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ABSTRACT

This article provides a new perspective of peer effects that coexist in different consumer activities and investigates how consumption of a household is affected by the level of incomes of its peers. Using unique panel data on Chinese households between 2011 and 2019, we explore the causal relationship between peers' income and household consumption and then analyze plausible mechanisms behind it. We find that the peer effect of income in consumption is significantly positive. Higher level of average income in a reference group is associated with the household's greater expenditure on consumption and the improvement of consumption structure. There is also evidence that peer household income helps to encourage the household consumption through its impact on household income and peer household consumption. By identifying peers' income as the average income of other households living in the same region, in the same age group and with the same level of education, our research contributes to the literature on peer effects in consumption, mapping relationships between intragroup income and individual consumption.

1. Introduction

People's economic behaviours are often influenced by cohorts they surround themselves with. 'Keeping up with the Joneses' implies that one's choices would closely resemble the choices of similar others. The growing salience of such peer effects has accompanied an increasingly dense network of interactions in contemporary society. Since the pioneering work of Case and Katz (1991) and Banerjee (1992), empirical and theoretical studies on the peer effect or network effect have collected considerable attention across fields in economics. Economists have widely examined how decisions made by peers of individuals and households affect their own economic outcomes, for instance, education, workplace performance, consumption, labour supply, herding behaviour in financial markets (Bikhchandani & Sharma, 2000; Calvó-Armengol et al., 2009; De Giorgi et al., 2010, 2020; Nicoletti et al., 2018). Peer effects can be

commonly related to the structure of social networks (Bramoullé et al., 2009; 2020; De Giorgi et al., 2010, 2020). The driving force for the growth in network studies is coupled with the evolution of communication technologies, which propagates the better understanding of human economic behaviours (Jackson, 2014). Thus, a wide range of social psychology research also focuses on exploring whether peer effects matter in explaining interpersonal or intergroup social relations (Festinger, 1954; Salancik & Pfeffer, 1978; Thibaut & Kelley, 2017).

Prior understanding of peer effects implies multiplier effects whereby changing the behaviour in one person leads to changes in the same behaviour among peers. Since consumer decisions are usually not independent with each other, this article extends the perspectives of peer effects to explore the impact of peers' economic conditions on other behaviours of the individual. It would be insightful to propose a framework that simultaneously discusses peer effects in different behaviours. Despite a whole slew of literature having documented peer effects exist in household consumption and income, little has clarified how consumption is affected by the income of one's peers and community. During the recent decade, there is burgeoning research focusing on the impact of relative income on consumption (Bricker et al., 2021; De Giorgi et al., 2020; Georgarakos et al., 2014; Sun & Wang, 2013). Given the peer effect in income and consumption, the relationship between relative income and consumption inspires us to further investigate how consumption of a household is affected by income level of its peers, and therefore to elucidate the peer effect of income in household consumption.

According to the seminal work of Duesenberry (1949), relative income hypothesis indicates that a household's attitude to consumption and saving is determined by its income in relation to others rather than by merely the absolute level of income. On this basis, Leibenstein (1950) first advances the theory of consumers' demand to explain the phenomena of 'conspicuous consumption', which conveys that households care not only about their own consumption level, but also their consumption level relative to those of other households in their reference group. A growing body of literature provides evidence for the peer effects in consumption, which supports the hypothesis that consumption expenditure of an independent household are significantly affected by comparisons with other people's consumption behaviour (Abel, 2005; Childers & Rao, 1992; De Giorgi et al., 2020; Grinblatt et al., 2008; Moretti, 2011). The hypothesis is further extended to the interpretation that an individual consumption function depends on the comparison of the lifetime income of his reference group (Alvarez-Cuadrado & Van Long, 2011). However, it is still controversial for the relationship between relative income within cohorts and household consumption. Based on Duesenberry's theory of consumption, Palley (2010) presents a novel theoretical model of consumption behaviour and concludes that the ratio of consumption to permanent income is negatively related to household relative permanent income. Bricker et al. (2021) find evidence that a household's positional income ranking relative to its close neighbours is positively associated with its expenditure on status consumption goods, for instance, high status cars. Sun and Wang (2013) posit that although consumption is negatively associated with the relative income of a household, it is positively related to the relative deprivation which encompasses both the

relative income and the absolute income disparity across households. A recent work of De Giorgi et al. (2020) has recognised the presence of peer effects in consumption, but their empirical results show that consumption is not significantly to be affected by changes in peers' disposable income.

Fast-growing literature has identified peer effects, but most adopt different methods of measuring peers. De Giorgi et al. (2010) define students attending courses in the same classes as reference group to capture relevant peer interactions. Exploiting employer–employee data, De Giorgi et al. (2020) identify co-workers as the peer group and construct the social network of a given household based on two spouses' workplace. Many previous studies also delineate a household's peer group as other households living in its neighbourhood within the same geographic region (Blanchflower & Oswald, 2004; Bricker et al., 2021; Li et al., 2013; Ravallion & Lokshin, 2002; Roychowdhury, 2019). De Giorgi et al. (2020) also posit that their results could be extended by investigating location networks in consumption. Concerning the peer effect of income, existing literature include a variety of measurement. The social influences of peers' income on a certain household are examined by its relative income ranking in the reference group (Ferrer-i-Carbonell, 2005; Ravallion & Lokshin, 2002). Would the different ways of measuring peers' income lead to inconsistencies in above-mentioned conclusions? To demonstrate the peer effect of income in consumption, this article measures peers' income as the average income of other households living in the same region, in the same age group and with the same level of education.

Moreover, there is a paucity of literature further discussing the mechanism behind how household consumption is affected by the average level of income in a reference group. An individual's effort and performance at work depend on his own income as well as on what others earn, namely income comparisons among the individual's peer group (Beugnot et al., 2019; Clark et al., 2010). Therefore, peers' average level of income may have an impact on household consumption by affecting household income. On the other hand, numerous studies focus on the peer effect in consumption. De Giorgi et al. (2020) find that peers' consumption is positively related to household consumption. Hence, another mechanism that may give rise to the peer effect of income in consumption is that the correlation between income and consumption in the peer group can further affect the household's own consumption. In this article, we follow those two strands of related research and consider two plausible mechanisms behind the relationship between peers' income and household consumption.

Using a biennial micro data set from the China Household Finance Survey (CHFS) during 2011 and 2019, this article goes a step further to examine the impact of average reference group income on household consumption and then analyse plausible mechanisms behind this linkage. In this article, we investigate this peer effect of income in consumption, mapping the relationship between income comparisons and consumption by introducing reference households. Our main findings indicate that peers' income is positively and causally related to the household's own level of consumption, which means households with richer peers generally have higher level of consumption. We also find that both promoted income and peers' consumption can play mediating roles in the positive effect of peers' income on household

consumption. Those mechanisms are based on two strands of literature. The first strand deals with the association between income and consumption. A second strand concerns the peer effect of income and that of consumption. Heterogeneity analysis shows that income of peer households has a greater impact on the level of household's consumption in female-headed households and households without liquidity constraint.

