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Money is time: geographical distance and intergenerational support to aging parents in rural China

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ABSTRACT

This study examines the effects of the geographical distance between adult offspring and their elderly parents on their support provided to their parents in rural China. Monetary and non-monetary support is closely related to the physical and psychological well-being of the elderly. Three waves of the China Health and Retirement Longitudinal Study (CHARLS) are used to identify a causal effect of the location of the adult offspring on outcomes such as financial transfers to the parents and provision of emotion/physical support. We find that the effects vary with the type of support. The effect of geographical distance on financial support sent by adult children to elderly parents shows a semi-inverted 'U-shaped' trend that first increases and then slowly decreases. The frequency of visit by the adult child to elderly parents decreases significantly as distance increase. Further analysis examines the heterogeneity of these effects. The paper combines theoretical and empirical evidence to illustrate how adult children make use of their limited time and money to provide parental support when they migrate different distances from home.

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1. Introduction

The global population is aging due to low fertility and low mortality rates. In rural China, the aging population has become a critical policy focus. Due to physical and life-course changes that accompany aging, such as decreases in functional ability and a move from productive labor to retirement, the elderly require financial and instrumental support as physical functioning falters. These types of assistance come from various sources in Western developed countries, but most elderly in rural China rely on their adult children. Increases in old-age dependency in rural China have increased the support burden of adults with elderly parents. Many adult children who otherwise would care for their elderly parents have migrated to developed urban areas in search of economic opportunity.

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Whether the migration of adults benefits or harms those left behind has received growing attention in the literature. Part of this literature has focused on the effects on children of migrants who stay behind. For example, Antman (2011, 2012) explores the effects of male parental migration on child schooling and work outcomes using data from Mexico. She finds that 12–15 year-old boys suffer most from their father's absence. Some boys reduce study hours and increase work hours due to financial hardship created by the father's migration to the U.S. Domestic migration is different from international migration. If the father remains in Mexico, no statistically significant effects are detected.

Place of migration has a clear relationship to effects on left-behind children. In China, the economic boom since the late 1970s has led to large-scale migration to urban areas, particularly toward industrial areas near the Eastern Coast. Numerous studies have examined the impacts of migration on children left behind. For example, Meng and Yamauchi (2017) analyze how parental migration affects child health and education outcomes using the Rural-Urban Migration Survey in China (RUMiC) and find a sizable adverse effect of parental migration on nutrition and education outcomes of children.

Literature on the consequences of migration of adult children on the well-being of elderly people left behind is less extensive (Ao et al., 2016; Huang et al., 2016; Yi et al., 2019). On the one hand, increased income following migration might allow migrant children to offer more financial support to their parents to compensate for less instrumental assistance and decreasing in-person contact. Alternatively, since spatial proximity facilities interaction and assistance, the distance caused by migration may reduce intergenerational cohesiveness and, as a result, migrant adults may send less financial support to left-behind parents. Migration of working-age children can affect traditional intra-family care arrangements and the allocation of responsibilities, which could lower the welfare of the left-behind. The effect of distance migrated on intergenerational support is theoretically inconclusive.

The objective of this paper is to analyze the causal impact of adult migration on the well-being of elderly parents left behind. We investigate whether distance migrated affects financial and emotional support provided to the rural elderly in China. The contribution to the literature is three-fold. First, a simple theoretical model is set up to represent the individual-level decision of the migrating adult child to allocate resources to their elderly parents. Second, most empirical studies use a dummy variable indicating whether the child migrates or not or a count of the number of migrated children, and ignore the effect of distance. This practice might be appropriate in studies of international migration such as from Mexico to the U.S. (Antman, 2011, 2012). However, in internal migration, distance may matter due to time and monetary costs of travel. These costs can affect the decision to substitute financial resources for time spent with elderly parents. The act of migration creates a substantial but not insurmountable barrier between the migrant and her parent. In China, the economic boom of the past 40 years has created alternative migration destinations into places of varying distances and with varying costs associated with returning home. Distance is an obstacle to providing care, but the strength of the obstacle varies; it matters where the adult offspring migrates.

Two variables are used to reflect distance: a categorical variable indicating the adult child and elderly parent living arrangement; and the exact reported distance in kilometers between the adult child and her parents. Treatment of migration as a matter of degree defined by distance is an important contribution of this paper. With rapid development of modern transportation and communications technology, migrated adult children can shorten travel times, and contact parents via mobile phone or computer. These factors may relieve obstacles related to distance.

A third contribution of the paper is to identify the causal effect of distance on the form of care provided to the parent. Studies examining health outcomes fail to capture the mechanism by which migration affects such outcomes. An effect of distance is to make face-to-face care more costly; children who migrate far from their parents may substitute financial transfers for face time because financial transfers are relatively less costly as distance grows. This trade-off has not been adequately explored.

The paper is organized as follows. Section 2 provides background, reviews the relevant literature and presents the theoretical framework. Section 3 describes data sources and summary statistics. Section 4 establishes the empirical strategy and the means of identification. Section 5 presents and discusses results, robustness checks and heterogeneity. Section 6 concludes the paper.

2. Theory

2.1. Background

Significant segregation between rural and urban populations in China has been legally enforced since the 1950s by the household registration (Hukou) system. This system supported the Chinese government's urban- and heavy-industry-focused development strategy beginning in the 1950s (Lin et al., 2003). Under the Hukou system, rural-urban migration was restricted and farmers provided cheap agricultural products to the industrial sector and urban areas. Rural incomes lagged behind those in urban areas: the ratio of urban to rural per capita income was about 2.6 in 1978 and exceeded 3.3 between 2007 and 2009. This ratio has recently declined, but was still estimated to be 2.6 in 2019 (National Bureau of Statistics (NBS)).

People in rural China do not have access to the same social benefits as do urban residents. Two notable benefits are health care insurance and pensions. Since 1985 when the village-based Cooperative Medical Scheme (CMS) collapsed, most rural residents have remained uninsured. Without health insurance, the rural elderly face greater health challenges than urban dwellers. In 2003, the Chinese government began a nationwide project known as the New Cooperative Medical Scheme (NCMS). Although health insurance coverage in rural areas has increased, the NCMS provides only low-cost basic services, so the family's health care burden largely remains.

About 90% of the rural elderly do not have pension coverage and depend on their families for old-age support (Shen & Williamson, 2010; Shi, 2006). In response to concerns about poverty among the rural elderly, in 2009 the government launched a nationwide contributory pension program–the New Rural Pension Scheme (NRPS). More than 460 million rural elderly were participating at the end of 2012. The benefit varies by county, but the basic benefit was only 55 RMB Yuan per month in 2009,

adjusted upward to 88 RMB Yuan per month in 2018,[1] obviously quite low. Many participants still rely on support from their family.

