit raw labor will increase with the development of the economy, not only because of the improvement of science and technology which raise the productivity of raw labor, but also because of the improvement of life quality of rock-bottom labors due to economic growth and welfare arrangements.

[15] In fact, minimum wage and raw labor differs with each other. The unit raw labor is the wage rate set by the demand and supply of market system, while the minimum wage is set by government's law for protecting the minimal labors right (Minster of Labor and Social Security PRC, 2004). When legal minimum wage reflects the raw labor determined by the market power, two concepts are perfectly substitutive. When legal minimum wage is higher than the minimum wage set by market power, two concepts deviate with each other. Thus the wage of raw labor is affected by institutional arrangements in the economy. And the minimum wage raises the intercept of the earnings equation and overestimate raw labor's share of GDP (Kruger, 1999).

renowned “migration tide”. The number of migrant workers increases from 78.5 million in 2000 to 137 million in 2007, taking up of 46.7% of urban employment population (Cai, 2008). These migrant workers often get raw labors compensation for lacking of human capital investment. One undeniable fact is that the migration of these rural surplus labors is the main cause for rapid economic growth and urbanization[16]. However, these economic constructors get relatively low return from the economic growth, and the stagnant of these people will pull down the aggregate labor’s share of GDP. Hence the unbalanced feature of economic growth will lead to uneven national income distribution.

VI. Conclusions and Policy Implications

This paper re-measures the labor’s share of GDP since the reform and opening up by amending and supplementing the corresponding data during 2004 to 2007. We find that the labor’s share decreases steadily after 1998. The paper also further divides labor into raw labor and human capital. By using the individual level data of UHS, we find the human capital’s share has increased rapidly while the raw labor’s share decreases steadily during 1988 to 2007. By using extended Mankiw, Romer and Weil (1992) growth model, we find that the movement of China’s national income distribution pattern is closely related to the unbalanced growth of three factors which are physical capital, human capital and raw labor. The high growth rate of physical and human capital brings upward trend of their share of GDP, while the stagnant state of raw labor will bring its share to decrease rapidly. By using various sources of factor growth data from 1995 to 2007, we confirm the inference of the extended model. And we find that the steady growth of physical capital, the slowing down of the growth rate of human capital, and the negative growth rate of raw labor are the causes of decreasing labor’s share of GDP during 1998-2006. Therefore, when examining the leaning trend of national income distribution towards capital, we combine macro economic growth with national income distribution so that we can discuss the expansion and division of the economic cake dynamically. We obtain the following views through above analyses.

Firstly, the unbalanced feature of economic growth is the key to understand China’s economy. Since reform and opening up, our economy has maintained relatively stable economic growth rate. However, the stable growth does not mean balanced growth. The balanced growth means all factors grow harmoniously at the rate of their contribution, and U.S. can be considered as a preferable example for operating along the BGP. Our analysis indicates that the unbalanced feature of China’s economy is distinctive, namely the high growth rate of physical and human capital and stagnant growth rate of raw labors. Since 1998, the slowing down of the growth rate of human capital and the negative growth rate of raw labor is the cause of decreasing labor’s share of GDP. Therefore, the unbalanced feature of economic growth finally turns out to be uneven functional income distribution.

Secondly, the unbalanced feature of China’s economic growth may have its own advantages. If we consider parameters of Cobb-Douglas production function as output elasticity, we find that the economic growth path of China has a relatively flexible elasticity. Therefore, the unbalanced feature of China’s economic growth can be generalized as “low wage growth strategy”. The “low wage growth strategy” means that although the economic growth benefits from the migration of

[16] Cai et al. (1999) suggest that 21% of GDP growth rate between 1978 and 1998 is contributed by migrant workers moving from agriculture to non-agriculture sectors. The scale of migration is much larger since 1998, thus the contribution of migrant workers may be more significant.

rural surplus labors, the labors compensation of these people are lower than their contribution. However, for these migrant workers, the urban employment indeed brings higher income than the farming income, thus they are willing to work with low wages in urban areas. The “low wage growth strategy” utilizes the high performance-to-price of migrant workers to realized economic growth under the “Pareto Improvement”. This might be a new annotation for explaining China’s economic growth miracle.

