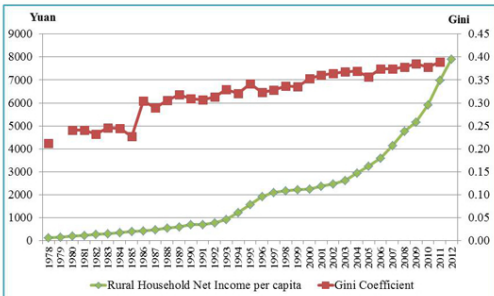


Motivation

- Since the late 1970s and early 1980s when the economic reforms were initiated, China has achieved fast economic growth and substantial rise of income level. At the same time, China has experienced increasingly rising income inequality (Griffin and Zhao, 1993; Riskin et al., 2001; Gustafsson et al., 2008; Ravallion and Chen, 2007; Li et al., 2013). The income inequality in China as a whole in terms of Gini Coefficients, increased from 0.28 in 1983 to 0.48 in 2007 (Ravallion and Chen, 2007; Li et al., 2013). Meanwhile, rural income growth and inequality displayed almost the same pattern in China. The rural household net income per capita was only 686 yuan in 1990, and first surpassed 2000 yuan in 1997. It was more than 5000 yuan in 2009, and close to 8000 yuan in 2012. Along with the increase of income level, the Gini coefficient expanded gradually from 0.31 in 1990 to almost 0.39 in 2011 (NBS, 2012).
- In studying the income distribution, the cross-sectional data only capture a static income disparity, while the income mobility based on the longitudinal data will characterize the income variations across years. Both the income gap in any given year and long-term income status reflect the income inequality. However, the latter is more important. If the position of particular families in income hierarchy varies widely from year to year, the short-term income distribution would not be solidified, and low-income earners have a good chance to be high-income earners. The inequality is a sign of social mobility, and equality of opportunity (Friedman, 1962; Krueger, 2012).



Research Questions

- Lots of attentions have been paid to the static income inequality in rural China. How about the income mobility?
 - What is the trend of income mobility in rural China?
 - What is the structure of Chinese rural household income mobility?
 - What is the relationship between income mobility and inequality?

Data

- China Household Income Project (CHIP) 1995, 2002, 2007, 2008, and 2009 rural data.
- CHIP is widely considered to be among the best available national survey data on household income and it is suitable to track the dynamics of income distribution in China. CHIP contains four repeated cross-sections for 1988, 1995, 2002 and 2007. All the four waves of CHIP include urban and rural households, and samples were drawn from larger National Bureau of Statistics urban and rural samples using a multistage stratified probability method to be nationally representative. In light of the increasing importance of rural-to-urban migration, a survey of rural-to-urban migrants has been added to CHIP since 2002 wave.
- Income data was provided retrospectively in 1995 and 2002 waves for CHIP rural samples.
- CHIP 2007, 2008, and 2009 (or RUMIC 2008, 2009, and 2010) waves included both cross-sectional surveys and longitudinal surveys, and all covered urban, rural and migrant households.

CHIP Rural Sample	1995	2002	2007	2008	2009
Total Households	7998	9200	8000	7999	7993
Panel Size	5900	8912			7866

- Information on CHIP: China Institution for Income Distribution.
<http://www.ciidbnu.org/index.asp>

Descriptive Result

Table 1 The Level and Growth of Rural Household Net Income per capita

Nominal Income	1991	1993	1995	1998	2000	2002	2007	2009
Mean	731.88	990.96	1526.79	2004.87	2356.65	2598.29	4895.26	5967.16
Growth rate (%)	35.40	54.07	17.55	10.25				21.90
Median	580.67	758.2	1207.33	1640.00	1897.67	2066.00	3931.84	4765.32
Growth rate (%)	30.57	59.24	15.71	8.87				21.20
S.D.	628.15	944.59	1281.74	1592.38	1873.43	2187.27	4058.52	5098.31
Real Income (at 2009 price)								
Mean	1752.27	1944.97	2071.31	2455.57	2926.42	3209.37	5159.96	5967.16
Growth rate (%)	11.00	6.50	19.17	9.67				15.64
Median	1418.50	1557.62	1684.02	2034.99	2381.68	2577.97	4161.79	4765.32
Growth rate (%)	9.81	8.11	17.04	8.24				14.50
S.D.	1451.81	1718.09	1617.06	1891.07	2255.41	2617.37	4236.93	5098.31

