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Rising Trends of Single-Person Households and Its Economic Consequence in China

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Abstract

This paper explores the main features of single-person household nowadays and its changing composition, the impact of changes in household structure and demographic on the income distributions and expenditure among Chinese residents based on the 1988-2018 household survey data (CHIP) of the Chinese Resident Income Distribution Research Group. Overall, the aged people and young adults (between 25 and 35) are the major forces accelerating the phenomenon of single-person household; increasing in education level and the changing perception towards marriage also contribute to the situation. Changes in household structure play major role in explaining changes in household per capita income and expenditure, indicated by the miniaturized households are overall having higher average income and expenditure level. From a macroeconomic perspective, due to this shift of income distribution among different types of household, the benefits brought by economies of scale would gradually transfer from inside to outside of the household.

Keyword : Household Structure, Single-Person Household, Demographic Features, Household Income and Expenditure

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I. Introduction

During the past few decades, China has undergone tremendous changes in household structure, which are highlighted by the miniaturization of family size; since the 1980s, China's implementation of promoting the one-child policy had a significant impact on family structure. In recent years, with the change of young people's concept of fertility, the miniaturization of family size has been further accelerated (Luo & Yan, 2020). Based on the data from National Bureau of Statistics of China, the single person household and two person household ratio rose from 7.7% to 18.5%, 18.4% to 29.5% respectively, during the past 20 years. On the contrary, the ratio of households with three or more people has been decreasing dramatically. This kind of trend also happens in other countries in the East Asian region as well; data from Statista shows that South Korea had reached a nationwide average percentage of single households of around 30.4% in the year 2020, while Japan's ratio had reached more than ⅓ as early as 2015. According to Yeung and Cheung (2015), single living state in Asia is not only an urban phenomenon, just like other western societies. While this kind of trend is widely common in most economically advanced countries, like Japan and South Korea; older men and women from rural areas in other developing countries, such as Myanmar and Vietnam, are more likely to live alone than the ones living in urban areas because of the rapid rise in the migrant labor force, which has resulted in an increasing number of young married couples and single people living by themselves in urban areas, leaving more elderly people living alone in rural areas. In China and many southeast Asian countries, a large number of young people live in collective dormitories, without regular family members. Another special feature in Asian societies

is that a considerable amount of elderly people living alone have children or relatives living nearby.

This increase in single households has been driven not only by falling birth rates, but also because people are more likely to delay some of their major life events, like getting married and having children (Tonby, 2021). These kind of demographic changes in family structure may change the allocation rules of resources among family members to a large extent, and also affect the risk diversification function of the family, as a result affecting the income gap between residents (Schultz, 1982; Lerman, 1996; Martin, 2006; Maia & Sakamoto, 2016).

This sharply increasing proportion of single-person households has led to the phenomenon of the rising single economy, often referred to as "solo economy", which can be defined as the new consumption patterns occurred by this enlarging living-alone group. The changing consumption pattern is not limited to products. The service and entertainment industries are also catching up to serve this growing population, with restaurant tables and travel packages designed for solo travelers, businesses are thinking desperately about experience to redesign the operation system to align with solo lifestyle and identity (Sandal, 2022). The concept of single economy was derived from a published article "The Bridget Jones Economy" on *The Economist* in 2001, brought up by an economist named F.T. McCarthy. The author points out that the improving educational level among women and economic independence are the main reasons for the rise of the single-women economy. With the continuous expansion of the scale of the single group and the differentiation of the internal structure, the concept of the single woman economy was extended to the single economy (Wu, 2022), in which the term of single economy does not only include the single

women in specific, but also refers to single group in general. In this paper, the single household refers to people who live alone in all ages regardless of gender.

Therefore, what are the motivations behind this enlarging single group to step into the solo-living stage? Does income become a main driving force in the circumstance? What are the characteristics within the groups, including aspects like education level, age group and career industry of the household head? What kinds of economic impact would this rising phenomenon of miniaturizing family size potentially cause? Did the income gap among different types of households enlarged by the change of household structure? These are some of the questions that the paper is trying to clarify based on the micro household data that are currently available.

Some previous studies have discussed the impact of the changing household structure on the differentiation in income distribution among different types of households (Luo & Yan, 2020); however, the household income per capita used in the papers were not adjusted for household size and age structure. Therefore, a proper equivalence scale is adopted in this paper to calculate an adjusted household income and expenditure per capita to narrow the income and expenditure gap between different types of households. Based on the results of adjusted income and expenditure, comparing the effects of the demographics features, such as the composition of the household, on household income and expenditures.

II. Literature Review

1. Household Scale Economies Theory

The early theory of economies of scale applied to enterprise production was proposed by Adam Smith (1776), Mill (1848) and other scholars, and was further studied by Marshall (1890). Marshall believed that there are two possible ways for enterprises to form economies of scale, internal economies of scale and external economies of scale. Internal economies of scale means that enterprises improve operational efficiency through the full utilization and deployment of their own resources, and external economies of scale improve efficiency through rational distribution of labor division and cooperation among different enterprises. Samuelson (1948) proposed a clearer understanding about economies of scale based on cost theory: when the scale of an enterprise expands, due to the effect of economies of scale, the production cost of an enterprise will continue to decrease until a moderate production scale occurs. It can be seen that the economy of scale of enterprises is achieved by expanding the scale of production of enterprises.

In consumer economics, the theory of economies of scale is applied to household consumption behavior, especially in household consumption that is influenced by household demographics. For example, when the elderly and their children live together, economies of scale in household production and consumption can be achieved (Cheng, Zhang & Liu, 2013). The adjustment of family population size is closely related to the economies of scale in consumption (Zou, Yu & Li, 2013). For consumer goods with economies of scale, household consumption expenditure will be less than

the sum of the individual consumption expenditures of household members (Mao & Xu, 2014). It can be seen that in consumption economics, the family is the basic economic unit of society and also an independent consumption unit. The labor input income or property income of some members of the family is shared by all family members, so that consumption produces economies of scale, and the per capita consumption of the family reduces accordingly.

