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Saving and Bequest in China: An Analysis of Intergenerational Exchange

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Abstract

Particularly high saving rates among the elderly in both rural and urban China call for an investigation of the involved bequest motive. Utilizing unique survey data from a diverse group of Chinese households, we document that the magnitude of the bequest from parent to child is synchronized with the level of personal assistance from child to parent. Moreover, both bequest and assistance are increasing in the parent's income and decreasing in the child's income. Comparing with the prediction from a stylized overlapping generations model, these findings are consistent with an exchange-based bequest motive. This conclusion has implications for how public policies and transfer schemes may be designed in order to contribute to the government objective of increased private consumption. Our results indicate that an important driver for our result is the housing wealth as part of the bequest.

Keywords: Bequest, intergenerational exchange, housing wealth, Chinese saving

JEL codes: D14, D64, E21

1 Introduction

The ongoing spectacular transition of the Chinese economy has so far been characterized by persistent high output growth and gross domestic saving rates exceeding 50 per cent of GDP the last decade. Consumption as a share of GDP has remained low, and private consumption is still barely above 35 per cent of GDP, despite the fact that Chinese authorities have explicitly highlighted an ambition to stimulate consumption growth.[1]

In order to predict future Chinese saving patterns and to design efficient policies stimulating consumption, an understanding of the relevant saving motives is called for. Utilizing unique survey data collected through personal interviews of elderly people in China, this paper attempts to contribute to this understanding by zooming in on the importance of an exchange-based bequest motive

[1]The ambitions of the Chinese Authorities to stimulate consumption growth were, for example, made very explicit during the opening of the Chinese National People's Congress in March 2013, see *http* : *//www.cnbc.com/id/*100520513.

and how this interacts with households' savings decisions. According to such a bequest motive, which has received a lot of attention since the seminal paper on "strategic bequest" by Bernheim et al. (1985), the elderly engage in an intentional exchange of bequest in return for received "assistance" from their children. Assistance refers broadly to time devoted to care and supply of other partly non-marketable services from children to parents. A preference for receiving assistance in old age and a low supply of substitutes offered by the public sector are likely to increase the life-cycle savings of forward-looking households.

Several observations suggest that bequest motives may be quantitatively important for household saving in China. First, there is evidence that the elderly, even though they are in the last part of their life cycle, have very high savings rates. Several previous papers have documented that urban households seem to have a "U-shaped" age-savings profile (see, e.g., Chamon and Prasad (2010), Chamon et al. (2013), Song and Yang (2010), Choukhmane et al. (2013), Curtis et al. (2011), Ge et al. (2012), Chamon and Prasad (2010), Chen (2014)). For example, based on panel data from the Chinese Urban Household Survey, Chamon and Prasad (2010: 103) show that the average saving rate for urban "household heads" in 2004 is at a 0.25-0.3 level for those in their mid-twenties, then it drops to a level of 0.15-0.2 for those in their late forties and then it again jumps to a stable 0.25-0.3 level for those aged 50 and above. In this paper we calculate age specific savings rates for 2007 in both urban and rural areas using Chinese Household Income Project (CHIP) data. The analysis of these confirms the "U-shaped profile" for urban areas and establishes a similar saving age profile in rural areas.

Moreover, the joint effects of cultural factors, less developed credit markets and a smaller welfare state may also explain an important role for bequests in China based on an intentional intergenerational exchange potentially rooted in strategic considerations over the life cycle. On the one hand, we note that a scarce provision of basic public services and a less developed social security system imply that most elderly Chinese rely on their children for care and support, see Banerjee et al. (2010). This is consistent with a traditional self-reliance within Chinese families (see e.g., Yin (2010)). Indeed, while the typical co-residence between parents and their son's family gradually becomes outdated in modern China, family ties are still tight. Parents and their son's family locate strategically in order to maintain a close relationship and to offer necessary care and

support to the elderly (Yan, 2010).

On the other hand, it seems that bequest and other inter-vivos intergenerational transfers are important for the children in the first stages of their adult life when they make their first housing investments and get married. This partly reflects that the homes of the majority of Chinese households are privately owned, i.e. all rural households live in private homes while the share of urban households living in privately owned homes increased to above 80 per cent after housing market reforms during 1990s, see Wang and Murie (2000); Wang et al. (2005) and evidence from previous CHIP data rounds (1995 and 2002). In our survey data on the elderly, 90% of respondents own the house where they reside and 97% of house owners have zero debt. Taking into account that the credit market is less developed and only a small fraction of the house owners has a mortgage, we conjecture that bequests, which may involve transfer of housing wealth, are quantitatively important for the young generation's financing of their housing investments.

As a point of departure, this paper presents a stylized theoretical overlapping generations model where an exchange-based bequest motive is modeled by means of a Nash bargain between parent and child, see Cox et al. (1998) for a similar bargaining approach to inter-vivos intergenerational transfers. If the adult has a preference for receiving assistance, this intuitively increases bequests and, in response, assistance. In turn, this will imply that forward-looking adults increase their life-cycle savings in order to afford satisfactory levels of both assistance and consumption in old age. We demonstrate that both bequest and assistance are increasing functions of the parent's income and decreasing functions of the child's income. These synchronized responses in bequest and assistance will not be present in the case of only a purely altruistic bequest motive.

As the aim of this paper is to zoom in on the exchange-based motive, we need detailed data on the relationship within families, the time spent on assistance, and financial conditions and transfers; and we were unable to find existing data sources that included all these variables. The CHIP data were suitable to describe urban and rural savings profiles. In that respect they serve as the motivation for our theoretical exercise and the empirical investigation of this paper. In order to obtain the additional information on bequests, bequests motives, assistance, co-habitation, and transfer of house and financial wealth, we collected, in collaboration with Hycon Resarch, our own survey data in four regions of China. The data are based on interviews with 600 elderly above

the age of 50. We cover rural and urban areas in Shanghai, located at the east coast of China, and Chengdu, located in the western inland province of Sichuan. The sample-selection reflects an attempt to capture both rural and urban, and coastal and inland, areas. We know that China is a populous country with extensive differences between both urban and rural part and coastal and inland areas. The regional coverage was chosen in order to represent the population of elderly in all these four, potentially different, areas. Our data include rather detailed information about income, wealth, demographics, actual and planned intergenerational transfers and bequests, and the level of assistance provided from children to parents.

The empirical analysis reveals that there is a positive relationship between assistance provided by the child and expected bequests, a relationship that is consistent with an exchange-based motive. Moreover, the data allow us to test the predictions that savings and assistance are increasing in the parent's income and decreasing in the child's income. Our data are by and large consistent with these predictions and as such give support for the exchange-based motive of savings and bequests.[2] Interestingly, it seems that transfer of housing wealth is key in understanding the exchange-based motive.

Our analysis adds to the literature on private consumption in China. Recent contributions explain the high household saving rates with reference to factors like financing of health expenditures, education of children and housing investments, see Chamon and Prasad (2010). According to Choukhmane et al. (2013), the importance of some of these factors for household savings rates seems to be due to their interaction with the Chinese demographic structure caused by the one-child policy.

Another recent study highlights the importance of precautionary savings. Chamon et al. (2013) present evidence which indicate that the combination of a lowered replacement rate in the old age pension system and higher income uncertainty may contribute to the explanation of a significant part of the "U-shaped" age-saving profile. Although these studies are important in order to understand the observed savings patterns in China, our empirical study indicates that an exchange-based bequest motive also matters for the magnitude of household savings.

[2]We are not able to conclude robustly on all testable implications of the model, however, as not all point estimates are statistically significant. We suspect that this may be related to our moderate sample size.

In general, intergenerational transfers in the form of inter-vivos transfers from children to elderly parents have also received attention in the literature. A study of Silverstein et al. (2006) indicates that the majority of parents have received transfers from at least one of their children. On the other hand, Yan (2003) argues that specific events like marriage are expected to trigger significant downward transfers. Cong (2008) even suggests that a child's willingness to provide assistance and care to the parents in old age will depend on earlier downward transfers. Downward transfers in the form of bequests have not received much assistance so far, however.

In the next section we establish the facts regarding age and savings in China. Section three presents our theoretical model and derives the theoretical predictions. Section four presents our data set and offers some descriptive statistics. The empirical analysis is presented in section five. Section six concludes and discusses our findings in light of potential attempts to boost private consumption and with respect to how the ongoing transformation of the Chinese society may impact the intergenerational mechanisms analyzed in this paper.

2 Saving patterns in China

The Chinese savings-age profile attracts attention both because it does not confirm implications from the most standard models of life-cycle savings, see Ando and Modigliani (1963), and Friedman (1963), and because it is different from the better known profiles observed in OECD countries.[3]

As our own data collection focuses on the elderly households only, we use an external data source to establish the savings profile. The Chinese Household Income Project (CHIP) has conducted four waves of household surveys, in 1988, 1995, 2002, and lastly 2007. These surveys were carried out as part of a collaborative research project on incomes and inequality in China organized by Chinese and international researchers, with assistance from the National Bureau of Statistics (NBS).[4]

All the CHIP waves contain surveys of urban and rural households. As we are not aware that

[3]Note that the "U-shaped" profile has also been documented for some other developing countries, whereas other developing countries seems to have a flatter or opposite u-shape (see e.g., Attanasio and Székely (2000)). As there are many country specific factors that can explain observed savings patterns, and since we have collected detailed data in China only, we do not make any attempt to explain general trends in savings patterns in developing countries or countries in economic transition. However, the intuitions from this paper may be useful as a starting point for studying other countries' savings profiles as well.

