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ARTICLE

Effect of older adults in the family on the sandwich generation's pursuit of entrepreneurship: evidence from China

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Abstract

Household entrepreneurship is a basic unit of entrepreneurial activity, and a crucial aspect of connecting personal and social wellbeing. This study examines the relationship between the proportion of elderly family members and household entrepreneurship. This study also assesses the mediating effect of the middle-aged generation's support to their parents and the moderating effect of the parents' support with respect to the proportion of elderly family members and entrepreneurship. We use data from the China Family Panel Studies. We adopt the instrumental variable method to deal with endogeneity, robustness and credibility of the estimation results. The results show that a higher proportion of elderly family members impedes household entrepreneurship. Moreover, the financial and instrumental support provided by the middle-aged generation to their parents significantly mediates the relationship between the proportion of elderly family members and household entrepreneurship. In turn, parents' financial support to the middle-aged generation moderates the focal relationship; however, parents' instrumental support does not moderate the focal relationship. These findings emphasise the need to develop a comprehensive social security network for older adults that will indirectly promote household entrepreneurship, and improve personal and social wellbeing.

Keywords: proportion of elderly family members; household entrepreneurship; intergenerational support

Introduction

Entrepreneurship activity has significant economic, political and social value, and improves the wellbeing of society and individuals (Banerjee and Newman, 1993). Entrepreneurship is a source of economic power that promotes economic development and meets people's growing material needs. Furthermore, entrepreneurship plays an important role in the accumulation of social wealth and the achievement of national prosperity. For individuals, entrepreneurship can sustain a family's productivity and life, besides remaining gainfully occupied. Entrepreneurship is

closely related to an individual's wellbeing and sense of self-worth. It is a crucial contributor to the organisation of a stable family (De Mel *et al.*, 2008).

Despite these positive effects, individual entrepreneurial enthusiasm and activity may still be low. This may because of the following reasons: (a) entrepreneurial activities may generate low profits, which can cause financial losses to families compared with being employed, and (b) distracting issues that arise within families hinder the sandwich generation's efforts to start entrepreneurial activities. The proportion of Chinese residents who abandon entrepreneurship because of family factors is approximately twice those who abandon because of low profits (Wennberg *et al.*, 2010; Justo *et al.*, 2015). Among these family factors, caring for older adults (or older generation) and raising children are important concerns that inhibit the sandwich generation from engaging in entrepreneurship (Zhu and Yang, 2018). However, to the best of our knowledge, few studies have examined the impact of population ageing on household entrepreneurship.

In 2018, 249 million older adults lived in China, accounting for 17.9 per cent of the total population. By the mid-21st century, the number of older adults in China is expected to reach 500 million, accounting for approximately 35 per cent of the total population (Gong *et al.*, 2019). Elders' dependence on their children for support is one of the core values of the culture of filial piety in China (Cong and Silverstein, 2012). However, family planning has led to a declining birth rate and a large number of '4-2-1' families (*i.e.* four grandparents, two parents and only one child) have emerged in China. These changes have continued to increase the old-age dependency ratio on families and compounded the burden of the middle-aged generation to support elderly family members. These have further affected the allocation of family resources and risk preference. Investigating the relationship between older adults in the family and household entrepreneurship can help reveal the critical influence of non-market factors (*i.e.* caring for older adults) on entrepreneurship. This can enrich the research on the determinants of entrepreneurship. Furthermore, understanding the relationship between ageing populations and entrepreneurship provides a reference for the development of relevant national policies; therefore, exploring the relationship between the elderly population and household entrepreneurship is also of great practical significance.

This study contributes to the literature in two ways. First, this study examines how older adults in families are associated with household entrepreneurship through the financial and instrumental support provided by the sandwich generation for the former's care. Our findings show that this support is important for elders, but it hinders household entrepreneurship. Second, the results show that financial support to parents can moderate the relationship between the proportion of elderly family members and household entrepreneurship. However, instrumental support does not moderate the relationship between the proportion of elderly family members and household entrepreneurship. Furthermore, East Asian countries (such as South Korea, Japan, *etc.*) are not only equivalent to China in terms of population ageing, but the household entrepreneurship environment of the sandwich generation in East Asian countries is also similar to that of Chinese families. These countries are also deeply influenced by the traditional culture of Confucianism. For the sandwich generation, supporting one's parents (including

financial and instrumental support, *etc.*) is considered a traditional virtue. Thus, the findings of this study may be applicable beyond China.

The remainder of this study is organised as follows. The second section reviews the research on the relationship between older adults in the family and household entrepreneurship, and proposes our hypotheses. The third section introduces the data, variables and methods. The fourth section describes the effect of the proportion of elderly family members on household entrepreneurship and the mechanism through which this effect occurs. The final section summarises and discusses the findings of this study.