Many young rural laborers moved from villages to cities with the rapid economic growth since the late 1980s. Rural-urban migration increased from 125.7 million in 2001 to 290.8 million in 2019.[2] About 62% of rural elderly households now have at least one adult child who migrated outside the home county.[3]

2.2. Motivations for and constraints to migration

Rural to urban migration is commonly characterized as being caused by push and pull factors. Surplus rural labor and subsequent low wages are main push factors (Zhao, 2005). Other than expected gains in lifetime income (a pull factor), diverse motivations affect the migration decision, including social networks (Palloni et al., 2001) and area amenities (Rappaport, 2007). Intergenerational dynamics and subjective preferences of potential migrants can come into play (Gillespie & Lippe, 2015). Due to these factors, self-selection of migration should be addressed when exploring outcomes of migration. Unobserved factors affect the decision and subsequent outcomes.

It is generally assumed that individuals decide to migrate as a way of maximizing gains (economic and noneconomic) net of costs of migrating. Other personal and household characteristics such as age, gender, education, marital status, family size, and income risk have been shown to affect the decision (Hare, 1999; Jalan & Ravallion, 2001; Zhao, 1997, 1999a, 1999b; Zhu, 2002).

Distance from parents creates costs that can affect migration decisions. Gillespie and Lippe (2015) consider the relationship between intergenerational solidarity and young adult's proximity to parents using data from the Netherlands. Results suggest that individuals with close emotional relationships live closer to their parents, but no evidence is provided on how distance affects subsequent contacts with parents.

Migration has economic benefits for rural households in China (Rozelle et al., 1999). Remittances may reduce the financial stress on left-behind family members. Studies have shown that migration of adult children has a positive effect on financial support (Guo et al., 2009; Yi et al., 2019) that can provide income for the elderly (Lu, 2013), alleviate economic stress, offer better access to quality food, and enable health treatment. Evidence on the effect of distance on physical and emotional support (the frequency of visit, etc.) is ambiguous. Although migrant children may continue to provide instrumental support during visits (Baldock, 2000), support during visits cannot completely compensate for regular support lost due to migration (Marchetti-Mercer, 2012). Geographical distance can constrain the frequency of visit and time spent providing instrumental care (Greenwell & Bengtson, 1997; Guo et al., 2018). Others find that distance is of only minor importance (Litwak, 1960). Some even conclude that greater distance between parents and adult children is associated with closer parent–child relationships (Guo et al., 2011).

2.3. Theoretical framework

We first assume that location of migration and times visiting parents are jointly determined. Second, we assume that the utility of the migrant depends in part on

parental well-being and the latter is produced by money and emotional support (total time) provided by the migrant. Third, while examining these tradeoffs, we account for time and money costs associated with providing instrumental support.

The utility function of the elderly parent is

$$U_p = u(M_i, T_{Ti}) \tag{1}$$

where M and T_T represent money and time provided by the *i*th adult family member to the parent. Utility for the migrating child is

$$U_i = u(U_p, T_{li}, Z_i) \tag{2}$$

where T_l is leisure and Z is a numeraire consumption good. Utility is maximized subject to the following:

$$Z_i + M_i + b_i V_i \leq I \tag{3-1}$$

$$T_{Li*} = H - T_{wi} \tag{3-2}$$

$$T_{Li*} = (T_i + 2t_i)V_i + T_{li} \tag{3-3}$$

$$t_i = g(D_i) \tag{3-4}$$

$$I = w_i * [H - (T_i + 2t_i)V_i - T_{li}] \tag{3-5}$$

$$M_i \geq 0, T_{Ti} \geq 0, T_{li} \geq 0, Z_i \geq 0, T_{wi} \geq 0, V_i \geq 0, T_i \geq 0, t_i \geq 0, b_i \geq 0, D_i \geq 0 \tag{3-6}$$

Equation (3-1) is a budget constraint where V is the annual number of visits to the parents, and b is the per-trip monetary cost. Equation (3-2) is a total time constraint; H is total time available, T_w is time spent at work, and T_{L*} is residual time after the labor decision has been made. Constraint (3-3) shows that this residual time can be spent on leisure, and traveling and providing emotional support to the parents. T is the average time per trip spent by the migrant and t is one-way travel time. Equation (3-4) shows that one-way travel time is a function of distance to the parent, and (3-5) is income.

The income, budget, and time constraints can be embedded in the utility-maximization problem which implies the child chooses D, M and V so as to maximize her utility: $U_i \max(U_p, T_{Li*} - (T_i + 2g(D_i))V_i, Z_i)$.

2.3.1. The trade-off between money and time with a realized migration decision

To explore how adult children decide where to live and how to support their parents, the Lagrangian is as follows:

$$\varsigma = \mathrm{U}(U_{\mathrm{p}},\ \mathrm{T_{Li*}} - (\mathrm{T}_i + 2\mathrm{g}(\mathrm{D}_i))V_i,\ \mathrm{Z}_i) + \lambda(\mathrm{w}_i[\mathrm{H} - (T_i + 2g(D_i))V_i - T_{li}] - Z_i - M_i - b_i V_i) \tag{4}$$

In the original optimization problem, the migranted adult child chooses both M_i and V_i such that the Lagrangian is as in (4). Holding D fixed, and maximizing with respect to M and V yields the following:

$$\frac{\partial \varsigma}{\partial M_i} = u'_i \cdot \frac{\partial U_p}{\partial M_i} - \lambda \tag{5}$$

$$\frac{\partial \varsigma}{\partial V_i} = u'_i \cdot \left(T_i \frac{\partial U_p}{\partial V_i} \right) - u'_{T_{Li}*} \cdot (T_i + 2g(D_i)) - \lambda \left[w_i (T_i + 2g(D_i)) + b_i \right] \tag{6}$$

Setting conditions (5) and (6) equal to 0 and rearranging terms, we get $\lambda = \frac{u'_i \cdot \partial U_p - \partial \varsigma}{\partial M_i}$. Substituting the expression of λ into Eq. (6) (equal to 0), the relationship between M_i and V_i is:

$$\frac{\partial V_i}{\partial M_i} = \frac{T_i - (T_i + 2g(D_i)) \frac{\partial V_i \cdot u'_{T_{Li}*}}{\partial U_p \cdot u'_i}}{w_i (T_i + 2g(D_i)) + b_i} \tag{7}$$

where $u'_i = \frac{\partial U_i}{\partial U_p}$, $u'_{T_{Li}*} = \frac{\partial U_i}{\partial U_{T_{Li}*}}$. Here from Eq. (7), we know that the relationship between M_i and V_i depends on $T_i - (T_i + 2g(D_i)) \cdot \frac{\partial V_i}{\partial U_{T_{Li}*}}$ and is related to tradeoffs between the migration child's non-labor time and the annual number of visits to elderly parents. If $T_i - (T_i + 2g(D_i)) \cdot \frac{\partial V_i}{\partial U_{T_{Li}*}}$ is positive, that is, $\partial V_i / \partial M_i > 0$ and we can conclude that the relationship between M_i and V_i is complementary; if it is negative, M_i and V_i are substitutes.

2.3.2. Implications of theoretical model

This model highlights the importance of tradeoffs between distance migrated and money and time spent on support for elderly parents. All three outcomes are interdependent and this interdependence reflects the travel costs associated with longer distance, and tradeoffs in parental well-being associated with alternative forms of support.