[4]For documentation about the CHIP data see Eichen and Zhang (1993), Li et al. (2008) and Luo et al. (2013). The CHIP surveys are closely related to the NBS household survey (see Li et al. (2008) for a description of the NBS household surveys).

Table 1: Household savings rates

	30 and less	31-49 years	50 and above
China Urban	33.8	29.5	34.0
China Rural	14.1	10.4	19.8
United States	12.8	23.5	16.6

Note: The table displays the household savings rates for different age groups in urban and rural areas, respectively, in 2007. The household age group is defined by age of household head. The data are taken from the CHIP data and savings are defined as household total income minus household total consumption expenditure. The numbers for the United States are based on the CEX data downloaded from http://www.bls.gov/cex/csxshare.htm, 16.11.2015.

the age-savings profile for rural areas has been previously documented, the possibility of including these areas was important when choosing to use the CHIP data. This comes at the cost of having to deal with cross-sectional data and we may worry about potential cohort effects in the cross-sectional representation of savings-age profiles. However, it is comforting that previous studies have shown that similar age profiles exist when using panel data for urban areas (see e.g., Chamon and Prasad (2010); Chamon et al. (2013); Song and Yang (2010); Yang et al. (2012).

Table 1 displays the savings rates for three age groups in China for 2007 [5] and compares it to the corresponding numbers from the United States using the Consumer Expenditure (CEX) data. Savings rates are calculated as the deviation between household income and household expenditure divided by household income. As we can see from the table both the young and the elderly save larger fractions of their income than the middle-aged.

The high savings rates among the young can be explained by credit constraints (see e.g., Deaton (1992)). If the young cannot borrow to finance their education or other expenses, they may save early in life although they would have preferred to borrow and consequently smooth consumption over their life-cycle if they could. The explanations for the high saving rates among the elderly is not that obvious though. Candidate explanations are precautionary savings (see e.g., Chamon and Prasad (2010); Chamon et al. (2013)) and in particular the effects of the one-child policy (Choukhmane et al., 2013; Curtis et al., 2011; Ge et al., 2012). However, our analysis suggests an additional explanation. We find support for exchange-based bequest motives, and our results indicate that these motives contribute significantly to the explanation of the high savings rate

[5] Note that similar patterns arise using the CHIP 1995 and 2002 data although the profile is quite flat in rural China for 1995.

among the elderly.

3 Theoretical framework

Building on the basic contributions of Bernheim et al. (1985) and Cox (1987), we formalize an exchange-based bequest motive and compare it with the benchmark case of an altruistic motive. Our stylized model is extended to explicitly capture how intertemporal savings decisions take the future intergenerational exchange of bequest for assistance into account. Moreover, we assume that this exchange is determined by Nash bargaining as in Cox et al. (1998).

The parent-generation and their children overlap in one period and each representative parent has one representative child. While the parent has a two-period life span, i.e. the parent lives in period 1 and 2, the child lives in period 2 only.[6] The parent participates inelastically in the labor force in period 1 and is retired in period 2. The child participates inelastically in the labor force in period 2. Wage incomes are exogenously given by w_p for the parent and w_k for the child. For simplicity we assume that both the real interest rate and the utility discount factor are zero.

Working backwards, the parent and child interact in period 2 in the sense that the child provides a certain number of time units of assistance, a, to the old parent, while the parent leaves a bequest, B, to the child. In period 1, the parent's saving decision is based on perfect foresight about the outcome of this bargain.

The period 2 utility of the parent $U_{p,2}$, and the child, $U_{k,2}$, are given by

$$U_{p,2} = u(c_{p,2}) + f(a) + \alpha\big(u(c_{k,2}) + v(L)\big), \tag{1}$$

$$U_{k,2} = u(c_{k,2}) + v(L) + \gamma\big(u(c_{p,2}) + f(a)\big), \tag{2}$$

where $u' > 0$, $u'' < 0$, $f' > 0$, $f'' \leq 0$, $v' > 0$, $v'' \leq 0$ and $v(0) = f(0) = 0$. As in Cox et al. (1998), the parameters α and γ capture the degree of altruism, $0 \leq \alpha \leq 1$ and $0 \leq \gamma \leq 1$. The period 2 consumption of the parent and the child, $c_{p,2}$ and $c_{k,2}$, and the leisure of the child, L, are given by

$$c_{p,2} = s - B, \tag{3}$$

$$c_{k,2} = w_k + B, \tag{4}$$

[6] In terms of demographic structure, this is similar to the framework utilized by Persson and Tabellini (1990: page 166).

$$L = \overline{L} - a, \tag{5}$$

where s is saving which is given by the parent's decision in period 1 and $\overline{L}$ is the exogenous total time-endowment of the child after we have subtracted the inelastic labor market supply.

Abstracting from potential problems related to parents' ability to commit to the derived bequest, the solution to the bargaining problem is given by the maximization of

$$N = (U_{p,2} - U_{p,2}^0)(U_{k,2} - U_{k,2}^0), \tag{6}$$

with respect to a and B, taking into account that $0 \leq a \leq \overline{L}$. The threat-points $U_{p,2}^0$ and $U_{k,2}^0$ capture a situation without any exchange, i.e. $B = 0$, $a = 0$ and, hence, $L = \overline{L}$. It follows from (1)-(5) that

$$U_{p,2}^0 = u(s) + \alpha\big(u(w_k) + \overline{L}\big), \tag{7a}$$

$$U_{k,2}^0 = u(w_k) + v(\overline{L}) + \gamma\big(u(s)\big). \tag{7b}$$

Utilizing (1)-(7), we can write the first-order conditions

$$\big(f'(a) - \alpha v'(L)\big)\big(U_{k,2} - U_{k,2}^0\big) + \big(-v'(L) + \gamma f'(a)\big)\big(U_{p,2} - U_{p,2}^0\big) = 0, \tag{8}$$

$$\big(u'(c_{p,2}) + \alpha u'(c_{k,2})\big)\big(U_{k,2} - U_{k,2}^0\big) + \big(u'(c_{k,2}) - \gamma u'(c_{p,2})\big)\big(U_{p,2} - U_{p,2}^0\big) = 0. \tag{9}$$

3.1 Altruism

Specifying $\alpha = \gamma = 1$ yields the benchmark case of complete, two-sided altruism. From (8) and (9) we obtain

$$u'(c_{p,2}) = u'(c_{k,2}), \tag{10}$$

$$v'(L) = f'(a), \tag{11}$$

implying a separation between the decisions of a and B.[7] It follows from (3), (4) and (10) that the optimal B serves to smooth the consumption level of the child and the parent, i.e. $c_{p,2} = c_{k,2}$, and

$$B = \frac{s - w_k}{2}. \tag{12}$$

[7]These first-order conditions in the case of altruism can equivalently be derived without any reference to bargaining. Adopting a traditional definition of two-sided altruism as in Foster and Rosenzweig (2001), we can assume that i) the parent decides the optimal B from the maximization of the sum of own direct utility and the child's direct utility and ii) that the child decides the optimal a from the maximization of the sum of own direct utility and the parent's direct utility. It is straightforward to show that this leads to the same first-order-conditions, i.e. (10) and (11).

On the other hand, (11) determines a, which hinges solely on the magnitude of $\overline{L}$ and the curvature of the utility functions $f(\cdot)$ and $v(\cdot)$, but is independent of w_k, s and in turn w_p.

The period 1 problem of the parent in the case of altruism is given by the maximization of his own lifetime utility and the utility of the child,

$$U_{p,1} = u(c_{p,1}) + u(c_{p,2}) + u(c_{k,2}) + v(L) + f(a), \tag{13}$$

with respect to s, given (3), (4), (12), and the insight that L and a are independent of s. We obtain the first-order condition

$$u'(c_{p,1}) = \frac{1}{2}u'(c_{p,2}) + \frac{1}{2}u'(c_{k,2}). \tag{14}$$

This implies that consumption is smoothed both over time and between generations, i.e. $c_{k,2} = c_{p,2} = c_{p,1}$, and

$$s = \frac{1}{3}(2w_p - w_k). \tag{15}$$

Based on (11), (12) and (15), the comparative static properties of the model in the case of altruism are:

$$\frac{\partial B}{\partial w_k} = \frac{1}{2}\left(\frac{\partial s}{\partial w_k} - 1\right) = -\frac{2}{3}, \qquad \frac{\partial B}{\partial w_p} = \frac{1}{2}\frac{\partial s}{\partial w_p} = \frac{1}{3}, \qquad \frac{\partial a}{\partial w_k} = \frac{\partial a}{\partial w_p} = 0 \tag{16}$$

3.2 Exchange

Turning to exchange motive, we specify $\alpha = \gamma = 0$ in (8) and (9), implying

$$\frac{f'(a)}{v'(L)} = \frac{u'(c_{p,2})}{u'(c_{k,2})} = \frac{U_{p,2} - U^0_{p,2}}{U_{k,2} - U^0_{k,2}}. \tag{17}$$

In order to derive illuminating closed-form solutions to the bargaining problem in this case, we assume that the utility of consumption is logarithmic, $u(c_{p,2}) = \log(c_{p,2})$ and $u(c_{k,2}) = \log(c_{k,2})$, while the utility functions for a and L are linear, $f(a) = a$ and $v(L) = L$. From (17), this allows us to solve for optimal B and a,

$$B = \frac{s - w_k}{2}, \tag{18}$$

$$a = \frac{\log s - \log w_k}{2} \tag{19}$$

We observe from (12) and (18) that the optimal B is the same as in the case of altruism. As we observe from (19), the distinction is that the exchange motive implies that not only B but also a

is increasing in s and decreasing in w_k. The intuition is straightforward. From the point of view of the parent, both consumption, $c_{p,2}$, and assistance, a, are normal goods. Consequently, a higher s from the previous period, is in period 2 smoothed optimally between $c_{p,2}$ and a by means of the response in B. For the child, a higher wage income is smoothed between consumption, $c_{k,2}$, and leisure, L, reducing the supply of assistance and the corresponding bequest received.