Thirdly, the unbalanced growth will arouse potential problems in terms of fair distribution view. If we take parameters of Cobb-Douglas production function as factor’s share of GDP, we can easily find enlarging income distribution with high economic growth rate. The enlargement of income distribution not only reflects between capital and labor, but also reflects between physical workers and other factors. The stagnant growth of raw labor indicates the stagnant income of rural migrant workers. This means that the economic contribution and return of those workers are unmatched. Therefore, the economic growth of China is realized at the expense of relative benefits of rural migrant workers. This contradicts the distribution principle of socialism either from perspectives of “distribution according to work” or “distribution according to contribution of factors”.

Therefore, contrasting with “reflexible” suggestions as “the share of labor compensation in the primary distribution should be raised”, our suggestion focuses on raising labors compensation for those who get minimum wages, especially for rural migrant workers. In recent years, the implementation of minimum wage policy and release of new *Law on Employment Contracts*, exert active effects on protecting labor’s rights and interests and promoting income of low qualified employees. We see that the raw labor has picked up by 20% during 2006 to 2007(see Table 5 Column 7). This will alleviate the leaning trend of national income distribution towards capital and maintain reasonable distribution relations during the economic growth process. However, whether the rapid increase of raw labor will lead to the slowing down of growth of other factors and finally hinder the aggregate economic growth is a suspending question for further study.

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Appendix 1 OLS Results of Mincerian Regression of Potential Experience of UHS Data (Corresponding to Table 3 Column 2)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0596***	0.0621***	0.0627***	0.0612***	0.0705***	0.0684***	0.0921***	0.0866***	0.0922***	0.0879***
	(0.00140)	(0.00134)	(0.00128)	(0.00134)	(0.00145)	(0.00325)	(0.00380)	(0.00376)	(0.00392)	(0.00398)
Experience	0.0928***	0.0844***	0.0811***	0.0778***	0.0856***	0.0741***	0.0761***	0.0728***	0.0726***	0.0646***
	(0.00118)	(0.00113)	(0.00110)	(0.00118)	(0.00122)	(0.00276)	(0.00316)	(0.00320)	(0.00336)	(0.00341)
Experience Squared	-0.00169***	-0.00148***	-0.00142***	-0.00141***	-0.00170***	-0.00151***	-0.00153***	-0.00145***	-0.00145***	-0.00124***
	(2.64e-05)	(2.55e-05)	(2.49e-05)	(2.66e-05)	(2.74e-05)	(6.11e-05)	(7.02e-05)	(7.14e-05)	(7.42e-05)	(7.49e-05)
Constant	5.630***	5.788***	5.914***	6.086***	6.148***	6.650***	6.616***	6.893***	6.922***	7.088***
	(0.0198)	(0.0192)	(0.0187)	(0.0203)	(0.0218)	(0.0498)	(0.0582)	(0.0582)	(0.0612)	(0.0633)
No. of Sample	27,916	26,053	27,034	26,804	32,972	7,521	7,336	7,398	7,244	7,283
R-squared	0.237	0.250	0.244	0.198	0.182	0.134	0.140	0.125	0.127	0.104
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.102***	0.108***	0.118***	0.123***	0.145***	0.144***	0.151***	0.153***	0.151***	0.152***
	(0.00419)	(0.00455)	(0.00449)	(0.00540)	(0.00429)	(0.00416)	(0.00429)	(0.00396)	(0.00397)	(0.00347)
Experience	0.0696***	0.0687***	0.0596***	0.0649***	0.0495***	0.0480***	0.0521***	0.0494***	0.0469***	0.0464***
	(0.00356)	(0.00382)	(0.00387)	(0.00453)	(0.00390)	(0.00437)	(0.00424)	(0.00348)	(0.00369)	(0.00314)
Experience Squared	-0.00133***	-0.00140***	-0.00113***	-0.00134***	-0.00082***	-0.00082***	-0.00093***	-0.00088***	-0.00084***	-0.00086***
	(7.94e-05)	(8.57e-05)	(8.78e-05)	(0.000102)	(9.03e-05)	(9.85e-05)	(0.000103)	(7.87e-05)	(8.39e-05)	(7.28e-05)
Constant	6.890***	6.911***	6.904***	6.904***	6.755***	6.864***	6.850***	6.958***	7.094***	7.248***
	(0.0666)	(0.0721)	(0.0723)	(0.0867)	(0.0696)	(0.0731)	(0.0716)	(0.0675)	(0.0685)	(0.0611)
No. of Sample	7,062	6,645	6,994	6,265	16,146	17,380	20,378	22,320	22,061	23,941
R-squared	0.122	0.127	0.122	0.119	0.148	0.137	0.147	0.167	0.156	0.172

