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Rising Income Inequality in China:

A Race to the Top

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Abstract

Income inequality in China has risen rapidly in the past decades across regions, between rural and urban sectors, and within provinces. The dynamics of divergence across these sub-national areas have taken the form of a “race to the top”—meaning that *all* segments of the population, including the poor with low education in lagging inland rural areas, have experienced gains in average income. The largest gains have been registered by those with higher income and education in leading coastal urban areas. Using the China Economic, Population, Nutrition and Health Survey data of 1989 and 2004, we show that the most important factors explaining overall inequality are differential returns to schooling and sector of employment. A decomposition analysis based on household income determination shows that the increase in returns to education explains two-thirds

of income changes in urban areas and one-sixth in rural areas. The widening income gaps are the consequence of higher growth in leading urban and coastal areas and that the skilled population has benefited more from the economic reforms carried out during the last 25 years. The authors argue that rising income inequality can be part of a normal process of development at a certain stage, and that the dynamics of spatial income divergence in the form of “a race to the top” can be desirable to some extent as it unleashes competitive pressure and creates incentives for investment in skills. Continuing to improve market efficiency and investing in people, in particular improving education service in lagging areas to poor people, are important for sustainable growth and equitable distribution in the long run.

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Rising Income Inequality in China: A Race to the Top*

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1. Introduction

The growth performance of the Chinese economy in the past decades has been spectacular with an annual per capita growth rate of about 9% since 1990. Overall living standards in China have improved with significant poverty reduction (Chen and Ravallion, 2007). However, growth has been uneven and disparity has surfaced – rising rural-urban inequality and the coastal-inland gap have been documented in many studies (Chaudhuri and Ravallion, 2006; Chen and Wang, 2001; Chotikapanich et al., 2007; Khan and Riskin, 2001; Ravallion and Chen, 2007; Wade, 2003; Wan et al., 2006; 2007). In 2004, the urban to rural household per capita income ratio was 3.2 times and coastal to inland GDP per capita ratio was 2.4 times, which were among the highest in the world. Not everyone has shared the success equally, though lagging inland and rural areas seemed to start catching up in the most recent years thanks to concerted development efforts. Understanding how distribution influences economic growth and how economic growth and changes in distribution jointly contribute to China’s extraordinary success in reducing poverty within a generation is of great interest.

There is a rich literature on changes in income distribution in China since the economic reform. Some studies focus on inequality between rural and urban areas and between coastal and inland areas (see for instance Gustafsson and Li, 2002; Kanbur and Zhang, 1999; Lu, 2002; Renard, 2002; Sicular et al., 2007; Tsui, 1991; 2007, Yu et al., 2007). Some other studies examine the impact of governmental policies on inequality (Fan et al., 2002; Heerink et al., 2006). More recently, attention is being turned to the relative importance of the potentially relevant contributing factors of inequality and poverty (Wan, 2007). Wan (2004) shows that the development of Township and Village Enterprises (TVEs) and education are the most important factors that influence changes in regional inequality and poverty. These studies are often based on micro-analyses at the disaggregated levels of counties, villages, households and even individuals, using some decomposition frameworks (Meng et al., 2007; Wan, 2004; Wan and Zhou, 2005; Zhang and Wan, 2006).

This paper contributes to the literature by using household level information to analyze (i) the evolution of rural and urban household income in coastal and interior provinces; (ii) the extent of changes in inequality; and (iii) the factors behind income growth. We argue that widening income inequality in China is not the result of stagnant income growth in certain segments of society or regions – all sub-national areas, including lagging inland rural areas, and the entire population, including the less affluent, has experienced gains in average income – but rather the consequence of unusually high and sustained growth in coastal and urban areas. By any international standard, growth performance in rural and inland areas was good in over a quarter century after the reform – average annual income growth is four percent in rural areas and GDP growth was nine percent in inland regions. However, income gaps have been widened because of the stellar growth performance in the urban and coastal areas – the average annual income growth was five percent in urban areas and GDP growth was 11 percent in coastal regions. In other words, the dynamics of spatial divergence across these sub-national areas have taken the form of a “race to the top”.

We show how uneven growth has contributed to changes in inequality, and then analyze the major determinants of income growth. Our results show that the increase in returns to education explains two-thirds of income changes in urban areas and one-sixth in rural areas. The important

roles of increase in returns to education in income growth and the “race to the top”-type of income divergence suggest that rising income inequality is part of a normal process of development and can be desirable for efficient growth as it unleashes competitive pressure and creates incentives for investment in skills. The structure of the paper is as follows. Section 2 presents the data; section 3 reviews the literature on inequality in China since the economic reforms; section 4 presents the empirical methodology; section 5 describes the results of unequal distribution and trends of changes in income and non-income dimensions; section 6 examines the sources of widening income differentials; and section 7 concludes.

2. Data

We use the China Economic, Population, Nutrition and Health Survey (CHNS), a longitudinal survey with six waves in 1989, 1991, 1993, 1997, 2000 and 2004. Li and Zhu (2006) and Zhang and Wan (2006) used part of this dataset in their analysis of income inequality in China. This data collection is an ongoing international collaborative project between the Carolina Population Center at the University of North Carolina at Chapel Hill, the National Institute of Nutrition and Food Safety, and the Chinese Center for Disease Control and Prevention.¹ The sample of households was randomly drawn from eight provinces, including three coastal provinces, *Liaoning*, *Shandong*, and *Jiangsu*, and five inland provinces *Henan*, *Hubei*, *Hunan*, *Guangxi* and *Guizhou*.² These provinces vary by geography and economic development, and can be considered as regionally representative. Four neighborhoods in each city, one county-town neighborhood, and three villages in each county, were then randomly selected. Approximately 20 households were sampled per community. Newly-formed households who resided in sample areas and additional households to replace those no longer participating were added to the sample. New communities were also added to replace communities no longer participating.

In this study, we use the 1989 and 2004 survey data to analyze the changes in income. The 1989 round included 3,795 households or 10,664 adults (18 years of age or older). The 2004 round included 3,810 households or 9,856 adults. In the CHNS dataset, household income in different survey years is adjusted to 1988 urban *Liaoning* price using rural/urban Consumer Price Index (CPI) at the provincial level. In this paper, if not mentioned otherwise, household income is measured in 1988 urban Liaoning prices.

3. Changes in Inequality in China

Regional development in China has been uneven since long before the reform. The problem was less visible mainly because of the overall low level of income. In the planning period, despite the government’s efforts in balanced growth, the entire economy was distorted by inefficient allocation of resources. Investment was largely allocated to inland provinces and the North-East, which followed political needs rather than regional comparative advantages. Regional development level did not well reflect comparative advantages or potential capacity. After the reform, several waves of preferential policies deliberately sequenced by the central government following market principles, along with differences in natural endowment and comparative

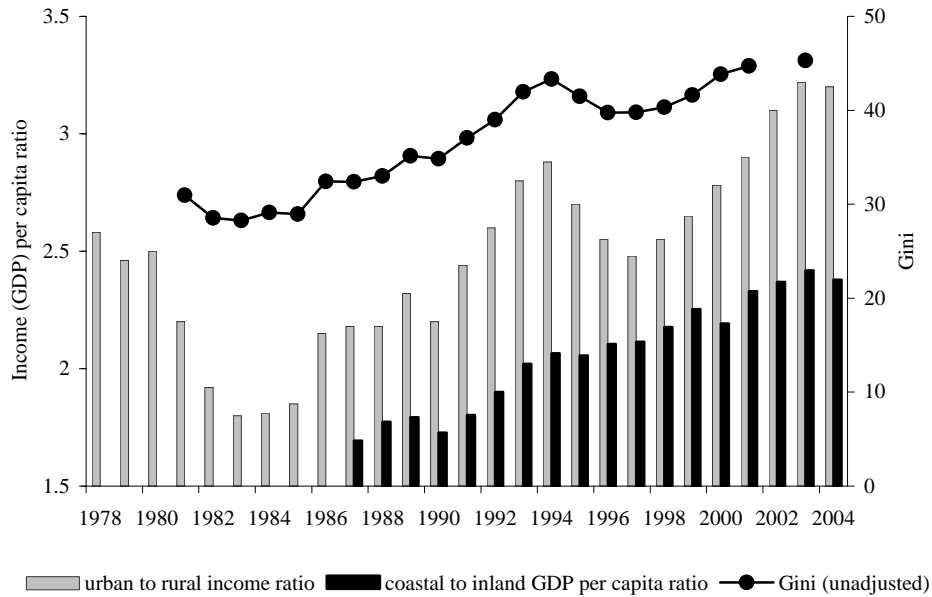
¹ A detailed description of the data can be obtained from <http://www.cpc.unc.edu/china/>.