Our analysis does not include differences in wages and hours worked associated with the migration distance decision. Such an inclusion would not affect the main findings; higher wages in more distant locations would reinforce the effect of time costs of visits; and more work hours in more distant locations would increase these time costs.

3. Data and measurement

3.1. Data

Data are from the China Health and Retirement Longitudinal Study (CHARLS). This unique tracking survey, led by the National School of Development at Peking University, has been conducted every two years since 2011 in 28 provinces. The survey focuses on living arrangements, health status, and personal and financial characteristics of households with respondents above 45 years old (responses are from elderly parents). The survey is divided into several parts: demographic background and health status of the elderly, family features, socioeconomic status, and community

facilities, etc. Respondents provide information about children, including age, gender, education, marital status, work, place of residence, and financial and emotional support received from each adult child.

The sample for this paper includes elderly parents who have an agricultural hukou in rural China (men above 60 years and women above 55 years old). It does not include the elderly without adult children or only with adult children who are students with no income. For each household, one elderly parent is randomly selected to match with their children's information. The resulting full sample includes 17,547 adult children (from 4,349 households), with 12,603 non-migrant adult children who reside in their parents' county and 4,944 migrants. The average number of adult children per elderly couple is about 4. The sample includes 12,328 adult children in all three waves, 3,716 adult children who were interviewed in two waves, and 1,503 adult children who were only interviewed once. Thus, the three-period panel is unbalanced.

3.2. Variable description

(1) Dependent variables. We focus on two dependent variables to measure the intergenerational support provided to elderly parents, while recognizing that migration distance is also endogeneous: financial support, and frequency of visit.[4] Financial support includes cash and the value of in-kind goods provided by the migrant in the prior year.[5] The frequency of visit has nine categories, which are converted into a continuous variable.

(2) Independent variables. The migration status of adult children is an endogenous variable and crucial for our research. In the literature, two measures are commonly used: a dummy variable for whether there is at least one migrated adult child (Huang et al., 2016), and the number of migrated adult children (Ao et al., 2016; Yi et al., 2019). We use the current living arrangements of each adult child and elderly parents to measure migration status.[6] We use two variables. First, a categorical variable is created indicating the adult child and parent's living arrangement (1) in same village/community but not together; (2) different villages in same county; and (3) different counties in the same province/outside the province. Second, the exact reported distance in kilometers between the child and her parents is used.

Figure 1 shows the pattern of financial support and frequency of visit with different living arrangements. About 64% of adult children live outside the village of their parent, the mean financial support returned to the parent ranges from 1844 to 3932 yuan/year, and the mean number of visits ranges 29–93 times/year, depending on living arrangements. Financial support sent to the parent steadily increases as distance migrated increases. The frequency of visit shows a negative correlation with distance migrated.

(3) Control variables include individual and family characteristics,[7] including the attributes of the elderly parents and the adult child in question.

3.3. Descriptive Statistics

Table 1 provides the descriptive statistics of the main variables. Differences in attributes by migration status are almost all statistically significant. The average amount of

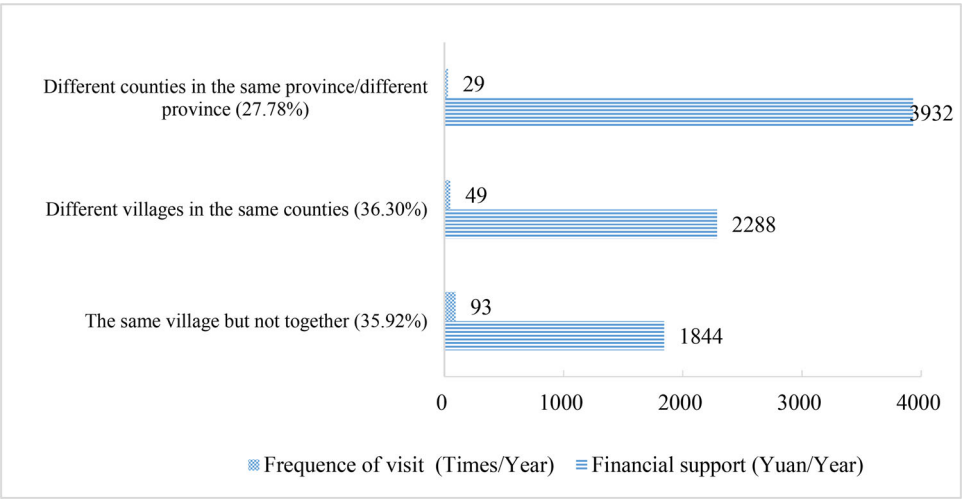

Figure 1. Financial support and visits from child to elderly parents by living arrangement.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

financial support received from migrant adult children (1,980 Yuan per year) is 1,042 Yuan more per year than from non-migrant adult children (938 Yuan per year). The average frequency of visit between elderly parents and non-migrant adult children is about 74 times per year, compared to about 9 times per year for migrants. As expected, the data suggest a degree of substitution between financial support and the frequency of visit for adult children who migrate.

Further, in terms of individual characteristics of adult children, the proportion of migrants who are males is about 7.5% higher than that of non-migrants; migrant adult children are younger (about 2.6 year) and better educated (1.2 years more) compared to non-migrants. Younger male adult children with higher education are more likely to migrate outside their home county. In addition, the parents of migrants are younger, better educated and have better self-care ability than non-migrant's elderly parents. However, the health of parents with migrant children is worse than those with only non-migrant children. This is consistent with the point of view that long-distance migration of children may have a negative effect on left-behind elderly parents (Ao et al., 2016; Huang et al., 2016).

4. Empirical strategy

4.1. Econometric methodologies

Identifying the impact of distance migrated on time and resources spent on left-behind parents is a challenge because some variables are difficult to observe and measure. These include 'ability', 'family values', and 'filial piety'. Since these variables could affect both the migration decision and the outcomes, ignoring such factors could produce biased estimates. For example, the more capable adult children are, the more likely they are to migrate to urban areas, and the more able they might be to provide more financial support. Without controlling for capability, the estimate of the

Table 1. Descriptive statistics of main variables.