The contribution of our article is threefold. First, the present article provides a new perspective of peer effects that coexist in different consumer activities, compared to prior literature merely focusing on peer effects occur when changing the behaviour in one person leads to changes in the same behaviour among peers. To be specific, our research sheds new light on the peer effect of income in household consumption by considering peers' average income within related cohorts. Despite consumption of individuals or individual households has been widely recognised to be correlated with income – absolute income, relative income, income volatility, income inequality, etc. (Duesenberry, 1949; Gorbachev, 2011; Leijonhufvud, 1967; Meyer & Sullivan, 2013), few studies pays heed to the relationship between household consumption and income of peer households. By identifying the cluster of peers, we further explore how consumption at household level is affected by intragroup income rather than merely household income itself. Second, concerning how consumption is affected by the relative income in a reference group, there are still inconsistencies in existing research findings (Abel, 2005; Alvarez-Cuadrado & Van Long, 2011; Childers & Rao, 1992; De Giorgi et al., 2020; Duesenberry, 1949; Grinblatt et al., 2008; Moretti, 2011; Palley, 2010; Sun & Wang, 2013). Based on diversified measures of peer households in previous studies (Blanchflower & Oswald, 2004; De Giorgi et al., 2010, 2020; Li et al., 2013; Ravallion & Lokshin, 2002; Roychowdhury, 2019), in this article, we define the households' reference group as their neighbours living in the same region, in the same age group and with the same level of education to provide strong evidence for the peer effect of income in consumption. Third, we enrich the previous evidence by probing into the mechanism behind the peer effect of income in consumption. The mechanism has been neglected in the latest related work De Giorgi et al. (2020). We find that peers' average income may increase household consumption by promoting household income as well as peers' consumption, following three realms of literature – the effect of income in consumption (Duesenberry, 1949), the peer effect in income (Beugnot et al., 2019; Clark et al., 2010) and the peer effect in consumption (De Giorgi et al., 2020).

The rest of this article is organised as follows. Section 2 summarises the data and variables. Section 3 describes models employed in our article. Sections 4–7 show the empirical results – baseline results, mechanism, heterogeneity analysis and robustness tests included. And brief conclusions and policy implications are presented in Section 8.

2. Data and variables

2.1. Data

We use microdata from the CHFS, biennially launched by the Survey and Research Center for China Household Finance since 2011. For five consecutive waves of CHFS,

8,438, 28,141, 37,289, 40,011 and 34,643 households have been interviewed in 2011, 2013, 2015, 2017 and 2019, respectively. Available five waves have so far attracted massive attention from the government, academia, and media around the world (Korkmaz et al., 2021; Yue et al., 2020, 2021; Ye and Yue, 2023; Zhou et al., 2023).

The survey has collected details involving demographic and household characteristics. Respondents are nationally representative from 29 provinces, 367 counties and 1,481 communities across China. The sample bias is minimised because of the nationwide random selection process. The household questionnaire covers the respondents' information about consumption, income, liquidity constraints and other specific financial status, which lays solid data foundations for this article to examine the impact of peer household income on household consumption.

2.2. Variables

In this article, our dependent variable is household consumption. Following De Giorgi et al. (2020) and Ling et al. (2018), we measure household consumption $Consumption_{it}$ as the total amount of consumption expenditure for each household i in the current period t. According to the data provided by CHFS, household current consumption includes a wide range of expenditure on food, daily necessities, transportation and communication, education, medical care, entertainment, etc. The article will further investigate how the structure of consumption is associated with the peer effect of income. To do so, we classify household consumption into three categories in terms of expenditure on diversified baskets of consumer goods for the purpose of meeting utilitarian, hedonic and developmental needs. Considering that extreme values may cause estimation bias, we also winsorize household consumption by excluding the samples with total consumption in the upper and lower 1% for robustness checks.

The level of income within peer households is our independent variable of interest. Our measurement of peers synthesises the previous interpretation of reference group households and is considered as similar households with close proximity of geographical location, generation and educational backgrounds. De Giorgi et al. (2020) define husband or wife's co-workers in the same workplace as peers of a household. Alvarez-Cuadrado et al. (2016) suggest that geographical proximity can be an important criterion to construct reference groups, and on this basis, households living in the same area (census tract) are regarded as the reference group using geographic data. Bricker et al. (2021) also take geographically close neighbours as a prime reference group to study the signaling impact of relative income on household consumption and financial decisions. Ling et al. (2018) use the Mahalanobis metric to measure the distance between households and match the nearest neighbours as a peer group. To highlight the significance of relative income, Alpizar et al. (2005) exploit the average income in certain cohorts. Following Alpizar et al. (2005), Alvarez-Cuadrado et al. (2016) and Bricker et al. (2021), this article measures peers' income $Income\_peer_{it}$ as the average income of other households who live in the same region, in the same age group and with the same level of education. In empirical tests, the dependent variable $Consumption_{it}$ and independent variable of interest $Income\_peer_{it}$ are in log.

Table 1. Summary statistics. This table reports summary statistics. All variables are based on the data set from the CHFS, covering 8,438, 28,141, 37,289, 40,011 and 34,643 households in 2011, 2013, 2015, 2017 and 2019. $Consumption_{it}$ is the total amount of consumption expenditure for each household i in the current period t. $Income\_peer_{it}$ is the average income of other households who live in the same region, in the same age group and with the same level of education.

Variables	Observations	Mean	SD	Min	Max
Consumption	132,265	55,876.266	471,864.500	0	1.695e + 08
Income_peer	132,265	76,743.879	55,466.145	2.273	1432,485.875
Age	132,265	52.901	13.782	16	117
Male	132,265	0.779	0.415	0	1
Married	132,265	0.870	0.336	0	1
Schooling	132,265	9.305	4.214	0	22
Family size	132,265	3.452	1.616	1	20
Children	132,265	0.575	0.818	0	10
Workforce	132,265	1.733	1.190	0	12
Netasset	132,265	920,357.800	6,392,416.290	−1.401e + 08	2.100e + 09
Income	132,265	80,222.430	192,620.425	−5,493,190	12,122,418
Rural	132,265	0.346	0.476	0	1
Age_peer	132,265	53.106	10.936	27.333	81.333
Adult_peer	132,265	2.805	0.476	1	6.600
Children_peer	132,265	0.559	0.302	0	2.385

Data source: China Household Finance Survey.

Following the previous literature (Alvarez-Cuadrado et al., 2016; De Giorgi et al., 2020; Ling et al., 2018), this article includes control variables as follows: household head characteristic variables (age, gender, marital status, years of schooling), household characteristic variables (family size, number of children, workforce, net asset, and income) and regional dummy variables (province, urban and rural areas), peer characteristic variables (peer age, number of peer adults, number of peer children). Gender is a dummy variable equal to 1 if it is a male-headed household. Marital status takes the value of 1 when the head of household is male and married. For regional dummy variables, we define a dummy variable Rural equal to 1 if the respondent household resides in rural region and 0 otherwise. The values of household net asset and income are in log.

Furthermore, this article drops samples with missing values and only keep samples of follow-up households in repeated surveys. In total, the processed data includes 132,265 observations. Table 1 presents summary statistics. For each variable, columns (2) to (6) report the number of observations, mean, standard deviation, minimum, and maximum values. Among all samples, the average household consumption is 55,876 and the average income of peer households is 76,744.

3. Model

In this article, we analyse the peer effect of income in household consumption. Following De Giorgi et al. (2020), the baseline model is employed as follow:

$$ln(Consumption)_{it} = \beta_0 + \beta_1 ln(Income\ peer)_{it} + \beta_2 X_{it} + \mu_j + \lambda_k + \varepsilon_{it}$$

$$(1)$$

$ln(Consumption)_{it}$ is the consumption of household i in period t. $ln(Income\ peer)_{it}$ is the peers' average income of household i in period t. The values of consumption and

income are in log. X_{it} includes a variety of control variables. μ_j is the province fixed effect. λ_k is the year fixed effect. ε_{it} is an unobserved error term.