² Liaoning was replaced by Heilongjiang in the round of 1997 and returned to the survey in 2000.

advantages implied by economic geography, contribute to reshaping the regional aspects of geo-economic development.

The coastal-inland development gap and the rural-urban divide are the two major components of overall inequality in China. Urban to rural household per capita income ratio and coastal to inland GDP per capita ratio both increased by almost 50 percent from 2.2 times and 1.7 times in the late 1980s to 3.2 times and 2.4 times respectively in 2004. The Gini coefficient has also increased by about 50 percent, from around 30 to 45 over the past 25 years (Figure 1).

Figure 1 – Income inequality in China

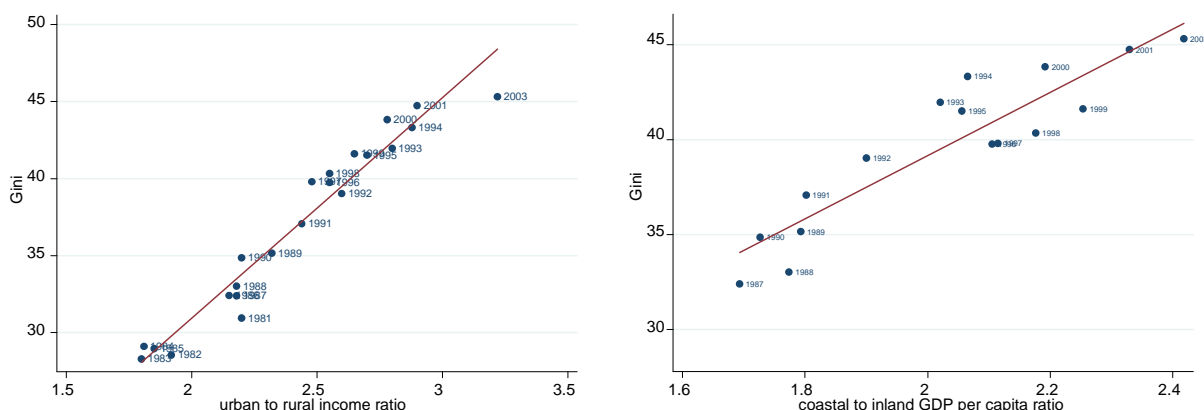


Source: Huang and Luo (2008)

Changes in the Gini coefficient are closely associated with changes in the urban-to-rural income ratio and the coastal-to-inland per capita GDP ratio (Figure 2). The evolution of reform focus and the policy inclination over coastal/inland region and rural/urban sectors play an important role in income distribution changes. For example, when rural income increased relative to urban income in the early 1980s due to the implementation of Household Responsibility System and mid 1990s due to the increase in grain purchase price, overall inequality dropped. When coastal income increased relative to inland income in the late 1980s and early 1990s due to the regional policy inclination, overall inequality increased. The sharp increase in urban inequality is a main component of the increase in overall inequality. Inequality in rural China remained slightly higher than in urban China. However, inequality in urban China has increased so rapidly in recent years that it may surpass that of rural China some time in the future (Chotikapanich et al., 2007). In the mid/late-1980s, when the full employment or the so called “iron rice bowl” policy (*tie fan wan*) came to an end as the restructuring of state-owned-enterprises (SOEs) became the center of 1990s reform -- profitable firms tended to increase wages for skilled or able workers while laying off the rest -- the number of laid-off workers increased. Poverty started to become more of an urban issue in the 1990s (Wang et al., 2002; Wu, 2004). Fang et al. (2002), using 1992-1998 urban household survey, find that the incidence of urban poverty declined from 1992 to 1995 but increased from 1996 to 1998. Meng et al. (2005), using a cross section of household survey data

from 1986 to 2000, suggest that urban consumption poverty increased in the 1990s due to the increase in income uncertainty as the price of education, housing, and health care (which were previously provided free or at highly subsidized prices by the state) went up when economic reforms deepened. Within rural areas, the patterns of income distribution changed over the past quarter century, which contributed to the differentiated impacts of growth on poverty reduction. Zhang and Wan (2006) quantify the relative importance of growth and distributional changes in explaining poverty, and find that rural poverty increased in the second half of the 1990s and adverse distributional changes are the main cause of increase in rural inequality and hence overall inequality. They argue that agriculture-led growth raised rural income, improved income distribution, and as a result achieved unprecedented reduction in rural poverty in the late 1980s; however, in the late 1990s, the impact of adverse distributional changes either outweighed or weakened the impact of growth on poverty reduction. Meng et al. (2005) regress the logarithms of a poverty index on those of the average income and Gini index to obtain the marginal impacts of growth and redistribution.³

Figure 2 – Relationship between Gini and urban-to-rural/coastal-to-inland income ratios



Source: Huang and Luo (2008)

Income inequality between rural and urban areas within provinces differs. Higher income provinces have smaller urban-rural income gaps, while difference in rural-urban incomes in the poorer regions is particularly pronounced (World Bank, *China Poverty Assessment*). In 2006, urban to rural per capita income for the three richest provinces (Beijing, Tianjin and Shanghai excluded) was about two and a half times, while the ratio was about four and a half for the three poorest provinces (Yao, 2008). A large part of the inequality between regions is in fact associated with the differences between their respective rural areas and is related to the uneven degree of urbanization across provinces. Rural income and urbanization rate are both lower in inland provinces than in coastal provinces. In 2005, rural per capita income is 70 percent higher and urbanization rate⁴ is 65 percent higher in coastal region than western region. As urban income is in average twice to three times rural income, a larger portion of urban population have contributed to a higher aggregate income level in coastal areas. Acceleration of migration and

³ Results on changes in poverty over time are sensitive to poverty lines chosen and index employed (Bishop et al., 2006).

⁴ Here, urbanization rate is defined as the ratio of population with urban residence to total population.

urbanization may reduce overall inequality as the proportion of population that remains in poorer rural areas will become smaller over time (Huang and Luo, 2008).

4. Methodology

In this section, we first present the evolution of income changes with growth incidence curves; then examine the interactions among income growth, inequality and poverty reduction through decomposition analyses of the determinants of household income growth at the sub-national level; and finally study the role of structural transformation in income changes.