The Trend of Income Mobility: Transition Matrix

- What is the trend of income mobility in rural China during the transition? What is the difference across periods? We answer these questions by constructing income transition matrices for periods 1991-1993, 1993-1995, 1998-2000, 2000-2002, and 2007-2009.
- In each period, we cross-classify the sample into income quintiles from the bottom or poorest quintile (1) to the top or richest quintile (5) with an equal number of people in each quintile.
- Each element of the income transition table denoted as P_{ij} shows the fraction of sample in income quintile i in one year that occupies income quintile j in a subsequent year.
- To facilitate comparisons of income mobility across periods, one summary indicators of income mobility embodied in the transition matrix is calculated. The average jump calculates the mean number of quintiles moved in absolute between two periods (Atkinson et al., 1992). It is defined as:

$$\text{Average Jump} = \frac{1}{n} \sum_{i=1}^n \sum_{j=1}^5 |j-i| \cdot p_{ij}$$

Table 2 Income Transition Matrices: Rural Household Net Income per capita

	1	2	3	4	5	1	2	3	4	5
Year 1993										
1	0.70	0.20	0.06	0.03	0.01	0.67	0.19	0.09	0.04	0.02
2	0.20	0.49	0.23	0.06	0.02	0.22	0.41	0.24	0.10	0.03
3	0.05	0.23	0.44	0.23	0.04	0.07	0.29	0.34	0.21	0.09
4	0.03	0.06	0.23	0.50	0.18	0.03	0.09	0.29	0.39	0.19
5	0.01	0.02	0.04	0.18	0.75	0.01	0.02	0.04	0.26	0.67
Year 1995										
1	0.75	0.17	0.04	0.02	0.02	0.63	0.21	0.09	0.04	0.02
2	0.20	0.58	0.16	0.04	0.02	0.20	0.44	0.22	0.10	0.04
3	0.04	0.19	0.55	0.17	0.05	0.09	0.20	0.41	0.21	0.08
4	0.02	0.04	0.23	0.56	0.15	0.04	0.10	0.19	0.45	0.21
5	0.00	0.01	0.02	0.21	0.76	0.03	0.05	0.07	0.20	0.65
Year 2000										
1	0.48	0.27	0.13	0.08	0.04	0.48	0.27	0.13	0.08	0.04
2	0.28	0.32	0.22	0.13	0.05	0.28	0.32	0.22	0.13	0.05
3	0.13	0.24	0.30	0.23	0.09	0.13	0.24	0.30	0.23	0.09
4	0.08	0.12	0.24	0.33	0.22	0.08	0.12	0.24	0.33	0.22
5	0.04	0.05	0.10	0.22	0.60	0.04	0.05	0.10	0.22	0.60
Year 2002										
1	0.48	0.27	0.13	0.08	0.04	0.48	0.27	0.13	0.08	0.04
2	0.28	0.32	0.22	0.13	0.05	0.28	0.32	0.22	0.13	0.05
3	0.13	0.24	0.30	0.23	0.09	0.13	0.24	0.30	0.23	0.09
4	0.08	0.12	0.24	0.33	0.22	0.08	0.12	0.24	0.33	0.22
5	0.04	0.05	0.10	0.22	0.60	0.04	0.05	0.10	0.22	0.60
Year 2007										
1	0.48	0.27	0.13	0.08	0.04	0.48	0.27	0.13	0.08	0.04
2	0.28	0.32	0.22	0.13	0.05	0.28	0.32	0.22	0.13	0.05
3	0.13	0.24	0.30	0.23	0.09	0.13	0.24	0.30	0.23	0.09
4	0.08	0.12	0.24	0.33	0.22	0.08	0.12	0.24	0.33	0.22
5	0.04	0.05	0.10	0.22	0.60	0.04	0.05	0.10	0.22	0.60