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; to get comparable and consistent among coefficients, the explained variable is replaced by annual wage.

Appendix 2 Robust Results of Mincerian Regression of Potential Experience of UHS Data (Corresponding to Table 3 Column 3)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0467***	0.0485***	0.0499***	0.0475***	0.0547***	0.0577***	0.0823***	0.0730***	0.0832***	0.0774***
	(0.000795)	(0.000863)	(0.000843)	(0.000838)	(0.000826)	(0.00242)	(0.00302)	(0.00290)	(0.00319)	(0.00325)
Experience	0.0548***	0.0520***	0.0506***	0.0454***	0.0455***	0.0431***	0.0490***	0.0449***	0.0475***	0.0458***
	(0.000673)	(0.000728)	(0.000727)	(0.000740)	(0.000699)	(0.00205)	(0.00251)	(0.00247)	(0.00274)	(0.00278)
Experience Squared	-0.00078***	-0.00072***	-0.00070***	-0.00062***	-0.00065***	-0.00066***	-0.00079***	-0.00072***	-0.00077***	-0.00075***
	(1.51e-05)	(1.64e-05)	(1.64e-05)	(1.67e-05)	(1.56e-05)	(4.55e-05)	(5.58e-05)	(5.52e-05)	(6.04e-05)	(6.12e-05)
Constant	6.173***	6.276***	6.370***	6.566***	6.685***	7.004***	6.956***	7.310***	7.248***	7.411***
	(0.0113)	(0.0124)	(0.0123)	(0.0127)	(0.0124)	(0.0371)	(0.0463)	(0.0450)	(0.0498)	(0.0517)
No. of Sample	27,916	26,053	27,034	26,804	32,972	7,521	7,336	7,398	7,244	7,283
R-squared	0.343	0.316	0.307	0.261	0.247	0.128	0.134	0.117	0.120	0.101
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0869***	0.0986***	0.106***	0.117***	0.125***	0.125***	0.134***	0.137***	0.134***	0.138***
	(0.00358)	(0.00368)	(0.00374)	(0.00432)	(0.00252)	(0.00254)	(0.00235)	(0.00224)	(0.00223)	(0.00206)
Experience	0.0502***	0.0503***	0.0421***	0.0526***	0.0438***	0.0363***	0.0376***	0.0396***	0.0374***	0.0326***
	(0.00305)	(0.00309)	(0.00321)	(0.00363)	(0.00224)	(0.00227)	(0.00209)	(0.00201)	(0.00195)	(0.00177)
Experience Squared	-0.00085***	-0.00090***	-0.00070***	-0.00092***	-0.00068***	-0.00051***	-0.00053***	-0.00062***	-0.00057***	-0.00048***
	(6.79e-05)	(6.93e-05)	(7.30e-05)	(8.13e-05)	(4.90e-05)	(4.95e-05)	(4.54e-05)	(4.33e-05)	(4.20e-05)	(3.84e-05)
Constant	7.289***	7.238***	7.281***	7.119***	7.084***	7.219***	7.201***	7.299***	7.438***	7.573***
	(0.0569)	(0.0584)	(0.0601)	(0.0694)	(0.0417)	(0.0424)	(0.0398)	(0.0382)	(0.0381)	(0.0354)
No. of Sample	7,062	6,645	6,994	6,265	16,146	17,380	20,378	22,320	22,061	23,941
R-squared	0.107	0.131	0.124	0.135	0.153	0.135	0.153	0.166	0.164	0.182

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; to get comparable and consistent among coefficients, the explained variable is replaced by annual wage.

