ABSTRACT

THE EFFECT OF INCOME INEQUALITY ON HOUSEHOLD CONSUMPTION: EVIDENCE FROM CHINA HOUSEHOLD FINANCE SURVEY DATA

by Shaoying Ma

This paper tests the effects of within-province income inequality on household consumption and education expenditures using the China Household Finance Survey (CHFS) data. Income inequality has a significant and positive impact on household consumption net of education expenditures in China, and no urban-rural heterogeneity of such effect is found. Income inequality significantly and positively affects education expenditures by the poor, and it has no impact on education expenditures by the middle class and the rich. The effect of income inequality on household consumption net of education expenditures varies across different quantiles of consumption distribution, and it is stronger at higher quantiles. The results are robust to various sets of household level control variables.

THE EFFECT OF INCOME INEQUALITY ON HOUSEHOLD CONSUMPTION: EVIDENCE FROM CHINA HOUSEHOLD FINANCE SURVEY DATA

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I INTRODUCTION

China's household savings rate has been high and overall rising during the past two decades. According to the Organisation for Economic Co-operation and Development (OECD), the household savings rate in China increased from 29.6% in 1995 to 37.99% in 2014[1]. Meanwhile, as reported by the World Bank, income inequality in China, measured by the Gini index, increased from around 0.40 in mid-1990s to well above 0.45 in early 2010s[2]. Researchers have attempted to explain the puzzle of high savings rate in China: for example, precautionary motives proposed by Chamon and Prasad (2010) and sex ratio imbalance proposed by Wei and Zhang (2011). Moreover, Jin *et al* (2011) connect the declining household consumption with the rising income inequality in China, and they find significant and negative effect of within-reference-group[3] income inequality on household consumption in China, using Chinese Urban Household Survey (UHS) data during 1997-2006. Jin *et al* (2011) show that their empirical findings could not be explained by sex ratio or the precautionary motives stemming from poor social security and downward income risk; they propose the alternative explanation that rising income inequality enhances people's motivation to accumulate wealth for upgrading their social status.

The goal of my paper is to re-examine the inequality-consumption link found by Jin *et al* (2011) at micro level using China Household Finance Survey (CHFS)[4] 2011 data from Southwestern University of Finance and Economics in China. My contributions are the following: first, I re-examine the findings by Jin *et al* (2011) using CHFS 2011 data, and I find positive relationship between income inequality and household consumption; second, I'm able to explore the heterogeneous effects of income inequality on urban and rural household consumption using CHFS, since CHFS covers both urban and rural families, whereas UHS only provides data of urban households. Additionally, the sample in Jin *et al* (2011)'s paper covers only 9 provinces in China, while CHFS 2011 data covers 25 provinces, so the sample in my paper is likely to be more representative of Chinese population.

With regard to the income inequality measures, I use Gini coefficient as the primary measure, and check the robustness of my results using three additional measures: Mehran index, Kakwani index and Theil entropy index. Ideally, I would generate Gini coefficient within each province-age group. However, Jin *et al* (2011)

[1] See https://data.oecd.org/hha/household-savings.htm.

[2] See http://www.worldbank.org/content/dam/Worldbank/document/Poverty%20documents/Inequality-In-Focus-0813.pdf.

[3] They define the reference group for each household with head i aged x living in province p as the group of households with heads aged between x - 5 and x + 5 living in p also.

[4] The China Household Finance Survey (CHFS) is provided by the Survey and Research Center for China Household Finance, Southwestern University of Finance and Economics, Chengdu, China. For more details about the dataset, please see Gan *et al* (2013).

have 102,971 households in their sample[5]; I have only 8,438 households in my sample. Creating the Gini coefficient for each province-age group would leave me with too few households in each group. Thus, I use the province level Gini instead of the Gini for each reference province-age group.

I find that within-province income inequality has significant and positive effect on household consumption net of education expenditures when a set of household level characteristics are controlled for. Further, there does not exist heterogeneity of such effect on urban/rural families. Meanwhile, within-province income inequality significantly and positively affects the education expenditures by the poor families, and it has no impact on the education expenditures by the middle class or rich families. The above findings are robust to different sets of household level control variables. I also find that the effect of income inequality on household consumption net of education expenditures varies across different quantiles of consumption distribution.

[5] Their sample is a 10-years rotating panel from 1997 to 2006; there are 21, 000 households each year in the surveys before 2002 and 56,000 households after 2002.

II LITERATURE REVIEW

There are two hypotheses in literature that imply contradictory signs of the relationship between income inequality and household consumption. One is the "Keeping up with the Joneses (KUJ)" hypothesis, which suggests that households may consume more in a more unequal society if relative consumption enters their utility function. Galí (1994) defines KUJ preferences as: the utility of each household is determined not only by its own consumption but also by the contemporaneous average (or per capita) consumption in the economy; when the average consumption in the economy increases, an individual household's marginal utility of own consumption also increases. Dupor and Liu (2003) follow the definition of KUJ preferences by Galí (1994) and show that, jealousy leads to overconsumption in laissez-faire equilibrium and KUJ preferences may enlarge this effect.

The empirical evidence of KUJ preferences is presented in the asset pricing settings, such as Gómez *et al* (2009). Gómez *et al* (2009) incorporate frictions into their model with KUJ preferences, and show that their model explains more cross-sectional variations in the international stock returns, and exhibits less pricing errors, than a set of commonly used asset pricing models, based on data from four countries, United States, United Kingdom, Germany and Japan. Helms (2012) provides empirical support for the KUJ effect on the renovation behavior by households. More specifically, Helms (2012) uses micro-level data about renovation activities in Chicago's residential buildings during 1995-2000 and identifies the positive effect of neighborhood quality on household renovation.