In period 1, the parent has perfect foresight about the bargaining in period 2 and maximizes

$$U_{p,1} = \log c_{p,1} + \log c_{p,2} + a \tag{20}$$

with respect to s. Here

$$c_{p,1} = w_p - s. \tag{21}$$

Substituting from (4), (18), (19) and (21) into (20), we derive the first-order condition

$$\frac{1}{w_p - s} = \frac{1}{s + w_k} + \frac{1}{2s}, \tag{22}$$

and it is now straightforward to demonstrate that $0 < \frac{\partial s}{\partial w_p} < 1$ and $-1 < \frac{\partial s}{\partial w_k} < 0$. Using these derivatives, (18) and (19), we obtain the comparative static properties of the model in the case of exchange-based bequest:

$$\begin{aligned}
\frac{\partial B}{\partial w_k} &= \frac{1}{2}\left(\frac{\partial s}{\partial w_k} - 1\right) \in \left(-1, -\frac{1}{2}\right), \\
\frac{\partial B}{\partial w_p} &= \frac{1}{2}\frac{\partial s}{\partial w_p} \in \left(0, \frac{1}{2}\right), \\
\frac{\partial a}{\partial w_k} &= \frac{1}{2}\left(\frac{1}{s}\frac{\partial s}{\partial w_k} - \frac{1}{w_k}\right) < 0, \\
\frac{\partial a}{\partial w_p} &= \left(\frac{1}{2s}\right)\left(\frac{\partial s}{\partial w_p}\right) > 0.
\end{aligned} \tag{23}$$

Comparing (23) to (16), we observe that the key to disentangle between the alternative bequest motives is the sensitivity of a to w_k and w_p in the case of exchange-based bequest. The exchange motive implies that a higher w_k not only increases the child's demand for $c_{k,2}$, and leisure, L, but also leads the forward-looking parent to save less early in life in response to a higher implicit price of a in terms of B. Moreover, a higher w_p triggers a positive saving response which reflects higher demand for both $c_{p,2}$ and a. Intuitively, all these effects imply that any variation in w_k, w_p and in turn s, creates positively synchronized movements in a and B.

4 Data collection and descriptives

Our survey was carried out from March until May 2012 in collaboration with Hycon Research in Shanghai.[8] The survey consisted of face-to-face interviews with elderly people aged 50-80. Professional local interviewers visited the individuals at their homes and read each question from the questionnaire to the respondent. The questionnaire spanned topics from personal information and demographics to income and occupation, as well as saving behavior and net wealth. A section was explicitly devoted to information on the respondent's children and on bequests and other intergenerational economic and non-economic transfers.

The interviews were conducted in both urban and rural areas of Shanghai and Chengdu. The former city is located on the coast, while the latter lies in the middle of China, in Sichuan province. The choice of these two locations was driven by the regional differences between the two cities which allows us to derive better predictions for China. Moreover, the distinction between urban and rural areas provides further variation across the individual responses. A multistage random cluster sampling was carried out within these four geographical areas. Districts within the four areas were chosen and divided in subareas which were then randomly picked for the interviews. In order to avoid residential segregation, the four poorest and four richest districts in the four areas were excluded. Within each cluster we opted for a quota-based sampling. A fixed amount of 150 respondents per area was established, as well as a 60-70% quota for the proportion of retired respondents and a 5% quota for each 5-year age group. Finally, a pre-determined "random walk" was used to choose the households to interview along the streets of the districts in order to avoid interactions with neighboring houses.

After a pilot survey we introduced screening questions in order to ensure a sufficient response rate. In particular, the respondents had to be above 50, have at least one child aged above 18 and be willing to share detailed information about their financial situation in order to be part of the survey. Eventually, given the quotas and the exclusion through screening questions, we got a sample of 600 responses satisfying these criteria.[9]

[8] While conducting the survey we were also benefitting from the collaboration with Fudan University and Antai School of Management at Shanghai Jiaotong University.

[9] The total number of non respondents is 4072 and the total exclusions during screening is 1785.

From the data collected we construct variables for our empirical investigation. Questions on bequests and on child's characteristics were asked for each child of the respondent. This allows us to construct variables which are child specific and to enlarge the sample size to 910 (although clustering at household level is necessary). In particular, we use two different measures for expected bequest. One is based on the intention to leave a bequest, while the other is constructed as the (predicted) stock of savings at the (expected) death of the parent. The first measure (*ExpectedBequest*) is the sum of the appropriate amount of bequest (*Bequest*) and non-monetary gifts (*Inkind bequest*) intended for a specific child, the amount of inter-vivos transfers from the parent to the child (*Intervivos*) and the economic value of the house (*House*). The latter is added only if the respondent is owner of the house and if he/she intends to leave the house to that specific child. The value of the house is divided by the respondent's number of children.[10] The amount of inter-vivos are future/intended transfers to the child for education, wedding and the purchase of the house for the child.

The second measure for expected bequest (*Tot savings at death*) is instead the sum of the stock of savings at the (expected) death of the parent (*Savings at death*) and the value of the house (*House*). Both measures are divided by the number of the respondent's children. The stock of savings is based on a question asking specifically the amount of the respondent and his/her spouse's total savings, including cash holdings, deposits in financial institutions, private savings associations, government bonds, as well as stocks/funds. From this question we get a measure of the stock of total savings. To predict the age of death of the parent, we use data from the World Health Organization for the life expectancy age in China provided per age and gender group. The stock of savings at death (*Savings at death*) is then constructed as the stock of savings declared at the time of the interview plus the monthly savings reported at the interview multiplied by the years of life expectancy. The measure for total savings at death (*Tot savings at death*), which also includes the value of the house, should be the amount of bequest that the child is going to receive.

In addition, in order to be consistent with the model assumption, we construct a measure of the

[10]Note that the model best corresponds to families with one child, as there may be interactions in multi-children families not picket up in the model. For this reason, we will provide results for the subsamples of families with one child and of families with more children in addition to results for the whole sample. For the direct tests of the model predictions we focus on the sample of families with one child only as this corresponds more closely to the model, although we provide the corresponding tests for the full sample in the appendix.

savings at the age of retirement of the parent. Indeed, in the model the parent stops saving when he/she stops working, therefore we construct a more precise measure for the savings (*Tot savings at retirement*). If the respondent is working, we add the value of monthly savings multiplied by the (expected) years until retirement to the stock of savings. Using information from the sample of retired individuals, we predict a retirement age per occupation and gender groups. We are aware that the sample of retired individuals may be different from the sample of non-retired individuals. However, using different bounds for this predicted retirement age does not change the results. If instead the respondent is retired, we know their age of retirement and we subtract the monthly savings multiplied by the number of years from retirement from the stock of savings. We then construct a measure of the total savings at the age of retirement (*Tot savings at retirement*) by adding the value of the house (*House*) to the stock of savings at retirement (*Savings at retirement*).

For the assistance provided by the children, we use a specific question which asks the extent of assistance provided from the child to the parent in daily activities. The questions focus on practical help in household chores, shopping, meal preparation, laundry.[11] For our main analysis we use a dummy ($\leq$ *monthly assistance*) that takes value 1 if the child assists the parent daily, weekly, or monthly. In order to identify the intensive margin of the effect of assistance on bequest, we also construct other dummies with different extent of assistance. In particular, *Daily assistance* takes value 1 if assistance is daily, $\leq$ *weekly assistance* takes value 1 if assistance is daily or weekly, $\leq$ *seldom assistance* takes value 1 if assistance is daily, weekly, monthly or seldom, *No assistance* takes value 1 if the child does not provide any assistance.

Finally, in order to capture the effect of parent and child income, we use specific questions aimed at addressing this information. In particular, child's income (*Child income*) is defined as the total yearly net income, while for the parent's income we use either the respondent and his/her spouse's yearly net income (*HH income*) or a combined measure which is the yearly net income of the respondent if the respondent is working and the yearly net income of the previous job if the respondent is retired or unemployed (*Parent income*).

Table 2 reports descriptive statistics for the main variables used for the empirical analysis. All financial amounts are provided in Chinese Yuan. Summary statistics for the parent's and the child's

[11] We also have some measures of financial management and intervivos that we will use as controls in our analysis.

main characteristics are shown in Tables 3 and 4.