The first baseline model employed is an ordinary least squares (OLS) regression model. However, both reverse causality and omitted variables may lead to the issue of endogeneity. The source of reverse causality is that household consumption may affect the income level of other households in reverse. Another source of endogeneity is omitted variables. In addition to the variables curbed in this article, some unobserved variables such as family members' personalities and preferences may affect household decisions on consumption. Therefore, this paper exploits a two-way fixed-effects (FE) model to minimise bias derived from omitted variable that do not vary over time. To address endogeneity issue, we further carry out a two-stage least squares (2SLS) estimation, using the instrumental variable (IV) that affect the peers' income but not affect the household consumption directly. We employ the average schooling years of peer households as an IV. It is an exogenous variable that may affect the level of peers' income. The exogeneity of IV can be explained because in our sample, 30.7% households in the same region consist of floating population with experiences of migration or tenants who temporarily join the neighbourhood. It means peer households are generally faced with diversified education sources and environment, indicating there is no direct link between peers' education and the subject household's income. The IV estimation can eliminate bias due to time-varying omitted variables and potential adverse selection issues.

To further explore the mechanism behind the peer effect of income on household consumption, this paper examines two plausible mechanisms using the following models. The income-consumption relationship has been widely documented by economists (Duesenberry, 1949; Gorbachev, 2011; Leijonhufvud, 1967; Meyer & Sullivan, 2013). In general, the households with higher income tend to spend more in consumption for any individual household. One the other hand, in recent decade, a growing body of studies focus on investigating the peer effect of income and the peer effect of consumption. Clark et al. (2010) and Beugnot et al. (2019) imply the relationship between an individual's own income and his or her peers' income. De Giorgi et al. (2020) suggest that household consumption is positively affected by the level of consumption of reference households. Those findings inspire us to consider the mediating mechanisms of household income and peers' consumption.

Using Equation (2), we focus on the mechanism of household income and examine the impact of income on consumption in each individual household. $ln(Income)_{it}$ represents the predicted value of income for household i in period t. The predicted value contains the only information that is related to peers' income.

$$ln(Consumption)_{it} = \beta_0 + \beta_1 ln(Income)_{it} + \beta_2 X_{it} + \mu_j + \lambda_k + \varepsilon_{it} \quad (2)$$

Using Equation (3), we then turn to the mediating role of peers' consumption by examining the peer effect of consumption. To get the unbiased estimator, we use the predicted value of peers' consumption for household i in period t.

Table 2. Baseline results. This table reports the baseline results from testing the impact of peers' income on household consumption. The dependent variable $Consumption_{it}$ is regressed on $Income\_peer_{it}$ and other control variables. Heteroskedasticity robust standard errors are given in parentheses. *** indicates significance at 1% level, ** at 5% level and * at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
ln(Income_peer)	0.2563***	0.3361***	0.0474***	0.0873***
	(0.0052)	(0.0084)	(0.0096)	(0.0266)
Age	−0.0061***	−0.0053***	−0.0068***	−0.0060**
	(0.0011)	(0.0011)	(0.0025)	(0.0025)
Age²	−0.0000***	−0.0000***	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	−0.0535***	−0.0495***	0.0203**	0.0209**
	(0.0051)	(0.0052)	(0.0100)	(0.0100)
Married	0.1751***	0.1763***	0.0745***	0.0747***
	(0.0072)	(0.0072)	(0.0146)	(0.0146)
Schooling	0.0421***	0.0406***	0.0101***	0.0101***
	(0.0006)	(0.0006)	(0.0017)	(0.0017)
Family size	0.1672***	0.1665***	0.1231***	0.1228***
	(0.0025)	(0.0025)	(0.0043)	(0.0043)
Children	−0.0380***	−0.0381***	−0.0100	−0.0099
	(0.0040)	(0.0041)	(0.0078)	(0.0078)
Workforce	−0.0306***	−0.0293***	0.0131***	0.0139***
	(0.0025)	(0.0025)	(0.0037)	(0.0037)
ln(Netasset)	0.0222***	0.0216***	0.0057***	0.0054***
	(0.0007)	(0.0007)	(0.0009)	(0.0009)
ln(Income)	0.0226***	0.0218***	0.0110***	0.0106***
	(0.0009)	(0.0009)	(0.0010)	(0.0010)
Rural	−0.3215***	−0.3055***	−0.0874***	−0.0788***
	(0.0053)	(0.0055)	(0.0283)	(0.0284)
Age_peer	0.0024***	0.0048***	0.0017***	0.0029***
	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Adult_peer	−0.1366***	−0.1382***	−0.0717***	−0.0778***
	(0.0075)	(0.0076)	(0.0148)	(0.0155)
Children_peer	−0.0168	0.0115	0.0873***	0.0981***
	(0.0134)	(0.0137)	(0.0302)	(0.0300)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	132,265	97,988	97,988
Adj.R²	0.4055	0.4008	0.5827	0.5826
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

$$ln(Consumption)_{it} = \beta_0 + \beta_1 ln(Consumption\_peer)_{it} \\ + \beta_2 X_{it} + \mu_j + \lambda_k + \varepsilon_{it} \tag{3}$$

4. Results

4.1. Baseline results

Table 2 presents the baseline results using Equation (1). Columns (1)–(4) report the OLS, the 2.S.L..S, the FE and the FE 2SLS results analyzing the nexus between the peers' income and household consumption. Variables related to characteristics of the household head, the observational household and peer households are controlled in regressions.

In all columns, results show that income of peer households has a significant positive impact on household consumption. In column (1), the OLS estimate is 0.256, which is significant at the 1% level. It indicates that 1% additional peers' income can significantly increase household consumption by 0.256%. Employing the educational level of peer households as an IV of peer household income, the 2SLS estimate in column (2) consistently shows that higher level of peers' income is associated with the household's greater expenditure on consumption. The IV used in 2SLS estimation is highly significant in the first stage. Furthermore, the CD Wald F statistics and KP rk LM statistic are large enough to eliminate the problem of weak instrument. The coefficients of control variables generally meet our expectation. To address the potential issue of omitted variables, we further exploit FE and FE 2SLS models. Both FE and FE 2SLS estimates are positive and significantly different from zero. According to the FE 2SLS results, one more percentage change in income of peer households would averagely lead to a 0.087% increase in household consumption. If sample households have opportunities to cross the middle-income threshold, achieving yearly income of 100,000 RMB, their consumption expenditure would increase by about 1,473 RMB per year. All baseline results in this table robustly suggest that household consumption is significantly positively affected by the average level of income within a peer group. This is similar to the results in Bricker et al. (2021), which find household income relative to its close neighbours has a positive effect on household expenditure on status consumption goods. The results also in line with Sun and Wang (2013), who argues that the relative deprivation which involves both the relative income and the absolute income disparity across households positively affects household consumption.