The other hypothesis is the "Status seeking" hypothesis, which suggests that households may choose to consume less and save more in a more unequal society, so that they can improve their social status by accumulating wealth. Cole *et al* (1992) stress the idea that one's social status determines how successful he is in the nonmarket sector, such as marriage and invitations to join a prestigious club, and thus one cares about his relative position in the society. The "wealth-is-status" model that Cole *et al* (1992) propose suggests that one's concern about social status gives him greater incentive to save in equilibrium. Bakshi and Chen (1996) empirically test the implications of the view that investors accumulate wealth not only for consumption but also for the social status it represents, showing that the concern for social status leads to parsimony in consumption spending. Futagami and Shibata (1998) state that one's utility depends not only on his consumption but also on his wealth holdings, and they call the latter "wealth preference"; moreover, they point out that rather than the absolute level of one's own wealth, one's utility depends on his relative position in the wealth distribution of the society. Corneo and Jeanne (1999) define the "status prize" as the difference in the levels of utility that two types of men yield to their mates in the matching process, and they show that higher status prize stimulates greater motive to save and thus increases the equilibrium savings. Corneo and Jeanne (1999)'s proposition about "status prize" implies that when income inequality

gets more severe, the "status prize" may be higher, so people are more motivated to save.

Jin *et al* (2011) use the annual Chinese Urban Household Survey (UHS) data during 1997-2006, from National Bureau of Statistics of China, to provide micro-level evidence of the effect of within-reference-group income inequality on household consumption net of education expenditures in China. Education expenditures are considered investment rather than consumption in their studies. They find that income inequality negatively affects household level consumption, which is consistent with the "Status-seeking" hypothesis. They provide additional empirical evidence to support the "Status-seeking" hypothesis, showing that younger and poorer households are more motivated to save, and households spend more on education when their reference groups are more unequal. They argue that younger households can enjoy the benefits of status upgrade for a longer time horizon, poorer households relative to richer households have greater incentive to save for status upgrade, and attaining education is another approach for status upgrade besides accumulating wealth. For the associations of education with social status, see Jackman and Jackman (1973), Fershtman *et al* (1996), and Weiss and Fershtman (1998). For the relationship between education and income inequality, see Glomm and Ravikumar (1992) and Durlauf (1996).

III DATA

The data in this paper is from China Household Finance Survey (CHFS), conducted by Southwestern University of Finance and Economics in China. CHFS covers 25 provinces in China, and provides household level demographic characteristics and financial information. I use CHFS data from the survey year of 2011, and CHFS 2011 data includes 29,463 individuals from 8,438 households. During July and August 2011, Southwestern University of Finance and Economics in China sent out over 600 trained interviewers, mostly its undergraduate and graduate students, to interview 8,438 households living in 25 provinces of China. CHFS uses stratified three-stage probability proportion to size (PPS) random sampling method. The primary sampling units (PSU) are counties, the secondary sampling units are communities, and the last stage of sampling is at household level. CHFS 2011 randomly selects 80 counties, and 4 communities within each selected county, and 20-50 households within each selected community; the average number of households chosen within each selected community is 25. Within each stage, the probability of a sampling unit being drawn is proportional to its population size.

The empirical analysis in this paper is at the household level. I restrict my sample to households with heads of households aged 18 or older. Further I drop households with negative income. After imposing those restrictions, my sample includes 8,369 households.

I present the variations in Gini coefficients across 25 provinces in Figure 1. Figure 1 shows that there are large variations of the Gini coefficient across provinces in 2010. Province level Gini coefficients vary from 0.36 in Shanxi (West)[6] to 0.71 in Guangdong. Table 1 gives the comparisons between the provincial Gini in China and the Gini coefficients of a set of countries. Based on the World Bank 2010 estimates[7], the Gini coefficient of the United States is 0.41; according to the OECD Income Distribution Database (IDD)[8], the Gini coefficient of the United States is 0.38 in 2010, the Gini coefficient of Japan is 0.34 in 2009, and the Gini coefficient of South Korea is 0.31 in 2010; the World Factbook[9] by the Central Intelligence Agency reports that the 2016 estimate of China's Gini coefficient is 0.47, the Gini coefficient of the United States is 0.45 in 2007, Japan's Gini coefficient is 0.38 in 2011, and the 2014 estimate of South Korea's Gini coefficient is 0.30. Figures 2-4 show that Mehran indices, Kakwani indices and Theil entropy indices across provinces exhibit similar patterns to that of the Gini coefficients in Figure 1. Based on the provincial

[6] There are two provinces in China with the same English name Shanxi. I distinguish them in this paper by their relative geographic locations, i.e. Shanxi (West) and Shanxi (East).

[7] See http://data.worldbank.org/indicator/SI.POV.GINI?end=2010&start=1981.

[8] See http://stats.oecd.org/Index.aspx?DataSetCode=IDD.

[9] See https://www.cia.gov/library/publications/the-world-factbook/rankorder/2172rank.html.

inequality computed using CHFS 2011 data, the correlation is 0.96 between Gini coefficient and Theil entropy index, 0.99 between Gini coefficient and Kakwani index, and -0.28 between Gini coefficient and Theil entropy index; thus except the Theil entropy index, Gini coefficient is highly and positively correlated with the other inequality indices. I label the Gini coefficients of 25 provinces on the map of China in Figure 5.