Literature review and hypotheses

Older adults in the family and household entrepreneurship

According to the work–family relationship theory, four relationships exist between entrepreneurship and the family (Greenhaus and Powell, 2006). First, families benefit from entrepreneurship by receiving the transferred social resources that entrepreneurship generates. Second, families can promote entrepreneurship because family resources can actively promote entrepreneurship. These two reasons focus on the mutually beneficial relationships between entrepreneurship and families (Eddleston and Powell, 2012). The third reason is that entrepreneurship can interfere with families; that is, entrepreneurship can restrict family resources. The fourth relationship is that family resources can interfere with the process and timing of entrepreneurship. These two reasons focus on an antagonistic relationship between entrepreneurship and families (Shelton, 2006; Jennings and McDougald, 2007). The work–family theory contributes to connecting family and entrepreneurship, and helps deepen our understanding of household entrepreneurship.

Many studies have analysed how family support affects entrepreneurship. However, these studies mainly focus on the support provided by elders to the sandwich generation, which, in turn, aims to encourage entrepreneurship. However, few studies have examined the role of ageing. Guo *et al.* (2016) demonstrated the impact of population changes on entrepreneurship. Specifically, the researchers used numerical simulation and found that population ageing is not favourable for the formation of entrepreneurship at the regional macro level. Wang and Xian (2020) used data from the 2013 China Household Finance Survey[1] to evaluate the influence of older adults in families on their children's career choices from economic and non-economic perspectives. These scholars found that caring for older parents and choosing entrepreneurship can result in high personal utility. However, members of the sandwich generation may reduce their investment in work because of the need to split their limited financial and time resources with caring for their elders. Thus, caring for older adults can be regarded as an opportunity cost of entrepreneurship. As opportunity costs increase, entrepreneurial investments may be hindered. The sandwich generation bears great obligations and burdens to support their older parents as the ageing process accelerates. Therefore, the following hypothesis is proposed:

- Hypothesis 1: It is less likely for the sandwich generation to engage in entrepreneurship in families with more older adults (i.e. a larger proportion of elderly people in the household).

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The influence of the sandwich generation's support for parents on the relationship between older adults in the family and household entrepreneurship

A few studies have analysed the impact of support from the sandwich generation to their parents on the relationship between the number of older adults in the family and household entrepreneurship (Zhu and Yang, 2018). Social support is categorised into economic, social and cultural (emotional) capital support (Cohen and Wills, 1985). In traditional Chinese society, families are the primary unit for supporting older adults. Support from children is the oldest and most fundamental tradition. Supporting older adults is considered a vital duty and is an important cornerstone of the survival and development of Chinese society (Yao, 2001). Supporting older adults in the family exerts a negative impact on the sandwich generation's entrepreneurship because of the so-called 'burden effect' (Zhu and Yang, 2018) for several reasons. First, the sandwich generation is more inclined to choose a job with a stable income rather than entrepreneurship, which brings the risk of losing money. Second, the sandwich generation's expenditure to support parents consumes most of the economic resources that could be allocated towards entrepreneurship. This reduces the possibility of engaging in entrepreneurship (Lewis and Giullari, 2005). Third, to engage in entrepreneurship, the sandwich generation needs to assume both a career role in running a business and a family role in taking care of parents (Jackson *et al.*, 1985). This may cause role conflicts and prevent the sandwich generation from effectively conducting entrepreneurial activities. Lastly, caring for older adults may lead adult children to experience negative emotions and diminish wellbeing. This can inhibit engagement in entrepreneurship (Shepherd *et al.*, 2009; Powell and Eddleston, 2013). Therefore, the following hypotheses are proposed from the perspective of the sandwich generation's support for their parents:

- Hypothesis 2: The sandwich generation's financial support to parents is an important mediating factor based on the effect of the proportion of elderly family members on the sandwich generation's household entrepreneurship.
- Hypothesis 3: The sandwich generation's instrumental support to parents is an important mediating factor based on the effect of the proportion of elderly family members on the sandwich generation's household entrepreneurship.

In China, given the traditional sentiment of 'more sons, more happiness', many families once had several children. These children could share the responsibility of caring for their parents in their later years. However, some Chinese families with parents working in government institutions, who strictly obey the one-child policy, only have one child. This child is expected to support all elders. Hence, in this situation, the number of older adults results in a higher proportion of elderly family members and a much smaller number of adult children who can care for the elders in their old age.

Older adults in the family and household entrepreneurship: the moderating role of parents' support for the sandwich generation

Under the circumstances of rapid ageing, social transformation and urbanisation in China, grandparents caring for grandchildren has become an extremely common

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social trend (Chen and Mair, 2011; Ko and Hank, 2014). This care is highly valued because of its contribution to the welfare of the entire family (Sheng and Settles, 2006). Considering this common Chinese family structure, we examine three generations in the family: including elderly parents, the middle-aged sandwich generation and the young. The elderly parents' generation refers to the older generation, the middle-aged generation represents the sandwich generation and the younger generation represents the grandchildren of the older generation.