4.2. The peer effect of income on the structure of consumption

In Ling et al. (2018), household consumption is divided into visible consumption (expenditure on clothing, housing, transportation, education and training, durable goods, and luxury goods) and non-visible consumption (expenditure on healthcare and transfer costs) to identify the peer effect in consumption among rural households in China. Visible consumption is categorised by different expenditure bundles in Charles et al. (2009), which measures visible goods such as clothing, jewelry and cars as conspicuous consumption. To reflect the characteristics of consumption structure of Chinese households, in this article, we classify consumption into three categories. The first utilitarian consumption refers to consumption which is necessary for the survival, including expenditure on clothing, food and housing. After these basic needs being satisfied, hedonic consumption, including transportation, communication and household equipment expenditure, is required by households in pursuit of pleasure. For the purpose of individual development, expenditure on education, recreation, medical and health care constitute developmental consumption, which caters to more advanced needs in consumption hierarchy. Then Table 3 reports the peer effect of income on the structure of consumption. The estimation results in columns (1) to (4) show that the average level of peers' income positively affects household consumption in both utilitarian and hedonic expenditure. The FE 2SLS estimates suggest that a 1%

Table 3. The peer effect of income on the structure of consumption. This table reports the associations between peers' income and household expenditure on different consumption categories. In columns (1) and (2), the dependent variable is utilitarian consumption, including expenditure on clothing, food and housing. In columns (3) and (4), the dependent variable is hedonic consumption, including expenditure on transportation, communication and household equipment. In columns (5) and (6), the dependent variable is developmental consumption, including expenditure on education, recreation, medical and health care. Heteroskedasticity robust standard errors are given in parentheses. *** indicates significance at 1% level, ** at 5% level and * at 10% level.

	(1) FE Utilitarian	(2) FE 2SLS Utilitarian	(3) FE Hedonic	(4) FE 2SLS Hedonic	(5) FE Developmental	(6) FE 2SLS Developmental
ln(Income_peer)	0.0612***	0.1225***	0.0483***	0.1062***	0.1181***	0.1311
	(0.0143)	(0.0400)	(0.0099)	(0.0271)	(0.0356)	(0.0954)
Age	0.0042	0.0053	−0.0030	−0.0021	−0.0882***	−0.0870***
	(0.0039)	(0.0039)	(0.0025)	(0.0025)	(0.0092)	(0.0092)
Age²	−0.0001***	−0.0002***	−0.0000	−0.0000*	0.0007***	0.0007***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Male	0.0255*	0.0263*	0.0205**	0.0212**	0.0656*	0.0666*
	(0.0150)	(0.0150)	(0.0100)	(0.0100)	(0.0355)	(0.0355)
Married	0.0920***	0.0923***	0.0887***	0.0891***	0.2236***	0.2233***
	(0.0220)	(0.0220)	(0.0144)	(0.0144)	(0.0523)	(0.0523)
Schooling	0.0149***	0.0148***	0.0086***	0.0086***	0.0215***	0.0215***
	(0.0025)	(0.0025)	(0.0017)	(0.0017)	(0.0057)	(0.0057)
Family size	0.1217***	0.1213***	0.0814***	0.0811***	0.2534***	0.2524***
	(0.0062)	(0.0062)	(0.0044)	(0.0044)	(0.0153)	(0.0153)
Children	−0.0132	−0.0131	0.0187**	0.0188**	0.2826***	0.2832***
	(0.0109)	(0.0109)	(0.0079)	(0.0079)	(0.0266)	(0.0266)
Workforce	0.0803***	0.0813***	0.0347***	0.0356***	−0.1221***	−0.1205***
	(0.0052)	(0.0052)	(0.0038)	(0.0038)	(0.0139)	(0.0139)
ln(Netasset)	0.0156***	0.0151***	0.0106***	0.0102***	0.0012	0.0007
	(0.0012)	(0.0012)	(0.0009)	(0.0009)	(0.0029)	(0.0029)
ln(Income)	0.0104***	0.0099***	0.0095***	0.0090***	0.0229***	0.0225***
	(0.0014)	(0.0014)	(0.0010)	(0.0010)	(0.0035)	(0.0036)
Rural	−0.1049**	−0.0931**	−0.0643**	−0.0542*	−0.1171	−0.1028
	(0.0415)	(0.0417)	(0.0287)	(0.0288)	(0.1005)	(0.1006)
Age_peer	0.0009	0.0026**	0.0017***	0.0033***	0.0089***	0.0100***
	(0.0010)	(0.0013)	(0.0006)	(0.0008)	(0.0026)	(0.0033)
Adult_peer	−0.0336	−0.0436*	−0.0755***	−0.0856***	−0.3495***	−0.3452***
	(0.0212)	(0.0224)	(0.0153)	(0.0161)	(0.0529)	(0.0558)
Children_peer	0.0416	0.0558	0.0868***	0.0982***	0.2809***	0.3056***
	(0.0443)	(0.0442)	(0.0311)	(0.0309)	(0.1039)	(0.1038)
Household	Yes	Yes	Yes	Yes	Yes	Yes
Province	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs	97,988	97,988	97,988	97,988	97,988	97,988
Adj.R²	0.5206	0.5205	0.5377	0.5376	0.3767	0.3766
F value at First-stage		40,977		40,977		40,977
Cragg-Donald Wald F		75,000		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000		17,000

Data source: China Household Finance Survey.

increase in income of peer households would significantly lead to 0.106% and 0.123% additional household's own expenditure on utilitarian and hedonic consumption categories, respectively. In column (5), the FE estimate indicates the positive peer effect of income in developmental consumption. However, the FE 2SLS estimate is statistically insignificant for the impact of peer's income on household developmental expenditure bundles. It implies that with the increase of peer household income, the level of total household consumption and consumption in each category experience an upward trend simultaneously, which means the structure of household consumption gets improved. When the reference group