The summary statistics are presented in Table 2, for the full sample, for three income groups separately, and for urban and rural households, since I explore the heterogeneous effects of within-province income equality on the rich, middle class, and the poor, and on urban and rural households. The three income groups of

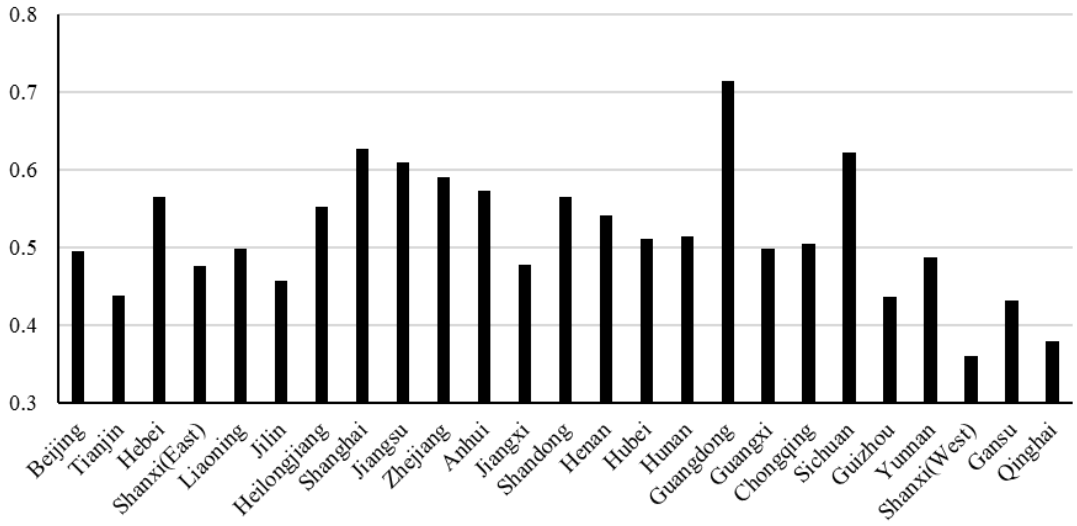

Figure 1

Gini Coefficients across 25 Provinces, Calculated Using CHFS 2011 Data

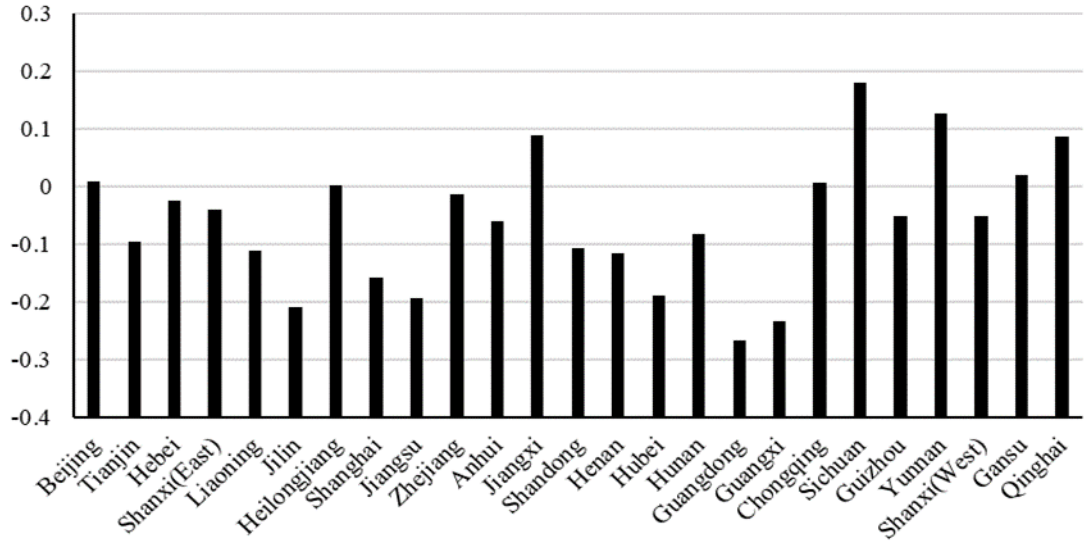

Figure 2

Mehran Indices across 25 Provinces, Calculated Using CHFS 2011 Data

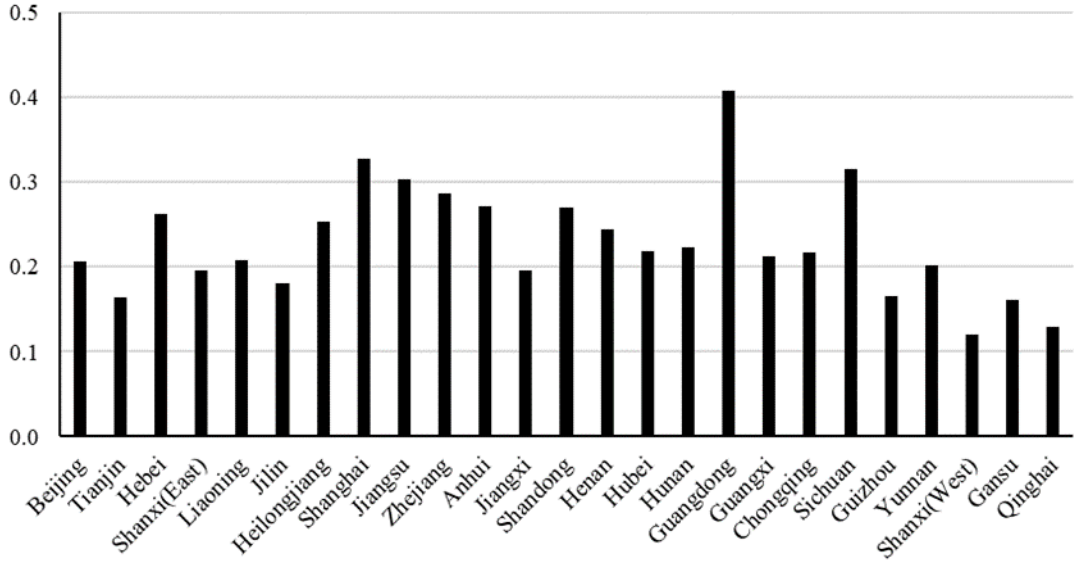

Figure 3

Kakwani Indices across 25 Provinces, Calculated Using CHFS 2011 Data

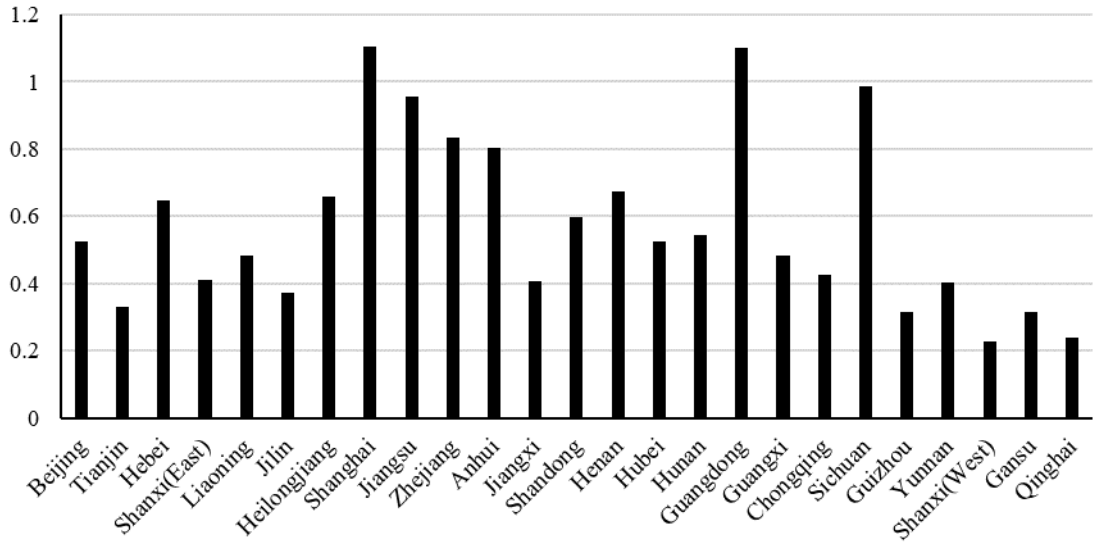

Figure 4

Theil Entropy Indices across 25 Provinces, Calculated Using CHFS 2011 Data

Figure 5

Gini Coefficients of 25 Provinces on Map of China, Calculated Using CHFS 2011 Data

households are the top 1/3, middle 1/3 and bottom 1/3 in the income distribution within each province in my sample. The equivalent family size is defined as the size of household *i* with the household head assigned weight 1, each of the other adults assigned weight 0.7 and each of the children and grandchildren under 18 years old assigned weight 0.5. The potential experience is calculated by subtracting 7 (which is the most common age when a child goes to elementary school in China) and the years of schooling from one's age. The education return is estimated for each province based on the Mincer regression, i.e. regressing the natural logarithm of individual labor income on years of schooling, potential experience and quadratic term of potential experience, and then obtaining the estimate of the coefficient on years of schooling.

According to Table 2, the mean consumption is approximately 17% of the mean income while the education expenditures are approximately 5% of the mean income for the whole sample. Here the household consumption expenditures include the expenses on clothing, renovation, heating, durables, luxuries, transportation, travel and health care (excluding medical expenses)[10] within the household during year 2010, and those are the only available categories of annual consumption made by each