Appendix 3 OLS Results of Mincerian Regression of Actual Experience of UHS Data (Corresponding to Table 3 Column 4)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0324***	0.0319***	0.0334***	0.0325***	0.0410***	0.0467***	0.0684***	0.0650***	0.0726***	0.0742***
	(0.00105)	(0.00101)	(0.000956)	(0.000966)	(0.000949)	(0.00248)	(0.00292)	(0.00293)	(0.00305)	(0.00329)
Experience	0.0801***	0.0724***	0.0687***	0.0645***	0.0571***	0.0474***	0.0442***	0.0429***	0.0397***	0.0356***
	(0.00104)	(0.000992)	(0.000941)	(0.000989)	(0.000896)	(0.00235)	(0.00277)	(0.00282)	(0.00294)	(0.00323)
Experience Squared	-0.00142***	-0.00118***	-0.00110***	-0.00105***	-0.00085***	-0.00067***	-0.00053***	-0.00054***	-0.00044***	-0.00036***
	(2.74e-05)	(2.56e-05)	(2.37e-05)	(2.49e-05)	(2.28e-05)	(5.90e-05)	(6.95e-05)	(7.11e-05)	(7.33e-05)	(8.11e-05)
Constant	6.157***	6.312***	6.416***	6.587***	6.738***	7.101***	7.135***	7.382***	7.406***	7.482***
	(0.0140)	(0.0140)	(0.0135)	(0.0142)	(0.0137)	(0.0365)	(0.0434)	(0.0442)	(0.0467)	(0.0512)
No. of Sample	27,258	25,337	26,298	26,004	31,376	7,044	6,822	6,910	6,706	6,717
R-squared	0.310	0.329	0.325	0.275	0.272	0.170	0.168	0.148	0.152	0.125
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0787***	0.0935***	0.101***	0.109***	0.135***	0.139***	0.146***	0.151***	0.154***	0.140***
	(0.00344)	(0.00364)	(0.00359)	(0.00417)	(0.00379)	(0.00380)	(0.00401)	(0.00349)	(0.00398)	(0.00316)
Experience	0.0355***	0.0354***	0.0354***	0.0327***	0.0933***	0.0871***	0.0866***	0.0789***	0.0802***	0.0486***
	(0.00337)	(0.00356)	(0.00347)	(0.00388)	(0.00401)	(0.00388)	(0.00402)	(0.00354)	(0.00369)	(0.00265)
Experience Squared	-0.00038***	-0.00034***	-0.00036***	-0.00032***	-0.00193***	-0.00177***	-0.00179***	-0.00163***	-0.00165***	-0.00106***
	(8.44e-05)	(8.97e-05)	(8.80e-05)	(9.60e-05)	(9.99e-05)	(9.48e-05)	(0.000103)	(9.05e-05)	(9.20e-05)	(6.96e-05)
Constant	7.485***	7.335***	7.339***	7.352***	6.593***	6.658***	6.679***	6.804***	6.824***	7.499***
	(0.0541)	(0.0579)	(0.0558)	(0.0653)	(0.0618)	(0.0613)	(0.0624)	(0.0574)	(0.0660)	(0.0474)
No. of Sample	6,386	5,877	6,225	5,339	16,475	17,754	20,844	22,817	22,586	23,784
R-squared	0.121	0.144	0.154	0.144	0.223	0.200	0.203	0.217	0.207	0.170

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; to get comparable and consistent among coefficients, the explained variable is replaced by annual wage.