Table 2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Bequest*	39.64	109.04	0.25	2000	806
Inkind bequest*	16.85	52.20	1.25	1000	877
Intervivos*	8.76	30.62	0	375	910
House*	503.44	887.03	12.5	10000	668
ExpectedBequest*	365.06	746.07	0	10051.25	910
Savings at death*	66.11	166.13	0	2450	910
Savings at retirement*	27.81	81.64	0	1610	910
Tot savings at death*	367.85	757.57	0	10170	910
Tot savings at retirement*	326.58	721.29	0	10089	910
Daily assistance	0.181	0.385	0	1	910
$\leq$ weekly assistance	0.38	0.486	0	1	910
$\leq$ monthly assistance	0.478	0.5	0	1	910
$\leq$ seldom assistance	0.61	0.488	0	1	910
No assistance	0.381	0.486	0	1	910
Child income*	19.17	16.46	1.25	250	887
HH income*	23.88	20.95	6	240	910
Parent income*	14.64	12.85	1.8	120	910

Note: The table displays summary statistics for the main variables used for the empirical analysis. *Bequest* is the appropriate amount of bequest that the parent intends to leave to the child. *Inkind bequest* is the appropriate amount of inkind bequest intended for the child. *Intervivos* are future/intended transfers to the child for education, wedding and the purchase of the house. *House* is the value of the house if owned by the respondent. *ExpectedBequest* is the sum of *Bequest*, *Inkind bequest*, *Intervivos* and *House*. *Savings at death* is the stock of savings predicted at the time of the (expected) parent's death. *Savings at retirement* is the stock of savings at the time of retirement of the parent. *Tot savings at death* is the sum of *Savings at death* and *House*. *Tot savings at retirement* is the sum of *Savings at retirement* and *House*. *Daily assistance* is a dummy which takes value 1 if assistance from the child to the parent is daily. $\leq$ *weekly assistance*, $\leq$ *monthly assistance*, $\leq$ *seldom assistance* are dummies which take value 1 if assistance from the child is daily or weekly; daily, weekly or monthly; and daily, weekly, monthly or seldom, respectively. *No assistance* is a dummy which takes value 1 if the child does not provide any assistance to the parent. *Child income* is the total yearly net income of the child. *HH income* is the respondent and his/her spouse's yearly net income. *Parent income* is the yearly net income of the respondent if the respondent is working and the yearly net income of the previous job if the respondent is retired or unemployed. Variables* are in thousands.

5 Empirical results

First, we aim at estimating the relationship between expected bequest and assistance. If our hypothesis that there exists an exchance-based savings motive is correct, higher assistance from a child should lead to a larger amount of (expected) bequest. Empirically, we test this hypothesis through the following estimation:

$$\begin{aligned}\log(\text{ExpectedBequest}_i) = \alpha_1 + \alpha_2 \text{Assistance}_i + \alpha_3 \log(\text{ChildIncome}_i) + \\ + \alpha_4 \log(\text{ParentIncome}_i) + \alpha_5 \mathbf{X}_i + \mu_{HH} + \epsilon_i\end{aligned} \tag{24}$$

Table 3: Summary statistics - Parent

Variable	Mean	Std. Dev.	Min.	Max.	N
Age	60.67	6.966	50	87	600
Gender	0.405	0.491	0	1	600
No. children	1.517	0.683	1	3	600
No. grandchild	1.312	1.082	0	6	600
Farmer	0.387	0.487	0	1	600
Own business	0.06	0.238	0	1	600
Private firm	0.162	0.368	0	1	600
SOE	0.322	0.468	0	1	600
Other occupation	0.053	0.225	0	1	600
Housewife	0.017	0.128	0	1	600
Retired	0.592	0.492	0	1	600
Unemployed	0.032	0.175	0	1	600
Age at retirement	54.369	5.424	38	68	355
Predicted years to retirement	4.636	3.274	0	12	217
Life expectancy age	21.167	5.676	4	29	600
Spouse information					
Farmer	0.33	0.471	0	1	600
Own business	0.048	0.215	0	1	600
Private firm	0.202	0.402	0	1	600
SOE	0.257	0.437	0	1	600
Other occupation	0.032	0.175	0	1	600
Housewife	0.015	0.122	0	1	600
Retired	0.468	0.499	0	1	600
Unemployed	0.028	0.166	0	1	600
No spouse	0.1	0.3	0	1	600

Note: The table displays summary statistics for parent's characteristics. *Age* is the age of the respondent. *Gender* is a dummy which takes value 1 if the respondent is a male. *No. children* and *No. grandchildren* are the number of children and grandchildren of the respondent. *Farmer*, *Own a business*, *Private firm*, *SOE*, *Other occupation* are dummies which takes value 1 if the respondent is a farmer, owns a business, works for a private firm, works for a state-owned enterprise, has another occupation, respectively. *Housewife*, *Retired*, *Unemployed* are dummies which takes value 1 if the respondent is an housewife, retired or unemployed, respectively. *Age at retirement* is the age of the respondent when he/she retired. *Predicted years to retirement* are the number of years until retirement predicted for those individuals who are still working. *Life expectancy age* is the number of years an individual is expected to live. The variables for *Spouse information* are defined in the same way. *No spouse* is a dummy which takes value 1 if the respondent does not have a spouse (widow, single or divorced).

Table 4: Summary statistics - Child

Variable	Mean	Std. Dev.	Min.	Max.
Age	36.155	8.331	16	61
Gender	0.504	0.5	0	1
1 sibling	0.396	0.489	0	1
2 siblings	0.214	0.411	0	1
No. children	0.865	0.529	0	3
Married	2.058	2.266	1	7
Co-residence	0.353	0.478	0	1
Elementary school	0.054	0.226	0	1
Middle school	0.384	0.487	0	1
High school	0.318	0.466	0	1
College	0.245	0.43	0	1
N		910		

Note: The table displays summary statistics for the child's characteristics. *Age* is the age of the child. *Gender* is a dummy which takes value 1 if the respondent is a male. *1 sibling* and *2 siblings* are dummies which take value 1 if the child has 1 or 2 siblings, respectively. *No. children* is the number of children of the child. *Married* is a dummy which takes value 1 if the child is married. *Co-residence* is a dummy which takes value 1 if the child lives with the parent. *Elementary school*, *Middle school*, *High school*, *College* are dummies for the highest level of education of the child.

As mentioned above, the variables are constructed specifically for each child i. The dependent variable is the measure of expected bequest based on the appropriate amount of bequest (*ExpectedBequest*) as described in the section 4. For the assistance from the child to the parent we use the daily, weekly or monthly extent ($\leq$ *monthly assistance*). Child income is the net yearly income of the child (*Child income*) as defined in section 4. For parent income we use the respondent and his/her spouse's yearly net income (*HH income*). In order to fully control for income effects, we add second and third order polynomials for both measures of income. We also control for a large set of both parent's and child's characteristics $\mathbf{X}_i$ (for the parent: age, age squared, gender, dummies for both parents' occupation, number of grandchildren, residence, health expenses; for the child: gender, age, education, dummy whether the child is married, number of children, dummy whether the child has siblings). Finally, we introduce household fixed effects (μ_{HH}) in order to capture any within household correlation with the error term.

The results from the estimation of (24) are provided in Table 5. Columns (1) and (2) report the results for the subsample of only children and of children with at least one sibling. Columns (3) and (4) report the results for the whole sample without and with the household fixed effects, respectively.

In column (5) the value of the house (*House*) from the measure of expected bequest. Finally, column (6) reports the results from a 2SLS estimation using the residential distance between the parent and the child as instrumental variable. The measure of the distance is a categorical variable of several residence locations of the child (household, village, province, ect.). The exclusion restriction for the instrument relies on the assumption that residential distance should not have any effect on the amount of bequest expected through other channels than the assistance that is provided by the child. At the same time, assistance should be strongly correlated with the distance. Given that we define assistance as help in daily activities, children living closer to the parent should be able to provide more assistance. Indeed, the F test for the first stage provides evidence for a strong correlation between the two variables. The exclusion restriction may be more questionable though, but in lack of better instruments, we provide the results for this regression as evidence of robustness of our results.

Given our hypothesis, we would expect the sign of α_2, i.e. the effect of assistance on expected bequest, to be positive. From Table 5 we notice that the coefficient for assistance is indeed positive and statistically significant across all the specifications expect in column (5) where we exclude the value of the house in the measure of bequest. Therefore, we find that assistance and bequest are positively correlated, but the relationship seems to rely on the transfer of the house from the parent to the child.

For completeness, we provide both robust and clustered (at the household level) standard errors of the estimates. In column (4) we can notice that the estimate for the effect of assistance loses its statistical significance when using clustered standard errors. We may explain this result due to the analysis on both only children and siblings in the same estimation. Indeed, for households with more than one child, there may be some within-cluster error correlation which is not controlled by the fixed effect and which is then corrected through clustered standard errors. However, this remaining within-cluster error correlation is not an issue for single-child households, for which the fixed effects already control for error correlation.[12] Indeed, when we run the analysis for the two separate subsamples (columns (1) and (2)) the statistical significance holds for both robust and clustered standard errors.

[12]See Cameron and Miller (2015) for a discussion on cluster specific fixed effects.