[10] The health care expenses excluding medical expenditures are those spent on measures to promote individual health and to protect one from illness but not through seeking medical services.

Table 1

Provincial Gini Coefficients in China, with Comparisons

Provinces in China	Gini Coefficient [a]	Countries	Gini Coefficient [b]
Beijing	0.50	USA	0.41 (2010, World Bank)
Tianjin	0.44		0.38 (2010, OECD)
Hebei	0.56		0.45 (2007, CIA)
Shanxi(East)	0.48	Japan	0.34 (2009, OECD)
Liaoning	0.50		0.38 (2011, CIA)
Jilin	0.46	South Korea	0.31 (2010, OECD)
Heilongjiang	0.55		0.30 (2014, CIA)
Shanghai	0.63	China	0.47 (2016, CIA)
Jiangsu	0.61		
Zhejiang	0.59		
Anhui	0.57		
Jiangxi	0.48		
Shandong	0.56		
Henan	0.54		
Hubei	0.51		
Hunan	0.51		
Guangdong	0.71		
Guangxi	0.50		
Chongqing	0.50		
Sichuan	0.62		
Guizhou	0.44		
Yunnan	0.49		
Shanxi(West)	0.36		
Gansu	0.43		
Qinghai	0.38		

Note: [a] The Gini coefficients for the 25 provinces in China are computed using CHFS 2011 data.
[b] Years and sources of the Gini coefficients for the four countries are in parentheses.

household in CHFS 2011 data[11]. The reasons for getting a relatively low ratio of mean consumption over mean income, 17%, could be that the questionnaire in CHFS 2011 did not exhaust all the possible consumption categories for the households, or that it is largely driven by the low average propensity to consume by the rich whose annual income is high, or both. The average age of the household head is 50 years old, and the average family size is around 2.6 in my sample. The schooling and potential experience given in Table 2 are those of the household head, and on average the household head has almost 9 years of formal schooling and 34 years of potential working experience. 34.6% of the households are found in the top 1/3 of the household income distribution within their own provinces, 33.5% of the households belong to the middle class and the rest 31.9% of the households are the poor. 62% of