4.1. Growth Incidence Curve

The growth incidence curve (GIC), developed by Ravallion and Chen (2001), describes the income growth rate of each segment of the population during the period of study. Mathematically, GIC indicates the growth rate in income between two points in time at each percentile of the distribution. More specifically, comparing two dates, $t-1$ and t , the growth rate in income of the p 'th quintile is:

$$g_t(p) = \frac{y_t(p)}{y_{t-1}(p)} - 1$$

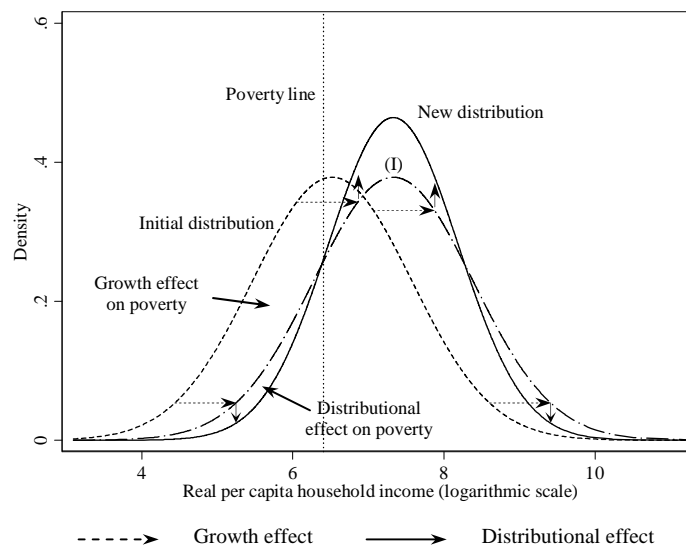
Letting p vary from zero to one, $g_t(p)$ traces out the GIC. For example, at the 50th percentile, the figure gives the growth rate of the median income. If there is no change in inequality, $g_t(p) = g$ for all p , where g equals the average growth rate in mean income. If $g_t(p)$ is a decreasing (increasing) function for all p , then inequality falls (rises) over time for all inequality measures, satisfying the Pigou-Dalton transfer principle. If the GIC lies above zero everywhere, $g_t(p) \geq 0$ for all p then there is first-order dominance of the distribution at date t over $t-1$. If the GIC is above the zero axis at all points up to some percentile p^* , then poverty has fallen for all headcount indices up to p^* (for all poverty lines up to the value that yields p^* as the headcount index) and for all poverty measures within a broad class. If the GIC switches sign then one cannot in general infer whether higher-order dominance holds by looking at the GIC alone.

4.2. Poverty-Growth-Inequality Arithmetic

The poverty-growth-inequality triangle, developed by Bourguignon (2003; 2005), provides an arithmetic framework to examine the interaction between income growth, inequality and poverty reduction. The difference between two income distributions – the distribution of the initial year and that of the final year – can be decomposed into growth effects and distributional effects, by assuming log-normality of the distributions. Figure 3 illustrates this decomposition where the poverty headcount is simply the area under the density curve to the left of the poverty line. Growth effects stand for the effects of a proportional change in all incomes that leaves the distribution of relative income unchanged; while distributional effects stand for the effects of a

change in the distribution of relative incomes which is independent of the mean (Datt and Ravallion, 1992).⁵

Figure 3 – Decomposition of change in distribution and poverty into growth and distributional Effects



Source: Bourguignon (2005).

Assuming every individual has the same increase of income that equals to the mean income growth of the entire population, the new hypothetical distribution would have the same distribution as the initial one and the same mean value as the final one. It can thus be presented as the horizontal translation of the initial density curve to curve (I) in Figure 3, which stands for the pure “growth effect” with no change taking place in the distribution of relative incomes. The “distributional effect”, which corresponds to the change in the distribution of “relative” income, is hence captured by the difference between this hypothetical intermediate distribution and the final one. In Figure 3, moving from curve (I) to the new distribution curve that occurs at constant mean income corresponds to the “distributional” effect.⁶

4.3. Decomposition of Income Growth

Oaxaca decomposition, first developed by Oaxaca (1973) then by Smith and Welch (1989), quantifies the influence of various variables in increasing household incomes by decomposing their effects into (i) main effect that occurs because of changes in household characteristics and (ii) year effect resulted from changes in returns to the specific characteristics. This methodology allows examining the roles of different attributes – such as individual demographical characteristics, schooling attainment, and occupation – in driving the differentiated income growth over time.

⁵ See also Bourguignon (2003), Dollar and Kraay (2002), Fields (2001), Kakwani (1993) and Ravallion (2001).

⁶ The decomposition can be path-dependent, and results may be slightly different between a “first horizontal then vertical” translation and a “first vertical then horizontal” translation. We presume the difference is sufficiently small for our purpose of analysis.

Mathematically, starting from two income equations for each household:

$$\log y_i = \sum_{k=1}^K \beta_k^{89} x_{k,i} + \mu_i^{89} \quad \text{for 1989} \quad (1)$$

$$\log y_i = \sum_{l=1}^K \beta_l^{04} x_{l,i} + \mu_i^{04} \quad \text{for 2004} \quad (2)$$

where y_i represents the real per capita income; $X_i = \{x_{k,i}\}_{k=1}^K$ are the independent variables, we estimate:

$$\log \hat{y}_i = \hat{\beta}^{89} X_i \quad \text{for 1989} \quad (3)$$

$$\log \hat{y}_i = \hat{\beta}^{04} X_i \quad \text{for 2004} \quad (4)$$

The wage growth during the period 1989-2004 can be decomposed as the following:

$$\log \tilde{y}_{04} - \log \tilde{y}_{89} = \hat{\beta}^{89} (\bar{X}_{04} - \bar{X}_{89}) + (\hat{\beta}^{04} - \hat{\beta}^{89}) \bar{X}_{04} \quad (5)$$

where \tilde{y}_{89} and \tilde{y}_{04} are geometric mean income in 1989 and 2004, respectively. $(\bar{X}_{04} - \bar{X}_{89})$ denotes the main effect of the independent variables, for example, that of education which signify the changing education stock of the population, that of industry which signify a structural transformation or the changing industry composition, etc. $(\hat{\beta}^{04} - \hat{\beta}^{89})$ denotes the year effect, for example, the changes in returns to education, the changes to industry-specific premiums, etc. Decomposition into main effects and year effects allows assessing the impact of structural transformation on income growth, and identifying sources of widening income gaps.

5. Unequal Distribution and Trends in Changes in Inequality

Using the CHNS data, we show that the distribution between coastal and inland regions and across rural and urban areas has been unequal in both income and non-income dimensions. Over time, the inequality of income has widened while that of human capital endowment starts to narrow.

5.1. Income Inequality

Overall, household per capita income increased and income inequality widened over time (Table 1). Household per capita income increased by 164% from 1044 yuan in 1989 to 2765 yuan in 2004. Inland-coastal income gap widened as income growth was faster in coastal provinces. Rural-urban income gap remained: mean household per capita income in urban areas was 40% higher than that in rural areas in 2004, a gap similar to 1989. However, rural income grew more rapidly in the three coastal provinces than in the five inland provinces. Household per capita income of coastal rural more than tripled while that of inland rural areas doubled in the same period. Income growth in coastal urban areas was also higher than that in urban inland. This is consistent with the concerted development effort to first concentrate resources in coastal provinces. As a result, coastal provinces are at a more advanced stage of development than inland provinces, and coastal rural-urban mean income gap seems to have begun to narrow while rural-urban gap is still widening in inland provinces. The sharp increase in inequality in rural and urban areas during the 15 years led to substantial increase in overall Gini coefficients. First, income

inequality rose more rapidly within urban areas than within rural areas. Second, the level of rural inequality has been and remained higher than urban areas'. Finally, the contribution of within urban inequality to overall inequality increased sharply relative to that of within rural inequality, from 21% in 1989 to 36% in 2004, while the contribution of within coastal and within inland provinces remained unchanged.