The existence of household scale economies confirms that there is some heterogeneity among members living in households with different population sizes and demographic structures, and household equivalent size is used as a measure of scale economies after the population structure is subdivided. The standardized values are used to eliminate the effects of population size and demographics. It can be seen that the equivalent size of a family is the population size that includes the individual differences of family members, rather than the simple sum of the number of family members. By incorporating individual differences into the study of family welfare, poverty and income distribution, it is more scientific to use the equivalent size of a family as a measurement factor rather than use the actual size of a family population to calculate the average level of living standard of a family.

2. Equivalence Scale

An equivalence scale is known as “a measure of the cost of living of a household of a given size and demographic composition, and its relation to the cost of living of a reference household (usually a single adult), when both households attain the same level of utility or standard of living.”

Equivalence scales are hard to define and construct because household utility cannot be directly measured in most cases, which results in economic identification problems. (Lewbel & Pendakur, 2008)

The first models of equivalence scales date back to the 19th century. Engel (1895) found that there is a negative correlation between the share of food expenditure and total household expenditure, and then proposed the Engel method. He pointed out that the richer the family, the less the proportion of food expenditure in the household budget, and as the size of the household population increases, the share of food expenditures increases. Deaton and Muellbauer (1980) confirmed the existence of household economies of scale under Engel's assumptions and explanations. In the next year, Lazear (1981) found that a two-adult household consumes 31-35% less than a two single-adult household.

Families have certain economies of scale effect in terms of housing, food, etc. The existence of the effect leads to the famous "Deaton and Paxson paradox", that is, with the increase of family members, the share of a certain type of consumption decreases (Deaton, A. and Paxson, C., 1998). Normally, all consumption items of households have economies of scale, and the economies of scale of shared goods will be relatively high.

Kakwani and Son (2005) pointed out that in poor families, clothing can even be shared to a certain extent through inheritance among family members, and there is a corresponding scale economy effect. Halliday (2010) found in the study that affected by the household demographic features, the survey of family income and consumption at a certain point in time was biased, so it was determined that there were economies of scale within the family. Trevon D. Logan (2011), aiming at the "food problem" and the old economies of scale model in the United States, pointed out that if larger

families can enjoy welfare with lower per capita expenditure, then the household scale economy effect is very important for measuring living standards. The paper confirmed the existence of family scale economic effects. The effect of household scale economy will change significantly at different time nodes.

3. Gender of Household Head

A lot of articles in the past had examined the distinct relationship between female-headed household and poverty, because, in the past society, family income was excessively dependent on the agricultural and husbandry industry, which was mainly based on physical strength; some regional culture and rites also limited the development of women, which reinforced the male-dominated status in the family. Ramaprasad Rajaram (2009) conducted relative research in rural India, the results of the analysis prove that the correlation between female-headed households and poverty are significant depending on poverty indicators. To be more specific, poverty measures based on housing conditions and wealth index show that female-dominated households are less poor than male-dominated households. But female-dominated households are poorer than male-dominated households based on the standard of living Index measure of poverty.

According to World Bank Group's report in 2018 which consists of samples from 89 different countries in the world (see Table.1), the overall ratio of female and male headed households is about 1:3; however, in terms of the poverty rate, the female-headed and male-headed households are 5.8 and 9.0, respectively, with a 8.2 poverty rate of all households. The share of

poor households indicates the same patterns, in which female-headed households take 16.4 percent of the share while male-headed households take 83.6 percent.

FIGURE. 1

HOUSEHOLD POVERTY RATE BY SELF-REPORTED HEADSHIP AND DISTRIBUTION OF POOR HOUSEHOLDS BY HEADSHIP

	POVERTY RATE	SHARE OF POOR HOUSEHOLDS	SHARE OF TOTAL HOUSEHOLDS
Female headed households	5.8	16.4	23.5
Male-headed households	9.0	83.6	76.5
All households	8.2	100	100

Source: World Bank staff calculations based on GMD

Therefore, when considering the income distribution among different household types, the gender of the household head can be an important factor to consider, whether the influence of the gender of the household head has changed during decades.

4. Educational Attainment

Since the later 20th century, numerous studies and research have been done on the rate of return to education. Card (1999) and Harmon (2003) used regression equations to verify that there is a statistically positive correlation between education and income. Psacharopoulos (1994) reviewed the studies on education return rate in more than 100 countries, showing that the world's average education return rate is about 11%. The return on education of women is higher than that of men, because compared with men,

highly educated women are much less common; The rate of return to education decreases as GDP per capita increases, from about 11% in low and middle-income countries (income per capita below $2,449) to about 7% in high-income countries (income per capita above $7,620). American economist Buchinsky (2001) used quantile regression model to analyze the population survey data and pointed out that in the 1960s, the educational return rate of the low-income class was higher than that of the high-income class, and in the 1990s, the educational return rate of the high-income class exceeded that of the low-income class. These studies suggest that human capital generated by education is the most important factor in income determination.

In China, there are also many articles conducted to explain the relation between education and income based on household structure. Liu, Huo and Chen (2022) uses the method of percentile structure analysis to analyze the internal structure of household income inequality caused by educational homogeneity in marriage. The results showed that there are significant differences in the distribution of total household income in China in terms of the education level of the household head. A small number of well-educated families hold a relatively large share of social wealth. The income disparity caused by education further aggravates the income gap of Chinese families. Moreover, both the sample size and the income share of the low-low education combination households show a downward trend, and the income decline is much higher than the sample size. The number of families with high-high or high-low education level combinations are increasing, accounting for more social income.

III. Data & Methodology

1. Data Description

1-1. Data Sources

The data used in this paper come from the previous household survey data of China Household Income Project (CHIP) led by China Institution for Income Distribution. The project has conducted the first national household survey since 1988, and collected household characteristics, personal information, income and expenditure status of urban and rural residents. Since then, household survey data of corresponding years have been collected in 1995, 2002, 2007, 2013 and 2018 respectively; in addition to this, the migrant data are available as a separate category from 2002, 2007 and 2013. The household samples for the CHIP data were all drawn from the large sample frame of the National Bureau of Statistics' annual household survey, and the income and expenditure information was also obtained from the journals of the National Bureau of Statistics' household survey.