[11] CHFS 2011 does not provide data about total consumption by each household. I add the available consumption categories up to calculate the total consumption during year 2010 for each household.

the households in my sample live in urban areas. The average province level Gini coefficient is 0.52. I estimate the following Mincer regression for each province *p*:

$$\ln(y_j^p) = \alpha_0^p + \alpha_1^p * S_j^p + \alpha_2^p * Exp_j^p + \alpha_3^p * \left(Exp_j^p\right)^2 + e_j^p \qquad (1)$$

where the dependent variable is the natural logarithm of individual *j*'s labor income in 2010, and the independent variables are individual *j*'s schooling, potential experience and quadratic term of *j*'s potential experience in 2010. The average province level education return is 8.4%, which means that on average one additional year of formal schooling increases individual labor income by 8.4%, holding potential experience constant.

The mean income of the rich is almost four times as high as that of the middle class, and the mean income of the middle class is almost four times as high as that of the poor; the consumption and education expenditures of the rich are not so much higher (although still much higher) than those of the middle class and the poor, relative to the differences in the mean income across three income groups. It appears that on average the household head is slightly younger, more educated but less experienced in the job market (based on the potential experience measure) in the rich group, compared to the middle class and the poor; however, the potential experience is closely related to one's age, and thus the heads from the rich households on average having less years of potential experience than those from the middle class and the poor households is consistent with that the rich having younger household heads, and it does not necessarily reflect that the heads from the rich households have less experience in the labor market. Table 2 also shows that the rich have slightly bigger families than the middle class and the poor. It is not surprising to see that there are more urban households among the rich and less in the middle class and the poor, since there is a large income gap between the urban residents and the rural residents in China[12].

Table 2 suggests that the mean income of urban households is a little more than twice as much as the mean income of rural households. The average consumption level of urban households is less than twice the average consumption level of rural households, and the urban-rural difference in education expenditures has the similar pattern. Urban households on average have younger, more educated heads and slightly smaller families. The household heads living in urban areas have less potential working experience than those living in the rural areas, perhaps also because that urban household heads are on average younger than rural household heads. The proportion of the rich is higher in urban households than that in rural households, and the proportion of the middle class is higher in rural households than that in urban households.

The equivalent family size in the full sample and in each subsample is between 2 and 3, and its standard error is around 1, which is consistent with the family planning policy in the history of China. Since there is little variation in the equivalent family

[12] See, for example, Terry *et al* (2007), Knight and Gunatilaka (2010), and Sutherland and Yao (2011).

Table 2

Summary Statistics

	Full Sample		Rich		Middle class		Poor		Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Household level characteristics												
Income (RMB)	53326	141795	116781	226749	30890	17068	8134	7829	65995	164792	32944	89967
Consumption (RMB)	9017	21824	12798	23189	6467	15319	6191	25771	10938	24803	6085	15824
Education expenditures (RMB)	2908	9848	3951	11427	2465	5479	2238	11352	3407	11860	2105	5074
Age of household head	50.015	14.004	47.302	13.306	50.191	13.432	52.766	14.757	48.376	14.444	52.650	12.835
Equivalent family size	2.611	0.994	2.747	0.926	2.664	0.985	2.408	1.043	2.452	0.894	2.866	1.091
Schooling (year)[a]	8.959	4.260	10.729	3.967	8.734	3.910	7.272	4.182	10.351	3.925	6.718	3.797
Potential experience (year)[a]	34.027	16.176	29.552	15.042	34.436	15.165	38.458	17.096	30.994	16.288	38.910	14.739
Rich	0.346	0.476							0.400	0.490	0.258	0.438
Middle class	0.335	0.472							0.331	0.471	0.341	0.474
Poor	0.319	0.466							0.269	0.443	0.400	0.490
Urban	0.617	0.486	0.714	0.452	0.609	0.488	0.519	0.500				
Sample size	8,369		2,894		2,803		2,672		5,161		3,208	
Province level characteristics												
Education return	8.422%	4.240%										
Gini coefficient	0.517	0.081										
Average household income (RMB)	46268	30686										
Sample size	25											

Note: [a] The schooling and potential experience given here are those of the household head.

size across households in China, I exclude it from estimations. Including equivalent family size as a control variable does not affect the main results in this paper (not shown here).

Overall, Table 2 shows that three income groups exhibit dissimilar characteristics, and there exists non-negligible gaps in various variables between urban and rural households.

IV MODEL

I estimate the following model:

$$\ln(C_{ip}) = \beta_0 + \beta_1 * Gini_p + \beta_2 * \ln(Y_{ip}) + X_{ip}\gamma + \beta_3 * \ln(Z_p) + \varepsilon_{ip} \quad (2)$$

where the dependent variable is the natural logarithm of household *i*'s consumption net of education expenditures in 2010, and the independent variables are the Gini coefficient in province *p* that household *i* lives in during year 2010, the natural logarithm of household *i*'s income in 2010, a set of household level characteristics X_i and the natural logarithm of within-province average household income $\ln(Z_p)$. X_i includes the age of household head, indicators for middle class and rich, indicators for urban households, and interaction terms between income groups and $\ln(Y_{ip})$, between income groups and $Gini_p$, between urban indicator and $\ln(Y_{ip})$, and between urban indicator and $Gini_p$. β_1 is the marginal effect of within-province income inequality (measured as Gini coefficient) on household consumption, and β_2 is the income elasticity of household consumption.