Table 1 – Distribution of household per capita income (1989-2004)

	Average per capita income (<i>yuan</i>)		Gini coefficient		Theil Decomposition	
	1989	2004	1989	2004	1989	2004
Total	1044	2765	0.354	0.482	0.205 (100.0)	0.452 (100.0)
Decomposition by sector						
Rural areas	925	2445	0.396	0.487	0.150 (73.3)	0.258 (60.9)
Urban areas	1279	3411	0.251	0.452	0.042 (20.6)	0.153 (36.0)
Between groups					0.012 (6.1)	0.013 (3.1)
Decomposition by region						
Inland provinces	982	2360	0.365	0.497	0.129 (62.9)	0.257 (60.6)
Coastal provinces	1149	3456	0.327	0.433	0.073 (35.7)	0.149 (35.2)
Between groups					0.003 (1.4)	0.018 (4.2)

Note: Average income is measure in *yuan* 1989 Liaoning urban price. The contributions to overall inequality (in percentage) are presented in parentheses.

Figure 4 summarizes the full Kernel density distribution of rural and urban income in 1989 and 2004 and shows the simultaneous increase of income and inequality. Starting with a lower level, income inequality within urban areas increased sharply over time and approached income inequality level within rural areas in 2004.

Figure 4 – Kernel density of household per capita income, by sector, 1989 and 2004

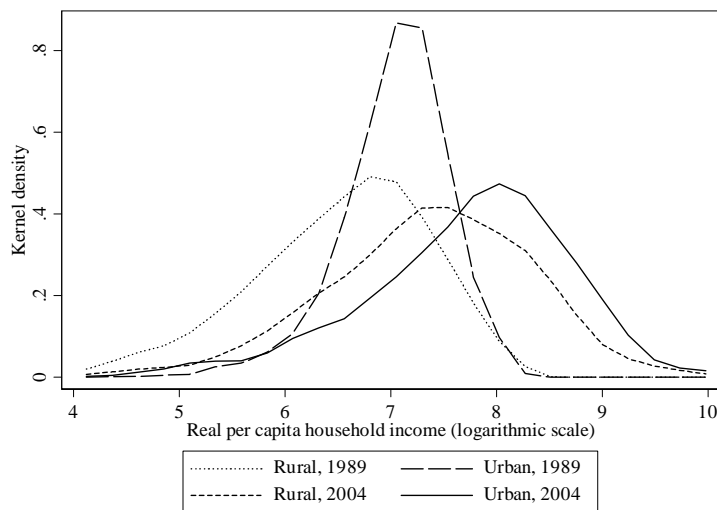


Figure 5 describes the growth incidence of the entire population. All segments of the population have experienced positive gains in average income. The poorest quartile gained less than 80%

while the richest quartile gained over 150%, income gaps widened in 1989-2004. Though unevenly, everybody has been sharing the fruits of economic growth with a mean growth rate of 165% in 15 years (6.7% per annum) or a median growth rate of 100 % (4.7% per annum).

Figure 5 – Growth incidence curves
(All provinces, 1989-2004)

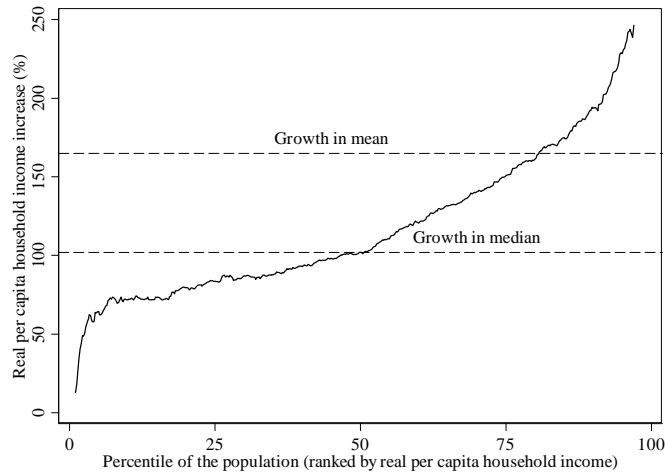
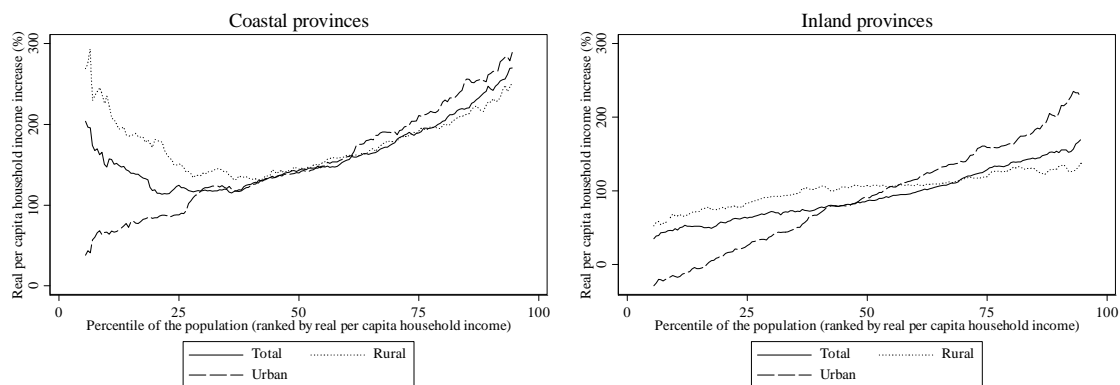


Figure 6 shows that the distribution of growth has been uneven in the spatial dimension. The biggest gains have been registered by the already rich in leading coastal and urban areas. Among coastal provinces, a U-shaped growth incidence curve indicates those at the poorest segment in rural areas has experienced phenomenal growth and to some extent has been catching up; while among inland provinces, a positively-sloped curve suggests the initially richer rural households have always enjoyed a higher growth. The difference in growth distribution in urban areas has been less significant across regions – income have increased faster among the richer households for both the coastal and inland regions; and inequality have risen more rapidly in the coast due to the sharper income increase of the richest end. In both urban and rural areas, growth rate has been higher in coastal provinces. Growth in the urban lower-end, both in coastal and inland provinces, has been less satisfactory due mainly to the SOE retrenchments; growth in the rural lower-end, whose initial income level was lower, has been high and has largely contributed to poverty reduction.

Figure 6 – Growth incidence curve: changes in per capita household income, percentile-to-percentile, eight Chinese provinces (1989-2004)



This rapid income growth of the poorest in rural coastal provinces could be attributed to the prosperity of Township and Village Enterprises (TVEs) and other non-farm activities because of proximity to economic centers – *Shanghai* for *Jiangsu*, *Bohai Economic Zone* for *Shandong* and *Liaoning*. Internal migration and remittance also play a role. On the other hand, the relatively smaller gains among the bottom end of the urban distribution could be attributed to the widespread retrenchment of SOE workers. Before the enterprise reforms in the 1990s, a large part of urban workers were employed by SOEs or collectively owned enterprises. The enterprise reforms gave enterprises flexibility in hiring/firing workers and in determining workers’ pay, and encouraged financially unviable enterprises to merge or shut down. Workers with higher ability or skills could more easily find gainful employment outside of the public enterprises. However, a large number of urban workers, laid-off from SOEs and collective-owned enterprises, were unskilled. Furthermore, the imperfect tax system has not been effective in taxing and redistributing.

Based on the one-dollar-a-day poverty line (Purchase Power Parity, 1993 international prices), China’s poverty rate had nearly halved to 33% in 1990, from 64% in 1980. By 2004, it stood at 10%. The absolute number of poor consuming less than a dollar-a-day fell from 634 million in 1981 to 134 million in 2004. We employ 1.5 dollars-a-day as income poverty line for the period of 1989-2004. Adjusted by rural and urban CPI at the provincial level, we translate 1.5 dollars-a-day into 768 *yuan*s 1988 Liaoning urban price per capita per year.