Lastly, we can notice that the IV estimate for the effect of assistance is larger than the OLS estimate. We may explain this result as a local average treatment effect (LATE), implying that children living closer to the parents do indeed provide more assistance and consequently, get larger bequests. The larger IV estimate may also suggest a measurement error in the variable for assistance.

Table 5: Bequest and Assistance

dep var: Exp Bequest	Only child	Siblings	Whole sample	Whole sample	No house	IV
Assistance	0.367	0.546	0.435	0.546	-0.046	2.595
	(0.188)*	(0.212)**	(0.127)***	(0.273)**	(0.141)	(0.685)***
	[0.188]*	[0.296]*	[0.137]***	[0.380]	[0.198]	[0.685]***
Child income	-26.692	36.503	-10.789	36.503	-0.898	26.303
	(19.629)	(35.915)	(14.744)	(46.115)	(14.492)	(36.921)
	[19.629]	[50.30]	[15.57]	[64.53]	[19.99]	[36.92]
HH income	89.811		81.624			
	(36.902)**		(31.235)***			
	[36.902]**		[34.80]**			
Constant	-212.569	-87.112	-229.639	-86.593	10.638	-56.953
	(141.101)	(105.635)	(109.914)**	(135.718)	(43.609)	(108.968)
	[141.101]	[147.8]	[121.9]*	[189.7]	[60.08]	[109.0]
Observations	346	538	879	887	887	887
R-squared	0.223	0.732	0.350	0.857	0.941	0.019
Polynomials	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Child+Parent	Child	Child+Parent	Child	Child	Child
HH Fixed effect	No	Yes	No	Yes	Yes	Yes
F test						15.54

*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the measure of expected bequest based on the appropriate amount of bequest (*ExpectedBequest*). *Assistance* is a dummy which takes value 1 if the child assists the parent daily, weekly or monthly. *Child income* is the net yearly income of the child, while *HH income* is the net yearly income of the respondent and his/her spouse. Second and third order polynomials are included for both measures of income. A set of controls on child's characteristics are included in the estimation for all columns. A set of controls on parents' characteristics are included in the estimation for columns (1) and (3). For the other columns, household fixed effects are included in the estimation. Columns (1) reports the results for the subsample of only children. Columns (2) reports the results for the subsamples of children with at least one sibling. Column (3) and (4) report the results for the whole sample (without and with household fixed effects, respectively). In column (5) we exclude the value of the house from the measure of expected bequest. Finally, column (6) reports the results from a 2SLS estimation using as instrumental variable the residential distance between the parent and the child. Unit of observation is the child. Robust standard errors are in parentheses. Standard errors clustered at the household level are in brackets.

Table 6 reports the results for a similar estimation of (24) using predicted savings at death (*Tot savings at death*) as measure of expected bequest. We notice that the coefficient for assistance is positive and statistically significant for all specifications, except for the specification in column (5) where we exclude the value of the house in the measure of bequest. Therefore, this alternative measure provides us with additional evidence that there is a positive relationship between assistance

and bequest, and that this relationship is hinging on the intergenerational transfer of the house.

Table 6: Bequest and Assistance

dep var: Tot savings at death	Only child	Siblings	Whole sample	Whole sample	No house	IV
Assistance	0.634	1.468	0.762	1.468	-0.095	3.849
	(0.292)**	(0.369)***	(0.249)***	(0.474)***	(0.193)	(1.080)***
	[0.292]**	[0.505]***	[0.286]***	[0.648]**	[0.272]	[1.080]***
Child income	-16.366	83.761	16.787	83.761	35.064	71.906
	(35.863)	(66.414)	(22.729)	(85.277)	(23.264)	(68.075)
	[35.863]	[92.90]	[24.21]	[119.2]	[31.41]	[68.08]
HH income	100.263		187.057			
	(61.884)		(56.842)***			
	[61.884]		[69.42]***			
Constant	-266.294	-220.115	-683.943	-221.875	-92.333	-187.107
	(232.851)	(196.658)	(196.715)***	(252.701)	(70.617)	(201.747)
	[232.851]	[274.9]	[237.7]***	[352.9]	[95.27]	[201.7]
Observations	346	538	879	887	887	887
R-squared	0.234	0.781	0.286	0.847	0.991	0.003
Polynomials	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Child+Parent	Child	Child+Parent	Child	Child	Child
HH Fixed effect	No	Yes	No	Yes	Yes	Yes
F test						15.54

*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the measure of expected bequest based on the stock of savings at the expected death of the parent (*Tot savings at death*). *Assistance* is a dummy which takes value 1 if the child assists the parent daily, weekly or monthly. *Child income* is the net yearly income of the child, while *HH income* is the net yearly income of the respondent and his/her spouse. Second and third order polynomials are included for both measures of income. A set of controls on child's characteristics are included in the estimation for all columns. A set of controls on parents' characteristics are included in the estimation for columns (1) and (3). For the other columns, household fixed effects are included in the estimation. Columns (1) reports the results for the subsample of only children. Columns (2) reports the results for the subsamples of children with at least one sibling. Column (3) and (4) report the results for the whole sample (without and with household fixed effects, respectively). In column (5) we exclude the value of the house from the measure of expected bequest. Finally, column (6) reports the results from a 2SLS estimation using as instrumental variable the residential distance between the parent and the child. Unit of observation is the child. Robust standard errors are in parentheses. Standard errors clustered at the household level are in brackets.

In the two previous estimations we use a measure of assistance based on relatively frequent interactions between the parent and the child. Given that we have different levels for the extent of assistance, we aim at exploring the intensive and extensive margin of assistance on the amount of bequest. Table 7 reports results using different dummies for assistance in estimating (24). In particular, column (1) uses a daily assistance dummy, column (2) uses a daily or weekly assistance dummy, column (3) uses a daily, weekly or monthly assistance dummy, column (4) uses a daily, weekly, monthly or seldom assistance dummy, and finally column (5) uses a no assistance dummy. The coefficient for assistance is positive and statistically significant (for robust standard

errors) for the first three measures of frequency. However, the magnitude barely changes across specifications, implying that an increase in the frequency of assistance does not have a larger effect on the amount of bequest. On the contrary, when assistance becomes seldom, the effect is still positive but loses statistical significance and more importantly, the effect of providing no assistance is negative, though also not statistically significant.[13] Therefore, the data confirm our hypothesis of an intergenerational transfer of assistance from the child in exchange of a larger bequest from the parent.

Table 7: Bequest and Assistance - intensive and extensive margin

dep var: Exp Bequest	Daily	$\leq$ Weekly	$\leq$ Monthly	$\leq$ Rare	No assistance
Assistance	0.579	0.569	0.546	0.262	-0.178
	(0.341)*	(0.293)*	(0.273)**	(0.395)	(0.394)
	[0.475]	[0.405]	[0.380]	[0.548]	[0.547]
Child income	35.118	35.158	36.503	39.973	39.346
	(46.987)	(47.705)	(46.115)	(46.486)	(46.679)
	[65.864]	[66.893]	[64.527]	[65.060]	[65.343]
Constant	-82.634	-83.332	-86.593	-96.785	-94.655
	(138.214)	(140.242)	(135.718)	(136.768)	(137.248)
	[193.584]	[196.492]	[189.733]	[191.254]	[191.965]
Observations	887	887	887	887	887
R-squared	0.856	0.856	0.857	0.854	0.854
Polynomials	Yes	Yes	Yes	Yes	Yes
Controls	Child	Child	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the measure of expected bequest based on the appropriate amount of bequest *ExpectedBequest*. *Assistance* is a dummy which takes value 1 if the child assists the parent daily (column 1); daily or weekly (column 2); daily, weekly or monthly (column 3); daily, weekly, monthly or seldom (column 4); child provides no assistance (column 5). *Child income* is the net yearly income of the child. Second and third order polynomials are included for child's income. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. Unit of observation is the child. Robust standard errors are in parentheses. Standard errors clustered at the household level are in brackets.

After having assessed some evidence in favour of a positive relation between bequest and assistance, we can test the theoretical predictions derived from the model. In particular, we derive two

[13]Similar results are obtained when using the alternative measure of bequest based on total savings at death (*Tot savings at death*).

theoretical predictions on the relationship between savings and parent's and child's income, respectively. The model predicts that parent's savings are positively correlated with parent's income, but negatively correlated with child's income. We can empirically test these two predictions through the following estimation:

$$\begin{aligned}\log(\text{Savings}_i) = \beta_1 + \beta_2 \log(\text{ChildIncome}_i) + \beta_3 \log(\text{ParentIncome}_i) + \\ + \beta_4 \mathbf{X}_i + \eta_i\end{aligned} \tag{25}$$

The dependent variable is the measure of savings at the age of retirement for the parent (*Tot savings at retirement*), as described in section 4. In order to get consistent results with the model predictions, we run the analysis for the subsample of only children. The results for the whole sample, as well as for the subsample of children with one or two siblings can be found in the appendix.