I use Mehran index, Kakwani index and Theil entropy index as three alternative measures of income inequality, to check the sensitivity of the estimation results to different inequality indices. I describe each of these measures below.

Suppose there is a population of *n* individuals, the *i*th individual has income y_i, and $\{y_i\}$, $i = 1, \ldots, n$ is sorted in ascending order. The mean of y_i is $\bar{y}$. The Gini coefficient of the income distribution of this population is measured as

$$Gini\ \ Coefficient = \frac{2}{n^2\bar{y}}\sum_{i=1}^{n} i(y_i - \bar{y}). \quad (3)$$

The Mehran index is measured as

$$Mehran\ \ Index = \frac{3}{n^3\bar{y}}\sum_{i=1}^{n} i(2n + 1 - i)(y_i - \bar{y}). \quad (4)$$

The Kakwani index is measured as

$$Kakwani\ \ Index = \frac{1}{2 - \sqrt{2}}\left[\left(\frac{1}{n\bar{y}}\sum_{i=1}^{n}\sqrt{y_i^2 + \bar{y}^2}\right) - \sqrt{2}\right]. \quad (5)$$

And the Theil entropy index is measured as

$$Theil\ \ Entropy\ \ Index\ \ = \frac{1}{n}\sum_{i=1}^{n}\frac{y_i}{\bar{y}}log\frac{y_i}{\bar{y}}. \quad (6)$$

Compared to the Gini coefficient, the Mehran index is more sensitive to the low-income individuals; the Gini coefficient is more sensitive to income transfers near $\bar{y}$, while the Kakwani index is more sensitive to income transfers at extreme levels; the Gini coefficient gives on average how dispersed the income distribution is, and the

Theil entropy index is more sensitive to dispersion at the tails of the distribution.

I also estimate the following equation:

$$\ln(E_{ip}) = \alpha_0 + \alpha_1 * Gini_p + \alpha_2 * \ln(Y_{ip}) + X_{ip}\omega + \alpha_3 \ln(Z_p) + \epsilon_{ip} \qquad (7)$$

where the dependent variable is the natural logarithm of household *i*'s education expenditures in 2010, and the independent variables are the same as those in equation (2). Based on the "Status seeking" hypothesis, as the income inequality gets more severe, households tend to cut their consumption and increase savings, so that they can accumulate wealth for status upgrade. Jin *et al* (2011) argue that rising income inequality will also motivate households to invest more in education, because achieving higher education level is another means for escalating social status; if Jin *et al* (2011)'s hypothesis is true, $\alpha_1 > 0$. α_2 is the income elasticity of household education expenditures. The estimation results of equations (2) and (7) are shown in Tables 3-6.

V RESULTS

1. Income inequality and consumption

Table 3 presents the estimated effect of within-province income inequality, measured by the Gini coefficient, on household consumption net of education expenditures. Column (1) shows that, without the Gini coefficient in the right hand side of the equation, the estimated income inelasticity of household consumption is 0.425, which means that when income increases by 10%, household consumption will rise by 4.25%, and this estimate is statistically significant at 1% level. Column (2) shows that, after the Gini coefficient is included in the right hand side of the equation, the estimated income elasticity of household consumption is 0.407, which is very close to what column (1) suggests; controlling for the natural logarithm of household income and the age of household head, the estimated effect of within-province income inequality on household consumption is 1.720 in column (2), and it is statistically significant at 1% level. Based on column (2), when income inequality rises by 0.1, household consumption will increase by 17.20%, holding household income and the age of household head constant. I include two dummies, middle class indicator and rich indicator, as additional control variables in column (3), and the estimated coefficient on the Gini index becomes 1.940, which is still statistically significant at 1% level. Two interaction terms, which are middle class indicator interacted with natural log of household income, and rich indicator interacted with natural log of household income, are added as control variables in column (4), and the effect of income inequality on household consumption is still statistically significant. In column (5), I follow Jin *et al* (2011) and include the natural logarithm of within-province average household income as additional control variable. More specifically, Jin *et al* (2011) uses province-age group as the reference group of income inequality, and includes group average income as one of the control variables. However, I use within-province income inequality here, and including the natural logarithm of within-province average household income as additional control variable likely causes multicollinearity in the equation, and the positive and significant effect of income inequality on household consumption vanishes in column (5). Both the Gini index and the natural logarithm of within-province average household income are at province level, and their correlation is 0.404. Due to the potential multicollinearity issue, the insignificant estimate for the coefficient on income inequality in column (5) is not reliable.

According to columns (2) – (4) in Table 3, within-province income inequality has a significant and positive effect on household consumption net of education expenditures, and the magnitude of this effect is considerable. My findings in Table 3 are consistent with the "Keeping up the Joneses" hypothesis, which implies that households increase their consumption when income inequality rises.

2. Income inequality and education expenditures

Table 4 presents the effect of within-province income inequality on household education expenditures. Jin *et al* (2011) argue that rising income inequality may

Table 3

The Effect of Income Inequality on Household Consumption

Dependent variable: log(household consumption net of education expenditures)					
	(1)	(2)	(3)	(4)	(5)
Gini		1.720***	1.940***	1.480**	-0.646
		(0.585)	(0.666)	(0.658)	(0.939)
Log(income)	0.425***	0.407***	0.343***	0.135**	0.022
	(0.038)	(0.039)	(0.068)	(0.061)	(0.049)
Age	-0.021***	-0.021***	-0.021***	-0.019***	-0.018***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Log(within-province average income)					0.481***
					(0.156)
Middle class			-0.146	0.207	0.473***
			(0.143)	(0.185)	(0.141)
Rich			0.228	-5.548***	-4.811***
			(0.153)	(0.656)	(0.506)
Middle class*log(income)				-0.004	-0.013
				(0.020)	(0.016)
Rich*log(income)				0.560***	0.522***
				(0.058)	(0.045)
Sample size	4,528	4,528	4,528	4,528	4,528
R^2	0.176	0.185	0.196	0.218	0.233