1-2. Data Definition and Explanation

The period from 1988 to 2018 was a critical period for China to carry out the reform of the market economic system. After entering the 21st century, China began a period of rapid modernization. The data during this

period recorded a lot of information about income and expenditure. The following is an overview of the data used:

In terms of sample selection, we used all six years of data provided by CHIP, in which data with missing values on household head information were excluded from the analysis.

1-2-1. Income and Expenditure

In this paper, the definition of annual total **income** includes income generated by human capital, and is considered as the only source of income, which excludes dividends, bonuses, price subsidies, regional subsidies, minimum living guarantees, amateur income, gains from investment and other kinds of income. The total household income is equal to the sum of the wage income of each household member.

Household **expenditure** refers to all expenditures that residents use to meet the daily consumption needs of households, including both cash consumption expenditure and physical consumption expenditure. Consumption expenditure includes food, tobacco and alcohol, clothing, housing, daily necessities and services, transportation and communications, education, culture and entertainment, medical care, and other supplies and services based on the definition from the National Bureau of Statistics of China. The household expenditure data in 1988 is not offered by CHIP data, this might be due to the food stamp offered by the Chinese government during the 1950s to early 1990s; the expenditure data are available for the rest of the years.

The household income and expenditure data used in the regression equation are the equivalised income per capita and expenditure per capita obtained by using the original income and expenditure data divided by equivalent household size.

Among them, the number of household size is the equivalent household size obtained through dividing the original household size by the modified OECD equivalent scale (See Equation (1).).

1-2-2. Age

The "**age**" variable: refers to the age of the head of the household in the year when research was conducted; the age variables of the migration household in 1988, 1995, 2002 and 2007 are directly filled in by the survey data; while the urban and rural household in 2007, 2013 and 2018 Household age variables are calculated by subtracting the year of birth from the year of the survey (without considering the month of birth).

1-2-3. Education

The "**education**" variable refers to the years of education the household head finished by the year of doing research. Since the way of asking education attainment was different in the past, "years of education achieved" in 1988 data set are converted according to the following criteria: college = 16, junior college = 14, high school graduation = 12, junior high school graduation = 9, primary school graduation = 6, three years or more = 4, three years or less = 2 and no schooling = 0.

"Years of education achieved" data in all the other years are numbers that are filled in directly by the household members.

1-2-4. Dummy Variables

This paper uses the following dummy variables:

①. Household head gender dummy variable **"male"**: set 0 for females and 1 for males. To test whether male or female-headed households are more significant in the income distribution and expenditure of households than the other.

②. Area dummy variables **"urban"**: since CHIP data are categorized into "urban" and "rural" in all six years with additional "migrant" category in the years 2002, 2007 and 2013, we want to eliminate the effect of the area due to the fact that in urban household would have a higher income and expenditure level compared to the rural and migrant household in general.

③. The dummy variables refer to the marital status of household heads are categorized into four groups:

a. **"Married"**: currently in a marital relation, includes first-time marriage and remarriage, etc.
b. **"Singlehood"**: refers to the group of people who have never married.
c. **"Divorced"**
d. **"Widowed"**

The marital status data in 1988 are not available from CHIP; therefore, for the consistency, the results involving marital status will not include results for 1988.

④. The industry dummy variable of the primary job of the household head, nearly 20 different industry classifications are divided into three categories according to industry classification (The classification is based on "National Economic Industry Classification" on the National Bureau of Statistics of China):

a. **"First industry"** or "primary industry": refers to agriculture, forestry, animal husbandry and fishery industries (excluding agricultural, forestry, animal husbandry and fishery service industries); the above industries are set to 1 and the rest to 0.
b. **"Second industry"** or "secondary industry": refers to mining industry (excluding mining auxiliary activities), manufacturing industry (excluding metal products, machinery and equipment repair industry), electricity, heat, gas and water production and supply industry, construction industry; the above industries are set to 1 and the rest to 0.
c. **"Tertiary industry"** or "third industry": the service industry, which refers to other industries other than the primary industry and the secondary industry. The tertiary industry includes: wholesale and retail, transportation, warehousing and postal services, accommodation and catering, information transmission, software and information technology services, finance, real estate, leasing and business services, scientific research and technical services industry, water conservancy, environment and public facilities

management, residential services, repairs and other services, education, health and social work, culture , sports and entertainment, public administration, social security and social organizations, international organizations, and others; the above industries are set to 1 and the rest to 0.

⑤. There are four types of dummy variables for family structure classification:

a. "**Single**" : a one-person household or a single-living household, the household includes only the head of the household, and the head of the household is 14 years old or older
b. "**Two_adults**" : a family of two, with two adults over the age of 14
c. "**Parent_Child**" : a family of three, with two adults over the age of 14 and one child under the age of 14
d. "**Three_adults**" : a family of three, with all three adults over the age of 14

(The age group is divided based on the modified OECD equivalence scale. According to the modified OECD, the equivalence scale used by “adults” over 14 years old is roughly similar, and its gap between the group under 14 years old is widened.)

2. Methodology

As mentioned in literature review, due to the effect of household economies of scale, we have to first calculate the equivalence household income and expenditure using the modified OECD equivalence scale.