Subject to the 1.5 dollars-a-day poverty line, for all eight provinces, rural poverty headcount more than halved from 50.1% in 1989 to 22.4% in 2004; urban poverty headcount fell by a-third from 19.0% in 1989 to 13.5% in 2004 (Table 2).⁷ The initial poverty headcount in 1989 was lower in coastal provinces than in inland provinces, as a result of earlier concerted effort to concentrate resources to develop the former. Because of their proximity to urban centers of high economic growth, coastal rural areas had witnessed stellar poverty reduction – poverty headcount from 40.2% in 1989 to 13.5% in 2004. Among urban coastal areas, poverty headcount also more than halved from 14.2% to 5.9%. Similarly, inland rural areas also witnessed halving of poverty incidence during this period. Poverty reduction is slowest in inland urban areas, decreasing from 21.8% in 1989 to 18.1% in 2004.

Table 2 - Poverty headcount by regions (%)

	All the provinces		Coastal provinces		Interior provinces	
	1989	2004	1989	2004	1989	2004
Rural	50.1	22.4	40.2	13.5	55.8	27.4
Urban	19.0	13.5	14.2	5.9	21.8	18.1

Note: 1.5 dollars-a-day (Purchase Power Parity, 1993 international price) translates into 768 *yuan*s 1988 Liaoning urban price.

⁷ Rural poverty rate can be overestimated relative to urban poverty rate based on single poverty line as the difference in cost-of-living between rural areas and urban areas has not been taken into account (Ravallion and Chen, 2007). The trends of poverty reduction for the entire sample and for coastal and inland provinces stay unchanged when we adjust rural income taking income cost-of-living difference. Results are available upon request.

Figure 7 presents the Kernel density distribution of household per capita income for rural and urban respectively. For tractability, we follow Bourguignon’s analysis and assume log-normal distribution of income (Bourguignon, 2002). Simulated poverty headcount, measured by the percentage of population with a household per capita income below a certain level, is captured by the area under the density curve to the left of the poverty line. The results in Figure 7 and Table 3 suggest that given the assumption of log-normality of income distribution, over the period of 1989-2004, poverty reduction has primarily been a result of rising income. Despite the hypothetical effect of poverty increasing as a result of worsening distribution, the overwhelming growth effect on poverty reduction is irrefutable – poverty headcount reduced significantly throughout the country, in rural as well as in urban areas, and in coastal provinces and inland provinces.

Figure 7 – Growth and distributional effects on poverty reduction
(All the province, 1989-2004)

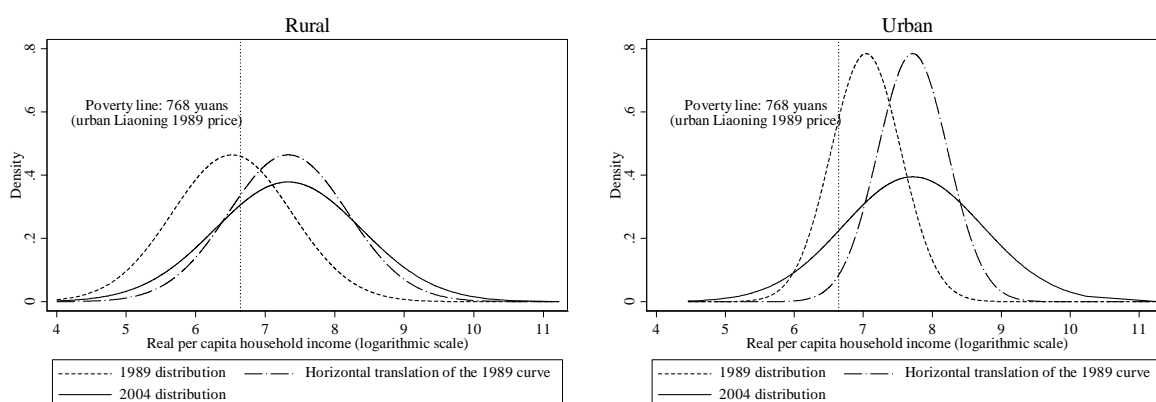


Table 3 - Decomposition of changes in poverty into growth and distributional effects

	Simulated poverty headcount (%)			Decomposition (%)		
	1989 distribution A	2004 distribution B	Horizontal translation of 1989 curve C	Total effect B-A	Growth effect C-A	Distributional effect B-C
All the provinces						
Rural	55.7	25.7	21.2	-29.9	-34.4	4.5
Urban	22.4	14.6	1.8	-7.8	-20.6	12.8
Coastal provinces						
Rural	50.9	16.3	13.3	-34.5	-37.5	3.0
Urban	14.5	4.9	0.2	-9.6	-14.3	4.7
Interior provinces						
Rural	58.7	31.2	27.1	-27.5	-31.6	4.1
Urban	26.9	20.5	4.7	-6.4	-22.2	15.8

Note: 1.5 dollars-a-day (Purchase Power Parity, 1993 international price) translates into 768 yuans 1988 Liaoning urban price.

5.2. Non-income Inequality

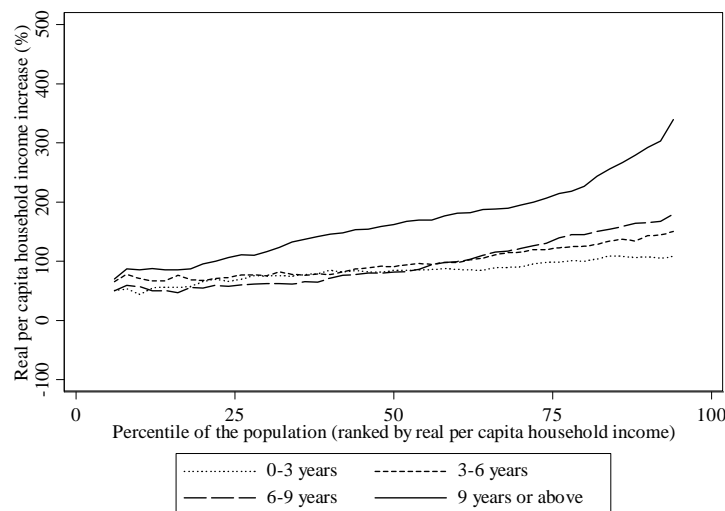
Non-income distribution is also uneven in a spatial dimension in favor of the leading coastal and urban areas. Overall, the average years of education of a household increased from 6.01 in 1989 to 6.75 in 2004 (Table 4). Human capital is better in coastal region than in inland region and in urban areas than in rural areas. The average increase in years of schooling is larger in coastal region than in inland region. However, unlike the distribution of income which worsened over time, the distribution of human capital stock tends to equalized – the segment of population with lower years of education gained more thanks to the implementation of nine-year compulsory education which has significantly improved the education level of the younger generation. Gini coefficient of years of formal education for all provinces decreased by 6.1 percent from 0.261 in 1989 to 0.245 in 2004. Gini coefficients of all subgroups also decreased over time to different extent.