Table 4. The peer effect of income on the structure of consumption: eight categories. This table reports the associations between peers' income and household expenditure on eight consumption categories. From columns (1) to (8), the dependent variable is expenditure on food, clothing, household equipment, education and recreation, medical and health care, transportation and communication, housing and other miscellaneous expenses, respectively. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(Income_peer)	0.0972***	0.1962**	0.1708***	0.0107	0.1067**	0.3118***	0.1023**	0.0178
	(0.0339)	(0.0869)	(0.0598)	(0.1117)	(0.0529)	(0.1180)	(0.0494)	(0.0992)
Age	−0.0007	−0.0076	0.0103*	−0.0491***	0.0160***	−0.0058	0.0123***	0.0427***
	(0.0028)	(0.0079)	(0.0060)	(0.0103)	(0.0055)	(0.0118)	(0.0047)	(0.0086)
Age²	−0.0001*	−0.0002**	−0.0002***	0.0005***	−0.0003***	−0.0003**	−0.0002***	−0.0004***
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)
Male	0.0252**	0.0333	0.0323	0.0926**	0.0481**	0.0053	0.0262	0.2026***
	(0.0118)	(0.0332)	(0.0232)	(0.0436)	(0.0196)	(0.0481)	(0.0186)	(0.0386)
Married	0.0751***	0.0881*	0.1385***	0.0590	0.1084***	−0.0268	0.1064***	0.1536***
	(0.0180)	(0.0453)	(0.0309)	(0.0563)	(0.0298)	(0.0625)	(0.0273)	(0.0457)
Schooling	0.0055***	0.0263***	0.0136***	0.0049	0.0220***	0.0295***	0.0121***	0.0074
	(0.0021)	(0.0055)	(0.0036)	(0.0065)	(0.0033)	(0.0076)	(0.0030)	(0.0059)
Familysize	0.0752***	0.2081***	0.0850***	0.1469***	0.1707***	0.4786***	0.0795***	0.1110***
	(0.0052)	(0.0135)	(0.0086)	(0.0166)	(0.0083)	(0.0209)	(0.0082)	(0.0138)
Children	0.0349***	0.0275	0.0056	−0.0266	−0.0454***	0.3544***	−0.0095	−0.0051
	(0.0089)	(0.0228)	(0.0150)	(0.0297)	(0.0139)	(0.0360)	(0.0146)	(0.0251)
Workforce	0.0276***	0.1911***	0.0623***	−0.0854***	0.0955***	0.0110	0.0386***	0.0267**
	(0.0046)	(0.0113)	(0.0076)	(0.0149)	(0.0068)	(0.0176)	(0.0069)	(0.0110)
ln(Netasset)	0.0078***	0.0394***	0.0125***	−0.0133***	0.0177***	0.0264***	0.0143***	0.0192***
	(0.0010)	(0.0028)	(0.0016)	(0.0032)	(0.0015)	(0.0036)	(0.0016)	(0.0027)
ln(Income)	0.0086***	0.0267***	0.0095***	0.0291***	0.0108***	0.0176***	0.0084***	0.0069**
	(0.0012)	(0.0030)	(0.0021)	(0.0042)	(0.0018)	(0.0044)	(0.0018)	(0.0031)
Rural	−0.0140	−0.0847	−0.1328**	−0.1903*	−0.0734	−0.0634	−0.2195***	0.0627
	(0.0380)	(0.0884)	(0.0591)	(0.0989)	(0.0518)	(0.1215)	(0.0521)	(0.0757)
Age_peer	0.0028***	0.0039	0.0044**	0.0056	0.0018	0.0158***	0.0026*	0.0055*
	(0.0010)	(0.0029)	(0.0020)	(0.0037)	(0.0017)	(0.0039)	(0.0015)	(0.0031)
Adult_peer	−0.1196***	0.0321	−0.0795**	−0.1099*	−0.0184	−0.4459***	−0.1393***	0.1472***
	(0.0193)	(0.0495)	(0.0326)	(0.0629)	(0.0300)	(0.0716)	(0.0295)	(0.0544)
Children_peer	0.1292***	−0.1119	0.0824	0.3908***	0.0676	0.2183*	0.0794	0.1129
	(0.0356)	(0.0884)	(0.0599)	(0.1044)	(0.0592)	(0.1268)	(0.0565)	(0.0901)
Household	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province	No	No	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	97,988	97,988	97,988	97,988	97,988	97,988	97,988	97,988
Adj.R²	0.4635	0.4518	0.3195	0.5263	0.5080	0.4244	0.3387	0.6852
F value at First-stage	40,977	40,977	40,977	40,977	40,977	40,977	40,977	40,977
Cragg-Donald Wald F	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Kleibergen-Paap rk LM statistic	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000

Data source: China Household Finance Survey.

enjoys income growth, the household itself would accordingly increase utilitarian consumption to meet its basic demand, and at the same time have surplus money spending in other hedonic and developmental goods or services, which facilitates the upgrading of household consumption structure.

We further divide household consumption into eight categories based on our survey data. Table 4 reports the associations between peers' income and household expenditure on these more refined consumption categories, including food, clothing, household equipment, education and recreation, medical and health care, transportation and communication, housing and other miscellaneous expenses. Consumption in most categories is affected by peer effects of income. Results indicate that the average level of peers' income has the greatest influence on household expenditure on transportation and communication, which are

significantly visible by surrounding cohorts. The estimate in column (6) shows that among all peer households, a 1% increase of income promotes the consumption in transportation and communication by 0.312%. The results are in line with peer effects of income in hedonic and utilitarian consumption mentioned above. By modeling the household consumption and felicity function, Arrow and Dasgupta (2009) illustrate that the desire for social status propels household preference to conspicuous consumption that is observable within a reference group. Therefore, most items in hedonic consumption are more likely to provoke bandwagon effects and conspicuous competition among peer households (Leibenstein, 1950), which is revealed by the statistically significant and larger coefficients based on hedonic consumption. Our results also render support to Ling et al. (2018), who suggest there is a stronger peer effect on visible consumption while the estimates for non-visible consumption are not statistically significant.

5. Mechanism

5.1. The mechanism of household income

A broad array of literature renders support to the peer effect in income, indicating that an individual's income at work is affected by the income of others (Beugnot et al., 2019; Clark et al., 2010). Nicoletti et al. (2018) provide evidence that family networks have influence on mothers' increasing outcome hours of work and stimulate female labour force participation in long run. By introducing relative income concerns into household utility functions, Neumark and Postlewaite (1998) find that women's decisions to seek paid employment depend on relative incomes of other peer women such as sisters and sisters-in-law. Schalembier et al. (2019) shows that the preferred working hours is associated with household relative income rather than absolute income. Sseruyange and Bulte (2020) also argue that social comparison has an impact on productivity. Therefore, peers' income may affect household income because of peer pressure and then affect household consumption. This article first investigates the mechanism of household income behind the nexus between peers' income and household consumption. It is widely recognised that the peer effect in income exists, implying the higher level of peer household income significantly leads to the rise in household income (Beugnot et al., 2019; Clark et al., 2010). We further focus on the linkage between household income and household consumption. Table 5 presents the impact of income on consumption in each individual households using Equation 2. In columns (1) to (4), all estimates are positive and significantly different from zero. The 2SLS and FE 2SLS estimates are 0.025 and 0.011, respectively. According to the FE 2SLS estimate in column (4), household consumption will increase by 0.173% when the household experiences a 1% lift in its income. The results are in line with the literature demonstrating the income-consumption links (Duesenberry, 1949; Leijonhufvud, 1967).

5.2. The mechanism of peers' consumption

The recent work of De Giorgi et al. (2020) documents the consumption network effects, which inspires us to explore the mediating role of peers' consumption. The peer effect in consumption has been widely recognised by previous studies. Childers

Table 5. Higher income encourages higher consumption in each individual household. This table reports the associations between household income and consumption. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
$ln(Incôme)$	0.5200***	0.6760***	0.0997***	0.1727***
	(0.0102)	(0.0163)	(0.0186)	(0.0516)
Age	0.0000	0.0029**	−0.0057**	−0.0040
	(0.0012)	(0.0012)	(0.0025)	(0.0026)
Age^2	−0.0001***	−0.0001***	−0.0000	−0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	−0.0109**	0.0066	0.0287***	0.0356***
	(0.0053)	(0.0055)	(0.0102)	(0.0108)
Married	0.1040***	0.0829***	0.0610***	0.0507***
	(0.0073)	(0.0076)	(0.0148)	(0.0166)
Schooling	−0.0080***	−0.0253***	0.0004	−0.0070
	(0.0013)	(0.0019)	(0.0025)	(0.0054)
Family size	0.0845***	0.0577***	0.1081***	0.0956***
	(0.0031)	(0.0038)	(0.0053)	(0.0096)
Children	0.0465***	0.0731***	0.0060	0.0186
	(0.0044)	(0.0049)	(0.0084)	(0.0114)
Workforce	−0.1918***	−0.2414***	−0.0149**	−0.0379**
	(0.0041)	(0.0057)	(0.0071)	(0.0170)
$ln(Netasset)$	−0.0075***	−0.0174***	0.0001	−0.0046
	(0.0010)	(0.0013)	(0.0014)	(0.0033)
Rural	−0.0552***	0.0450***	−0.0343	0.0139
	(0.0084)	(0.0117)	(0.0298)	(0.0412)
Age_peer	−0.0072***	−0.0078***	−0.0001	−0.0003
	(0.0004)	(0.0004)	(0.0007)	(0.0008)
Adult_peer	−0.0356***	−0.0054	−0.0533***	−0.0438***
	(0.0079)	(0.0083)	(0.0148)	(0.0156)
Children_peer	−0.0403***	−0.0190	0.0855***	0.0936***
	(0.0135)	(0.0137)	(0.0304)	(0.0304)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	13,2265	97,988	97,988
$Adj.R^2$	0.4005	0.3951	0.5817	0.5815
F value at First-stage		41,256		41,256
Cragg-Donald Wald F		76,000		76,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