Appendix 4 Robust Results of Mincerian Regression of Actual Experience of UHS Data (Corresponding to Table 3 Column 5)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0266***	0.0279***	0.0298***	0.0282***	0.0369***	0.0406***	0.0636***	0.0562***	0.0655***	0.0626***
	(0.000702)	(0.000766)	(0.000754)	(0.000748)	(0.000743)	(0.00220)	(0.00271)	(0.00262)	(0.00287)	(0.00292)
Experience	0.0569***	0.0547***	0.0534***	0.0490***	0.0446***	0.0405***	0.0388***	0.0343***	0.0328***	0.0292***
	(0.000692)	(0.000750)	(0.000742)	(0.000765)	(0.000702)	(0.00209)	(0.00257)	(0.00252)	(0.00278)	(0.00287)
Experience Squared	-0.00088***	-0.00081***	-0.00078***	-0.00070***	-0.00060***	-0.00052***	-0.00041***	-0.00037***	-0.00030***	-0.00024***
	(1.82e-05)	(1.94e-05)	(1.87e-05)	(1.93e-05)	(1.78e-05)	(5.24e-05)	(6.45e-05)	(6.35e-05)	(6.91e-05)	(7.20e-05)
Constant	6.467***	6.551***	6.626***	6.797***	6.931***	7.222***	7.249***	7.587***	7.568***	7.718***
	(0.00934)	(0.0106)	(0.0107)	(0.0110)	(0.0108)	(0.0325)	(0.0403)	(0.0395)	(0.0440)	(0.0454)
No. of Sample	27,258	25,337	26,298	26,004	31,376	7,044	6,822	6,910	6,706	6,717
R-squared	0.407	0.376	0.363	0.321	0.309	0.180	0.173	0.144	0.145	0.122
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0678***	0.0818***	0.0900***	0.0971***	0.117***	0.115***	0.123***	0.127***	0.125***	0.125***
	(0.00314)	(0.00321)	(0.00325)	(0.00381)	(0.00219)	(0.00220)	(0.00201)	(0.00190)	(0.00188)	(0.00178)
Experience	0.0274***	0.0294***	0.0306***	0.0327***	0.0652***	0.0615***	0.0582***	0.0583***	0.0543***	0.0381***
	(0.00307)	(0.00313)	(0.00313)	(0.00354)	(0.00189)	(0.00189)	(0.00176)	(0.00169)	(0.00166)	(0.00166)
Experience Squared	-0.00021***	-0.00025***	-0.00029***	-0.00034***	-0.00122***	-0.00114***	-0.00107***	-0.00111***	-0.00102***	-0.00068***
	(7.71e-05)	(7.90e-05)	(7.95e-05)	(8.76e-05)	(4.70e-05)	(4.67e-05)	(4.32e-05)	(4.14e-05)	(4.03e-05)	(3.86e-05)
Constant	7.725***	7.598***	7.574***	7.562***	7.055***	7.170***	7.227***	7.325***	7.480***	7.771***
	(0.0494)	(0.0510)	(0.0505)	(0.0596)	(0.0318)	(0.0321)	(0.0299)	(0.0282)	(0.0282)	(0.0290)
No. of Sample	6,386	5,877	6,225	5,339	16,475	17,754	20,844	22,817	22,586	23,784
R-squared	0.115	0.144	0.152	0.143	0.211	0.189	0.198	0.209	0.204	0.185

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; to get comparable and consistent among coefficients, the explained variable is replaced by annual wage.