Family child care in China is primarily informal (including taking care of the children's diet, living and care, among other day-to-day concerns). If the sandwich generation chooses to engage in entrepreneurship, family members may face a shortage of both time and care-givers to care for their children. Consequently, many families turn to intergenerational care. Adopting intergenerational care can free up entrepreneurs' time (Wang and Xian, 2020). If entrepreneurs are less involved in family affairs, or have more flexible time arrangements, they can concentrate on entrepreneurial activities, fulfil their responsibilities, and improve the harmony between family care and entrepreneurship (Hsu *et al.*, 2016). Therefore, support from older parents in caring for their grandchildren enables the middle-aged generation to shift efforts from the family to entrepreneurship, thereby assisting entrepreneurs in being more flexible with their entrepreneurship schedules and conducting entrepreneurial activities.

Besides instrumental support for children, providing financial support for children has also become a common parental behaviour in China, considering the responsibility and emotional ties of consanguinity. Moreover, because of the continuation of family in the traditional culture, the next generation of the family inherits from their previous generation (Zhang and Chen, 2014). Parents regard providing unconditional financial support for children as a primary task and obligation, with some parents even reducing their own living standards to support their children.

For the entrepreneurial group, family planning to engage in entrepreneurship should prepare for material capital at an early stage; only sufficient liquidity can support the development and operation of an entrepreneurial project. Evans and Leighton (1989) investigated the relationship between wealth and entrepreneurship using the National Longitudinal Survey of Young Men. The authors found a significant positive correlation between entrepreneurship and individual asset levels. This correlation may exist because of the liquidity constraints faced by people who want to start an entrepreneurship project. Cagetti and Nardi (2006) also asserted that a lack of funds was a common developmental obstacle for entrepreneurs in various countries. Dunn and Holtz-Eakin (2000) demonstrated that at the family level, children's probability of starting an entrepreneurial activity was positively associated with the amount of inheritance. Therefore, if members of the sandwich generation obtain financial support from their parents, they can accumulate original wealth, relieve economic burdens, increase entrepreneurial tendencies and become more engaged in entrepreneurial activities (Zhu and Yang, 2018). Considering the effects of the two types of parental support for the sandwich generation, the following two hypotheses are proposed:

- Hypothesis 4: Parents' financial support for the sandwich generation can moderate the negative effect of the proportion of elderly family members on household entrepreneurship.

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- Hypothesis 5: Parents' instrumental support for the sandwich generation can moderate the negative effect of the proportion of elderly family members on household entrepreneurship.

Methods and data

Data

The data used in this study were from the China Family Panel Studies (CFPS), which was launched in 2010 by the Institute of Social Science Survey of Peking University in China. The CFPS is a nationally representative, annual longitudinal general social survey project designed to record changes in Chinese society, economy, population, education and health. Using a multi-stage, multi-level random sampling strategy, CFPS sampled 19,986 participants from 649 villages in 162 counties within 25 provinces or municipalities. All members over the age of 9 years in the sampled families were interviewed. These individuals constituted core members of the CFPS and were followed up annually. The CFPS focuses on recording the economic and non-economic wellbeing of Chinese people, and its topics cover economic activities, educational attainment, family relationships and dynamics, migration, and physical and mental health (Xie and Jin, 2015). The CFPS 2010, 2012 and 2014 surveys did not have variables representing intergenerational support; therefore, 2016 CFPS survey data were selected, which include not only variables for household entrepreneurship but also for family intergenerational support.

The CFPS questionnaire includes information on village (residence), family and individual family members. Here, we mainly used data on families and individuals. We considered several important aspects of the data selection process. First, we studied the influence of the proportion of elderly family members on household entrepreneurship at the family level. Household entrepreneurship is characterised by collaboration and risk-sharing. Therefore, the decision-making process usually involves the entire family. Moreover, it is difficult to subdivide the investment capital or profits from entrepreneurship among individual family members (Zhou and Li, 2016). Second, the sandwich generation was limited to 18–60-year-olds because the entrepreneurial crowd is primarily concentrated in young and middle-aged people (Hurst and Lusardi, 2004). Third, household heads with living parents and children were selected as study subjects. The CFPS surveyed a total of 10,963 households in 2016, with 6,105 belonging to 'sandwich' families. The absence of data on household entrepreneurship caused random loss of 292 samples. Therefore, a total of 5,813 samples were utilised in this study.

Variables

Dependent variable

The dependent variable was the household entrepreneurship decision. This is a binary dummy variable (0 = no, 1 = yes), referencing Zhou and Li (2016). This variable was measured by asking respondents the following question: 'Have you been engaged in self-employment or started a private enterprise in the past year?' As Table 1 shows, the proportion of household entrepreneurship in 2016 in our sample was 12.13 per cent.