and Rao (1992) argue that the consumption choices of peers have an impact on individual product and brand decisions. Moretti (2011) constructs a model of social learning and posits that the consumption decisions of individuals rely on information they receive from their peers. Abel (2005) elucidates that the utility of consumers depends not only on their own consumption level but on the weighted average of consumption relative to others. Thus, this article examines another plausible mechanism behind the peer effect of income in household consumption. The association between income and consumption in the reference group can further affect the household's own level of consumption.

Table 6 presents the estimation results using Equation (3). It shows the impact of peers' consumption on household consumption. In column (4), the FE 2SLS estimate suggests that the consumption level of a household would increase by 0.191% for 1% additional expenditure on consumption in its peers. It means that household consumption is

Table 6. The positive peer effect in consumption. This table reports the impact of peers' consumption on household consumption. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
$ln(Consump\hat{t}ion\_peer)$	0.5615***	0.7362***	0.1039***	0.1913***
	(0.0115)	(0.0184)	(0.0210)	(0.0583)
Age	−0.0050***	−0.0038***	−0.0066***	−0.0056**
	(0.0011)	(0.0011)	(0.0025)	(0.0025)
Age^2	−0.0000***	−0.0001***	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	−0.0454***	−0.0389***	0.0218**	0.0237**
	(0.0051)	(0.0052)	(0.0100)	(0.0100)
Married	0.1791***	0.1815***	0.0752***	0.0760***
	(0.0072)	(0.0072)	(0.0146)	(0.0146)
Schooling	0.0403***	0.0382***	0.0098***	0.0095***
	(0.0006)	(0.0006)	(0.0017)	(0.0017)
Family size	0.1611***	0.1585***	0.1220***	0.1207***
	(0.0025)	(0.0025)	(0.0043)	(0.0044)
Children	−0.0327***	−0.0311***	−0.0090	−0.0081
	(0.0040)	(0.0041)	(0.0078)	(0.0078)
Workforce	−0.0222***	−0.0184***	0.0147***	0.0167***
	(0.0025)	(0.0026)	(0.0037)	(0.0038)
$ln(Netasset)$	0.0212***	0.0203***	0.0055***	0.0051***
	(0.0007)	(0.0007)	(0.0009)	(0.0009)
$ln(Income)$	0.0223***	0.0214***	0.0109***	0.0105***
	(0.0009)	(0.0009)	(0.0010)	(0.0010)
Rural	−0.2803***	−0.2515***	−0.0797***	−0.0648**
	(0.0056)	(0.0061)	(0.0283)	(0.0290)
Age_peer	0.0088***	0.0132***	0.0029***	0.0050***
	(0.0005)	(0.0006)	(0.0007)	(0.0013)
Adult_peer	−0.1102***	−0.1037***	−0.0669***	−0.0688***
	(0.0076)	(0.0076)	(0.0147)	(0.0148)
Children_peer	−0.0538***	−0.0370***	0.0805***	0.0855***
	(0.0134)	(0.0135)	(0.0304)	(0.0306)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	132,265	97,988	97,988
Adj.R^2	0.4055	0.4008	0.5827	0.5826
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

positively related to peers' consumption. This is similar to the results in De Giorgi et al. (2020), which find non-negligible and statistically significant peer effects in consumption.

6. Heterogeneity analysis

6.1. Greater peer effect of income in consumption for female-headed households

Prior literature on consumption has discussed the gender difference in consumption patterns. The gender composition of household would lead to different decisions on consumption (Case & Deaton, 2003). Wang and Griskevicius (2014) assert that unlike for men, women's consumption in luxury products often serves as signals to other women and plays its role in interpersonal relationships. There are also numerous studies focusing on dissimilarity in different categories of expenditure by gender such

Table 7. Greater peer effect of income in consumption for female-headed households. This table reports the results from testing heterogeneous peer effect of income in consumption for male-headed and female-headed households. The interaction term between peers' income and male dummies ($ln(Income\ peer) * Male$) is introduced and tested. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
$ln(Income\_peer)$	0.2609***	0.3358***	0.0682***	0.1210***
	(0.0087)	(0.0115)	(0.0161)	(0.0290)
$ln(Income\_peer)* Male$	−0.0060	0.0003	−0.0257*	−0.0410**
	(0.0085)	(0.0098)	(0.0153)	(0.0189)
Age	−0.0061***	−0.0053***	−0.0068***	−0.0060**
	(0.0011)	(0.0011)	(0.0025)	(0.0025)
Age^2	−0.0000***	−0.0000***	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	0.0128	−0.0526	0.3042*	0.4736**
	(0.0958)	(0.1099)	(0.1709)	(0.2116)
Married	0.1747***	0.1763***	0.0737***	0.0731***
	(0.0072)	(0.0072)	(0.0145)	(0.0145)
Schooling	0.0421***	0.0406***	0.0099***	0.0098***
	(0.0006)	(0.0006)	(0.0017)	(0.0017)
Family size	0.1672***	0.1665***	0.1231***	0.1227***
	(0.0025)	(0.0025)	(0.0043)	(0.0043)
Children	−0.0380***	−0.0381***	−0.0100	−0.0098
	(0.0040)	(0.0041)	(0.0078)	(0.0078)
Workforce	−0.0306***	−0.0293***	0.0130***	0.0137***
	(0.0025)	(0.0025)	(0.0037)	(0.0037)
$ln(Netasset)$	0.0222***	0.0216***	0.0057***	0.0054***
	(0.0007)	(0.0007)	(0.0009)	(0.0009)
$ln(Income)$	0.0226***	0.0218***	0.0109***	0.0106***
	(0.0009)	(0.0009)	(0.0010)	(0.0010)
Rural	−0.3218***	−0.3055***	−0.0874***	−0.0789***
	(0.0054)	(0.0055)	(0.0283)	(0.0284)
Age_peer	0.0024***	0.0048***	0.0017***	0.0029***
	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Adult_peer	−0.1364***	−0.1382***	−0.0713***	−0.0773***
	(0.0075)	(0.0076)	(0.0148)	(0.0155)
Children_peer	−0.0169	0.0115	0.0869***	0.0972***
	(0.0134)	(0.0137)	(0.0302)	(0.0299)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	132,265	97,988	97,988
Adj.R^2	0.4055	0.4008	0.5827	0.5827
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

as education consumption (Aslam & Kingdon, 2008). Therefore, this article is concerned with the role of gender in the impact of peers' income on household consumption, by introducing the interaction term between peer household income and male-headed household dummies into regressions. The results are shown in Table 7. All estimates for peers' income remain significantly positive, while the coefficients of the interaction term turn out to be significantly negative using FE and FE 2SLS models. It implies that in female-headed households, the peer effect of income in consumption is greater. Given peers enjoy the same increase in their income, female-headed households would increase their consumption more than male-headed ones.