The structure of income mobility: Decomposition

- In order to describe the multi-dimensional mobility and examine the structure of mobility, we will employ the mobility indices which are decomposable.
- Fields and Ok (1996, 1999) proposed a measure of the movement in total absolute income or log-income movement in a society. They are formulated as follows:

$$M'_{F-0-1}(x, y) = \frac{1}{n} \sum_{i=1}^n |y_i - x_i|$$

$$M'_{F-0-2}(x, y) = \frac{1}{n} \sum_{i=1}^n |\log y_i - \log x_i|$$

- Where n is the number of observations in the economy, and x_i and y_i are the initial and final incomes, respectively. These two indices both gauge the extent of fluctuation in incomes and are called "non-directional income movement" or "flux" (Fields, 2008).

- Furthermore, a decomposition of income mobility indices into three basic sources (Van Kerm, 2004) will be adopted to see what the structure of absolute income mobility is.

$$M(y) = M^G(y) + M^D(y) + M^E(y) \quad \text{Equ (1)}$$

- Where $M^G(y)$ represents the "Growth Mobility", $M^D(y)$ captures the "Dispersion Mobility", and the "Exchange Mobility" is illustrated by $M^E(y)$.

- Vividly, Consider the following four hypothetical processes with $n = 3$
 - $I: x=(1,2,3) \rightarrow (3,2,1)=y$
 - Exchange Mobility: individuals only exchange their positions
 - $II: x=(1,2,3) \rightarrow (2,4,6)=y$
 - Growth Mobility: incomes increase or decrease according to the same scale
 - $III: x=(1,2,3) \rightarrow (0,2,4)=y$
 - Dispersion Mobility: total income is redistributed among individuals while without any change in ranks
 - $IV: x=(3,1,2) \rightarrow (5,6,7)=y$
 - The mobility in Process IV is a combination of above three components, and thus can be split into three parts.
 - First, the income vector $x=(3,1,2)$ can be changed to vector $x1=(1,2,3)$ by "Exchange Mobility".
 - Second, we find the mean of income is 2 initially and 6 finally, so the "Growth Mobility" makes $x1=(1,2,3)$ to be $x2=(3,6,9)$.
 - Finally, it is obvious that the transformation between $x2$ and y is a pure "Dispersion Mobility".

- It is note that one major shortcoming of such a sequential decomposition procedure is the dependence of the estimated contributions upon the sequence adopted to introduce the factors (Van Kerm, 2004). This paper will present the non-hierarchical decomposition results.

Table 3 The Decompositions of Income Movement Indexes

	1991-1993	1993-1995	1998-2000	2000-2002	2007-2009
Non-directional income movement					
Exchange	517.99	636.52	700.04	1066.60	2357.41
	392.65	554.09	376.97	858.47	1774.75
	(75.80%)	(87.05%)	(53.85%)	(80.49%)	(75.28%)
Growth	109.48	66.74	305.95	180.28	523.02
	(21.14%)	(10.49%)	(43.70%)	(16.90%)	(22.99%)
	15.86	15.68	17.12	27.85	59.64
	(3.06%)	(2.46%)	(2.45%)	(2.61%)	(2.53%)
Non-directional log income movement					
Exchange	0.2848	0.3179	0.2592	0.3503	0.4441
	0.2191	0.2777	0.1514	0.2948	0.3571
	(76.94%)	(87.34%)	(58.43%)	(84.15%)	(80.41%)
Growth	0.0548	0.0300	0.1031	0.0471	0.0736
	(19.24%)	(9.43%)	(39.77%)	(13.45%)	(16.57%)
	0.0109	0.0103	0.0046	0.0084	0.0134
	(3.82%)	(3.23%)	(1.79%)	(2.39%)	(3.02%)

Mobility and Inequality

- What is the relationship between mobility and inequality? The aim of studying income mobility is eventually to improve the income distribution and narrow the income gap.
- In literatures, there are mainly three income mobility indices based on the measurement of inequality (Shorrocks, 1978; Chakravarty, Dutta & Weymark, 1985; Fields, 2010).
- Shorrocks (1978) studied how the income mobility would reduce inequality. He first defined a rigidity index R as follows:

$$R = \frac{I(y_{agg})}{\sum_k \omega^k I(y^k)} = \frac{I(y_{agg})}{\sum_k \omega^k I(y^k)}$$