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Table 1. Definition and descriptive analysis of variables

Variables		Definition of variables	Percentage	Mean (SD)
Dependent variables	Household entrepreneurship	Dummy variable: 0 = no, 1 = yes	0 = 85.72, 1 = 14.28	
Independent variables	Proportion of elderly family members	Continuous variable: the number of elderly people in the family/the number of members in the family		0.44 (0.22)
Individual characteristic variables	Gender	Dummy variable: 0 = female, 1 = male	0 = 46.38, 1 = 53.62	
	Age	Continuous variable: survey year – year of birth		42.68 (7.94)
	Marital status	Dummy variable: 0 = unmarried, 1 = married	0 = 8.37, 1 = 91.63	
	Education level	Continuous variable: 1 = illiteracy, 2 = primary school, 3 = junior high school, 4 = senior high school, 5 = junior college, 6 = undergraduate, 7 = undergraduate above		2,083 (1.31)
	Religion belief	Dummy variable: 0 = no, 1 = yes	0 = 86.45, 1 = 13.55	
	Internet usage	Dummy variable: 0 = no, 1 = yes	0 = 52.55, 1 = 47.45	
Family characteristic variables	Bank loan	Dummy variable: 0 = no, 1 = yes	0 = 91.30, 1 = 8.70	
	Folk loan	Dummy variable: 0 = no, 1 = yes	0 = 85.43, 1 = 14.57	
	Logarithm of family cash gift expense	Continuous variable: total family cash gift expense (RMB)		6.93 (4.88)
	Logarithm of household income	Continuous variable: total household income (RMB)		10.63 (1.30)
	Logarithm of household expense	Continuous variable: total household consumption (RMB)		10.31 (1.04)
	Logarithm of household saving	Continuous variable: total household cash deposit (RMB)		7.56 (2.00)
Social characteristic variables	Social insurance	Dummy variable: 0 = no, 1 = yes	0 = 7.30, 1 = 92.70	
	Urban/rural area	Dummy variable: 0 = rural, 1 = urban	0 = 48.69, 1 = 51.31	

(*Continued*)

Table 1. (*Continued.*)

Variables		Definition of variables	Percentage	Mean (SD)
Mediation variables	Logarithm of financial support to older parents	Continuous variable (RMB)		2.61 (3.07)
	Instrumental support to older parents	Continuous variable: 0 = never, 1 = once in a few months, 2 = once a month, 3 = two or three times a month, 4 = one or two times a week, 5 = three or four times a week, 6 = almost every day		1.38 (2.16)
Moderating variables	Logarithm of older parents providing financial support for the sandwich generation	Continuous variable (RMB)		1.67 (2.83)
	Older parents providing instrumental support for the sandwich generation	Continuous variable: 0 = never, 1 = once in a few months, 2 = once a month, 3 = two or three times a month, 4 = one or two times a week, 5 = three or four times a week, 6 = almost every day		1.49 (2.42)

Note: SD: standard deviation.

Independent variable

The independent variable was the proportion of elderly family members, according to Wang and Xian (2020). This variable was measured as the ratio of the number of older adults and the number of all family members.

Control variables

A series of variables were controlled for, including household members' individual, family and social characteristics (Wong *et al.*, 2005). Notably, entrepreneurship is an important event in a family and is usually discussed by all family members (Hurst *et al.*, 2004). In China, all household members play a crucial role in family decision-making. Thus, the individual characteristic variables were measured using the householders' individual characteristics.

Control variables at the individual level. In the context of China, men and women have different roles in the family (characterised by a division of labour in which 'men dominate outside and women dominate inside'). Furthermore, men may have a dominant position in household entrepreneurship (Wang and Xian, 2020). Therefore, we included gender as a control variable. A person's skills can differ greatly among different age groups. Skills such as memorising, multitasking and information processing will gradually weaken, whereas cognitive skills, such as abstract thinking and interpersonal relationship processing, will increase with age (Cai *et al.*, 2016). Thus, age is one of the most important factors influencing entrepreneurial choices. Simultaneously, married people may be more rational in conducting social behaviours (such as entrepreneurship) based on family responsibilities. Therefore, marital status was included as a control variable. Entrepreneurial activities require professional knowledge and business skills (Lazear, 2004). Education affects an individual's skills mastery and knowledge acquisition. Thus, we included education level as a control variable. Furthermore, religious beliefs affect an individual's economic attitudes and social capital accumulation (Arrunñada, 2010). This, in turn, affects their entrepreneurial behaviour. Therefore, we included religious beliefs as a control variable. Second, the widespread use of the internet has accelerated the dissemination of knowledge and information, greatly reduced the cost of information acquisition and affected individuals' access to entrepreneurial information (Cumming and Johan, 2010). Hence, we included internet use as a control variable. In summary, the individual control variables were gender (dummy variable: 0 = female, 1 = male), age (continuous variable: survey year − year of birth), marital status (dummy variable: 0 = unmarried, 1 = married), education level (continuous variable: 1 = illiteracy, 2 = primary school, 3 = middle school, 4 = high school, 5 = college, 6 = undergraduate, 7 = graduate or above), religious beliefs (dummy variable: 0 = no, 1 = yes) and internet use (dummy variable: 0 = no, 1 = yes).

Control variables at the family level. Household entrepreneurship requires capital accumulation. The level of family wealth directly affects the mobility of family resources and household entrepreneurial funds. Therefore, the family characteristic variables were bank loans (dummy variables: 0 = no, 1 = yes), private loans (dummy variables: 0 = no, 1 = yes), household income (continuous variable, logarithm),

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family consumption (continuous variable, logarithm) and household savings (continuous variable, logarithm).