Table 4 - Average years of formal education of household adult members

	Mean value			Index of Gini		
	1989	2004	1989-2004 variation (%)	1989	2004	1989-2004 variation (%)
All provinces	6.01	6.75	12.3	0.261	0.245	-6.1
Coastal provinces	6.36	7.24	13.8	0.248	0.235	-5.2
Urban areas	7.27	8.43	16.0	0.234	0.214	-8.5
Rural areas	5.88	6.63	12.8	0.247	0.235	-4.9
Interior provinces	5.80	6.47	11.6	0.266	0.248	-6.8
Urban areas	6.90	7.62	10.4	0.249	0.238	-4.4
Rural areas	5.25	5.91	12.6	0.261	0.241	-7.7

Not only household income level but also income gains are closely associated with education of household members. Households with better educated members tend to have higher income growth over time as the GICs of households with more years of education in general lie above those with less years of education (Figure 8). In particular, as the GIC of education of 10 years or above locates above all other curves for the entire population with a steeper slope, while the GICs of lower education levels somehow cluster together with a flatter slope, households with the highest education (with members in average completed primary middle school education or above) tend to have registered the biggest gains, especially those with higher initial income. As all GICs have a positive slope, which suggests that households with higher initial income have higher income growth, income distribution worsened within households of each category of education, and the widening of income gaps is the most acute between households with less than primary middle school education and those with better education, and within households with better education. In other words, there is a close relationship between income growth and education level. Households with a higher initial income and a better education level tend to have higher income growth due to the compound effects. This also gives support to the increase in overall inequality level for the entire population, and that in the higher end of the spectrum in particular.

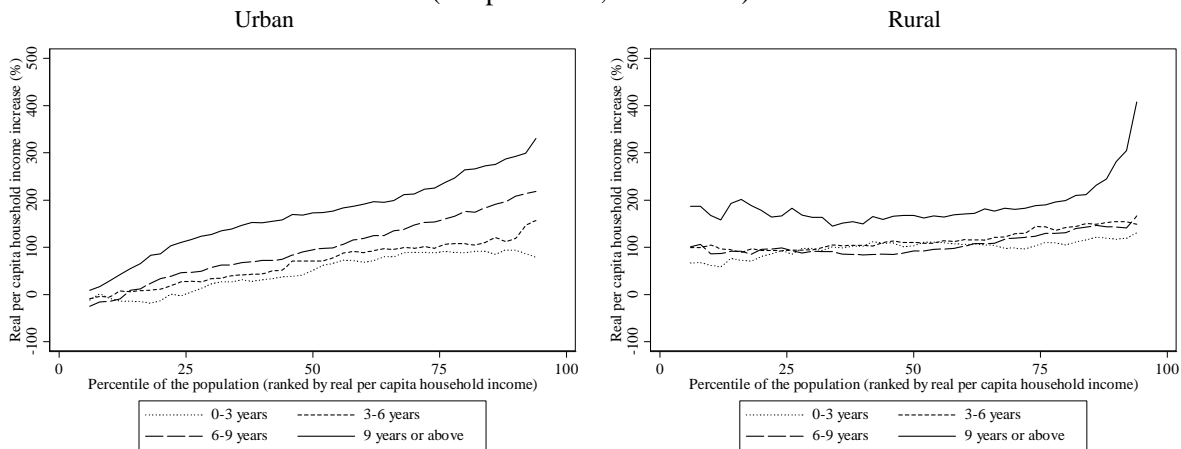
Figure 8 – Growth incidence curves by average of completed years of formal education
(All provinces, 1989-2004)



The distribution of income changes between households with various human capital stocks differs across urban areas and rural areas (Figure 9). The GIC patterns for urban areas are similar to those for the entire sample. In urban areas, a higher initial income is closely associated with a higher income growth, for example, the increase in real per capita household income was about 50 percent for the poorest quartile of households with in average nine years of education or less and 100 percent for the poorest quartile of households with in average nine years of education or above; while the increase were more than 100 percent and 200 percent for the respective two richest quartiles. This suggests that urban labor market is sensitive to difference in skilled and returns to education are monotonically increased with years of schooling. A widening income gap can be observed in all households with any level of initial human capital endowment. In rural areas, the GIC patterns are different – it is virtually flat around 100 percent for all households with in average nine years of education or less, which suggest everyone more or less double income in 1989-2004 so income gaps remained unchanged in relative sense; while it is flat around 200 percent for all households with in average nine years of education or above of the three poorest quartile and positively sloped quite steeply for the richest quartile, which suggest that everyone except the richest quartile tripled income in 1989-2004 while the richest quartile gained substantially more up to about quintupled income. Hence, income gaps widened between all households with less education and those with better education but remained unchanged within rural households with less education, and income gaps widened within rich households with better education. One reason that may explain the differentiated pattern of distribution of income change in rural areas is that most rural labor with less education participates mainly in farm activities and the marginal returns to education do not significantly differ as human capital stock remains below a certain threshold. However, for those with better education, a large proportion of rural labor may participate in non-farm activities, where returns to education may be significantly higher. Rural households with higher initial income may have higher income growth for two reasons: first, many rural households with higher income in 1989 were those in coastal provinces, who had better opportunities in working in TVEs and can earn higher non-farm

income; second, rural households with higher initial income had smaller financial constraints in sending members to other areas seeking better opportunities or in undertaking more investment with higher returns.

Figure 9 – Growth incidence curves by average of completed years of formal education
(All provinces, 1989-2004)



One common finding for the entire sample as well as for urban and rural sub-samples is that, households with in average primary middle school education or above gained significantly more than those with less education and income growth differential is higher within the richer households with better education. This offers support that the increasing difference in returns to education has been closely associated with the widening of income gaps, especially for households that face less constraint in capturing potential opportunities.

6. Sources of Widening Income Differentials

We discuss in this section the role of different household characteristics (e.g. accumulation of human capital, occupation, mode of production, etc.) in income determination, and examine the interactions among changes in household characteristics, changes in returns to specific characteristics, and changes in income.

6.1. Estimating Household Income

We estimate per capita household income determination for rural and urban households in 1989 and 2004 separately. We first control for household demographic characteristics, such as “proportion of male adults”, “average age of adults” and “average of completed years of formal education”, and for provincial fixed effects. For urban areas, we introduce “number of household members with different profession” to study the impacts of labor composition; and we introduce “number of household members who had a secondary occupation” to study the impacts of multiple job-holding. For rural areas, we introduce the “number of household members who participate in firms of different ownerships” with collective-ownership (mainly TVEs) as reference group and examine the impacts of farm and non-farm activities. We also introduce “amount of household’s farmed land” and dummy variables of “participation in various off-farm activities” to control for their impacts. Consistent with the findings in the previous section on the

close relationship between education level and income changes, the regression results in Table 5 show that increasing return to education and difference in returns to occupations are major forces that widen income inequality.

Table 5 – Estimation of income equation

Dependant variable: logarithm of real household per capita income

	Urban		Rural	
	1989	2004	1989	2004
Proportion of male adults	0.133 (1.50)	0.173 (1.44)	0.201* (1.78)	0.306*** (3.82)
Average age of adults	0.004** (2.53)	0.024*** (10.29)	0.009*** (4.81)	0.011*** (5.66)
Average of completed years of formal education	0.031*** (5.19)	0.086*** (10.85)	0.046*** (6.77)	0.065*** (8.98)
Number of household members who have the following professions (Ref.: army and police, other occupations or out of employment)				
Senior professional/technical personnel (doctor, professor, lawyer, architect, engineer, etc.)	0.106*** (2.84)	0.550*** (6.48)		
Professional/technical personnel (midwife, nurse, teacher, editor, photographer, etc.)	0.054* (1.69)	0.458*** (5.27)		
Administrator/executive/manager, factory manager, government official, section	0.123*** (4.24)	0.415*** (5.66)		
Office staff (secretary, office helper, etc.)	0.076*** (2.61)	0.461*** (6.13)		
Farmer, fisherman, hunter, logger, etc.	-0.058*** (-2.90)	-0.182*** (-4.30)		
Technical, skilled worker (foreman, craftsman, etc.)	0.081*** (4.22)	0.320*** (4.90)		
Non-technical, non-skilled worker (laborer)	0.037** (2.38)	0.276*** (4.27)		
Service worker	0.040** (2.00)	0.358*** (6.74)		
The number of household who had a secondary occupation	0.032 (1.46)	0.205** (2.07)		
Number of household members participate in the following types of firms (Ref.: collective)				
State			0.313*** (11.00)	0.562*** (12.23)
Urban private			0.070* (1.87)	0.327*** (10.72)
Household farming			-0.090*** (-7.13)	-0.064*** (-2.92)
Others			-0.077*** (-5.88)	0.430*** (4.72)
Amount of household's farmed land			0.046** (2.26)	0.068*** (4.96)

