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Internal Migration, Elderly Care and Mortality in China

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September 2013

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1 Introduction

China currently has a rapidly aging population and unprecedentedly vast waves of migration from rural to urban areas. With two-thirds of China's elderly population lives in the rural areas, the number of elderly parents left behind in rural areas has increased dramatically in the past few decades as their children leave home for employment in the cities. In rural China, as pension and health insurance systems are almost non-existent until very recently, the responsibility of elderly care falls squarely on the shoulders of family members. On one hand, the absence of adult children creates challenges for elderly care. On the other hand, remittances from migrant children may provide extra resources for family members back in the rural areas. Systematic research based on representative national data on the impact of adult children's outmigration on the well-being of the Chinese elderly parents is limited to date.

This paper investigates these relationships based on panel data collected in China. We ask the following questions: (1) Does having a migrant child increase the risk of heart disease, disability or mortality hazard for the left behind elderly parents? (2) Does the relationship differ whether it is a son or a daughter who migrated to the cities? and (3) What are the mechanisms through which adult children's migration affects left behind parent' mortality hazard? Potential mechanisms we examine include monetary and instrumental assistance, and emotional support. To address the selectivity issue in examining the casual relationship between outmigration and the mortality hazard of left behind elderly parents, we will use the propensity score matching (PSM) approach. This approach allows us to evaluate the treatment effects of migration when using non-experimental data lack of random assignment of participants into treatment conditions (Rubin, 1997).

2 Recent Social Contexts for the Elderly in China

The Chinese population is aging at a rate faster than that in many developed countries as a result of a dramatic decline in fertility due to the one-child policy and the unprecedented speed of socioeconomic development since the economic reform in the late 1970s. China's 2010 Population Census reported the proportion of those 65 and above increased from 6.96 percent in 2000 to 8.87 percent in 2010 (National Bureau of Statistics of China 2010). It is forecasted to be 17 percent in 2030, and 27 percent in 2050 (Chinese Ministry of Civil Affairs Report 2010). The proportion of the oldest-old (80 years and older) among the elderly (65 years and older) in particular is growing at an unprecedented speed, expected to climb to 114 million accounting for 34.4 percent in 2050 (Zeng and George 2000). At the same time, latest statistics show that the number of urban-rural migration has continued to increase to more than 200 million (Chinese Bureau of Statistics, 2010). This demographic landscape presents a tremendous challenge for the Chinese society to support and care for the elderly because both private and public assistance for the elderly have weakened in China since the economic reform started in late 1970s.

3 Internal Migration, Health and Old-age Support

Modernization theory predicts that the process of urbanization and industrialization is accompanied by the transformation of the family structure from extended to nuclear family, the spatial dispersion of family, and reduced support for elderly family members. Competing predictions are posited by labor migration theory and the modified extended family model about the relationship between children's out-migration and support of older parents left behind.

The economics of labor migration theory views migration as a household decision jointly made by movers and stayers to improve household well-being together. Accordingly, the migrant

and family members left behind share the costs and returns of migration (Stark & Bloom, 1985; Brown & Poirine, 2005; Poirine, 1997; Stark, 1991). Through remittances, migrants often can increase the financial support to families back at the sending community. Yet the amount of remittances might vary according to the stages of children's out-migration, which partly depends on how well the migrant children settled down, their income, and living costs in cities (Liu & Reilly, 2004; Rozelle, Taylor, & deBrauw, 1999). The modified extended family model (Litwak, 1960a, 1960b) posits that extended family relations between migrants and family members can be maintained due to advances in transportation and communication. These theories predict that children's out-migration has a positive effect on older parents through continued economic and emotional ties with migrant children.

In rural areas, the young adult migration is often described in a negative light due to the lack of emotional and instrumental supports for left-behind elderly (Aboderin, 2004; Kosberg and Garcia, 2004; Sen, 1994; United Nations, 2002). Yet, Knodel and his colleague (2010) find positive results that most migrant children maintain social contact and provide financial support. Based on qualitative data in Thailand, Knodel (2005) shows that the negative effects of migration on social supports for the elderly parents have been attenuated by the advanced infrastructure in rural areas. Kuhn, Everett and Silvey (2011), based on data from a longitudinal family survey in Indonesia, also show that children's migration, at a minimum, does not diminish elderly kin's health defined by limitations in ADLs, self-reported health and mortality in rural areas. However, the impact of out migrant children on the mental health outcomes of older people left-behind is mixed. Abas et al (2009) using a population-based survey of 1,147 elderly in rural Thailand shows the outmigration of all children was not associated with greater depression in parents left behind. In contrast to this finding, another study based on data from a

national survey of elderly in Thailand conducted in 2007 finds that the elderly who had a migrant child were more likely to have symptoms of poor mental health using logistic regression (Adhikari, Jampaklay and Chamratrithrong 2011).