	Total sample			Non-migrant adult child (resides in home county)			Migrant adult child (resides outside home county)			Test of difference in var between two cohorts
Variables	All obs	Mean	SD	Obs (No)	Mean1	SD1	Obs (Yes)	Mean2	SD2	MeanDiff
Dependent and independent variables										
Financial support from adult child to parents (Yuan/year)	17,547	1231.631	2862.858	12,603	938.114	2194.608	4944	1979.850	4004.285	−1041.736***
Frequency of visit between child and parent (Times/year)	16,886	56.030	80.012	12,310	73.630	85.552	4576	8.685	29.325	64.945***
Geographical distance in kilometers of child to parent (km)	15,024	153.622	589.863	12,485	9.378	33.334	2539	862.912	1203.502	−853.534***
Child and parent's living arrangement	17,547	1.930	0.793	12,603	1.510	0.500	4944	3.000	0.000	–
Control variables: Characteristics of adult child										
Hukou (1 = agricultural)	17,547	0.884	0.321	12,603	0.910	0.286	4944	0.817	0.387	0.093***
Gender (1 = male)	17,547	0.460	0.498	12,603	0.439	0.496	4944	0.514	0.500	−0.075***
Age (years)	17,547	41.539	8.035	12,603	42.284	8.090	4944	39.641	7.568	2.643***
Years of schooling (years)	17,547	7.658	3.739	12,603	7.320	3.615	4944	8.518	3.907	−1.198***
Marital status (1 = with spouse)	17,547	0.962	0.191	12,603	0.969	0.174	4944	0.945	0.228	0.024***
Family income per year	17,547	2.542	1.066	12,603	2.424	1.034	4944	2.845	1.089	–
The number of children under 16	17,547	0.847	0.880	12,603	0.805	0.880	4944	0.952	0.871	−0.147***
Oldest child (1 = yes)	17,547	0.313	0.464	12,603	0.317	0.465	4944	0.304	0.460	0.013
Control variables: Characteristics of elderly parents										
Gender (1 = male)	17,547	0.491	0.500	12,603	0.476	0.499	4944	0.527	0.499	−0.051***
Age (years)	17,547	68.734	7.425	12,603	69.253	7.451	4944	67.411	7.189	1.842***
Years of schooling (years)	17,547	3.429	3.468	12,603	3.309	3.431	4944	3.734	3.541	−0.425***
	17,547	0.708	0.455	12,603	0.688	0.463	4944	0.760	0.427	−0.072***

(*continued*)

Table 1. Continued.

Variables	Total sample			Non-migrant adult child (resides in home county)			Migrant adult child (resides outside home county)			Test of difference in var between two cohorts
	All obs	Mean	SD	Obs (No)	Mean1	SD1	Obs (Yes)	Mean2	SD2	MeanDiff
Widowhood status (1 = with spouse)										
Self-rated health status	17,547	2.861	0.939	12,603	2.870	0.943	4944	2.838	0.930	–
Overall activity ability	17,547	15.072	2.754	12,603	15.044	2.768	4944	15.143	2.716	−0.099**
Working in past year (1 = yes)	17,547	0.566	0.496	12,603	0.537	0.499	4944	0.638	0.481	−0.101***
Receiving a pension (1 = yes)	17,547	0.660	0.474	12,603	0.671	0.470	4944	0.630	0.483	0.041***
The number of children	17,547	4.304	1.701	12,603	4.390	1.705	4944	4.083	1.673	0.307***
Household income per capita (thousand Yuan) per year	17,547	3.100	5.963	12,603	3.223	5.998	4944	2.787	5.863	0.436***
Own computer (1 = yes)	17,547	0.070	0.256	12,603	0.067	0.251	4944	0.078	0.268	−0.010**
Own mobile phones (1 = yes)	17,547	0.713	0.453	12,603	0.696	0.460	4944	0.754	0.431	−0.058***
Instrumental variables										
The percentage of male out migrants from in village	16,348	0.632	0.172	11,692	0.643	0.177	4656	0.602	0.157	0.041***
Distance to the nearest coast port from parent's city (km)	17,184	487.793	408.129	12,381	469.340	412.655	4803	535.360	392.283	−66.019***
Square of distance to the nearest coast port from parents's city (km)	17,184	404,501.6	719,313.5	12,381	390,550.6	736,383.4	4803	440,464	672,058.1	−49,913.4***

Notes. (1) Standard errors are reported in parentheses. *, ** and *** represent 10%, 5% and 1% significance level, respectively. (2) Child and parent's living arrangement: as mentioned above, 1–4; (3) Family income: 1. Below 10,000; 2. 10,000–20,000; 3. 20,000–50,000; 4. 50,000–100,000; 5. More than 100,000. (4) Self-rated health status:1.Very poor; 2. Poor; 3. Fair; 4. Good; 5. Very good. (5) Overall activity ability[10]: 0–18, the scores of the last 18 activities are summed; the higher the score, the more self-care ability.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

impacts of distance would be biased upward. Adult children with stronger 'family values' and 'filial piety' are more likely to remain close to their elderly parents and give more money and time to their parents.

The effects of these factors can be reduced by either controlling for more confounding variables in the estimation or through an improved modeling design, for example, a panel data model. Using panel data, the fixed effect (FE) transformation can solve the problem of omitted unobserved time invariant effects that might be correlated with the error term in the outcome equation (Wooldridge, 2019). These effects can be individual-or household-specific.

A limitation of the FE transformation is that it is impossible to estimate impacts of time-invariant variables that may affect support to elderly parents, such as the gender of the adult child, her education (almost all fixed for adult children), her birth order and others. Correlated random effects (CRE) approaches might be appropriate and be viewed as complementary to fixed effects/bias adjustment approaches, with CRE applying in situations with short panels, arbitrary time heterogeneity, and arbitrary time dependence (Wooldridge, 2019). In addition to the FE transformation, we employ an ordinary least squares (OLS) linear model with the CRE approach for panel data to examine the effect of distance migrated on financial support and the frequency of visit. The outcome equations can be expressed as (8)–(9):

$$M_{ijt} = \alpha_0 + \alpha_1 \text{Distance}_{ijt} + \alpha_2 X_{ijt} + \theta g_t + \delta z_{ij} + c_{ij} + \mu_{ijt} \tag{8}$$

$$V_{ijt} = \beta_0 + \beta_1 \text{Distance}_{ijt} + \beta_2 X_{ijt} + \omega g_t + \lambda z_{ij} + c_{ij} + \phi_{ijt} \tag{9}$$

where i is the individual subscript and j denotes the household. M_{ijt} is the amount of financial support from the adult child to her elderly parents in t year; V_{ijt} is the frequency of visit (times/year). Distance_{ijt} is the independent variable of interest, denoting the distance between the adult child and her elderly parent. As discussed, distance can be represented as either a categorical variable for living arrangement, or the distance in kilometers. X_{ijt} is the vector of control variables, including observable covariates describing individual/household characteristics of the adult child and their elderly parents. g_t is a vector of year dummies. Z_{ij} is a set of time-constant observed variables of the adult child (gender, first child, etc.); it also includes household and province fixed effects. The unobserved heterogeneity of individual and household, denoted c_{ij}. μ_{ijt} and φ_{ijt} both are the error term of the individual and household.

4.2. Endogeneity problem and the choice of the instrumental variables

Although the CRE method can solve the problem of omitted variables to some extent, the regression model itself contains an endogenous explanatory variable (distance). We employ instrumental variables (IVs) to address this endogeneity problem. A valid instrument is a variable that predicts the migration decision, but has no correlation with μ_{ijt} or φ_{ijt}. It also does not affect money and visit independently of its effect on distance migrated. Several types of IVs in the context of migration are found in the literature. Historical migration rates (Hildebrandt et al., 2005; Huang et al., 2016;

Mckenzie & Rapoport, 2011), ecological variables like distance to key destination sites in which the household is likely to have migrant networks, and economic and social conditions in destination areas (Amuedo-Dorantes et al., 2010; Antman, 2011; Cortes, 2015; Yang, 2008) have been used by others.