"The modified OECD scale" : adopted by EUROSTAT in the late 1990s, which is also known as the revised version of "old OECD equivalence scale" in the 1980s. This scale was first proposed by Haagenars et al. (1994), assigning a value of 1 to the head of household, 0.5 to each additional adult member(aged 14 or above), and 0.3 to each child (aged below 14) :

For household head aged above 14, generate α;

For each additional member aged above 14, generate Â;

For each member aged below 14, generate ç;

For individual household equivalent scale:

$$\hat{S} = \alpha + g\,\hat{A} + \theta\,ç \qquad (1)$$

In which α = 1, Â = 0.5, ç = 0.3

Then, calculate modified household income per capita (Ĭ) and expenditure per capita (Ĕ) using individual household scale calculated in (1):

$$\text{Where} \quad \breve{I} = I / \hat{S} \qquad (2)$$

$$\breve{E} = E / \hat{S} \qquad (3)$$

The contribution of demographic characteristics within the households to household income and expenditure are obtained without controlling other factors affecting income and expenditure, therefore on the basis of including other factors. Estimate the following two linear regression equations:

$$\ln\check{I} = \alpha + \beta\text{structure} + \delta X + \varepsilon \quad (4)$$

$$\ln\check{E} = \alpha + \beta\text{structure} + \delta X + \varepsilon \quad (5)$$

Where $\check{I}$ represents the per capita income (calculated through (4)) and $\check{E}$ represents the per capita expenditure (calculated through (5)) of the family; "structure" represents different groups of household structure, that is, the family population size, family population structure and individual age structure. X represents the control variables, including the region of the households and characteristics of the household head, such as age of the household head, education level of the household head, gender of household head, industry category of the primary job of household head. ε is the random error in the measurement. Below are the two detailed versions of the equation (4) and equation (5):

$$\begin{aligned}\text{In (income}_i) = {} & \beta_0 + \beta_1 (\text{Single-person Household}_i) + \beta_2 (\text{Two-adult Household}_i) + \beta_3 (\text{Parent-Child Household}_i) + \beta_4 (\text{Three-adult Household}) + \beta_5 (\text{Male}_i) + \beta_6 \ln(\text{Education}_i) + \beta_7 \ln(\text{Age}_i) + \beta_8 (\text{Urban}_i) + \beta_9 (\text{First industry}_i) + \beta_{10} (\text{Second industry}_i) + \beta_{11} (\text{Tertiary industry}_i)\end{aligned} \quad (6)$$

$$\ln(\text{expenditure}_i) = \beta_0 + \beta_1(\text{Single-person Household}_i) + \beta_2(\text{Two-adult Household}_i) + \beta_3(\text{Parent-Child Household}_i) + \beta_4(\text{Three-adult Household}) + \beta_5(\text{Male}_i) + \beta_6 \ln(\text{Education}_i) + \beta_7 \ln(\text{Age}_i) + \beta_8(\text{Urban}_i) + \beta_9(\text{First industry}_i) + \beta_{10}(\text{Second industry}_i) + \beta_{11}(\text{Tertiary industry}_i) \quad (7)$$

Table. 2 & Table. 3 list the regression results of equation (6) & (7), respectively.

The results from the above equations can provide a general overview about the relationship between income distribution (or expenditure level) and different attributes of households.

To examine the characteristics of single household, we want to take a closer look at how the control variables related to the single households during the same time period by estimating the logistic regression equation:

$$\text{Logit}(p) = a + b_1X_1 + b_2X_2 + \ldots + b_nX_n \quad (8)$$

Where Logit(p) is a shortcut for log(p/1-p),

And p = P{Y = 1}, meaning the probability of "success" or the presence of a certain outcome;

Therefore,

$$\text{logit}(p) = \log\left(P\{Y=1\} / P\{Y=0\} \right) \quad (9)$$

The result of logit(p) is also called log-odds ratios;

$X_1, X_2 \ldots X_n$ are predictor variables.

Here is the equation of the function (8) for single-person household:

$$\text{Logit (Single-person Household}_i) = a + b_1 \ln(\text{Education}_i) + b_2 \ln(\text{Age}_i) + b_3 \ln(\text{Male}_i) + b_4 \ln(\text{Urban}_i) + b_5 (\text{Tertiary industry}_i) + b_6 (\text{Married}_i) + b_7 (\text{Singlehood}_i) + b_8 (\text{Divorced}_i) + b_9 (\text{Widowed}_i) \quad (10)$$

Table. 1 demonstrates the logistic regression results of equation (10).

IV. Results

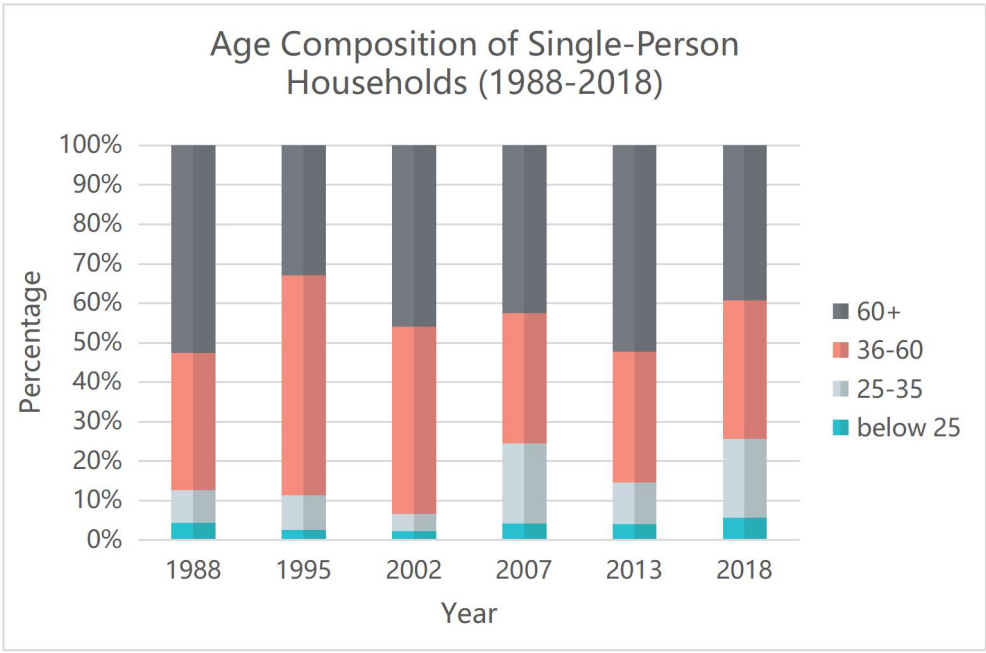
1. Overview of Single-Person Household

1-1. Age Composition

Based on the CHIP data of urban and rural households, the age composition of China's single-person household are shown in Figure. 2. From the figure, we can see that the aged group (people aged over 60) is taking a bigger portion than it was in 1995, and has become the largest age group within the single household in 2013 and 2018, with around 52 and 39 percent respectively; while the ratio of the group with people aged between 36 to 60 decreased dramatically. The younger group with people aged between 25 and 35 are taking a bigger proportion in recent years as well, which indicates that more young adults in their 20s or early 30s are living by themselves.