Control variables at the socio-economic level. China's urban and rural entrepreneurial environments and policies differ. Thus, we included a dummy variable to control for urban and rural locales. Social insurance, as an important policy to avoid risks, directly affects an individual's risk preference. Therefore, we included social insurance as a control variable. In summary, the social characteristic variables included urban and rural (dummy variable: 0 = rural, 1 = towns) and social insurance (dummy variables: 0 = no, 1 = yes).

Mediation variables

The mechanism variable in this study was the sandwich generation's support for their parents. This support includes two aspects: financial support and instrumental support. These two variables were measured using the following two questions: 'Does your family provide your older parents with financial support?' (continuous variable, logarithm) and 'Does your family provide your older parents with instrumental support?' (continuous variable, 0 = never, 1 = once in a few months, 2 = once a month, 3 = two or three times a month, 4 = one or two times a week, 5 = three or four times a week, 6 = almost every day).

Moderating variables

The moderating variable was older parents' support for the sandwich generation. This support includes financial support and instrumental support. These two variables were measured from the following two questions: 'Do your older parents provide you with financial support?' (continuous variable, logarithm) and 'Do your older parents provide you with instrumental support?' (continuous variable, 0 = never, 1 = once in a few months, 2 = once a month, 3 = two or three times a month, 4 = one or two times a week, 5 = three or four times a week, 6 = almost every day).

Methods

Following Minns and Rizov (2005), our dependent variable was binary based. Then, we used the following probit model:

$$\text{probit}(Entreprentur_i = 1) = \varphi(\alpha_0 + \alpha_1 \times old_i + \alpha_2 x_i + \varepsilon_i) \quad (1)$$

Here, $Entreprentur_i$ refers to the household entrepreneurship decision; old_i is the proportion of elderly family members (a continuous variable); x_i represents the set of control variables, including the sandwich generation's individual, family and social characteristic variables; α_1 and α_2 represent the regression coefficients; α_0 is a constant term; and ε is the residual regression term. To overcome any potential correlation of random disturbance items, standard errors were clustered at the county (district) level.

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Table 2. Impact of the proportion of elderly family members on household entrepreneurship

Variables	Model 1	Model 2	Model 3	Model 4
Proportion of elderly family members	−0.392*** (0.092)	−0.425*** (0.097)	−0.304*** (0.103)	−0.393*** (0.106)
Gender		−0.015 (0.040)	−0.015 (0.042)	−0.008 (0.043)
Age		−0.006** (0.003)	−0.007** (0.003)	−0.004 (0.003)
Marital status		0.264*** (0.087)	0.220** (0.094)	0.254*** (0.095)
Education level		0.0920*** (0.016)	0.012 (0.018)	−0.011 (0.020)
Religion belief			0.013*** (0.005)	0.012*** (0.005)
Internet usage			0.244*** (0.069)	0.281*** (0.070)
Household saving			0.172*** (0.060)	0.186*** (0.060)
Bank loan			0.045*** (0.013)	0.049*** (0.013)
Folk loan			0.120*** (0.022)	0.115*** (0.022)
Family cash gift expense			0.119*** (0.026)	0.096*** (0.026)
Household income				0.211*** (0.059)
Household expense				0.0971* (0.051)
Urban area				0.244*** (0.047)
Social insurance				−0.164*** (0.048)
Constant	−0.888*** (0.044)	−1.130*** (0.145)	−3.912*** (0.290)	−3.801*** (0.295)
Pseudo R^2	0.0137	0.1226	0.1524	0.1585
Observations	6,371	6,231	5,877	5,813

Note: Values in the parentheses are standard errors.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Results and analysis

Impact of the proportion of elderly family members on household entrepreneurship

Baseline regression results

In Model 1, without any control variables, the proportion of elderly family members negatively affected household entrepreneurship ($\beta = -0.392$, $p < 0.001$) (Table 2). This indicates that a higher proportion of older adults in the family

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resulted in a lower possibility of household entrepreneurship. In Model 4, the individual, family and social characteristics control variables were added. Other than the change in the size of the regression coefficients, the effect of the proportion of elderly family members was still significant ($p < 0.001$). These results demonstrate that the proportion of elderly family members has a significant negative impact on household entrepreneurship, thereby supporting Hypothesis 1.

Furthermore, the results of the relevant control variables reveal that: (a) marital status proactively affects household entrepreneurship, (b) religious beliefs can increase the probability of entrepreneurship, (c) internet usage has a positive effect on household entrepreneurship, (d) household income and consumption play a role in promoting household entrepreneurship, (e) bank and private loans can promote household entrepreneurship, and (e) cash gift expenses increase the likelihood of household entrepreneurship. Finally, regarding social characteristics, urban residents were more likely to engage in entrepreneurship than rural residents. Moreover, social insurance has a negative effect on entrepreneurship.