For the parent's income we use the measure of the current net yearly income if the respondent is working and the income in the previous job for retired or unemployed respondents. Second and third order polynomials are included in order to fully capture the relation between income and savings. We also include a set of controls for child's and parent's characteristics. Table 8 reports the overall effect for child's and parent's income, taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. From Table 8 we notice that the child income effect is not statistically significantly estimated in any of the specifications, but the point estimate is negative when including second and third polynomials, as the theoretical prediction suggests. The parent income effect is positive regardless of the functional form used for income, and statistically significant for the linear model, providing evidence in favour of the theoretical predictions. One reason for the lack of significance may be due to the small sample size used for this analysis.

The empirical evidence for a positive (negative) relation between parent (child)'s income and savings

Table 8: Income effect on savings

dep var: Savings at retirement	(1)	(2)	(3)
Child Income	0.109	5.271	-74.324
	(0.178)	(4.516)	(59.028)
2nd Poly		-0.290	8.448
		(0.257)	(6.569)
3rd Poly			-0.316
			(0.241)
Total effect (child)	0.109	-0.302	-0.512
	(0.178)	(0.663)	(0.925)
Parent income	0.447*	8.081	71.471
	(0.265)	(4.972)	(56.816)
2nd Poly		-0.407	-7.207
		(0.268)	(6.012)
3rd Poly			0.241
			(0.211)
Total effect (parent)	0.447*	0.239	0.289
	(0.265)	(0.518)	(0.667)
Constant	19.530	-38.494	3.439
	(16.218)	(30.517)	(229.971)
Observations	346	346	346
R-squared	0.138	0.163	0.183
Polynomials	No	Yes	Yes
Controls	Child+Parent	Child+Parent	Child+Parent
HH Fixed effect	No	No	No

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on the savings at retirement (*Tot savings at retirement*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on parent's and child's characteristics are also included in the estimation. The analysis is restricted to the subsample of only children. Standard errors are in parenthesis.

also provides support in favour of the correlation between bequest and income. Even though from the model the effect of income on bequest depends on the relation between saving and income, nonetheless we can directly test for this relation between bequest and child/parent income. Similarly to the previous estimation, we run the analysis for subsample of only children. The results for the whole sample, as well as for the subsample of children with one or two siblings can be found in the appendix. For the parent's income we use the measure of the current net yearly income if the respondent is working and the income in the previous job for retired or unemployed respondents. Second and third order polynomials are included in order to fully capture the relation between income and savings. We also include a set of controls on parent's and child's characteristics. The model predicts that child (parent)'s income should be negatively (positively) correlated with the amount of bequest. Table 9 reports the overall income effect on expected bequest for the child and the parent, taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. Again all the coefficients for child income is again insignificant, but we find the predicted point estimates when including the second and third income polynomial. Moreover, we find a (significant) positive relation between parent's income and expected bequest, as predicted by the model.

Finally, we can investigate the relationship between parent's and child's income on assistance. The model predicts a positive (negative) relation for the parent (child)'s income which we can evaluate through the following estimation:

$$\begin{aligned} \text{Assistance}_i = \gamma_1 + \gamma_2 \log(\text{ChildIncome}_i) + \gamma_3 \log(\text{ParentIncome}_i) + \\ + \gamma_4 \mathbf{X}_i + \xi_i \end{aligned} \tag{26}$$

The dependent variable is the daily, weekly or monthly dummy for assistance ($\leq$ *monthly assistance*). Child income is the net yearly income of the child (*Child income*). For parent income we use the measure of the current net yearly income if the respondent is working and the income in

Table 9: Income effect on bequest

dep var: Exp Bequest	(1)	(2)	(3)
Child income	0.023	1.576	-18.127
	(0.111)	(1.912)	(21.831)
2nd Poly		-0.087	2.075
		(0.109)	(2.395)
3rd Poly			-0.078
			(0.087)
Total effect (child)	0.023	-0.102	-0.152
	(0.111)	(0.302)	(0.42)
Parent income	0.304**	2.133	22.245
	(0.131)	(1.989)	(23.536)
2nd Poly		-0.097	-2.253
		(0.107)	(2.523)
3rd Poly			0.076
			(0.090)
Total effect (parent)	0.304**	0.26	0.278
	(0.131)	(0.227)	(0.297)
Constant	8.243	-7.223	-10.472
	(11.911)	(16.593)	(96.618)
Observations	346	346	346
R-squared	0.191	0.195	0.198
Polynomials	No	Yes	Yes
Controls	Child+Parent	Child+Parent	Child+Parent
HH Fixed effect	No	No	No

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on expected bequest (*ExpectedBequest*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on parent's and child's characteristics are also included in the estimation. The analysis is restricted to the subsample of only children. Standard errors are in parenthesis.

the previous job for retired or unemployed respondents (*Parent income*). Second and third order polynomials are included in order to fully capture the relation between income and assistance. We use the same set of controls for parent's and child's characteristics ($\boldsymbol{X}_i$) as described above. We run the analysis for subsample of only children. The results for the whole sample, as well as for the subsample of children with one or two siblings can be found in the appendix. Table 10 reports the results for the estimation of (26). The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. The effect is negative for the child's income and positive for the parent's income, providing evidence in favor of an exchange motive and against an altruistic motive for bequest (however, the point estimates are not statistically significant). Indeed, if parents were exclusively altruistic, we would expect a negative correlation between the assistance provided by the child and the parent's income. The intuition is that children would not need to provide assistance in exchange for a higher bequest, since they would nonetheless receive a bequest from their altruistic parents. Instead, from our data we find the opposite evidence that the parent's income is positively correlated with the assistance received from the child supporting the hypothesis of an intergenerational transfer through bequest and assistance.

5.1 Robustness checks

Another source of variation among households which could affect the relation between assistance and bequest is the extent of assistance provided by grandchildren as well as the income level of the siblings. In Table 11 we report the results from estimation of (24) using grandchildren's assistance as control in columns (1) and (2). We run the analysis for the subsample of only children and for the whole sample, respectively. The relation between assistance and expected bequest is still positive and statistically significant, providing further support for the exchange-based motive. In columns (3) and (4) we restrict the sample to those children who have the same income as their

Table 10: Income effect on assistance

dep var: Assistance	(1)	(2)	(3)
Child income	-0.033	0.173	0.932
	(0.026)	(0.483)	(5.371)
2nd Poly		-0.012	-0.094
		(0.027)	(0.584)
3rd Poly			0.003
			(0.021)
Total effect (child)	-0.033	-0.051	-0.050
	(0.026)	(0.071)	(0.103)
Parent income	0.031	-0.243	-3.980
	(0.038)	(0.673)	(9.424)
2nd Poly		0.015	0.415
		(0.036)	(1.002)
3rd Poly			-0.014
			(0.035)
Total effect (parent)	0.031	0.046	0.041
	(0.038)	(0.072)	(0.010)
Constant	-0.218	-0.064	9.194
	(2.731)	(4.219)	(31.953)
Observations	346	346	346
R-squared	0.193	0.194	0.194
Polynomials	No	Yes	Yes
Controls	Child+Parent	Child+Parent	Child+Parent
HH Fixed effect	No	No	No

Note: The table reports the overall income effect for child's and parent's income on assistance ($\leq$ *monthly assistance*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on parent's and child's characteristics are also included in the estimation. The analysis is restricted to the subsample of only children. Standard errors are in parenthesis.

siblings, with and without household fixed effects, respectively. As discussed in section 4, different levels of income across siblings may bias the effect of a specific child on the expected bequest from the parent. Therefore, focusing on those children with equal income levels, we can mitigate the potential interactions among sibling's incomes. The relation between assistance and expected bequest is positive but not statistically significant[14].

Table 11: Robustness Checks

dep var: Exp Bequest	Grandchild assistance Only child	Grandchild assistance Whole sample	Same income Siblings	Same income Siblings
Assistance	0.343	0.539	0.192	0.108
	(0.185)*	(0.270)**	(0.231)	(0.298)
	[0.185]*	[0.376]	[0.270]	[0.421]
Child income	-28.436	36.836	44.199	-172.921
	(19.547)	(47.710)	(36.076)	(1,274.662)
	[19.547]	[66.777]	[40.923]	[484.113]
HH income	96.142		23.700	
	(37.031)***		(65.733)	
	[37.031]***		[66.898]	
Constant	-232.464	-85.554	-203.511	486.337
	(139.965)*	(140.711)	(254.062)	(3,791.554)
	[139.965]*	[196.767]	[259.083]	[1452.356]
Observations	346	879	337	337
R-squared	0.230	0.857	0.331	0.764
Polynomials	Yes	Yes	Yes	Yes
Controls	Child+Parent	Child	Child+Parent	Child
HH Fixed effect	No	Yes	No	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the measure of expected bequest based on the appropriate amount of bequest (*ExpectedBequest*). *Assistance* is a dummy which takes value 1 if the child assists the parent daily, weekly or monthly. *Child income* is the net yearly income of the child, while *HH income* is the net yearly income of the respondent and his/her spouse. Second and third order polynomials are included for both measures of income. A set of controls on child's characteristics are included in the estimation for all columns. A set of controls on parents' characteristics are included in the estimation for columns (1) and (3). For the other columns, household fixed effects are included in the estimation. Column (1) and (2) report the results controlling for grandchildren's assistance for the subsample of only children and for the whole sample respectively. Columns (3) and (4) restrict the sample to those children who have the same income as their siblings. Unit of observation is the child. Robust standard errors are in parentheses. Standard errors clustered at the household level are in brackets.