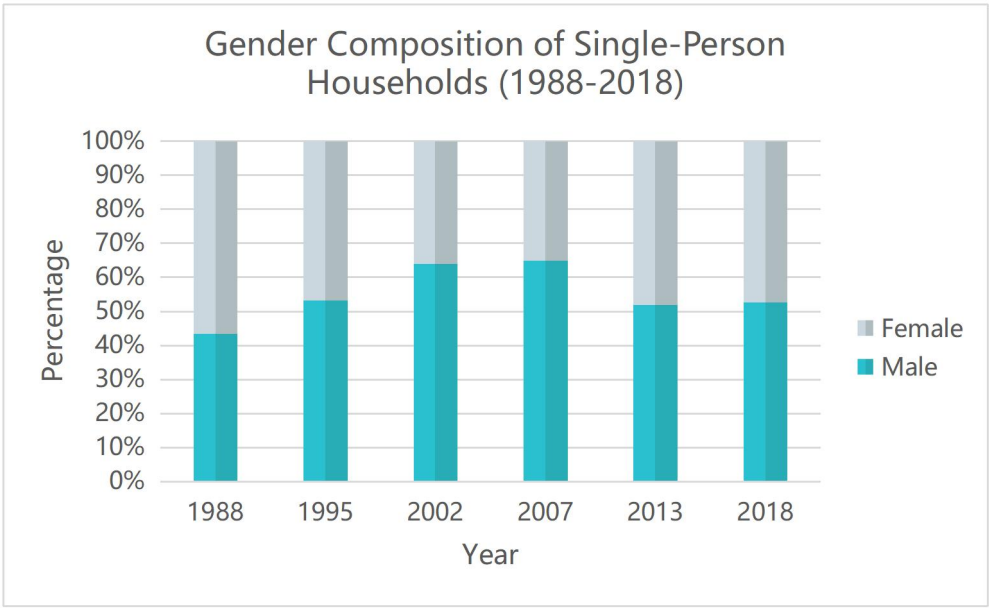
This changing age composition of single-person household also brings up the attention considering the issue of safety and convenience of the aging population and young adults who are living by themselves.

FIGURE. 2



Data Source: CHIP

FIGURE. 3



Data Source: CHIP

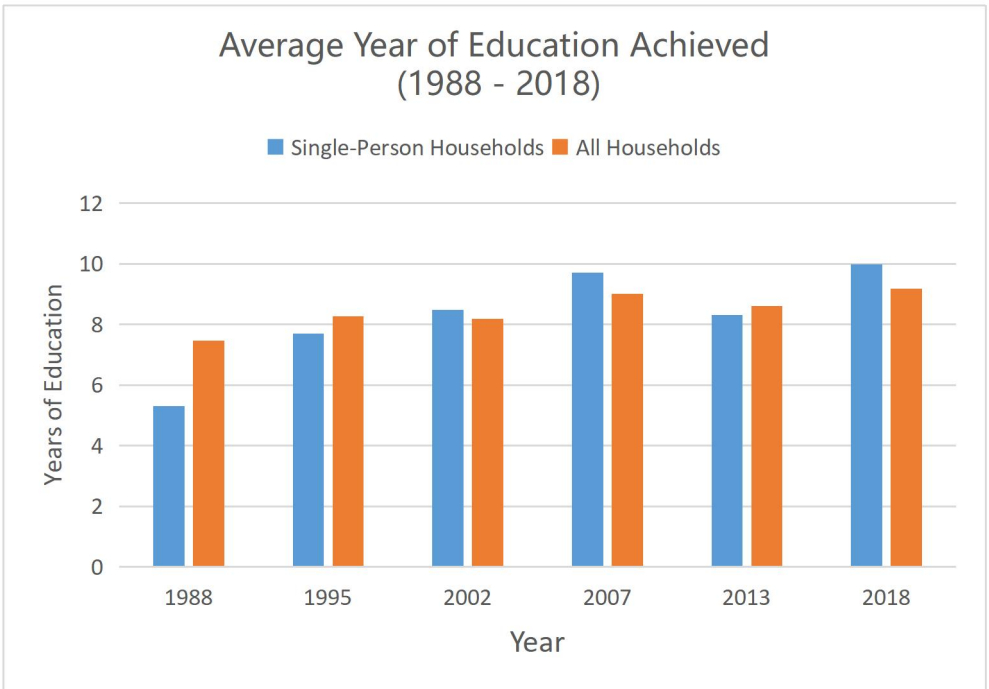
1-2. Gender Composition

Looking into the overall gender composition of single-person households (Figure.3), in 1988, female took up a larger proportion, about 56 percent, of the solely living group, while in 2002 and 2007, male dominates the group by occupying more than 60 percent proportion. In the recent years 2013 and 2018, it approaches a quite balanced state between male and female within the group, with a slightly larger share by male. It indicates the trend nowadays that both male and female are equally preferring single living state.

1-3. Education Attainment

From Figure. 4, we can see that the overall average education attainment of single-person households increased dramatically, from about 5 years in 1988 to around 10 years in 2018. Compared with the average attainment of all household heads, the education level of single living group was much lower in earlier years; however, after 2002, the average education level of single-person household was overall higher or about the same as the overall average education level, which only increased about 1.6 years by 2018.

FIGURE. 4



Data Source: CHIP

2. Logistic Regression of Single-Person Household

Based on the results in Table. 1, we can see how demographic characteristics are correlated with the likelihood of being a single-person household.