Table 8. Greater peer effect of income in consumption for households without liquidity constraint. This table reports the results from testing heterogeneous peer effect of income in consumption for households with and without liquidity constraints. The interaction term between peers' income and liquidity constraint dummies (ln(Income peer) * Liquidity) is introduced and tested. The dummy variable *Liquidity* indicates whether monthly consumption of household is greater than monthly income. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
ln(Income_peer)	0.2906***	0.3793***	0.0874***	0.1231***
	(0.0058)	(0.0084)	(0.0095)	(0.0244)
ln(Income_peer)* Liquidity	−0.0175***	−0.0318***	−0.0404***	−0.0767***
	(0.0068)	(0.0079)	(0.0087)	(0.0109)
Liquidity	0.7593***	0.9114***	1.0159***	1.4137***
	(0.0752)	(0.0881)	(0.0959)	(0.1212)
Age	−0.0067***	−0.0057***	−0.0035	−0.0026
	(0.0011)	(0.0011)	(0.0023)	(0.0023)
Age²	−0.0000	−0.0000**	−0.0000	−0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	−0.0535***	−0.0493***	0.0249***	0.0256***
	(0.0048)	(0.0049)	(0.0092)	(0.0092)
Married	0.1828***	0.1838***	0.0727***	0.0720***
	(0.0067)	(0.0068)	(0.0135)	(0.0135)
Schooling	0.0470***	0.0453***	0.0099***	0.0099***
	(0.0006)	(0.0006)	(0.0016)	(0.0016)
Family size	0.1580***	0.1574***	0.1217***	0.1210***
	(0.0024)	(0.0024)	(0.0040)	(0.0040)
Children	−0.0439***	−0.0439***	−0.0152**	−0.0150**
	(0.0038)	(0.0039)	(0.0072)	(0.0072)
Workforce	0.0069***	0.0078***	0.0511***	0.0522***
	(0.0024)	(0.0024)	(0.0034)	(0.0034)
ln(Netasset)	0.0245***	0.0239***	0.0075***	0.0072***
	(0.0007)	(0.0007)	(0.0008)	(0.0008)
ln(Income)	0.0556***	0.0546***	0.0408***	0.0407***
	(0.0012)	(0.0012)	(0.0012)	(0.0012)
Rural	−0.3391***	−0.3224***	−0.0891***	−0.0799***
	(0.0051)	(0.0052)	(0.0267)	(0.0268)
Age_peer	0.0032***	0.0057***	0.0024***	0.0033***
	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Adult_peer	−0.1276***	−0.1287***	−0.0588***	−0.0590***
	(0.0071)	(0.0071)	(0.0137)	(0.0144)
Children_peer	−0.0387***	−0.0102	0.0841***	0.0988***
	(0.0127)	(0.0130)	(0.0278)	(0.0277)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	132,265	97,988	97,988
Adj.R²	0.4742	0.4682	0.6473	0.6472
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

6.2. Greater peer effect of income in consumption for households without liquidity constraint

Previous findings indicate that households may change their consumption in response to liquidity constraints (Holm, 2018; Zeldes, 1989). This article further examines whether heterogeneous peer effects exist between household with and without liquidity constraints. We add the interaction term of peers' income and liquidity constraint dummies to the baseline model. The dummy measuring liquidity constraints is equal to 1 if household monthly

Table 9. Robustness test: Winsorize consumption. This table reports the results of robustness tests by winsorizing consumption to exclude the samples with consumption expenditure in the upper and lower 1%. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4)FE 2SLS
ln(Income_peer)	0.2563***	0.3361***	0.0474***	0.0873***
	(0.0052)	(0.0084)	(0.0096)	(0.0266)
Age	−0.0061***	−0.0053***	−0.0068***	−0.0060**
	(0.0011)	(0.0011)	(0.0025)	(0.0025)
Age^2	−0.0000***	−0.0000***	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	−0.0535***	−0.0495***	0.0203**	0.0209**
	(0.0051)	(0.0052)	(0.0100)	(0.0100)
Married	0.1751***	0.1763***	0.0745***	0.0747***
	(0.0072)	(0.0072)	(0.0146)	(0.0146)
Schooling	0.0421***	0.0406***	0.0101***	0.0101***
	(0.0006)	(0.0006)	(0.0017)	(0.0017)
Family size	0.1672***	0.1665***	0.1231***	0.1228***
	(0.0025)	(0.0025)	(0.0043)	(0.0043)
Children	−0.0380***	−0.0381***	−0.0100	−0.0099
	(0.0040)	(0.0041)	(0.0078)	(0.0078)
Workforce	−0.0306***	−0.0293***	0.0131***	0.0139***
	(0.0025)	(0.0025)	(0.0037)	(0.0037)
ln(Netasset)	0.0222***	0.0216***	0.0057***	0.0054***
	(0.0007)	(0.0007)	(0.0009)	(0.0009)
ln(Income)	0.0226***	0.0218***	0.0110***	0.0106***
	(0.0009)	(0.0009)	(0.0010)	(0.0010)
Rural	−0.3215***	−0.3055***	−0.0874***	−0.0788***
	(0.0053)	(0.0055)	(0.0283)	(0.0284)
Age_peer	0.0024***	0.0048***	0.0017***	0.0029***
	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Adult_peer	−0.1366***	−0.1382***	−0.0717***	−0.0778***
	(0.0075)	(0.0076)	(0.0148)	(0.0155)
Children_peer	−0.0168	0.0115	0.0873***	0.0981***
	(0.0134)	(0.0137)	(0.0302)	(0.0300)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	132,265	97,988	97,988
Adj.R^2	0.4055	0.4008	0.5827	0.5826
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

consumption is greater than monthly income and 0 otherwise. Table 8 reports the estimation results. In columns (1) to (4), the estimated coefficients of the interaction term show significantly positive. It means that liquidity constraints can lead to smaller impact of peers' income on household consumption. Compared to households with liquidity constraint, those without liquidity constraint tend to spend more on consumption expenditure when the income level of their peers moves upwards.

7. Robustness tests

Tables 9–11 report the results of our robustness tests. In these tests, we winsorize consumption, winsorize income and replace consumption and income in current period with first-order difference in consumption and income. The results of these tests are similar to our main results.