Endogenous analysis

Endogeneity may be caused by measurement errors, two-way causality or missing variable bias. The sandwich generation may not have the time and energy to have children after starting a business. This may reduce the number of births. Conversely, if the sandwich generation succeeds in starting a business, sufficient funds may be accumulated to raise more children. Therefore, these two attributes may influence family size, thereby affecting the measurement of the family's demographic structure. Furthermore, there are many factors that affect household entrepreneurship, such as the number of siblings. We could not identify or capture all these potential influential factors. These omitted variables may then affect the regression results. Therefore, we adopted the instrumental variable (IV) method to deal with endogeneity and verify the robustness of our findings. As in Zhu and Yang (2018), the old-age dependency ratio in the same city was used as the IV of the proportion of elderly family members to solve the endogenous problems. This ratio was set as a continuous variable.

Before describing the IV-probit estimators, several key statistics should be analysed to ensure the reliability of the IV analysis results. Table 3 shows the following: first, a strong correlation exists between the IV and the independent variable. The *F* statistic was 223.68 in the regression that tested the strength of the relationship between the IV and the independent variable (the first-stage regression of IV-probit). According to the threshold table in Stock *et al.* (2002), the threshold value of a weak IV is 16.38. Therefore, here, weak IVs are not a problem; rather, the IV can effectively explain the proportion of elderly family members. Second, the Wald endogenous test result shows that there is a systematic difference between the probit and the IV-probit models. This indicates the endogeneity of the proportion of elderly family members and household entrepreneurship. The proportion of elderly family members was still found to affect household entrepreneurship negatively ($p < 0.001$). This indicates the robustness and credibility of the estimation results.

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Table 3. Endogenous treatment: instrumental variable method

Variables	Independent variable: proportion of elderly family members First-stage regression results	Dependent variable: household entrepreneurship Second-stage regression results
Proportion of elderly family members		−1.270*** (0.362)
Instrumental variable	0.725*** (0.030)	
Constant	−0.0704 (0.080)	−3.397*** (0.570)
Control variables	Yes	Yes
Observations	5,813	5,813
Value of *F* in first stage	268.43	
Wald test of exogeneity	6.68	
Value of *p* in Wald endogenous test	0.0098	

Note: Values in the parentheses are standard errors. Control variables including householders' individual characteristics, family characteristics and social characteristics.
Significance level: *** $p < 0.01$.

Impact mechanism of the sandwich generation's support for parents on the relationship between the proportion of elderly family members and household entrepreneurship

Following Zhang *et al.* (2018), we selected the sandwich generation's financial and instrumental support for older parents as independent variables to examine whether a high proportion of elderly family members resulted in the sandwich generation providing more financial and instrumental support. If so, more financial and instrumental support provided to elders may impose a greater burden on the sandwich generation and reduce the possibility of engaging in entrepreneurship. This mediating effect was tested using the Sobel test. The regression results are presented in Table 4.

In Models 1 and 2, the results suggested that the proportion of elderly family members had a positive impact on both the financial ($p < 0.001$) and instrumental support ($p = 0.040$) provided by the sandwich generation to their older parents. A high proportion of elderly family members resulted in more support by the sandwich generation, which in turn used more of their entrepreneurial resources. In Models 3 and 5, both financial and instrumental support showed a positive relationship with household entrepreneurship ($p < 0.001$ and $p = 0.017$, respectively). Table 4 indicates that both financial and instrumental support are significantly implicated in the relationship between the proportion of elderly family members and household entrepreneurship. The indirect effect also showed that financial and instrumental support mediate the association between the proportion of elderly family members and household entrepreneurship.

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Table 4. The effect of the proportion of elderly family members on the sandwich generation providing support for parents (Sobel test)

Variables	Model 1: Household entrepreneurship	Model 2: Financial support	Model 3: Household entrepreneurship	Model 4: Instrumental support	Model 5: Household entrepreneurship
Proportion of elderly family members	−0.076*** (0.022)	0.397** (0.193)	−0.078*** (0.021)	0.745*** (0.138)	−0.080*** (0.022)
Financial support			0.004*** (0.001)		
Instrumental support					0.006*** (0.002)
Control variables	Yes	Yes	Yes	Yes	Yes
Constant	−0.336*** (0.057)	1.148*** (0.504)	−0.370*** (0.056)	1.932*** (0.360)	−0.336*** (0.058)
Observations	5,813	5,813	5,813	5,813	5,813

Note: Values in the parentheses are standard errors. Control variables including householders' individual characteristics, family characteristics and social characteristics.
Significance levels: ** $p < 0.05$, *** $p < 0.01$.