The urban households hold a clear negative correlation in this case from 2002, 2007 and 2013, which are the three years with migrant data. The result in the latest year shows a reverse positive correlation of 0.537. Results in 1995 for the urban variable are not significant.

In terms of education level, it had clear positive correlation in 2007, 2013 and even a stronger positive correlation in 2018. The significance level of 0.493 in 2018 means that each unit increase in education level results in 0.493 increase in log-odd ratios of single-person households. This indicates that, overall, people nowadays who finished more years of education would be more likely to live by themselves. The results for 1995 and 2002 are not significant.

The age and gender of the household head have played a significant role in determining the features of single-person households. In 1995, the age of the household heads had a strong positive correlation with single-person households of 2.201. From 2002 and 2007, the correlation of the variable turned in a strong negative direction, with the distinctive significance level of -2.788 and -1.808, respectively; age results for the recent 2013 and 2018 are not significant. Moreover, gender also has negative correlation during the period from 2002 to 2013 with single-person households, indicating females are more likely to live by themselves rather than male.

The role of industry variable here fluctuates from positive to negative to positive again in 2002, 2007 and 2013, does not show any predictable trend in this case. The results for 1995 and 2018 are not significant.

Comparing the results of four groups in terms of marital status, unsurprisingly, married people are less correlated with the single living state during the whole period of time; from 1995 to 2013, household heads who had never married and who had divorced are the top 2 groups of people that are more likely to be single-person households. In the results of 2018,

widowed group are becoming the second highest correlation followed by singlehood inferring the rising trend of widowed single-person households.

TABLE . 1

VARIABLES	1995 single	2002 single	2007 single	2013 single	2018 single
ln_education	0.0691	0.117	0.393***	0.380*	0.493***
	(0.305)	(0.220)	(0.128)	(0.226)	(0.166)
ln_age	2.201***	-2.788***	-1.808***	-0.122	0.108
	(0.717)	(0.395)	(0.159)	(0.356)	(0.280)
male	-0.144	-0.609***	-0.685***	-0.397**	0.0241
	(0.368)	(0.187)	(0.0935)	(0.174)	(0.139)
urban	0.368	-1.738***	-2.913***	-0.283*	0.994***
	(0.432)	(0.235)	(0.137)	(0.169)	(0.145)
tertiary_industry	-0.210	0.987***	-0.587***	0.324**	-0.152
	(0.356)	(0.171)	(0.0710)	(0.143)	(0.124)
married	7.949***	12.13***	14.01***	-1.523	-2.210***
	(0.405)	(0.692)	(0.376)	(1.035)	(0.352)
singlehood	13.02***	15.05***	17.80***	3.737***	2.959***
	(0.403)	(0.708)	(0.386)	(1.042)	(0.372)
divorced	12.95***	15.54***	16.90***	2.234**	1.267***
	(0.429)	(0.758)	(0.440)	(1.034)	(0.364)
widowed	12.35***	14.96***	16.16***	1.956*	1.518***
	(0.274)	(0.756)	(0.481)	(1.035)	(0.384)
Constant	-23.38***	-6.755***	-9.176***	-3.380*	-4.468***
	(2.804)	(1.586)	(0.734)	(1.887)	(1.284)
Observations	13,317	16,892	11,246	11,322	13,842
Pseudo R-squared	0.3776	0.2922	0.5501	0.4476	0.4377

***, **, and * denote 1%, 5%, and 10% significance levels in turn.Standard errors in parentheses.

3. Per Capita Income

After looking into the different demographic characteristics of single-person household, we want to compare it with other types of household as well, and further examine the economic consequences from the income (Table. 2) and expenditure (Table. 3) level.

According to the data from 1988 and 1995, the significant coefficient between per capita income and single-person households is lower than that of two-adult households, parent-child households and three-adult households. Especially in the year 1995, the correlation between single-person household and per capita income is -0.132, which means a single-person household in 1995 would have an overall 13.2% lower per capita income compared to other households. On the contrary, the results from 2002 to 2018 show that the positive correlation between per capita income and single-person households is the highest (2002 and 2013) and the second highest (2007 and 2018) during this period among that correlations between two-adult households, parent-child households and thee-adults households. In addition, the correlations between per capita income and two-adult households stay the highest among the households (except for the years 2002 and 2013), indicating that two-adult households overall have higher per capita income than other types of household. The correlation results of parent-child households and three-adults households have also decreased relatively compared to single-person households.

The region of households also has significant correlation with household per capita income, this is demonstrated by a strong negative correlation result of urban households in 1988 of -3.037, and totally a

converse in all the other years. From 1995 to 2018, urban households show a consistent positive trend in correlation with per capita income, which reaches 0.709 in the year 2018, showing a distinctive income gap between urban and rural household.

For the characteristics of household heads, the results from 1988 to 2018 consistently show that male-headed households have a clear negative correlation with per capita income; from having -0.164 in 1998 to -0.059 in the recent 2018, which indicates that male-headed household overall have 16.4% lower per capita income in 1988 than that of female-headed households, and this income gap between male-headed households and female-headed households are shrinking from the results.

In terms of the education level of the household head, the positive correlation with per capita income maintained during the whole period, the more years of schooling the household head achieved, the higher the per capita income of the household. According to the data, from 1988 to 2018 the significance of the number of years of schooling of the household head to household per capita income kept increasing, from 0.067 in 1988 to 0.517 in 2018.

The age of the head of household also has a significant impact on household per capita income. From 1988 to 1995, there is a continuously positive correlation between the age of household head and household per capita income, with the highest one of 0.244 in 1995. That is, with a 1% increase in the age of the household head, the per capita income of the household increased by 0.244%. Starting from 2002, this significance level became negative, with a -0.069 and -0.116 in 2002 and 2007, respectively.

The industries of the primary job of the household heads also play a certain role in determining the household per capita income. From the chart, we can see a negative correlation of primary industry and per capita income in 1988 with a significance level of -0.176 while the results for secondary and tertiary industry are not significant. In 1995, the significance level of households with its household head working in the primary industries and secondary are lower than households with tertiary industries working household heads, indicating households with its head working in tertiary industries have a relatively higher per capita income level. For the remaining years, the results of primary industry and some secondary industry are statistically insignificant.