Three IVs are considered here. One possible IV is the proportion of male migrant workers in the village of the parent.[8] The second and third possible IV is the distance from the parent's city to the nearest coastal port and the square of the distance from parent's location to the nearest coastal port.[9]

The rationale of our choice is as follows. First, it is known that there is a demonstration/peer effect and the decision to migrate can be affected by behavior of others in the home village (Du et al., 2005). Studies have shown that social networks are closely related to migration behavior. Migrants from the same village enjoy stronger social networks that can provide information on the attributes of potential destinations (Massey et al., 1993), and migrants from the village will benefit from the cost reductions due to this social network (Calvo-Armengol & Jackson, 2004). Thus, a higher proportion of migrant workers from the village is likely to increase the probability of out migration (Yi et al., 2019). However, male children are primarily responsible for supporting elderly parents in the Chinese tradition. Therefore, the proportion of males who migrate from the village to work elsewhere may be negatively related to distance of migration due to a desire to provide instrumental support.

Second, the distance to the coastline is an important initial spatial endowment that can explain differences in economic development between regions. The closer the coastline is, the easier it is to migrate there (Black & Henderson, 2003; Gallup et al., 1999). Coastal cities have magnet effects in the labor market, and families closer to the coast are more likely to send migrants out, but distance migrated is likely to be lower. We pose that the distance to the nearest coast port from the parents affects migrating distance in a non-linear fashion. The closer to a coastal city, the shorter the migration distance but the relationship flattens as distance from the coast increases.

These three variables are likely to affect the migration distance/location but not other outcomes. During estimation, we conduct statistical tests of relevance and exogeneity. The results suggest that the instruments do not significantly explain the adult children's financial support and frequency of visit other than through the geographical distance of migration.

5. Results

5.1. Baseline results

5.1.1. The relationship between geographical distance and elderly support

We apply the Generalized Least Squares (GLS) panel data model with the CRE approach to estimate the impact of geographical distance on elderly support (Table 2). The coefficient on distance in column (1) shows that compared with the reference group (lives in 'the same village/community but not together'), the adult child who resides in 'different villages in the same counties' or 'different counties in the same province/different province' provides more financial support to her elderly parents.

Table 2. The impact of distance migrated on elderly support: correlated random effects and generalized least squares model

	Financial support (Yuan/year)[a]		Frequency of visit (Times/year)[b]	
	(1)	(2)	(3)	(4)
VARIABLES	CRE + GLS	CRE + GLS	CRE + GLS	CRE + GLS
1.Reference group: the same village but not together				
Different villages	0.350***		−0.480***	
in the same counties	(0.068)		(0.037)	
Different counties in the same	0.335***		−0.884***	
province/different province	(0.097)		(0.055)	
2.Distance		0.159**		−0.169***
in kilometers (km)[c]		(0.073)		(0.036)
The square of distance		−0.018		0.004
in kilometers (km)		(0.011)		(0.006)
Constant	0.753	1.546	14.317***	13.071***
	(3.371)	(3.589)	(1.729)	(1.922)
Observations	17,547	15,024	20,008	17,534

Note: (1)Standard errors are reported in parentheses. *, ** and *** represent 10%, 5% and 1% significance level, respectively. (2) abc: the amount of financial support in the last year, the frequency of visit between adult child and their parents, distance in kilometers are taken in a logarithmic form, for example lndistance = ln(distance + 1). (3)Province dummies, year dummies, household dummies and the individual characteristics of parents, children and their families are included.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

The outcome is positively related to distance (by group) and significant, but it only reflects the relationship between living arrangements and financial support, it does not identify the relationship between distance migrated and financial support. When examining effects of actual migration distance and its square on financial support (column 2), we find that distance is positively related to financial support. A 1% increase in distance migrated increases financial support sent home by 0.159%.

We use the same approaches to estimate impacts of distance on the frequency of visit (column (3) of Table 2). Compared to the reference group (living in 'the same village/community but not together'), the frequency of visits is negatively associated with distance migrated. Frequency of visits is significantly lower for distance categories 'different villages in the same counties' and 'different counties in the same province/outside the province', showing that the frequency of visits decreases as distance increases. Further, using the actual distance migrated measure in column (4) we find that as distance increases, the frequency of visit also decreases. A 1% increase in distance decreases the frequency of visits by 0.169%.

These estimates are consistent with the relationship stated above. The impact of distance migrated on financial and emotional support are broadly consistent with the theory.

5.1.2. Addressing potential endogeneity of the migration distance decision

As discussed above, distance migrated can be considered to be endogenous, so IV methods are applied (Table 3). The instruments are acceptable as they pass conventional tests. The weak identification test from the first-stage regression of the instruments on the endogenous variables shows them all to be significant at the 1% level, well above the rule-of-thumb cutoff for weak instruments. They also pass the Sargan-Hansen test (greater than 0.1) for exogeneity.

Table 3. The impact of distance migrated on elderly support: IV estimates.

	Financial support (Yuan/year)			Frequency of visit (Times/year)		
	G2SLS + CRE + IV			G2SLS + CRE + IV		
VARIABLES	First-stage		Second stage	First-stage		Second stage
Distance			1.655***			−0.616**
in kilometers (km)			(0.549)			(0.280)
The square of distance			−0.162**			−0.024
in kilometers (km)			(0.080)			(0.043)
The percentage of the male	−0.534***	−5.204***		−0.496***	−4.723***	
migration worker in village	(0.114)	(0.773)		(0.103)	(0.693)	
Distance to the nearest coast port	1.508***	11.579***		1.244***	9.432***	
from parent's living city (thousand km)	(0.043)	(2.924)		(0.385)	(2.596)	
The square of distance to the nearest	−0.002***	−0.012***		−0.002***	−0.010***	
coast port from parent's living city (thousand km)	(0.000)	(0.002)		(0.000)	(0.002)	
Constant	−7.878***	−42.290**	4.444	−7.923***	−43.269**	8.899***
	(2.791)	(18.958)	(4.107)	(2.536)	(17.082)	(2.109)
Observations	13,657	13,657	13,657	15,971	15,971	15,971
Average marginal effects of distance(ln)			1.047***			−0.616**
F test of excluded instruments (first-stage)	30.87	31.69		36.35	33.93	
Weak identification test (Cragg-Donald Wald F statistic)			19.834			22.683
Overidentification test (Sargan statistic)			0.8169			0.6776

Note: (1) Standard errors are reported in parentheses. *, ** and *** represent a 10%, 5% and 1% significance level, respectively. (2) Logarithm of independent variable and dependent variable; please refer to notes in Table 2 for information on other variables included in the model.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

The IV results are slightly different than the estimates without allowing for endogeneity of distance migrated. In contrast to the linear relationship found in Table 2, the effect of distance on financial support is non-linear. The estimates suggest that when distance between the adult child and their elderly parents is less than 165 kilometres, a 1% increase in distance increases financial support sent to parents by 1.655%. In contrast, when the distance between the child and her parents exceeds 165 kilometres, a 1% increase in distance has a minor effect, decreasing financial support by only 0.162%. The average marginal effect of distance on financial support is 1.047, about 6 times greater than the estimates found from estimates not controlling for endogeneity. We conclude that a nonlinear relationship between distance and financial support has a semi-inverted 'U-shape' increasing steeply at low distances and decreasing at a relatively minor rate after (Figure 2).