Table 10. Robustness test: Winsorize income. This table reports the results of robustness tests by winsorizing income to exclude the samples with income in the upper and lower 1%. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
ln(Income_peer)	0.2563***	0.3361***	0.0474***	0.0873***
	(0.0052)	(0.0084)	(0.0096)	(0.0266)
Age	−0.0061***	−0.0053***	−0.0068***	−0.0060**
	(0.0011)	(0.0011)	(0.0025)	(0.0025)
Age²	−0.0000***	−0.0000***	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	−0.0535***	−0.0495***	0.0203**	0.0209**
	(0.0051)	(0.0052)	(0.0100)	(0.0100)
Married	0.1751***	0.1763***	0.0745***	0.0747***
	(0.0072)	(0.0072)	(0.0146)	(0.0146)
Schooling	0.0421***	0.0406***	0.0101***	0.0101***
	(0.0006)	(0.0006)	(0.0017)	(0.0017)
Family size	0.1672***	0.1665***	0.1231***	0.1228***
	(0.0025)	(0.0025)	(0.0043)	(0.0043)
Children	−0.0380***	−0.0381***	−0.0100	−0.0099
	(0.0040)	(0.0041)	(0.0078)	(0.0078)
Workforce	−0.0306***	−0.0293***	0.0131***	0.0139***
	(0.0025)	(0.0025)	(0.0037)	(0.0037)
ln(Netasset)	0.0222***	0.0216***	0.0057***	0.0054***
	(0.0007)	(0.0007)	(0.0009)	(0.0009)
ln(Income)	0.0226***	0.0218***	0.0110***	0.0106***
	(0.0009)	(0.0009)	(0.0010)	(0.0010)
Rural	−0.3215***	−0.3055***	−0.0874***	−0.0788***
	(0.0053)	(0.0055)	(0.0283)	(0.0284)
Age_peer	0.0024***	0.0048***	0.0017***	0.0029***
	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Adult_peer	−0.1366***	−0.1382***	−0.0717***	−0.0778***
	(0.0075)	(0.0076)	(0.0148)	(0.0155)
Children_peer	−0.0168	0.0115	0.0873***	0.0981***
	(0.0134)	(0.0137)	(0.0302)	(0.0300)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	132,265	132,265	97,988	97,988
Adj.R²	0.4055	0.4008	0.5827	0.5826
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM statistic		17,000		17,000

Data source: China Household Finance Survey.

7.1. Winsorize consumption

To keep as many samples as possible, this study merely excludes the household samples with missing values for the sample selection in baseline regressions. Considering that outliers may cause estimation bias, this article winsorizes households' consumption by excluding the samples with total expenditure in the upper and lower 1%. In Table 9, the FE 2SLS results show that a 1% increase in income of peer households significantly lead to 0.09%, which is consistent with the previous findings.

7.2. Winsorize income

We also try to winsorize households' income by excluding the samples with total earnings in the upper and lower 1%. In Table 10, all results using different estimation

Table 11. Robustness test: First-order difference in consumption and income. This table reports the results of robustness tests by examining the impact of the change in peers' income on the change in household consumption over time. The first-order difference in consumption is regressed on the first-order difference in peers' income. Heteroskedasticity robust standard errors are given in parentheses. ***indicates significance at 1% level, **at 5% level and *at 10% level.

	(1) OLS	(2) 2SLS	(3) FE	(4) FE 2SLS
$\Delta ln(Income\_peer)$	0.0692***	0.3621**	0.0278**	1.6853**
	(0.0093)	(0.1650)	(0.0140)	(0.7021)
Age	−0.0073***	−0.0031	−0.0031	0.0206*
	(0.0021)	(0.0031)	(0.0058)	(0.0114)
Age^2	0.0001***	0.0000	0.0000	−0.0002**
	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Male	−0.0048	−0.0033	0.0160	0.0176
	(0.0093)	(0.0093)	(0.0232)	(0.0232)
Married	−0.0114	−0.0146	0.1266***	0.1109***
	(0.0125)	(0.0126)	(0.0340)	(0.0344)
Schooling	−0.0010	−0.0010	0.0005	0.0032
	(0.0010)	(0.0011)	(0.0037)	(0.0039)
Family size	0.0216***	0.0222***	0.0656***	0.0700***
	(0.0040)	(0.0040)	(0.0094)	(0.0096)
Children	0.0293***	0.0309***	0.0429**	0.0506***
	(0.0066)	(0.0067)	(0.0175)	(0.0177)
Workforce	0.0128***	0.0145***	0.0471***	0.0563***
	(0.0042)	(0.0043)	(0.0085)	(0.0092)
$ln(Netasset)$	0.0012	0.0011	0.0027	0.0028
	(0.0010)	(0.0010)	(0.0019)	(0.0019)
$ln(Income)$	0.0114***	0.0105***	0.0132***	0.0081**
	(0.0013)	(0.0014)	(0.0023)	(0.0032)
Rural	−0.0042	−0.0049	0.0027	−0.0200
	(0.0086)	(0.0086)	(0.0782)	(0.0786)
Age_peer	0.0015**	0.0041**	0.0033**	0.0170***
	(0.0006)	(0.0016)	(0.0015)	(0.0061)
Adult_peer	−0.0060	−0.0468*	−0.0103	−0.2674**
	(0.0130)	(0.0257)	(0.0332)	(0.1145)
Children_peer	0.0176	0.0348	0.0711	0.1223*
	(0.0226)	(0.0240)	(0.0640)	(0.0673)
Household	No	No	Yes	Yes
Province	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes
Obs	64,037	64,129	48,874	48,955
Adj.R^2	0.0369	0.0360	−0.2766	−0.2761
F value at First-stage		40,977		40,977
Cragg-Donald Wald F		75,000		75,000
Kleibergen-Paap rk LM Statistic		17,000		17,000

Data source: China Household Finance Survey.

methods tell that the estimated effect of peers' income on household consumption is slightly magnified compared with baseline results shown above. It means ruling out outliers helps to unveil the more unbiased peer effect in consumption.

7.3. First-order difference in consumption and income

Households often optimise intertemporal consumer choices to cope with the fluctuations in income over time. Therefore, this article exploits the first-order difference in consumption and income to examine the impact of the change in peers' income on the change in household consumption over time. Table 11 reports the estimation

results. According to the FE 2SLS estimate, a 1% rise in the rate of change in peer household income will facilitate a 1.685% rise in the rate of change in household consumption. It robustly shows peer effects of income in consumption exist in long run.

8. Conclusion

Interest in the extent of network effects or peer effects in consumption has increased greatly in recent years. This article contributes to three realms of the economic literature – the links between income and consumption, the peer effect in income and the peer effect in consumption – in demonstrating how peers' income affects household consumption through its effect on household income and peers' consumption.

We use unique data on Chinese households during 2011 and 2019 to examine the causal relationship between the average income of reference group and the consumption of the household. By identifying peer households as cohorts living in the same region, in the same age group and with the same level of education, we investigate the peer effect of income in consumption, mapping the relationship between intragroup income and individual consumption. Our main findings indicate that peers' income is positively and causally related to the household's own level of consumption, which means on average, households with richer peers have higher level of consumption. Meanwhile, the structure of household consumption gets improved with the increase of peer household income. We also find that both promoted income and peers' consumption can play mediating roles in the positive impact of peers' income on household consumption. Heterogeneity analysis shows the peer effect of income in consumption is relatively greater for female-headed households and households without liquidity constraint. All results are robust to various specifications.

Our findings provide policy implications related to improving the level of income within a group rather than zooming in on that in an individual household. Household consumption benefits not only from household's own income but also from the average income of a peer group where the household is positioned. This peer effect in consumption could be multiplied when a larger population enjoys income promotion as a whole. It implies the expansion of the country's middle-income group usually improves the country's spending power. In this way, how to improve the overall income and narrow the income disparity is of vital importance. Future work that further investigates the risk of households falling into a debt trap (Yue et al., 2022) in the presence of peer effects in consumption, would be an important contribution to the literature. Another fruitful area for future work is to extend the framework that simultaneously discusses peer effects in different consumer behaviours. The peer effect of income in other household decisions on renewable energy consumption (Wang et al., 2020), for example, would be an interesting extension.

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