Table 5. The moderating effect of parents' support for the sandwich generation

Variables	Model 1	Model 2	Model 3	Model 4
Proportion of elderly family members	−0.410*** (0.107)	−0.306** (0.120)	−0.400*** (0.108)	−0.343*** (0.123)
Financial support	−0.005 (0.007)	0.025 (0.018)		
Financial support × Family old-age dependency ratio		−0.068* (0.037)		
Instrumental support			−0.005 (0.009)	−0.013 (0.020)
Instrumental support × Family old-age dependency ratio				−0.043 (0.045)
Control variables	Yes	Yes	Yes	Yes
Constant	−3.799*** (0.295)	−3.839*** (0.296)	−3.787*** (0.296)	−3.808*** (0.297)
Observations	5,798	5,798	5,812	5,812

Note: Values in the parentheses are standard errors. Control variables including householders' individual characteristics, family characteristics and social characteristics.
Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The moderating effect of parents' support for the sandwich generation on alleviating the negative impact of the proportion of elderly family members on household entrepreneurship

As Table 5 shows, in Model 1, parents' financial support for the sandwich generation was a significant predictor of household entrepreneurship ($p < 0.001$). This indicates that the financial support provided by parents can affect household entrepreneurship. In Model 2, the interaction effect of parents' financial support and the proportion of elderly family members was significant on household entrepreneurship ($p = 0.065$). This suggests that parents' financial support for the sandwich generation can influence the effect of the proportion of elderly family members on household entrepreneurship. However, in Model 3, parents' instrumental support for the sandwich generation was not significant ($p = 0.549$). Moreover, in Model 4, parents' instrumental support did not moderate the negative impact of the proportion of elderly family members on household entrepreneurship ($p = 0.336$). Thus, Hypothesis 4 is supported, while Hypothesis 5 is not.

Discussion and conclusion

In recent years, entrepreneurship and innovation have been rapidly increasing. They have given birth to a large number of new market forces and represent an active source of China's economic development. Meanwhile, Chinese society is now ageing. Under such circumstances, the relationship between the proportion of elderly family members and household entrepreneurship is a social issue that requires attention. This study used CFPS data to analyse this relationship empirically.

The results indicate that the proportion of elderly family members had a significantly negative effect on household entrepreneurship. This effect was observed even

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after applying the IV method to address endogeneity problems. Thus, Hypothesis 1 was supported. At the macro level, a country's population that is ageing rapidly may weaken entrepreneurship, change the age structure of social networks, and affect innovation and entrepreneurship (Guo *et al.*, 2016). Meanwhile, the study of Liang *et al.* (2018), based on multinational enterprises' monitoring data, revealed that the proportion of middle-aged and elderly people in enterprises increases with an increase in the ageing population. This reduces promotion opportunities for young people and is not conducive to their acquisition of human capital in terms of ability and experience. This ultimately leads to a decline in entrepreneurial activities. Moreover, an ageing population results in a decrease in the proportion of young people in social networks, a decrease in communication opportunities among potential entrepreneurs and a negative emergence of new entrepreneurial ideas, thereby eliminating opportunities to engage in entrepreneurship (Hurst and Lusardi, 2004).

At the micro level, a high proportion of elderly family members results in more financial and instrumental support that the sandwich generation must provide for older adults. This leads to a decrease in the probability of household entrepreneurship. Here, we took the sandwich generation's support for older parents as an impact mechanism. We found that this financial and instrumental support was an important channel through which the dependence of older adults inhibited household entrepreneurship. Thus, Hypotheses 2 and 3 are supported. In China, although the function of family support for older adults has weakened, most scholars believe that the influence of the filial piety culture will not disappear completely (Guo *et al.*, 2012). Furthermore, the intergenerational reciprocity mechanism within families still has considerable influence (Lin and Yi, 2011). Home care is the primary mode of caring for older adults. Adult children providing older parents with instrumental and financial support remains common (Zhan *et al.*, 2006). Therefore, the ageing of the population in China will objectively increase the demand for elderly care. Furthermore, limited family resources will inevitably lead to greater constraints on family resources and further influence the allocation of entrepreneurial resources.

Specifically, the negative effects of caring for older adults on adult children's entrepreneurship are derived from two characteristics. The first is the allotment of the time required to engage in entrepreneurship. Family care includes economic and non-economic costs. A very important part of the non-economic costs is the care-giver's time expenditure. Entrepreneurs with limited time need to allocate time to manage complicated business affairs during the process of launching an entrepreneurial venture and bearing the responsibility of family care support (Dan *et al.*, 2016). If adult children allocate more time to take care of older adults, they will have less time for entrepreneurship activities. This can reduce their entrepreneurial tendency (McManus *et al.*, 2002).

The second characteristic is crowding out spending on entrepreneurship. Economic cost refers to the monetary expenditure of care-givers. The theory of intergenerational support holds that the transfer of private economic resources, mainly supported by adult children in the family, and the transfer of public economic resources, mainly supported by pensions, has an important effect in ensuring the economic security of older adults (Becker, 1974). To support their parents better, sandwich generation members usually choose jobs with stable incomes to avoid the potential for property loss caused by entrepreneurial failures. In turn,

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this may cause a decline in the quality of care provided to older parents. Furthermore, starting an entrepreneurial venture requires that individuals invest significant material resources in the early stages. However, monetary expenditure on parents crowds out such resources, including renting space and buying office supplies, thereby reducing entrepreneurial tendency.