Cong and Silverstaein, (2008, 2011), based on data collected in Anhui province, report that the elderly parents are more likely to receive greater financial assistant from migrant son than non-migrant son. Regarding the child-care services from parents left behind, money exchanges for childcare can also contribute positively to the psychological well-being of the grandparents (Cong and Silverstein, 2008).

Studies on this topic (Du, Ding, Li, & Gui, 2004; Knodel & Saengtienchai, 2005; Kuhn, 2005) yield conflicting results, some shows children's out-migration has benefited the economic situation for elderly while others show the opposite. Most of the existing research relied on cross-sectional data or data collected from selective samples. The cross-sectional nature of the data makes it difficult to address the selectivity issue. It is not clear whether children's out-migration affects the support of parents, or whether parents' resources or health affect children's out-migration.

This paper uses data from a national representative longitudinal survey to investigate whether and how the adult children's out-migration influences the health outcomes for the left behind parents. We examine how monetary transfer, instrumental assistance, and emotional support mediate the effects of having children migrated on health outcomes, and whether these patterns differ by son and daughter migrated?

4 Methods

Given these socioeconomic contexts in China, we investigate the implications of the out-migration from rural to urban areas in China for the socioeconomic and health well-being of elderly parents who remain in the rural areas.

Data

We draw data from the Chinese Longitudinal Healthy Longevity Survey (CLHLS), a penal survey launched in 1998 and followed-up in 2000, 2002, 2005 and 2008. The sample was randomly collected from half of the counties and cities in 22 of China's 31 provinces, which constitutes about 85% of the total population in China (Zeng 2008). The CLHLS interviewed 8,959 and 11,161 individuals aged 80-112 in 1998 and 2000 respectively, and 16,057 and 15,638 individuals aged 65–112 in 2002 and 2005 respectively. This study employs two waves from baseline in 2005 to follow-up wave in 2008. Our sample consists of 6,111 elderly from rural areas.

Analytical Strategy

Propensity score matching method is used to estimate the causal effect of outmigration of children on health outcomes of elderly parents left-behind. Frist, we estimate the propensity scores by modeling logistic regression that predicts the likelihood of elderly having migrant child, which is used to correct the confounding relationship between outmigration and health outcomes of elderly parents. To predict the treatment – having migrant child, we review the previous studies to determine the potential explanatory variables for outmigration, which includes socio-demographic characteristics of elder parents, number of living children, number of living sons, gender of first living child, and wealth. Our matching strategy is based on the nearest neighbor matching within calipers (0.25*SD) and without replacement. Second, after matching, cox proportional hazards regression is conducted to estimate disparities of mortality

between the treated group (elderly parents with migrant children) and untreated group (those without child outmigration). The weighted variable in CLHLS is not included in the second stage of the analysis, since it is not applicable to the matched sample which has been weighed by propensity score in the first stage.

5 Measurements and Models

All-cause Mortality

Survival time was calculated as the number of days from the baseline survey completion to the date of death or whether there is an onset of a disease in the second wave of the interview.

Having children migrated as treatment

The elderly were asked how far away each child lived from presents in baseline 2005 interview. The answers to this question on distance of child living includes: (1) co-residence with the sampled elderly parents, (2) same village, (3) same town or district, (4) same county or city, (5) county or city near by, and (6) elsewhere. We define elderly who had at least a child living in (5) county or city near by or (6) elsewhere as the treated group coded as 1. Those who had all their children live in categories from (1) to (4) are untreated group coded as 0.

Condition variables for predicting propensity score

Predictors of having children migrated includes demographic characteristics of elderly parents, number of living children, number of living sons, male as oldest living child, and living conditions (see Table 1), which are collected in the baseline survey of 2005.

Demographic characteristics are measured by age (65-105 years old), gender (female=1, male=0), education (no schooling=0, 1-5 years=1, and 6 and above years=2), marital status (currently married=0, devoiced=1, widowed=2), residence (urban=0, rural=1), ethnicity (minority=1, Han=0), occupational status (high=1, low=0), and geographical areas (east=0, central=1, west=2). Number of living children and number of living sons are continuous variables calculated by total number of living children or sons in 2005 survey. Male is code as 1 (female =0) for the oldest living children. Living conditions are measured by whether the elderly parents owned a home and whether they had tap water in 2005.

Controls for post matching analysis

Cox regression analysis is conducted based on matched sample (see Table 3). We control for geographical distance from parents, monetary transfer, self-reported health, functional limitation, inadequate medical care, lack of fruits, receiving governmental assistance, and emotion distress in baseline 2005. Self-reported health is measured at continuous scale (1=very good, 2=good, 3=so-so, 4=bad, and 5=very bad). Ability of daily living (ADL) is measured by six items：bathing, dressing toileting, transferring, continence, and feeding. The scale for each item is continuously measured: 0=without assistance, 1=one part assistance and 2=more than one part ADL, where (2) and (3) coded as 1 and (1) as 0. ADL limitation index equals to the mean of total score of six items. Inadequate medical service is measured by asking “do you go to see doctor when getting sick”,

which is coded “yes” as 0 and “no” as 1. Lack of fruits is a 4 point scale variable by asking “how often eat fruits” (1=almost every day to 4=rarely or never). Whether or not received governmental aid or assistance is also included (yes=1, no=0).