Appendix 5 Results of Mincerian Regression of Hour Wage Approach of UHS Data (2002-2006)

Year	Potential Work Experience (OLS)					Potential Work Experience (Robust)				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Education	0.140***	0.136***	0.149***	0.152***	0.151***	0.124***	0.125***	0.137***	0.140***	0.139***
	(0.00381)	(0.00362)	(0.00362)	(0.00352)	(0.00383)	(0.00254)	(0.00254)	(0.00235)	(0.00224)	(0.00224)
Experience	0.0360***	0.0261***	0.0303***	0.0299***	0.0261***	0.0339***	0.0262***	0.0272***	0.0280***	0.0259***
	(0.00347)	(0.00338)	(0.00355)	(0.00318)	(0.00320)	(0.00229)	(0.00231)	(0.00213)	(0.00205)	(0.00200)
Experience Squared	-0.00040***	-0.00024***	-0.00032***	-0.00034***	-0.00029***	-0.00039***	-0.00023***	-0.00025***	-0.00030***	-0.00026***
	(7.75e-05)	(7.56e-05)	(7.92e-05)	(7.06e-05)	(7.28e-05)	(5.05e-05)	(5.07e-05)	(4.64e-05)	(4.44e-05)	(4.32e-05)
Constant	-0.666***	-0.437***	-0.564***	-0.492***	-0.355***	-0.467***	-0.349***	-0.399***	-0.304***	-0.182***
	(0.0627)	(0.0605)	(0.0637)	(0.0597)	(0.0657)	(0.0424)	(0.0428)	(0.0402)	(0.0386)	(0.0386)
No. of Sample	15,105	16,393	19,235	21,109	20,959	15,105	16,393	19,235	21,109	20,959
R-squared	0.154	0.138	0.163	0.169	0.161	0.148	0.134	0.157	0.167	0.167
Year	Actual Work Experience (OLS)					Actual Work Experience (Robust)				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Education	0.123***	0.122***	0.134***	0.139***	0.138***	0.110***	0.110***	0.121***	0.125***	0.123***
	(0.00335)	(0.00331)	(0.00336)	(0.00301)	(0.00349)	(0.00222)	(0.00223)	(0.00205)	(0.00194)	(0.00192)
Experience	0.0482***	0.0410***	0.0447***	0.0396***	0.0360***	0.0432***	0.0403***	0.0382***	0.0384***	0.0350***
	(0.00330)	(0.00288)	(0.00313)	(0.00269)	(0.00274)	(0.00207)	(0.00204)	(0.00190)	(0.00180)	(0.00179)
Experience Squared	-0.00074***	-0.00061***	-0.00068***	-0.00060***	-0.00056***	-0.00065***	-0.00059***	-0.00055***	-0.00060***	-0.00054***
	(8.09e-05)	(7.06e-05)	(7.42e-05)	(6.47e-05)	(6.56e-05)	(5.09e-05)	(5.00e-05)	(4.59e-05)	(4.37e-05)	(4.28e-05)
Constant	-0.484***	-0.339***	-0.441***	-0.355***	-0.226***	-0.313***	-0.225***	-0.228***	-0.132***	0.00970
	(0.0527)	(0.0496)	(0.0527)	(0.0473)	(0.0554)	(0.0345)	(0.0344)	(0.0322)	(0.0303)	(0.0305)
No. of Sample	15,257	16,554	19,429	21,350	21,190	15,257	16,554	19,429	21,350	21,190
R-squared	0.175	0.159	0.184	0.185	0.172	0.170	0.155	0.172	0.181	0.177

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Appendix 6 Results of Mincerian Regression of Hour Wage Approach of CHNS Data (Corresponding to Table 3 Column 6-7)