In terms of emotional support, the IV results, like the earlier estimates, suggest a linear relationship between distance and the frequency of visit. The influence of distance on the frequency of visit is negative and significant. A 1% increases in distance decreases the frequency of visit to elderly parents by 0.616%, about a three times greater effect than the estimates not considering endogeneity. Both model results indicate that long distances impair frequent visits and are consistent with the prediction of our theoretical analysis.

In summary, adult children trade off financial support and instrumental support and distance clearly affects the cost of providing instrumental support to left-behind parents. The average marginal effect of distance on financial support

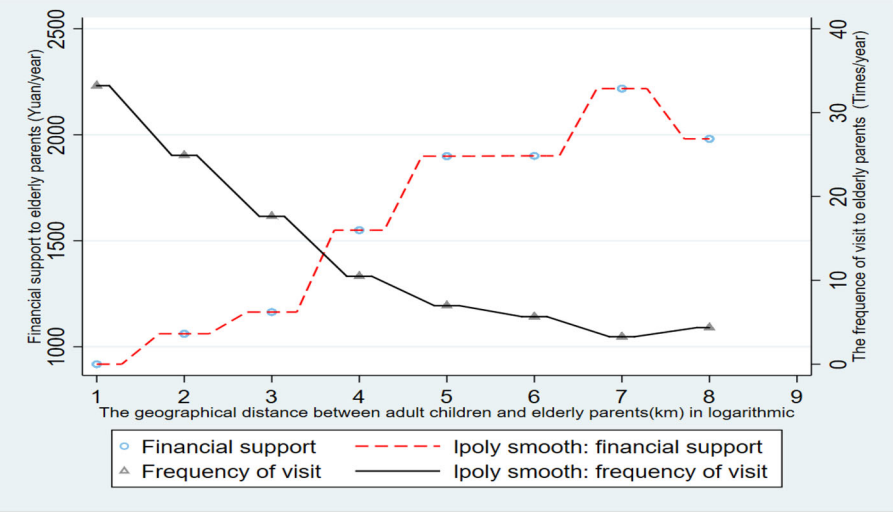

Figure 2. Relationship between financial support and frequency of visit as distance increases.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

(positive 1.047) and the average marginal effect on the frequency of visit (negative 0.616) suggest that the relationship between the two is one of substitution as distance increase.

5.2. Robustness check

To check for the robustness of the findings, we estimate the effect of distance migrated on support to elderly parents using different data and different methods (Table 4). First, we use CRE and IV approach in cross-section data to estimate the influence of distance on financial and emotional support. These results are reported in columns (1) and (4) of Table 4, respectively. Second, considering the potential for heteroskedasticity, we use IV and CRE approaches in two-step GMM panel models to reestimate; results are presented in columns (2)–(3) and (5)–(6) of Table 4.

Estimation results using all methods are remarkably close to the previous baseline findings. The coefficients and average marginal effects of the estimates are slightly lower than the baseline case. However, the main findings are unchanged: as distance migrated increases, financial support first increases and then decreases slowly, while frequency of visit decreases with distance.

5.3. Heterogeneity analysis

Table 5 shows the effect of distance on elderly support by adult child and elderly parent characteristics. The effect of distance on financial support shows significant differences by gender of the migrating adult child. Female adult children offering financial support are more affected by distance than male adult children. This is mainly related to the traditional culture of China where men face a higher burden for sending

Table 4. Robustness checks.

	Financial support (Yuan/year)			Frequency of visit (Times/year)		
VARIABLES	(1) CRE + IV	(2) GMM + IV	(3) GMM + CRE + IV	(4) CRE + IV	(5) GMM + IV	(6) GMM + CRE + IV
Geographical distance	1.542***	1.498***	1.544***	−0.595**	−0.602**	−0.588**
in kilometers (km)	(0.591)	(0.508)	(0.511)	(0.302)	(0.258)	(0.260)
The square of Geographical distance	−0.143*	−0.136*	−0.144*	−0.025	−0.024	−0.026
in kilometers (km)	(0.085)	(0.074)	(0.074)	(0.046)	(0.040)	(0.040)
Constant	2.402	3.802	2.405	9.091***	9.239***	9.139***
	(4.421)	(3.760)	(3.895)	(2.383)	(1.994)	(2.052)
Observations	13,657	13,657	13,657	15,971	15,971	15,971
R-squared	−0.043	−0.045	−0.043	0.207	0.203	0.208
Average marginal effects of distance(ln)	1.005***	0.987***	1.003***	−0.595**	−0.602**	−0.588**
Weak identification test (Cragg-Donald Wald F statistic)	22.387	22.596	22.387	23.325	23.408	23.325
Overidentification test (Hansen J statistic)	0.9301	0.7392	0.9202	0.7011	0.7331	0.6576

Note: (1) Standard errors are reported in parentheses. *, ** and *** represent a 10%, 5% and 1% significance level, respectively. (2) Logarithm of independent variable and dependent variable; please refer to notes in Table 2 for information on other variables included in the model.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

Table 5. Heterogeneity analysis of factors affecting financial and emotion support.

SUBSAMPLE		Financial support Panel CRE + GLS	Frequency of visit Panel CRE + GLS
Characteristics of Adult Child			
Gender	female	2.345***(0.626)	−0.659(0.403)
		−0.285***(0.101)	−0.027(0.070)
	male	0.940(1.066)	−0.540(0.556)
		−0.051(0.128)	−0.021(0.073)
Whether the Oldest child	No	2.427***(0.934)	−0.706(0.532)
		−0.276**(0.132)	−0.009(0.080)
	Yes	0.937(0.627)	−0.629(0.436)
		−0.060(0.113)	−0.046(0.074)
Characteristics of Elderly Parent			
Health situation	Fair/poor/very poor	1.243**(0.566)	−0.471(0.336)
		−0.113(0.084)	−0.040(0.052)
	Good/very good	3.060*(1.748)	−2.007**(0.801)
		−0.323*(0.184)	0.139(0.095)
Receive a pension	NO	3.485***(1.243)	−1.147**(0.505)
		−0.391**(0.163)	0.032(0.072)
	YES	0.807(0.542)	−0.446(0.352)
		−0.059(0.082)	−0.028(0.056)

Note: (1) Standard errors are reported in parentheses. *, ** and *** represent a 10%, 5% and 1% significance level, respectively. (2) Logarithm of independent variable and dependent variable; please refer to notes in Table 2 for information on other variables included in the model.
Source: 2011, 2013, 2015 rounds of the China Health and Retirement Longitudinal Study (CHARLS). Additional data are from the National Coastal Port Layout Plan issued by the Ministry of Communications of China in 2006.

resources home. The effect of distance on financial support has significant birth order differences; the oldest/first adult child is less affected by distance than are younger siblings. This is mainly related to Chinese cultural traditions that the eldest child is primarily responsible for support of parents.