6 Concluding remarks

Motivated by the observation of very high saving rates among the elderly in both urban and rural China, this paper has investigated key aspects of household wealth accumulation in old age and

[14]When using a different measure of assistance (more frequent) we get statistical significance.

the potentially involved bequest motives. Based on our unique survey data from different parts of China, we document that the magnitude of the bequest from parent to child is positively related to the level of assistance provided by the child for the parent. In accordance with this finding, our data also suggest that both bequest and assistance increase with the income level of the parent and decrease with the income level of the child. An additional insight is the finding that accumulated housing wealth is a crucial part of bequeathed wealth.

Compared to the predictions from a stylized, theoretical overlapping generations model where bequest and assistance are determined by Nash bargaining between the parent and the child, our findings of synchronized movements of bequest and assistance support an exchange-based bequest motive. In contrast, our benchmark case of two-sided altruism implies – according to our simple model – no such synchronization because assistance is independent of the wage levels of both child and parent. The latter result is sensitive to the model specification, however. The well-known model of Cox (1987), for example, builds on the assumptions of downward altruism and utility functions which are non-separable in consumption and assistance. It then turns out that the signs of the relationships between assistance and the wage levels of child and parent respectively, are indeterminate. Thus, we will not make strong claims in the direction of rejecting that altruism matter for bequests. Our conclusion is the more careful one: The results do indicate that an exchange-based bequest motive matters for households' wealth accumulation – and we conjecture that this motive may potentially work together with both an altruistic motive as well as the effects of unintentional bequests caused by uncertain lifetimes.

The existence of a significant exchange-based bequest motive has obvious implications for policies geared towards stimulation of private consumption. Firstly, an improved and extended supply of publicly provided health care and other services to senior citizens will reduce the need for assistance from the children. Secondly, the development of a larger and more mature domestic credit market will reduce the reliance of the young generation on bequests and inter-vivos transfers in order to afford a satisfactory home. A policy-mix combining these measures is likely to diminish the magnitudes involved in the exchange of assistance for bequest within the family. In turn this will reduce the saving rates of the elderly.

As discussed in the introduction, the exchange of assistance for bequest is partly rooted in

culture and social norms. We might therefore expect that the ongoing transformation of the Chinese society in itself will gradually reduce this exchange. As argued by Lindbeck (1997), norms and incentives may interact, convincing us that the prescribed policy measures may be forceful tools in attempts to stimulate household consumption in China.

References

Ando, Albert and Franco Modigliani, "The 'life cycle' hypothesis of saving: Aggregate implications and tests," *The American economic review*, 1963, pp. 55–84.

Attanasio, Orazio P. and Miguel Székely, "Household Saving in Developing Countries – Inequality, Demographics and All That: How Different are Latin America and South East Asia ?," *Inter-American Development Bank Working Paper*, 2000.

Banerjee, Abhijit, Xin Meng, and Nancy Qian, "The life cycle model and household savings: Micro evidence from urban china," *National Bureau of Demographic Dividends Revisited*, 2010, *21.*

Bernheim, B. Douglas, Andrei Shleifer, and Lawrence H. Summers, "The strategic bequest motive," *The Journal of Political Economy*, 1985, pp. 1045–1076.

Cameron, A. Colin and Douglas L. Miller, "A practitioner?s guide to cluster-robust inference," *Journal of Human Resources*, 2015, *50* (2), 317–372.

Chamon, Marcos D. and Eswar S. Prasad, "Why are saving rates of urban households in China rising?," *American Economic Journal: Macroeconomics*, 2010, pp. 93–130.

Chamon, Marcos, Kai Liu, and Eswar S. Prasad, "Income uncertainty and household savings in China," *Journal of Development Economics*, 2013, *105*, 164–177.

Chen, Yi, "Never Too Old to Save Explaining the High Saving Rates of the Chinese Elderly," *Working paper*, 2014.

Choukhmane, Taha, Nicholas Coeurdacier, and Keyu Jin, "The One-Child policy and household savings," 2013.

Cong, Zhen, "Children's migration and the financial, social, and psychological well-being of older adults in rural China." Phd disseration, Leonard Davis School of Gerontology, University of Southern California April 2008.

Cox, Donald, "Motives for private income transfers," *Journal of Political Economy*, 1987, *95* (3), 508–546.

_ , Zekeriya Eser, and Emmanuel Jimenez, "Motives for private transfers over the life cycle: An analytical framework and evidence for Peru," *Journal of Development Economics*, 1998, *55* (1), 57–80.

Curtis, Chadwick C., Steven Lugauer, and Nelson C. Mark, "Demographic patterns and household saving in China," Technical Report, National Bureau of Economic Research 2011.

Deaton, Angus, *Understanding consumption*, Oxford University Press, 1992.

Eichen, M. and M. Zhang, *The Distribution of Income in China*, New York: St. Martins Press,

Foster, Andrew D. and Mark R. Rosenzweig, "Imperfect commitment, altruism, and the family: Evidence from transfer behavior in low-income rural areas," *Review of Economics and Statistics*, 2001, *83* (3), 389–407.

Friedman, Milton, *Windfalls, the" Horizon", and Related Concepts in the Permanent-Income Hypothesis*, Department of Economics of the Graduate School of Business of the University of Chicago, 1963.

Ge, Suqin, Dennis Tao Yang, and Junsen Zhang, "Population policies, demographic structural changes, and the Chinese household saving puzzle," 2012.

Li, Shi, Chuliang Luo, Zhong Wei, and Ximing. Yue, *Inequality and Public Policy in China*, New York: Cambridge University Press,

Lindbeck, A., "Incentives and social norms in household behavior," *American Economic Review (papers and proceedings)*, 1997.

Luo, Chuliang, Shi Li, Terry Sicular, Quheng Deng, and Ximing Yue, *Rising Inequality in China: Challenges to a Harmonious Society*, Cambridge University Press, 2013.

Silverstein, Merril, Daphna Gans, and Frances M. Yang, "Intergenerational support to aging parents the role of norms and needs," *Journal of Family Issues*, 2006, *27* (8), 1068–1084.

Song, Zheng Michael and Dennis Tao Yang, "Life cycle earnings and the Chinese household saving puzzle in a fast-growing economy," Technical Report, draft mimeo 2010.

Wang, Ya Ping and Alan Murie, "Social and spatial implications of housing reform in China," *International Journal of Urban and Regional Research*, 2000, *24* (2), 397–417.

_ , Yanglin Wang, and Glen Bramley, "Chinese housing reform in state-owned enterprises and its impacts on different social groups," *Urban Studies*, 2005, *42* (10), 1859–1878.

Yan, Yunxiang, *Private life under socialism: Love, intimacy, and family change in a Chinese village, 1949-1999*, Stanford University Press, 2003.

_ , *The individualization of Chinese society*, Berg, 2010.

Yang, Dennis Tao, Junsen Zhang, and Shaojie Zhou, "Why are saving rates so high in China?," in "Capitalizing China," University of Chicago Press, 2012, pp. 249–278.

Yin, Ting, "Parentchild co-residence and bequest motives in China," *China Economic Review*, 2010, *21*, 521–531.

Appendix

Table 12: Income effect on savings (whole sample)

dep var: Savings at retirement	(1)	(2)	(3)
Child income	-0.456	-11.168	78.853
	(0.626)	(10.949)	(135.208)
2nd Poly		0.606	-9.349
		(0.616)	(15.031)
3rd Poly			0.363
			(0.553)
Total effect (child)	-0.456	0.355	0.609
	(0.626)	(1.47)	(2.01)
Parent income	2.684***	8.073	-6.770
	(0.618)	(32.326)	(33.735)
2nd Poly		-0.251	1.013
		(1.731)	(2.087)
3rd Poly			-0.035
			(0.057)
Total effect (parent)	2.684***	3.45	2.79
	(0.618)	(2.97)	(3.14)
Constant	-10.557	7.871	-203.520
	(7.141)	(116.509)	(333.243)
Observations	887	887	887
R-squared	0.824	0.828	0.831
Polynomials	No	Yes	Yes
Controls	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on the savings at retirement (*Tot savings at retirement*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. The analysis is run on the whole sample. Standard errors clustered at household level are in parenthesis.

Table 13: Income effect on savings (siblings)

dep var: Savings at retirement	(1)	(2)	(3)
Child income	-0.456	-11.168	78.853
	(0.488)	(8.534)	(105.393)
2nd Poly		0.606	-9.349
		(0.480)	(11.717)
3rd Poly			0.363
			(0.431)
Total effect (child)	-0.456	0.274	0.381
	(0.488)	(1.08)	(1.46)
Parent income	1.243**	14.831	6.388
	(0.614)	(12.532)	(11.076)
2nd Poly		-0.703	0.022
		(0.656)	(0.528)
3rd Poly			-0.019
			(0.016)
Total effect (parent)	1.243**	2.29	2.23
	(0.614)	(1.3)	(1.29)
Constant	5.293*	-12.848	-250.656
	(2.741)	(86.782)	(289.283)
Observations	538	538	538
R-squared	0.748	0.754	0.757
Polynomials	No	Yes	Yes
Controls	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on the savings at retirement (*Tot savings at retirement*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. The analysis is restricted to the subsample of children with siblings. Standard errors clustered at household level are in parenthesis.