Table 5 (continued)

	Urban		Rural	
	1989	2004	1989	2004
Participation in off-farm activities				
Home vegetable and/or fruit gardening			0.081* (1.87)	0.074 (1.57)
Livestock or poultry			-0.198*** (-4.70)	-0.023 (-0.51)
Fishing			0.299*** (3.61)	0.067 (0.51)
Small handicraft or commercial business			0.428*** (10.08)	0.433*** (9.92)
Province fixed effect (Ref.: <i>Guizhou</i>)				
<i>Liaoning</i>	0.273*** (5.13)	0.173* (1.74)	-0.222*** (-3.25)	-0.007 (-0.10)
<i>Jiangsu</i>	0.297*** (5.68)	0.373*** (3.78)	0.501*** (7.52)	0.741*** (10.53)
<i>Shandong</i>	-0.002 (-0.04)	0.279*** (2.85)	0.083 (1.22)	0.195*** (2.68)
<i>Henan</i>	0.033 (0.63)	0.174* (1.84)	0.145** (2.27)	-0.184*** (-2.57)
<i>Hubei</i>	-0.003 (-0.06)	-0.025 (-0.26)	0.072 (1.13)	-0.059 (-0.85)
<i>Hunan</i>	0.195*** (3.71)	0.160* (1.64)	0.152** (2.40)	-0.075 (-1.04)
<i>Guangxi</i>	0.099* (1.88)	-0.091 (-0.95)	0.205*** (3.24)	-0.149** (-2.08)
Constant	6.370*** (59.23)	5.350*** (29.30)	5.845*** (44.41)	5.849*** (39.86)
R^2	0.199	0.354	0.227	0.309
Number of observations	1272	1250	2491	2493

Note: The t-students are presented in parentheses. *** indicates coefficient significant at 1% level; ** indicates coefficient significant at 5% level; * indicates coefficient significant at 10% level.

We start by looking at the role of household demographic characteristics. The proportion of male adults has a significant impact on rural household income, as expected, but not for urban household income. This suggests that, in rural areas, as agriculture in China is still dominated by traditional mode of production, household income depends largely on male workers' input; in urban areas, remuneration is not significantly different between men and women. The results also show that age of adults, which can be considered as a measure of experience, has positive impacts on household income.

One key finding of our estimations is that education plays an increasingly important role in household income determination for both urban and rural areas. Income gaps have increased between households with better human capital endowment and those with less. This is consistent with the results on distribution and trends of changes in income and non-income dimensions in the previous section and corroborates the findings of many researches that returns to education increased significantly as the reforms deepened in China (Wan, 2004). Knight and Song (1999) argue that in China, the place of a person's birth is one of the most important determinants of that

person's adult skill level. As resource constraints differentially affect access to education of individuals in different parts of China, especially in rural areas and in the poor inland provinces, inequality in opportunity may be closely linked to inequality in income which tends to perpetuate disparity (Heckman, 2005). In pre-reform era, people with different education level earned similar income due to policy distortions. After the reforms, wage returns to one additional year of schooling almost tripled, increasing from 4% in 1988 to 11% in 2003 (Zhang et al., 2005). As well-educated people are more likely to live in urban areas with higher income, the increase in returns to education often initially leads to an increase in overall inequality. However, as Dollar (2007) argues, such changes in equality is expected to be inverted U-shape – it will ultimately tend to reduce inequality if equality of opportunity, especially equality in access to education, can be achieved as over time a greater and greater share of the population will become educated.

Consistent with the findings that human capital and skill are important, we also find that returns to professions outside of agriculture, army and police, and the unemployed, increased during 1989-2004. In urban areas, the income level of households whose members work primarily as “white-collar workers”, such as professional/technical personnel, administrator, factory manager, government official, office staff, is significantly higher than that of households whose members work primarily as “blue-collar workers” or other. The coefficients of “Technical, skilled worker”, “Non-technical, non-skilled worker” and “Service worker” are also significantly positive. As these “white-collar jobs” are often filled with workers with higher level of education, the differentiated returns to occupation also indirectly captures the positive marginal impact of education. Such impact was even stronger in 2004. The income of households earning a living on farm activities is significantly lower than that of other urban households.⁸

One important reason for the widening income inequality in urban areas is the sharp increase in unemployment from 1989 to 2004. In the 1980s, explicit urban unemployment did not exist and the wage level was generally low. The difference between employment wage and retirement pension was small. Income gap between the employed and those who are out of employment was insignificant. However, in the 1990s, as the reforms deepened, wage income and bonus income increased for the employed, while retirement pension stayed almost unchanged. The coverage of retirement pension even decreased due to the closure of bankrupt enterprises (see also Fang et al., 2002; Meng et al., 2007). In theory, an increase in “out of employment” may generally result from two forces: first, the aging of population leads to an increase in retirement rate; second, unemployment increases among active population. We find that both are important sources in our case. In 1989, there is little out-of-employment. Total employment rate was 87.7%. However, in 2004, total employment rate dropped to 59.8%. In 1989, employment rate for adults under 60 years of age and over 60 are respectively 90.9% and 65.7%; in 2004, these two dropped to 70.3% and 24.1%. In other words, in 2004, not only employment rate of adults over 60 decreased two-thirds, but also that of adults under 60 decreased sharply – about one in three of the active population is out of employment in 2004 compared to only 10% in 1989. The likely reasons could be, many enterprises and government institutions reduce their redundant staff and require some employees to retire earlier (e.g., for many firms and institutions, retirement age fell from 60 to 55 for men and from 55 to 50 for women). Since the SOE reforms in the 1990s, urban unemployment increased drastically, of which a large part of redundant workers became

⁸ According to CHNS's sampling design, cities include suburban neighborhoods and county seat. Thus there is a small part of households who live on farm activities in urban areas.

explicitly unemployed. In addition, the number of household who had a secondary occupation was associated with higher household income in 2004, but not in 1989, which suggests that moonlighting plays a more important role.

The results of Table 5 show that, in rural areas, households whose members work in state-owned firms and urban private firms have higher income than those whose members work in collective units, household firms and other. Households that mainly rely on farming have lower income. And their income gap increased over time. As expected, the amount of household farm-land has positive impacts on income. Many researches show that non-farm activity plays a more and more important role in rural income (FAO, 1998). Our results suggest that households working on small handicraft or commercial business have significantly higher income.

The income level of urban households in coastal provinces is higher than that in inland provinces, others being equal. The advantages of a household locating in urban Liaoning, Jiangsu and Shandong are significant in 1989 and 2004, and increase in importance over time. In particular rural households in Jiangsu province has significantly higher income, probably thanks to the beneficial effects of proximity to Shanghai and the prosperity of non-farm activities.