In terms of elderly parents' characteristics, the worse the health status of parents, the less sensitive are both forms of support to distance. In addition, elderly parents without pension subsidies need more support from their adult children. But financial support given by migrant children to them is more affected by distance compared to elderly parents receiving a pension. This finding implies that pension subsidies substitute for private intergenerational support.

6. Conclusion and discussion

This paper presents a simple theoretical model of the individual decision of migrating adult children to allocate resources to their elderly parents. It empirically assesses the effect of distance migrated on financial and emotional support from adult children to their parents in rural China. We find a nonlinear relationship between distance and levels of financial support with a semi-inverted 'U-shape'; the effect of distance is positive, but declines as distance grows. In terms of emotional support, the influence of distance on the frequency of visit has a negative and significant linear relationship. The average marginal effect of distance on financial support (1.047) and on frequency of visit (−0.616) implies a substitute relationship between money and time as geographical distance grows. These findings are consistent with the theory.

This paper is unique in that it identifies a causal effect of distance on care provided to the parent. The trade-off between money and time is clear. Studies

examining health outcomes of left-behind parents often fail to capture the mechanism by which migration affects such outcomes. This paper fills the gap and confirms that an effect of distance is to make face-to-face care more costly. In addition, more distant children substitute financial transfers for face time because financial transfers are relatively less costly as distance grows. Future papers considering the effects of migration on elderly left-behind parents should consider this distance-support relationship.

The findings have several implications in China and other developing countries. First, measures should be taken to support development of town and village enterprises to increase the employment opportunities for adult children. This will not only facilitate intergenerational support, but will also improve economic status and quality of life for non-migrating children. Further, it is of great importance to establish a comprehensive social pension public service system for the elderly to reduce care burdens on children.

This paper has some limitations. First, due to lack of available data, we cannot estimate effects of distance on different forms of instrumental support (such as help for cooking/washing, etc.). This lack of instrumental support likely has important impacts on well-being of the left-behind elderly; there is a limit to which money can substitute for this support.

Second, we lack information on the time needed to travel to visit left-behind elderly. It is likely that switches in access to modes of transportation create non-linearities in the observed distance-outcome relationships. This may cause biased estimates. We control for individual characteristics of migrating children in the empirical model to reduce this bias, but do not totally eliminate it.

Finally, the paper mainly discusses the impact of the migration distance/location on the intergenerational support of elderly parents from the perspective of individual decision-making and does not involve/discuss interactions and bargaining between siblings. Differences in divisions of labor between or bargaining among different family members may affect the results. For example, adult children living close to elderly parents may provide more instrumental and emotional support, and the migrating children may provide more financial and emotional support. This will involve modeling the bargaining process and is left to future research.

Notes

1. 55 RMB Yuan values 8.052 Dollar in 2009 (the average exchange rate is 6.8310 RMB Yuan per Dollar) and 88 RMB Yuan values 13.298 Dollar in 2018 (the average exchange rate is 6.6174 RMB Yuan per Dollar).
2. Calculated based on the 2001–2018 migrant workers monitoring survey report from National Bureau of Statistics of China.
3. Authors' calculation based on the China Health and Retirement Longitudinal Study (CHARLS).
4. The ten options for visit frequency are: 'almost every day', '2–3 times per week', 'once a week', 'every two weeks', 'once a month', 'once every 3 months', 'once every 6 months', 'once a year', 'almost never' and 'other' as 1–10 in order. The meaning of 'other' is unclear and we treat it as missing value.
5. 2011 was the first wave of the survey and its corresponding financial has many missing values due to lack of experience. We assume the missing values may be omitted or 0. Thus, if the financial support is 0 in 2013 and 2015, we insert a 0 value in 2011 to expand the sample size.

6. The migration status variable was constructed using the following question: 'Where does CHILDn's NAME normally live now?'. Available responses were: (1) This household, but economically independent; (2) The same or adjacent dwelling/courtyard; (3) Another household in this village/neighborhood; (4) Another village/neighborhood in this county/city; distance from here (km); (5) Another county/city in this province; distance from here (km); (6) Another province; distance from here (km); and (7) Abroad. There was a small change in potential responses to this question in 2013 and 2015. One option was added (1) This household, and economically dependent, and (5)–(6) were merged into a single option (6) Other, province_city_county/city/district _village/neighborhood. We delete the observations 'abroad' because the sample size is very small and domestic migration is different from international migration.
7. Parent individual characteristic variables include gender, age, years of schooling, widowhood status, employment status and participation in pensions. The parent's family characteristics include household per capita income, the number of children, whether they own mobile phones or home computers. Variables reflecting characteristics of the adult child include Hukou, gender, age, years of schooling and marital status, etc. The adult child's family characteristics also include her own family income and the number of children below 16-years.
8. The instrumental variables are from the community questionnaire of the CHARLS data in 2011.
9. The source of the coastal port from《National Coastal Port Layout Plan》issued by the Ministry of Communications of China in 2006. The latitude and longitude of all prefecture-level cities and ports in China are obtained through Google Maps, and then use Stata15 software calculate the shortest distance from the city where the rural elderly parents are located to the coastal port.
10. The ability to participate in 18 basic activities (waking up, getting dressed, eating, walking, taking a bath, etc.). If the parent can complete an activity independently a value of 1 is assigned, and those who cannot are assigned a 0.

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References

Amuedo-Dorantes, C., Georges, A., & Pozo, S. (2010). Migration, remittances and children's schooling in Haiti. *The Annals of the American Academy of Political and Social Science*, *630*(1), 224–244. https://doi.org/10.1177/0002716210368112

Antman, F. M. (2011). The intergenerational effects of paternal migration on schooling and work: What can we learn from children's time allocations? *Journal of Development Economics*, *96*(2), 200–208. https://doi.org/10.1016/j.jdeveco.2010.11.002

Antman, F. M. (2012). Gender, educational attainment, and the impact of parental migration on children left behind. *Journal of Population Economics*, *25*(4), 1187–1214. https://doi.org/10.1007/s00148-012-0423-y

Ao, X., Jiang, D., & Zhao, Z. (2016). The impact of rural–urban migration on the health of the left-behind elderly parents. *China Economic Review*, *37*, 126–139. https://doi.org/10.1016/j.chieco.2015.09.007

Baldock, C. V. (2000). Migrants and their parents care giving from a distance. *Journal of Family Issues*, *21*(2), 205–224. https://doi.org/10.1177/019251300021002004

Black, D., & Henderson, V. (2003). Urban evolution in the USA. *Journal of Economic Geography*, *3*(4), 343–372. https://doi.org/10.1093/jeg/lbg017