Table 14: Income effect on bequest (whole sample)

dep var: Exp bequest	(1)	(2)	(3)
Child income	-0.228	-6.310	39.221
	(0.269)	(5.642)	(66.002)
2nd Poly		0.344	-4.691
		(0.322)	(7.410)
3rd Poly			0.184
			(0.275)
Total effect (child)	-0.228	0.232	0.36
	(0.269)	(0.78)	(0.989)
Parent income	1.943***	25.576*	13.894
	(0.330)	(13.558)	(13.753)
2nd Poly		-1.266*	-0.160
		(0.722)	(0.928)
3rd Poly			-0.035
			(0.029)
Total effect (parent)	1.943***	2.28	1.93
	(0.330)	(1.28)	(1.29)
Constant	-5.462	-87.711*	-182.240
	(3.746)	(46.481)	(167.753)
Observations	887	887	887
R-squared	0.847	0.852	0.854
Polynomials	No	Yes	Yes
Controls	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on expected bequest (*ExpectedBequest*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. The analysis is run on the whole sample. Standard errors clustered at household level are in parenthesis.

Table 15: Income effect on bequest (siblings)

dep var: Exp bequest	(1)	(2)	(3)
Child income	-0.228	-6.310	39.221
	(0.210)	(4.398)	(51.448)
2nd Poly		0.344	-4.691
		(0.251)	(5.776)
3rd Poly			0.184
			(0.214)
Total effect (child)	-0.228	0.186	0.24
	(0.210)	(0.572)	(0.708)
Parent income	0.576**	10.296*	5.160
	(0.252)	(5.623)	(5.465)
2nd Poly		-0.501*	-0.039
		(0.293)	(0.268)
3rd Poly			-0.013**
			(0.007)
Total effect (parent)	0.576**	1.36	1.33
	(0.252)	(0.606)	(0.608)
Constant	7.934***	-12.108	-129.771
	(1.300)	(40.138)	(135.601)
Observations	538	538	538
R-squared	0.714	0.723	0.727
Polynomials	No	Yes	Yes
Controls	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on expected bequest (*ExpectedBequest*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. The analysis is restricted to the subsample of children with siblings. Standard errors clustered at household level are in parenthesis.

Table 16: Income effect on assistance (whole sample)

dep var: Assistance	(1)	(2)	(3)
Child income	-0.104*	0.737	4.979
	(0.063)	(0.905)	(10.792)
2nd Poly		-0.048	-0.517
		(0.051)	(1.178)
3rd Poly			0.017
			(0.042)
Total effect (child)	-0.104*	-0.168	-0.156
	(0.063)	(0.131)	(0.186)
Parent income	0.091	1.807	0.758
	(0.079)	(2.962)	(2.938)
2nd Poly		-0.097	0.002
		(0.160)	(0.171)
3rd Poly			-0.003
			(0.005)
Total effect (parent)	0.091	0.021	-0.012
	(0.079)	(0.282)	(0.303)
Constant	0.883	-10.205	-19.128
	(0.841)	(11.465)	(27.319)
Observations	887	887	887
R-squared	0.821	0.823	0.823
Polynomials	No	Yes	Yes
Controls	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on assistance ($\leq$ *monthly assistance*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. The analysis is run on the whole sample. Standard errors clustered at household level are in parenthesis.

Table 17: Income effect on assistance (siblings)

dep var: Assistance	(1)	(2)	(3)
Child income	-0.104*	0.737	4.979
	(0.049)	(0.705)	(8.413)
2nd Poly		-0.048	-0.517
		(0.051)	(1.178)
3rd Poly			0.017
			(0.042)
Total effect (child)	-0.104*	-0.162	-0.157
	(0.063)	(0.097)	(0.14)
Parent income	-0.092	5.664***	3.805***
	(0.067)	(1.315)	(1.027)
2nd Poly		-0.291***	-0.097**
		(0.070)	(0.043)
3rd Poly			-0.007***
			(0.002)
Total effect (parent)	-0.092	0.473	0.469
	(0.067)	(0.473)	(0.469)
Constant	2.710***	-29.016***	-35.802
	(0.402)	(7.354)	(24.387)
Observations	538	538	538
R-squared	0.701	0.704	0.704
Polynomials	No	Yes	Yes
Controls	Child	Child	Child
HH Fixed effect	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Note: The table reports the overall effect for child's and parent's income on assistance ($\leq$ *monthly assistance*), taking into consideration second and third order polynomials. The first column only estimates the linear effect for income. The second column estimates both linear and second polynomial for income. The third column estimate linear, second and third polynomial for income. The *Total effect* rows show the total income effect for each estimation: $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income$ for the second column; and $\hat{\beta} = \beta_{Income} + 2\beta_{Income^2} * Income + 3\beta_{Income^3} * Income^2$ for the third column. A set of controls on child's characteristics as well as household fixed effects are also included in the estimation. The analysis is restricted to the subsample of children with siblings. Standard errors clustered at household level are in parenthesis.

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14/15 June, **Astrid Kunze** and Amalia R. Miller, "Women Helping Women? Evidence from Private Sector Data on Workplace Hierarchies"

15/15 July, **Kurt R. Brekke**, Tor Helge Holmås, Karin Monstad, Odd Rune Straume, «Do Treatment Decisions Depend on Physicians Financial Incentives?"

16/15 July, **Ola Honningdal Grytten**, "Norwegian GDP by industry 1830-1930".

17/15 August, **Alexander W. Cappelen**, Roland I. Luttens, **Erik Ø. Sørensen**, and **Bertil Tungodden**, «Fairness in bankruptcy situations: an experimental study».

18/15 August, **Ingvild Almås, Alexander W. Cappelen, Erik Ø. Sørensen**, and **Bertil Tungodden**, "Fairness and the Development of Inequality Acceptance".

19/15 August, **Alexander W. Cappelen**, Tom Eichele,Kenneth Hugdah, Karsten Specht, **Erik Ø. Sørensen**, and **Bertil Tungodden**, "Equity theory and fair inequality: a neuroconomic study".

20/15 August, Frank Jensen and **Linda Nøstbakken**, «A Corporate-Crime Perspective on Fisheries: Liability Rules and Non-Compliance".

21/15 August, Itziar Lazkano and **Linda Nøstbakken**, "Quota Enforcement and Capital Investment in Natural Resource Industries".

22/15 October, **Ole-Petter Moe Hansen** and Stefan Legge, "Trading off Welfare and Immigration in Europe".

23/15 October, Pedro Carneiro, Italo Lopez Garcia, **Kjell G. Salvanes**, and Emma Tominey, "Intergenerational Mobility and the Timing of Parental Income".

24/15 October, David Figlio, Krzysztof Karbownik, and **Kjell G. Salvanes**, "Education Research and Administrative Data".

25/15 October, **Ingvild Almås, Alexander W. Cappelen, Kjell G. Salvanes, Erik Ø. Sørensen,** and **Bertil Tungodden**: «Fairness and family background».

26/15 November, Lars Ivar Oppedal Berge, **Kjetil Bjorvatn**, Simon Galle, Edward Miguel, Daniel Posner, **Bertil Tungodden**, and Kelly Zhang "How Strong are Ethnic Preferences?".

27/15 November, **Agnar Sandmo**, "The Public Economics of Climate Change".

28/15 November, **Aline Bütikofer** and **Kjell G. Salvanes**, "Disease Control and Inequality Reduction: Evidence from a Tuberculosis Testing and Vaccination Campaign".

29/15 December, **Aline Bütikofer**, Katrine V. Løken and **Kjell G. Salvanes**, "Long-Term Consequences of Access to Well-child Visits"

30/15 December, **Roger Bivand**, "Revisiting the Boston data set (Harrison and Rubinfeld, 1978): a case study in the challenges of system articulation".

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01/16 January**, Ingvild Almås and** Anders Kjelsrud**,** "Pro-poor price trends and inequality | the case of India".

02/16 January, Tuomas Pekkarinen, **Kjell G. Salvanes,** and Matti Sarvimäki, «The evolution of social mobility: Norway over the 20th century"

03/16 February, Sandra E. Black, Paul J. Devereux, and **Kjell G. Salvanes**, "Healthy(?), Wealthy, and Wise. Birth Order and Adult Health".

04/16 March, Hiroshi Aiura, "The effect of cross-border healthcare on quality, public health insurance, and income redistribution"

05/16 March**, Jan Tore Klovland**, "Shipping in dire straits: New evidence on trends and cycles in coal freights from Britain, 1919-1939"

06/16 April, Branko Bošković and **Linda Nøstbakken**, "The Cost of Endangered Species Protection: Evidence from Auctions for Natural Resources"

07/16 April, Cheti Nicoletti, **Kjell G. Salvanes**, and Emma Tominey, "The Family Peer Effect on Mothers' Labour Supply"

08/16 April, Hugh Gravelle and **Fred Schroyen**, "Optimal hospital payment rules under rationing by random waiting"

09/16 May, Branko Bošković and **Linda Nøstbakken** "Do land markets anticipate regulatory change? Evidence from Canadian conservation policy"

10/16 May, **Ingvild Almås**, Eleonora Freddi, and **Øystein Thøgersen**, "Saving and Bequest in China: An Analysis of Intergenerational Exchange"

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