Table. 2: Income

	1988	1995	2002	2007	2013	2018
single	.197*	-.132*	.583***	.482***	.265***	.259***
	(.108)	(.078)	(.041)	(.02)	(.034)	(.029)
two_adults	.353***	.183***	.444***	.597***	.188***	.294***
	(.035)	(.021)	(.016)	(.019)	(.019)	(.016)
parent_child	.245***	.125***	.268***	.379***	.208***	.192***
	(.02)	(.016)	(.015)	(.02)	(.02)	(.019)
three_adults	.212***	.159***	.261***	.251***	.175***	.184***
	(.027)	(.016)	(.014)	(.019)	(.016)	(.015)
ln_education	.067***	.161***	.313***	.308***	.447***	.517***
	(.017)	(.015)	(.014)	(.019)	(.02)	(.016)
ln_age	.06**	.244***	-.069***	-.116***	-.016	-.02
	(.026)	(.026)	(.026)	(.025)	(.032)	(.029)
male	-.164***	-.107***	-.206***	-.026*	-.097***	-.059***
	(.03)	(.015)	(.016)	(.015)	(.019)	(.016)
urban	-3.037***	.665***	.55***	.692***	.361***	.709***
	(.023)	(.019)	(.014)	(.017)	(.015)	(.013)
first_industry	-.176**	-.722***	.079	-.081	.193	-.13
	(.086)	(.143)	(.053)	(.053)	(.203)	(.105)
second_industry	.054	-.453***	.219***	-.084***	.321	-.022
	(.086)	(.142)	(.051)	(.027)	(.202)	(.103)
tertiary_industry	.053	-.407***	.312***	-.049*	.368*	.05
	(.086)	(.142)	(.051)	(.026)	(.202)	(.103)
_cons	7.281***	7.217***	7.842***	8.962***	8.692***	8.872***
	(.14)	(.181)	(.118)	(.11)	(.249)	(.162)
Obs.,	16538	13309	16887	11229	11273	13588
R-squared	.708	.462	.336	.335	.246	.408

***, **, and * denote 1%, 5%, and 10% significance levels in turn.Standard errors in parentheses.

4. Per Capita Expenditure

The impact of household size and structure on household per capita expenditure also show distinctive significance. From the result of 2002, 2007, 2013, and 2018, where the all of four household types are significant, the correlation between per capita expenditure and single-person households are positive and overall higher compared with other types of households except for the year 2007. It clearly demonstrates a rising expenditure trend of single-person households, while the result of single household in 1995 is not statistically significant. The correlation between two-adult households and per capita expenditure are slightly decreasing during the whole period, dropping from 0.200 in 1995 to 0.172 in 2013 and 0.191 in 2018. However, if we compare the significance level of two-adult households with the other 3 types of household, we could find that it has a relatively higher expenditure per capita than the other types of household in 1995 and 2007. If we take a look at the significance level of parent-child households on expenditure, it increases overall, and jumps to the highest in coefficient among these households in 2013 and 2018. This means parent-child households have higher expenditure levels than the other types of households nowadays which reflects the great significance of the cost of raising a child, and lower economies of scale in consumption in such a type of household.

With no surprise, the region of the household impact the expenditure level of household, with urban households having higher expenditure compared to the households in rural area; the results in 1995 show a significance level of 0.294 and increased to 0.614 in 2002. According to the

most recent result of 2018, urban households have overall 45.6% higher in per capita expenditure than migrant and rural households.

Considering the characteristics of household heads, the results from 1995 to 2018 show that male-headed households and household per capita expenditure have an all-time negative correlation, which means male-headed households spend less than female-headed households in all time periods recorded. The result of this gender variable is not significant in the year 2007.

In terms of education level, despite for the households with a household head having more years of education tends to have a higher per capita income, their per capita expenditure is also higher; the trend is going upward as time goes by, rises from 0.259 significance level in 1995 to 0.449 in 2018, indicating that education level also positively impact the consumption behavior of households.

The age of the household head have significant positive correlation with household per capita expenditure in 1995 with a significance level of 0.228; while from 2002 to 2018, it demonstrates clear increasing negative correlations of -0.164, -0.185, -0.127 and -0.297, indicating the households with younger aged household head spend more in daily consumption.

In terms of the industry type variables, by comparing the data in 1995 and 2002, we could find that the primary industry variable has a lower number in significance level than the results of secondary industry and tertiary industry, which means households with its household head working in primary industry spend less than the other two industry categories. The results of other years are not completely significant.

Table 3: Expenditure

	1995	2002	2007	2013	2018
single	.086	.431***	.204***	.201***	.203***
	(.095)	(.04)	(.021)	(.033)	(.025)
two_adults	.2***	.349***	.403***	.172***	.191***
	(.025)	(.016)	(.02)	(.018)	(.014)
parent_child	.179***	.212***	.282***	.203***	.213***
	(.02)	(.015)	(.021)	(.02)	(.017)
three_adults	.175***	.239***	.245***	.149***	.133***
	(.019)	(.014)	(.019)	(.016)	(.013)
ln_education	.259***	.284***	.308***	.412***	.449***
	(.018)	(.014)	(.02)	(.019)	(.014)
ln_age	.228***	-.164***	-.185***	-.127***	-.297***
	(.032)	(.025)	(.026)	(.032)	(.025)
male	-.085***	-.247***	-.021	-.128***	-.095***
	(.019)	(.016)	(.015)	(.019)	(.013)
urban	.294***	.614***	.574***	.377***	.456***
	(.024)	(.014)	(.017)	(.014)	(.011)
first_industry	-.895***	.103**	-.03	.031	-.262***
	(.175)	(.052)	(.054)	(.199)	(.091)
second_industry	-.569***	.171***	-.088***	.171	-.163*
	(.174)	(.05)	(.028)	(.198)	(.089)
tertiary_industry	-.548***	.297***	-.005	.238	-.079
	(.174)	(.05)	(.027)	(.198)	(.089)
_cons	7.305***	8.009***	8.865***	8.826***	10.106***
	(.221)	(.115)	(.114)	(.245)	(.14)
Obs.,	13282	16890	11245	11224	13664
R-squared	.257	.354	.262	.261	.382

***, **, and * denote 1%, 5%, and 10% significance levels in turn.Standard errors in parentheses.

V. Discussion

From the overview of the single-household data, we can simply tell that the expanding single living group are mainly consisted by aged group (60+) and young adults aged from 25-35. The female and male are having equal tendency to live by themselves in current days. Moreover, education level of single-person households increases rapidly comparing with the overall education level of household heads.