Calvo-Armengol, A., & Jackson, M. O. (2004). The effects of social networks on employment and inequality. *American Economic Review*, *94*(3), 426–454. https://doi.org/10.1257/0002828041464542

Cortes, P. (2015). The feminization of international migration and its effects on the children left behind: Evidence from the Philippines. *World Development*, *65*, 62–78. https://doi.org/10.1016/j.worlddev.2013.10.021

Du, Y., Park, A., & Wang, S. (2005). Migration and rural poverty in China. *Journal of Comparative Economics*, *33*(4), 688–709. https://doi.org/10.1016/j.jce.2005.09.001

Gallup, J. L., Sachs, J. D., & Mellinger, A. D. (1999). Geography and economic development. *International Regional Science Review*, *22*(2), 179–232. https://doi.org/10.1177/016001799761012334

Gillespie, B. J., & Lippe, T. (2015). Intergenerational cohesiveness and later geographic distance to elderly parents in the Netherlands. *Advances in Life Course Research*, *23*, 56–66. https://doi.org/10.1016/j.alcr.2014.07.001

Greenwell, L., & Bengtson, V. L. (1997). Geographic distance and contact between middle-aged children and their parents: The effects of social class over 20 years. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *52*(1), S13–S26.

Guo, M., Aranda, M. P., & Silverstein, M. (2009). The impact of out-migration on the intergenerational support and psychological wellbeing of older adults in rural China. *Ageing and Society*, *29*(7), 1085–1104. https://doi.org/10.1017/S0144686X0900871X

Guo, M., Chi, I., & Silverstein, M. (2011). Family as a context: The influence of family composition and family geographic dispersion on intergenerational relationships among Chinese elderly. *International Journal of Social Welfare*, *20*(Supplement s1), S18–S29. https://doi.org/10.1111/j.1468-2397.2011.00793.x

Guo, M., Liu, J., Xu, L., Mao, W., & Chi, I. (2018). Intergenerational relationships and psychological well-being of Chinese older adults with migrant children: Does internal or international migration make a difference? *Journal of Family Issues*, *39*(3), 622–643. https://doi.org/10.1177/0192513X16676855

Hare, D. (1999). 'Push' versus 'pull' factors in migration outflows and returns: Determinants of migration status and spell duration among China's rural population. *Journal of Development Studies*, *35*(3), 45–72. https://doi.org/10.1080/00220389908422573

Hildebrandt, N., Mckenzie, D. J., Esquivel, G., & Schargrodsky, E. (2005). The effects of migration on child health in Mexico [with comments]. *Economía*, *6*(1), 257–289. https://doi.org/10.1353/eco.2006.0009

Huang, B., Lian, Y., & Li, W. (2016). How far is Chinese left-behind elderly parents' health left behind? *China Economic Review*, *37*, 15–26. https://doi.org/10.1016/j.chieco.2015.07.002

Jalan, J., & Ravallion, M. (2001). Behavioral responses to risk in rural China. *Journal of Development Economics*, *66*(1), 23–49. https://doi.org/10.1016/S0304-3878(01)00154-7

Lin, J. Y., Cai, F., & Li, Z. (2003). *The China miracle: Development strategy and economic reform*. Chinese University Press.

Litwak, E. (1960). Geographic mobility and extended family cohesion. *American Sociological Review*, *25*(3), 385–394. https://doi.org/10.2307/2092085

Lu, Y. (2013). Household migration, remittances and their impact on health in Indonesia. *International Migration*, *51*, e202–e215. https://doi.org/10.1111/j.1468-2435.2012.00761.x

Marchetti-Mercer, M. C. (2012). Those easily forgotten: The impact of emigration on those left behind. *Family Process*, *51*(3), 376–390. https://doi.org/10.1111/j.1545-5300.2012.01407.x

Massey, D. S., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A., & Taylor, J. E. (1993). Theories of international migration: A review and appraisal. *Population and Development Review*, 431–466. https://www.jstor.org/stable/2938462

Mckenzie, D., & Rapoport, H. (2011). Can migration reduce educational attainment? Evidence from Mexico. *Journal of Population Economics*, *24*(4), 1331–1358. https://doi.org/10.1007/s00148-010-0316-x

Meng, X., & Yamauchi, C. (2017). Children of migrants: The cumulative impact of parental migration on children's education and health outcomes in China. *Demography*, *54*(5), 1677–1714. https://doi.org/10.1007/s13524-017-0613-z

Palloni, A., Massey, D. S., Ceballos, M., Espinosa, K., & Spittel, M. (2001). Social capital and international migration: A test using information on family networks. *Australasian Plant Pathology*, *106*(5), 1262–1298.

Rappaport, J. (2007). Moving to nice weather. *Regional Science and Urban Economics*, *37*(3), 375–398. https://doi.org/10.1016/j.regsciurbeco.2006.11.004

Rozelle, S., Taylor, J. E., & DeBrauw, A. (1999). Migration, remittances, and agricultural productivity in China. *American Economic Review*, *89*(2), 287–291. https://doi.org/10.1257/aer.89.2.287

Shen, C., & Williamson, J. B. (2010). China's new rural pension scheme: Can it be improved? *International Journal of Sociology and Social Policy*, *30*(5/6), 239–250. https://doi.org/10.1108/01443331011054217

Shi, S. J. (2006). Left to market and family – Again? Ideas and the development of the rural pension policy in China. *Social Policy & Administration*, *40*(7), 791–806. https://doi.org/10.1111/j.1467-9515.2006.00533.x

Wooldridge, J. M. (2019). Correlated random effects models with unbalanced panels. *Journal of Econometrics*, *211*(1), 137–150. https://doi.org/10.1016/j.jeconom.2018.12.010

Yang, D. (2008). International migration, remittances and household investment: Evidence from Philippine migrants' exchange rate shocks. *The Economic Journal*, *118*(528), 591–630. https://doi.org/10.1111/j.1468-0297.2008.02134.x

Yi, F., Liu, C., & Xu, Z. (2019). Identifying the effects of migration on parental health: Evidence from left-being elders in China. *China Economic Review*, *54*, 218–236. https://doi.org/10.1016/j.chieco.2018.11.005

Zhao, Y. (1997). Labor migration and returns to rural education in China. *American Journal of Agricultural Economics*, *79*(4), 1278–1287. https://doi.org/10.2307/1244284

Zhao, Y. (1999a). Labor migration and earnings differences: The case of rural China. *Economic Development and Cultural Change*, *47*(4), 767–782. https://doi.org/10.1086/452431

Zhao, Y. (1999b). Leaving the countryside: Rural-to-urban migration decisions in China. *American Economic Review*, *89*(2), 281–286. https://doi.org/10.1257/aer.89.2.281

Zhao, Z. (2005). Migration, labor market flexibility, and wage determination in China: A review. *The Developing Economies*, *43*(2), 285–312. https://doi.org/10.1111/j.1746-1049.2005.tb00263.x

Zhu, N. (2002). The impacts of income gaps on migration decisions in China. *China Economic Review*, *13*(2–3), 213–230. https://doi.org/10.1016/S1043-951X(02)00074-3