6.2. Decomposing Income Growth

We apply the Oaxaca method to decompose income growth between 1989 and 2004 into changes in the stocks of education, occupation and other factors, and changes in the returns to these characteristics, using the estimations of Table 5. Table 6 summarized the main effect and year effect of various factors for urban areas.⁹ The results suggest that returns to education increased drastically during that period. About two thirds of urban real household per capita income changes between 1989 and 2004 can be attributed to year effects of education, namely returns to education. The economic reform led to unleashing of market forces that promote efficient reallocation of resources. Workers can self-select through their own comparative advantages into jobs that value their particular attributes. The higher returns to skills in China simply reflect the increasing demand for skills from globalization and technology, as in other open economies. As employment rate dropped in 2004, the main effect of occupation composition was negative. The effects of the changes in returns to occupation, i.e. the year effects, explain about one third of total change in income variation, which becomes the second major source of income increase. In other words, during the period of 1989-2004, the share of higher-paid jobs increased.

Table 6 – Decomposition of per capita income growth between 1989 and 2004
(urban area)

	Total growth in logarithm	Contribution of various variables to income growth							
		Education		Occupation		Secondary occupation		Province fixed effect	Others factors
		Main effect	Year effect	Main effect	Year effect	Main effect	Year effect		
Effect	0.673	0.027	0.438	-0.079	0.218	-0.002	0.009	0.019	0.044
Percentage	100.0	4.1	65.1	-11.8	32.4	-0.3	1.3	2.8	6.5

⁹ As CHNS is a longitudinal survey, most household characteristics are unchanged.

The results of Table 7 show a slightly different picture for rural income growth. About one-fifth of rural real household per capita income variation between 1989 and 2004 can be attributed to changes in education (of which 14.3% due to the changes in return to education and 3.9% the changes in composition of education), confirming the findings of Wan (2004). The input of household labor in different type of work unit holds an important place in income variation. The changing composition of type of work units – as the labor force reshuffled from low to high productivity unit – combined with the changing unit premium account for 37% of income variation. It suggests that a structural transformation has taken place in rural areas as off-farm activities absorbed a larger proportion of rural labor force; furthermore, income gap between off-farm activities and agriculture has significantly increased. About 30% of rural income variation is attributed to “other factors”, of which 11.0% due to the main effect of the proportion of male adults and the average age of adults, and 18.7% the year effect of these two factors. In other words, changes in household demographical characteristics, such as increase in male labor and increase in labor age, play an important role in household income growth. Only 2.2% of income variation was attributed to returns to land. The shortage of land remains a major constraint of agriculture productivity.¹⁰ China’s countryside is still primarily traditional agriculture, with little modernization. Under the current land regime, land cannot be freely exchanged between households. This limits the concentration of land and thus agricultural scale economy. A more effective land reform allowing land concentration to households who specialize in farming will be useful to increase scale economy and returns to agriculture. Given the high demographic pressure in countryside and the limited quantity of arable land, off-farm activities and diversification of production play a particularly important role in absorbing surplus agricultural labor, enhancing the income of farmers and reducing rural poverty (Wan and Zhou, 2005). Our results suggest that about one-fifth of income growth in 1989-2004 was attributed to the changes in participation in off-farm activities, of which 10.8% was due to the changes in participation and 8.5% to the changes in returns.

**Table 7 – Decomposition of per capita income growth between 1989 and 2004
(rural area)**

	Total growth in logarithm	Contribution of various variables to income growth									
		Education		Type of work unit		Land		Participation in off-farm activities		Province fixed effect	Other factors
		Main effect	Year effect	Main effect	Year effect	Main effect	Year effect	Main effect	Year effect		
Effect	0.804	0.032	0.115	0.133	0.164	0.001	0.017	0.087	0.068	-0.056	0.244
Percentage	100.0	3.9	14.3	16.5	20.4	0.2	2.2	10.8	8.5	-7.0	30.3

Compared with urban areas, the provincial fixed effect for rural areas, in terms of absolute value, is stronger (see Table 8). In rural areas, these effects (*Guizhou* as reference) are of the opposite direction of income change, implying that regional disparities have decreased. In fact, provincial year effect varies across the seven provinces. The year effect is positive for the three coastal provinces but negative for the four inland provinces. This result implies that, over the period 1989-2004, rural household income levels have diverged between coastal and inland provinces of China, but converged within inland provinces.

¹⁰ The average land area was small (about 0.30 hectare) and virtually unchanged between 1989 and 2004.

Table 8 – Year effect by provinceReference: *Guizhou*

	Total	Province						
		<i>Liaoning</i>	<i>Jiangsu</i>	<i>Shandong</i>	<i>Henan</i>	<i>Hubei</i>	<i>Hunan</i>	<i>Guangxi</i>
Urban	0.019	-0.012	0.010	0.035	0.017	-0.003	-0.004	-0.024
Rural	-0.062	0.027	0.030	0.013	-0.042	-0.016	-0.028	-0.046

7. Conclusion

Before 1978, China was a poor society and the issue of uneven distribution had not surfaced. The reforms have unleashed market forces, and improved economic efficiency. As a result, the economy grew, and disparity in income rose. Using CHNS data, we examined the changes in inequality during 1989-2004, and the impacts of structural transformation on income growth. We find everyone has benefited from economic growth over time. The poverty headcount has fallen. Inequality in per capita household income widened, especially among urban residents in coastal and interior provinces and between households with better education and those with less. The dynamics of income divergence has been taking the form of “a race to the top”.

The increase in urban income inequality in 1989-2004 is largely a result of the differentiated opportunities and remuneration between the skilled and unskilled, as reflected in the rising returns to schooling and the occupations in secondary and tertiary sectors. During the transition from planned to market economy, institutional reforms failed to keep pace. Rent-seeking, unclear property rights in SOEs, and imperfect tax system have benefited some more than the others. Retrenchment from SOEs and collective-owned-enterprises, and reduction in real income of the retired also contributed to widening income gap, especially in urban areas. In rural areas, participation in non-farm activities is among the main factors of income growth. Differentiated returns to education, especially between those with primary middle school education or above and those with less education, is also an important factor that contributes to rural income inequality.

A decomposition analysis based on household income determination shows that the largest proportion of changes in total income can be attributed to the increase in returns to education. As economic reforms deepen, labor market works more efficiently by balancing demand and supply of skills. Scarce skilled labor is commanding higher premium. Such efficiency gain is one important force that drives rapid economic growth, while at the same time contributes to rising inequality. As Dollar (2007) suggests, education is one of the key paths out of poverty. Among those with nine years or more of education, the poverty rate is only 2%, compared to a 10% national average in China. Inequality of access to education is an important source of inequality across people contemporaneously and across generations (Heckman, 2003; 2005). Under the uniquely decentralized fiscal system, funding education is primarily responsibilities of local governments. As poor localities are less able to fund these services due to tighter fiscal constraints and poor households are less able to afford the high private cost of basic education, if not appropriately addressed, an increase in income inequality may lead to an increase in

inequality in education outcomes.¹¹ Our results suggest that inequality in education started to narrow as the households with less education tended to gain more thanks to the nine-year compulsory education. As education is a key factor of production and the differential of returns to education increases over time, the narrowing of gaps in education can contribute to harmonizing income distribution in the long run.

Inequality of income can be inevitable at a certain stage of development. However, inequality of opportunity will undermine long-term prospects for development (The World Bank, 2005). Human capital is an asset that ultimately conditions the wealth of a nation. Continuing to improve market efficiency and investing in people, in particular equalizing opportunities and accessing to education and improving education services in lagging areas to poor people, are important for sustainable growth and equitable distribution in the long run.

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¹¹ For example, in 1998, per pupil expenditure in Beijing was 12 times that in *Guizhou*; and the difference jumped to 15 times in 2001. On average, rural labor force has four years less schooling than urban labor force.

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