Considering the variables in determining the probability of a single-person household, male household head variable consistently shows negative correlation, so does the age variable in recent years. From the aspect of education level, the results from the recent years 2007, 2013 and 2018 demonstrate that people completed more years of education are having higher chances to live by themselves. Urban households are more likely to be single-person households in 2018 according to the logistic regression results. As for marital status, singlehood and widowed are the top two groups that are more likely to live solely in 2018.

To sketch out the main characteristics of a single-person household, taking the most recent available results as a reference, we can conclude that females who are living in the urban area, with younger age and relatively higher educational level who had never married would have higher chance to live solely.

After having a big picture of who are the people living by themselves, we want to further compare the income and expenditure level among different types of household. Through the analysis of the cross-sectional data in 1988, 1995, 2002, 2007, 2013 and 2018, it can be seen that the ratio

of income distribution on single-person households significantly increases based on the adjusted household per capita income from regression analysis results. Also, the characteristics of households having higher living standards in the past versus nowadays, the effect of economies of scale within the different household structure, in terms of the average income and expenditure within households, can be summarized through results as well.

In the past, single-person household are not in an advantageous state in terms of income level; however in recent years, the per capita income level of single-person and two-adult households are overall higher than other types of household, indicating the miniaturization phenomenon of household size would actually increase the life quality of people. On the other hand, the expenditure level of single-person households are overall higher than other types of household (with an exception in 2007), showing a loss of scale economies within the household in China nowadays. For parent-child households, despite its relatively lower per capita income, the expenditure level stays the highest among these four types of household in the recent years, 2013 and 2018, showing a trend of rising cost of raising a child and less effect of economies of scale.

In terms of region, with no surprise, urban households overall have higher income level, and also higher expenditure level, indicating urban households have better material quality of life; moreover, the population urbanization process decreases the effect of household economics of scale.

Male-headed households overall have lower average income, and lower average expenditure during the whole period, meaning that overall,

male-headed households were not advantageous in earning higher incomes but demonstrate better economies of scale.

Education factor, even though plays a positive influence in higher household income, it also has strong positive correlation with household expenditure as well, this means households with higher education level household head tend to spend more than the households with lower educational level head.

The result of age tells a different story, that it has negative correlation with income in more recent times, indicates the fact that younger generation households are becoming richer than the ones in the past. This can also be examined from the expenditure results, that younger generations are spending more, with one unit increase in age, the per capita expenditure level decreases by 29.7%.

In terms of the industry impact on per capita income, the results show that households with household heads who were working in the primary industry overall had lower per capita income and lower expenditure level. However, most industry results in 2013 and 2018 are not significant, demonstrating the industry factors of household heads do not play a vital role in income distribution or household expenditure anymore.

VI. Conclusion

In Conclusion, this paper explores the main features of single-person household nowadays and its changing composition in a 30-year time span, the impact of changes in household structure and demographic on the income distributions and expenditure among Chinese residents based on the CHIP data from 1988 to 2018. The descriptive analysis results answer that questions that who are these people living by themselves, why people nowadays prefer the solo living state, higher income and expenditure level meaning that higher purchasing abilities offers people much better material life than it is in the past, while it also shows having a child in household decrease the average income and increase the spending within the household, which indirectly and greatly increased the burden of households.

Also, if we see the results based on a macroeconomic perspective, the benefits of economies of scale may transfer from in-between household members to a larger external aspect, for example, shared by all the miniaturized households, or certain types of households.

Of course, there are some limitations of this paper to be further developed: first, the choice of equivalence scale is very limited due to the fact that China currently does not have a proper standardized equivalence scale correspond to its actual domestic consumption abilities of individuals; as a result, this paper can only use equivalence scale adopted by OECD, but there are distinct differences between China and OECD countries. Creating proper scale may help in conducting such the research in the future; second, the micro data set is extremely restricted, there are only 6 years available data without a regular interval times in between (the interval are between 5-7 years); if the data resource of China can be more accessible and organized, it would definitely help conducting better results. Last but not

least, the conceptions of the term “household head” may vary from different households since there is no clear definition of the term in the original research questionaires; therefore, the bias created by such uneven conception may influence the research result as well. A Clear definition is needed or having certain requirements to be the “household head” can better address the problems in doing large scale research.

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중국 1 인 가구의 증가 추세와 경제적 영향

요약: 본 논문은 중국국민소득분배연구단의 1988~2018 년 가계조사자료(CHIP)를 바탕으로 현재 1 인 가구의 주요 특징 및 ,가구구조 변화 및 인구통계학적 변화가 중국국민의 소득분배와 지출에 미치는 영향을 탐구하였다. 총괄적으로 보면 노인과 청년(25~35 세)은 1 인 가구 현상을 가속화되는 주요 요인이며 교육 수준의 증가와 사람들이 결혼에 대해 가치관의 변화가 이러한 상황이 뒷받침된다는 논증이 있다. 가구구조의 변화가 가구 1 인당 소득과 지출의 변화에서 큰 역할을 기여하고 있다.소형화된 가구는 전반적으로 보면 평균 소득과 지출 수준이 높은 것으로 나타났다. 거시경제적 관점에서 볼 때는 이러한 소득분배의 변화로 인해 규모의 경제가 가져오는 혜택은 점차 가구의 내부에서 외부로 이전될 것으로 예상된다.

핵심어: 가정의 구조 , 1 인 가구, 가구의 소득 및 지출

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