Moreover, parents' support for the sandwich generation fails to alleviate the negative impact of the proportion of elderly family members on household entrepreneurship. Rather, it strengthens this negative effect. That is, older adults' financial support for the sandwich generation may still not adjust the negative impact of the proportion of elderly family members on household entrepreneurship. Hypotheses 4 and 5 were not supported, for which there were two specific reasons.

First, from the perspective of the nature of entrepreneurship, financial or instrumental support from parents may be one of the necessary conditions to encourage the sandwich generation's family entrepreneurship; however, this is not a sufficient condition (Rodriguez *et al.*, 2009). As Sieger and Minola (2017) noted, there is a paradox between family financial support and entrepreneurship. If the sandwich generation does not have financial or instrumental support from their parents, the possibility of starting a business is low. In contrast, families are less likely to start a business when parents give their children financial and instrumental support (Edelman *et al.*, 2016). As is well known, starting a business is a risky choice. The probability of failure is much higher than the probability of success. Therefore, older parents believe that the risk of family entrepreneurship is high and hope that the sandwich generation will engage in more stable occupations (such as work within the Chinese system), even though parents give the sandwich generation financial and instrumental support.

Second, from the perspective of family intergenerational support, because of limited family resources, including human capital, material capital and time, a zero-sum game exists among family members. For example, either the wife or the husband should assume the responsibility of the care-giver, and children should choose to spend time on family care or marketing activities. In China, the key to the zero-sum game exists in the family structure and relations. Because Chinese families are relatively flexible, older adults will provide selfless support whenever their children need it (Chen and Mair, 2011). Theoretically, older adults' instrumental support can free their children from household chores, reduce children's financial burden related to child care, and release time and materials for the family (Compton, 2013), regulate the relationship between ageing and household entrepreneurship, and increase the possibility of children's household entrepreneurship. However, in reality, the relationship between older parents and their adult children presents increasingly prominent characteristics of equivalent exchange. The result of parents' reduced intergenerational resources is to obtain more elderly support resources from the family (Cox, 1987). Adult children's support for older parents is an important factor for ageing that affects household entrepreneurship. If the burden of providing support for older adults is too heavy, adult children's economic and care burden will increase. This is not conducive to household entrepreneurship (Lewis and Giullari, 2005).

Furthermore, according to the work–family theory, entrepreneurship and family have different expectations for the sandwich generation's role. Whether it is due to moral constraints, legal obligations or out of consideration for the health of elderly parents, if the sandwich generation cares for their parents, there will be positive

'social value-added' benefits. Simultaneously, the sandwich generation's entrepreneurship will also gain 'personal value-added' benefits. However, it is necessary to allocate personal energy input so that the two kinds of value additions are mutually opportunity costs that show an alternative relationship. Therefore, in this process, the sandwich generation should rethink their own lifestyles, clarify their own value tendencies, and find a balance between family and career.

Our conclusions imply that family support is one of the reasons that the sandwich generation does not pursue entrepreneurship. We reveal the important role of family factors in individual entrepreneurial decision-making. It not only provides a more powerful explanation of why China's entrepreneurial rate is low, but also offers empirical evidence to explain the relationships between family and work (Rehman and Azam Roomi, 2012).

This study has some limitations. First, we used cross-sectional data for the analysis. This means that a causal relationship between the proportion of elderly family members and household entrepreneurship cannot be identified, although the IV method was used. Second, it is impossible to add all factors that affect the family entrepreneurship of the sandwich generation to the regression model due to limited data availability. This may affect the robustness of regression results. Furthermore, China's ageing process is accelerating, and the family structure and environment for entrepreneurship are rapidly changing. Because the data in this study were collected in 2016, the timeliness of this study could also be a limitation, and the findings may not reflect the current situation.

Despite these limitations, this research has important policy implications. First, China's fertility rate has declined and the proportion of elderly people has increased in recent years. Close attention should be paid to the adverse impact of the ageing of the family's population structure on residents' entrepreneurship. The impact will become increasingly apparent. Population ageing mainly affects household entrepreneurship from two major channels: living care and economic costs. Therefore, from the perspective of living care cost, it is highly recommended that social elderly care institutions be vigorously developed to replace and supplement the traditional family-style elderly care and reduce the pressure on the sandwich generation. From the perspective of economic costs, the government should increase financial, taxation and social security support to reduce the financial burden of households for elderly people. In contrast, for most families, the intergenerational flow of family economic and living care resources relieves entrepreneurs' financing and time constraints, thus promoting the occurrence of information sharing and transactions. However, it still cannot regulate the negative impact of the effects of ageing on entrepreneurship. The government should promote the development of elderly care and nursing homes to reduce the pressure on the sandwich generation, release family labour and reduce the opportunity cost of household entrepreneurship.

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Ethical standards. The study was exempt from human subjects' approval (non-identifiable data).

Conflict of interest. The authors declare no conflicts of interest.

Note

1 *See* https://chfs.swufe.edu.cn/datacenter/apply.html.

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