Year	1989	1991	1993	1997	2000	2004	2006
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.000597	0.00955***	0.00708	0.0240***	0.0710***	0.102***	0.117***
	(0.00505)	(0.00328)	(0.00459)	(0.00449)	(0.00457)	(0.00570)	(0.00532)
Experience	0.0286***	0.0292***	0.0304***	0.0221***	0.0275***	0.0318***	0.0226***
	(0.00429)	(0.00319)	(0.00448)	(0.00400)	(0.00406)	(0.00571)	(0.00534)
Experience Squared	-0.000395***	-0.000372***	-0.000434***	-0.000292***	-0.000402***	-0.000401***	-0.000197*
	(9.45e-05)	(7.49e-05)	(0.000103)	(9.08e-05)	(9.05e-05)	(0.000126)	(0.000116)
Constant	-1.146***	-1.054***	-0.687***	0.298***	0.206***	0.0351	0.101
	(0.0662)	(0.0449)	(0.0638)	(0.0606)	(0.0628)	(0.0918)	(0.0869)
No. of Sample	3,515	3,155	2,686	2,488	2,704	1,842	1,979
R-squared	0.030	0.081	0.043	0.037	0.102	0.159	0.200
Year	1989	1991	1993	1997	2000	2004	2006
Explained Variable	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage	lnwage
Education	0.0219***	0.0203***	0.00434	0.0227***	0.0748***	0.114***	0.117***
	(0.00283)	(0.00247)	(0.00381)	(0.00400)	(0.00397)	(0.00529)	(0.00489)
Experience	0.0282***	0.0270***	0.0223***	0.0233***	0.0268***	0.0311***	0.0211***
	(0.00240)	(0.00240)	(0.00371)	(0.00357)	(0.00353)	(0.00530)	(0.00492)
Experience Squared	-0.000298***	-0.000256***	-0.000279***	-0.000310***	-0.000368***	-0.000356***	-0.000155
	(5.28e-05)	(5.64e-05)	(8.57e-05)	(8.09e-05)	(7.87e-05)	(0.000117)	(0.000107)
Constant	-1.534***	-1.234***	-0.630***	0.286***	0.134**	-0.122	0.0860
	(0.0370)	(0.0338)	(0.0529)	(0.0540)	(0.0546)	(0.0852)	(0.0800)
No. of Sample	3,515	3,155	2,686	2,488	2,704	1,842	1,979
R-squared	0.120	0.167	0.045	0.048	0.140	0.211	0.227

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; all regressions are set hour wage as explained variables.

Appendix 7 Results of Mincerian Regression of CHIP Data: Urban and Overall China (Corresponding to Table 3 Column 8-9)

Category	Urban					Overall China				
	Annual Wage Approach			Hour Wage Approach		Annual Wage Approach			Hour Wage Approach	
Year	1988	1995	2002	1995	2002	1988	1995	2002	1995	2002
Explained Variable	0.0376***	0.0511***	0.0969***	0.0564***	0.104***	0.0379***	0.0720***	0.0772***	0.0551***	0.0765***
Education	(0.000913)	(0.00160)	(0.00228)	(0.00181)	(0.00245)	(0.000947)	(0.00172)	(0.00171)	(0.00182)	(0.00150)
Experience	0.0445***	0.0428***	0.0321***	0.0427***	0.0317***	0.0440***	0.0809***	0.0721***	0.0428***	0.0445***
	(0.000836)	(0.00162)	(0.00230)	(0.00183)	(0.00247)	(0.000831)	(0.00159)	(0.00169)	(0.00170)	(0.00149)
Experience Squared	-0.00058***	-0.00052***	-0.00032***	-0.00050***	-0.00029***	-0.00057***	-0.00127***	-0.00125***	-0.00048***	-0.00056***
	(1.93e-05)	(3.97e-05)	(5.63e-05)	(4.51e-05)	(6.06e-05)	(1.94e-05)	(4.29e-05)	(4.96e-05)	(4.60e-05)	(4.35e-05)
Constant	3.971***	7.416***	7.497***	-0.261***	-0.265***	3.963***	6.730***	7.360***	-0.269***	-0.0963***
	(0.0134)	(0.0251)	(0.0372)	(0.0282)	(0.0399)	(0.0135)	(0.0208)	(0.0178)	(0.0220)	(0.0157)
No. of Sample	17,292	12,025	9,599	11,711	9,502	19,238	14,698	21,130	14,373	20,888
R-squared	0.331	0.218	0.199	0.202	0.196	0.305	0.405	0.313	0.234	0.308

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; where, the overall China refers to rural and urban employment population for 1988 and 1995, and it includes rural migrant population for 2002.