- Where $I(\cdot)$ is the measurement of inequality, i.e. Gini coefficient, Theil index, and so on. $\mu(\cdot)$ is the mean of income. y_{agg} is the total incomes over k years.
- Thus, Shorrocks's rigidity index has in the numerator the inequality of T -period incomes using an inequality measure $I(\cdot)$, and in the denominator a weighted average of the inequalities in each year, with the weights being the ratio of the mean income in that year to the mean income over k years.
- Therefore, Shorrocks's mobility measure is then $M_S = 1 - R$.
- According to the social welfare function (SWF), Chakravarty, Dutta & Weymark (1985) proposed CDW mobility index defined as follows:

$$M_{CDW} = \frac{E(y_{agg})}{E(x)} - 1$$

- where $E(\cdot)$ is an equality measure, y_{agg} is aggregate income over the observation period, and x is income in the first period. If expressed by the inequality measure, $I(\cdot)=1-E(\cdot)$, then CDW index can be written as:

$$M_{CDW} = \frac{I(x)-I(y_{agg})}{1-I(x)}$$

- Furthermore, Fields (2010) develop a new class of measures of mobility as an equalizer of longer-term incomes. It is defined as:

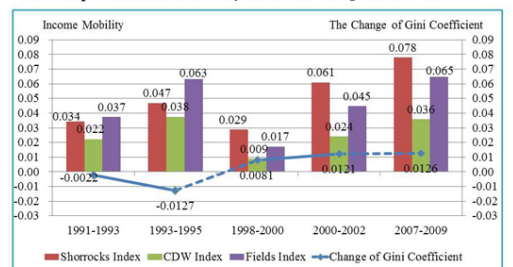
$$M_E = 1 - \left(\frac{I(\mu)}{I(x)} \right)$$

- where μ is the average income. If the inequality of long-term incomes is smaller, the M_E index would be larger.
- Fields (2010) also pointed out that Shorrocks index (M_S) was not intended to quantify the direction and the extent of the difference between the inequality of longer-term income and the inequality of base year income. From the perspective of social welfare, Fields Index as an equalizer of longer-term incomes (M_E) is also different from CDW index (M_{CDW}).

Table 4 The Changes of Income Inequality

	1991	1993	1995	1998	2000	2002	2007	2009
Gini Coefficient	0.3748	0.3726	0.3598	0.3417	0.3498	0.3619	0.3555	0.3681
Change (%)		-0.59	-3.41		2.37	3.47		3.54
Theil Index	0.2475	0.2535	0.2292	0.2096	0.2160	0.2346	0.2290	0.2437
Change (%)		2.42	-9.59		3.07	8.62		6.39

The Comparisons between Mobility Indexes and Changes in Gini Coefficient



Conclusions

- Using CHIP 1995, 2002, 2007, 2008, and 2009 rural household survey data, this paper first examines the trend of rural household income mobility in transitional China, and then explores the structure of mobility, finally discusses the relationship between income inequality and mobility.
- Our results show that rural household income mobility is closely related to the economic reform and development.
- In rural China, the economic development lagged behind in 1990s because of the urban-prone reform policies. Rural net household per capita income increased slowly and the overall income mobility was not strong.
- By the early 2000s, rural income mobility was still weak, and income inequality in rural China worsened simultaneously with the widening of urban-rural gap. Consequently, the government attached importance to the "Three Rural" issues again. At the same time, with the barriers of rural-urban migration eliminating gradually, more and more rural surplus labor force turn to non-agricultural employment. Thus, rural residents' income sources diversified and income level increased significantly.
- From 2007 to 2009, the mobility of rural household per capita net income boosted up notably.
- Regarding to the structure of income mobility, the decompositions show that the exchange component due to the re-ranking of positions is the most important part of income mobility. The more shares it contributes, the higher degree of income mobility.
- Compared with income inequality, the results indicated that the low degree of income mobility is not conducive to the narrowing of inequality. However, the high degree of mobility is not accompanied by the substantial reduction of income gaps either.

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