Note: Standard errors are robust to heteroskedasticity and clustered at province level.
*** Indicate statistical significance at the 1% level.
** Indicate statistical significance at the 5% level.
* Indicate statistical significance at the 10% level.

motivate households to increase education investments; they provide the empirical evidence that, when the within-reference-group Gini coefficient increases by 0.1, household education expenditures will increase by 50.6%, and such effect does not vary greatly across the three income groups, the rich, middle class, and the poor. According to Table 4, within-province income inequality has a significant impact on education expenditures by the poor, but not on those by the middle class and the rich. Based on column (4), when the Gini index rises by 0.1, education expenditures by the poor will increase by 19.43%; however, *t* tests show that the effect of the Gini index on household education expenditures is insignificant for both the middle class and the poor (both *p*-values are greater than 0.50).

The above heterogeneous effects of within-province income inequality on household education expenditures across the three income groups may explain why income inequality has no significant impact on education expenditures in the whole sample shown by columns (1) – (3). Columns (1) – (3) present the mix of the effects of income inequality on the poor, the middle class and the rich. It is likely that the poor increases education expenditures in response to rising income inequality, with the hope that their next generation may obtain relatively higher social status, whereas the middle class and the rich find it unnecessary to further increase education expenditures. It's also likely that the poor adjusts education expenditures because they see the great and positive education returns to the middle class and the rich

Table 4

The Effect of Income Inequality on Household Education Expenditures

Dependent variable: log(household education expenditures)					
	(1)	(2)	(3)	(4)	(5)
Gini	1.211	0.988	0.621	1.943**	0.909
	(1.048)	(0.981)	(0.953)	(0.771)	(1.142)
Log(income)	0.231***	0.354***	0.229***	0.217**	0.199**
	(0.040)	(0.064)	(0.079)	(0.078)	(0.084)
Middle class		-0.398***	-0.003	0.078	0.131
		(0.091)	(0.175)	(0.150)	(0.183)
Rich		-0.529***	-4.301***	-3.674***	-3.546***
		(0.177)	(0.602)	(0.582)	(0.548)
Middle class*log(income)			-0.019	0.120**	0.111*
			(0.018)	(0.054)	(0.055)
Rich*log(income)			0.361***	0.370***	0.352***
			(0.059)	(0.073)	(0.068)
Middle class*Gini				-2.681**	-2.554**
				(1.017)	(1.018)
Rich*Gini				-1.261	-1.054
				(1.267)	(1.288)
Education return					2.576
					(1.923)
Sample size	3.610	3,610	3,610	3,610	3,610
R^2	0.056	0.066	0.076	0.079	0.082

Note: Standard errors are robust to heteroskedasticity and clustered at province level.
*** Indicate statistical significance at the 1% level.
** Indicate statistical significance at the 5% level.
* Indicate statistical significance at the 10% level.

during the past several decades.

In column (5), when I include province-specific education return as additional control variable following Jin *et al* (2011), the significant and positive effect of income inequality on poor households' education expenditures disappears, and meanwhile no significant impact of income inequality on education expenditures is found for the middle class (p value > 0.15) or the rich (p value > 0.90) households according to t tests. The specification in column (5) likely suffers from multicollinearity problem, since both the Gini coefficient and education return are at province level, and their correlation is 0.3115. The model in column (4) is the preferred specification, which reveals the heterogeneous effects of income inequality on different income groups in China.

3. Urban-rural heterogeneity

Since CHFS 2011 data includes not only urban households but also families living in rural areas, I test the heterogeneity of the effect of income inequality on urban and rural households. The results are presented in Table 5. Column (1) shows that, holding household income and the age of household head constant, rural families consume 45.8% less than urban families. Column (2) shows that there is no significant difference in the income elasticity of household consumption between

Table 5

The Heterogeneous Effect of Income Inequality on Urban/rural Household Consumption

Dependent variable: log(household consumption net of education expenditures)					
	(1)	(2)	(3)	(4)	(5)
Rural	-0.458***	-0.671	-0.742*	-0.700	-0.575
	(0.075)	(0.401)	(0.413)	(0.543)	(0.524)
Gini			1.393**	1.431*	0.362
			(0.556)	(0.738)	(0.830)
Rural*Gini				-0.090	-0.382
				(1.011)	(0.768)
Log(income)	0.388***	0.379***	0.363***	0.363***	0.341***
	(0.032)	(0.037)	(0.039)	(0.039)	(0.037)
Rural*log(income)		0.021	0.030	0.031	0.039
		(0.038)	(0.040)	(0.043)	(0.036)
Age	-0.018***	-0.018***	-0.018***	-0.018***	-0.017***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Log(within-province average income)					0.248*
					(0.134)
Sample size	4,528	4,528	4,528	4,528	4,528
R^2	0.201	0.201	0.206	0.206	0.211

Note: Standard errors are robust to heteroskedasticity and clustered at province level.
*** Indicate statistical significance at the 1% level.
** Indicate statistical significance at the 5% level.
* Indicate statistical significance at the 10% level.

Table 6

The Effects of Different Measures of Income Inequality on Household Consumption

Dependent variable: log(household consumption net of education expenditures)						
	Mehran index		Kakwani index		Theil entropy index	
	(1)	(2)	(3)	(4)	(5)	(6)
Inequality	-0.299	-0.151	2.010***	1.743**	0.547***	0.499**
	(0.528)	(0.536)	(0.669)	(0.730)	(0.180)	(0.210)
Log(income)	0.422***	0.149***	0.406***	0.133**	0.406***	0.128*
	(0.036)	(0.052)	(0.039)	(0.061)	(0.039)	(0.063)
Age	-0.021***	-0.020***	-0.021***	-0.019***	-0.021***	-0.019***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Middle class		0.124		0.215		0.231
		(0.201)		(0.186)		(0.184)
Rich		-6.119***		-5.512***		-5.566***
		(0.690)		(0.656)		(0.633)
Middle class*log(income)		0.003		-0.005		-0.006
		(0.024)		(0.020)		(0.019)
Rich*log(income)		0.607***		0.557***		0.563***
		(0.065)		(0.058)		(0.057)
Sample size	4,528	4,528	4,528	4,528	4,528	4,528
R^2	0.176	0.212	0.185	0.218	0.184	0.219

Note: Standard errors are robust to heteroskedasticity and clustered at province level.
*** Indicate statistical significance at the 1% level.
** Indicate statistical significance at the 5% level.
* Indicate statistical significance at the 10% level.

Table 7

Quantile Regressions of Household Consumption on Income Inequality

Dependent variable: log(household consumption net of education expenditures)					
	Quantiles				
	10%	25%	50%	75%	90%
	(1)	(2)	(3)	(4)	(5)
Gini	0.974	1.374***	1.449***	1.447***	2.146***
	(0.655)	(0.458)	(0.316)	(0.419)	(0.411)
Log(income)	0.106	0.202***	0.159***	0.141***	0.176**
	(0.072)	(0.073)	(0.047)	(0.048)	(0.077)
Age	-0.021***	-0.023***	-0.018***	-0.019***	-0.018***
	(0.004)	(0.004)	(0.002)	(0.003)	(0.003)
Middle class	0.469***	0.282	0.138	-0.061	-0.048
	(0.179)	(0.300)	(0.144)	(0.151)	(0.426)
Rich	-5.859***	-4.423***	-5.395***	-5.395***	-5.967***
	(1.561)	(0.948)	(0.696)	(0.844)	(0.758)
Middle class*log(income)	-0.025**	-0.008	-0.001	0.012	-0.004
	(0.012)	(0.028)	(0.013)	(0.011)	(0.042)
Rich*log(income)	0.616***	0.472***	0.540***	0.533***	0.556***
	(0.149)	(0.095)	(0.069)	(0.082)	(0.081)
Sample Size	4528	4528	4528	4528	4528
R^2	0.102	0.126	0.142	0.138	0.119

Note: Standard errors are robust to heteroskedasticity.
*** Indicate statistical significance at the 1% level.
** Indicate statistical significance at the 5% level.
* Indicate statistical significance at the 10% level.

urban and rural households. According to column (3), when income inequality rises by 0.1, household consumption will increase by 13.93%. Column (4) shows that when income inequality rises by 0.1, consumption by urban households will increase by 14.31%, and there is no significant difference in the effect of income inequality on household consumption between urban and rural households. After adding the natural logarithm of within-province average income to the right hand side of the equation, the effect of income inequality on household consumption becomes insignificant based on column (5), which is likely caused by the multicollinearity issue mentioned earlier.

Table 5 shows heterogeneity in the consumption behavior between urban and rural households; however, I do not find heterogeneous effects of income inequality on consumption made by urban and rural families.

4. Robustness check

Table 6 gives the regression results of household consumption net of education expenditures on within-province income inequality and two sets of control variables, using Mehran index, Kakwani index and Theil entropy index as alternative measures of income inequality. The results using Kakwani index are similar to the findings in Table 3. However, the estimated coefficients on Theil entropy index are much smaller than what Table 3 suggests, although they are still statistically significant at 5% level. There is no significant effect of income inequality on household

consumption using Mehran index, regardless of the control variables.

5. Quantile regressions

It is possible that the relationship between income inequality and household consumption at certain quantiles of the distributions of household income and consumption, is different from the mean estimates shown in Tables 3-6. I present the results of quantile regressions estimating the effect of income inequality on household consumption in Table 7. More specifically, I estimate the effect at 10%, 25%, 50%, 75% and 90% quantiles.

Table 7 shows that the effect of within-province income inequality on household consumption varies across the five quantiles. The effect of income inequality on household consumption is not statistically significant at 10% quantile, and it increases from 25% quantile to 90% quantile. More specifically, the effect of income inequality on household consumption is 1.374 at 25% quantile, 1.449 at 50% quantile, 1.447 at 75% quantile and 2.146 at 90% quantile.

Based on the findings in Table 7, high consumption households further increase their consumption in response to rising income inequality, and low consumption households do not adjust their consumption by much when income inequality rises. The “Keeping up with the Joneses” effect is most profound at high quantiles of household consumption.

VI CONCLUSIONS

Using CHFS 2011 data, I re-examine the inequality-consumption link in China found by Jin *et al* (2011), and I show that within-province income inequality significantly and positively affects household consumption net of education expenditures, which is consistent with the "Keeping up with the Joneses" hypothesis. This result is robust to different sets of household level control variables. There does not exist heterogeneity of such effect on urban/rural families. I also show that there exist heterogeneous effects of income inequality on household education expenditures across the poor, the middle class and the rich; the effect of income inequality on household education expenditures is positive for the poor but insignificant for the middle class and the rich. Furthermore, the effect of within-province income inequality on household consumption varies across different quantiles of the distribution of household consumption; this effect is stronger at higher quantiles.

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