6 Preliminary Results

Descriptive analysis shows that a quarter of the rural elderly had at least a child living in a different county (city). About 10 percent of rural elderly parents have two or more children who have live in different counties (cities). 90 percent of elderly parents received money from children, while 10 percent parents gave money to their children. The total number of migrant children is positively associated with the amounts of remittances that parents received (see Table 2).

In 2005, almost three quarters of rural elderly were not covered in social public security system such as pension, retirement wages, or any kinds of private health or life insurances. A majority of the elderly, therefore, relied on their children. About seventy percent of rural elderly parents received financial supports mainly from their own children. In 2005, rural elderly parents received about 970RMB (median 500RMB) from son and daughter-in-law, and 600RMB (median 300RMB) from daughter and son-in-law on average. Ten percent of elderly parents who are more likely in high social economic conditions gave 951RMB (median is 400RMB) to children.

Table 1 presents the weighted and unweighted overall sample descriptions before matching (n=6,111), and shows resampling of elderly parents who had or hadn’t children migrated as treatment in 2005 interview (1,590 treated vs. 1,590 untreated) after matching. Using nearest neighbor non-replacement matching method within caliper 0.25*SD, we balance the

datasets based on the propensity score (n=3,180). After matching, Cox regression model is applied to estimate the effects of outmigration on mortality hazards. Table 3 shows that having migrant children are more likely to increase the mortality hazard of elderly parents by 18.5 percent after controlling distance of outmigration, remittances, indicators of economic stress, physical and mental health conditions. Whether there exists the significant difference of morality by migrant sons and daughters need further investigations.

Next steps:

In the next few months, we will continue our analysis to examine whether the gender of the adult children who migrated out matters or not, and explore the mediating channels through which children's out-migration affects elderly health.

Table 1. Description by treatment (having migrant child) for overall and matched samples (%) 2005 CLHLS

	Weighted		Unweighted			
	Overall untreated (N=4,503)	*Overall treated (N=1,608)*	*Overall untreated (N=4.503)*	*Overall treated (N=1,608)*	*Matched untreated (n=1,590)*	*Matched treated (n=1,590)*
Socio-demographic variables						
Age [a,*]						
65-79 years old	86.35	86.71	36.46	37.00	37.11	37.23
80-105 years old	13.65	13.29	63.54	63.00	62.89	62.77
Sex [a,*]						
Female	51.58	51.23	55.92	55.91	57.17	55.79
Male	48.42	48.77	44.08	44.09	42.83	44.21
Ethnicity [a,*]						
Han	93.54	88.84	91.96	90.24	91.07	90.31
Minority	6.46	11.16	8.04	9.76	8.93	9.69
Education [a,*]						
No schooling	54.64	52.03	67.22	64.05	66.23	63.90
Years of schoolings (1-5 years)	30.01	32.49	23.58	25.44	23.65	25.47
Years of schoolings (6 + years)	15.36	15.49	9.19	10.51	10.13	10.68
Marital status*						
Currently married	61.89	63.87	35.07	37.44	36.86	37.23
Divorced	0.20	0.12	0.20	0.12	0.06	0.13
Widowed	37.91	36.00	64.71	62.44	63.08	62.64
Occupational Status*						
Low	95.69	95.25	96.94	96.21	96.73	96.23
high	4.31	4.75	3.06	3.79	3.27	3.77
Geographical areas*						
east	54.05	52.95	55.27	56.09	56.42	55.97
central	29.68	25.97	28.63	26.93	26.54	27.17
west	16.27	21.08	16.10	16.98	17.04	16.86
Family structure						
Living arrangements						
Living alone	13.49	12.70	14.35	15.24	14.65	15.41
Living with spouse only	35.38	37.89	19.83	20.96	21.45	20.88
Living with children	50.67	49.37	64.89	62.88	63.33	62.26
Living with others	0.22	0.21	0.40	0.50	0.31	0.50
Institution	0.24	0.33	0.53	0.93	0.25	0.94
Family size						
1	113.73	13.03	14.88	16.17	14.91	16.35
2	36.93	39.38	24.54	25.62	25.09	25.60

(Cont.)	Weighted		Unweighted			
	Overall untreated (N=4,503)	*Overall treated (N=1,608)*	*Overall untreated (N=4.503)*	*Overall treated (N=1,608)*	*Matched untreated (n=1,590)*	*Matched treated (n=1,590)*
3	9.42	10.19	15.68	16.23	14.65	16.23
4+	39.92	37.40	44.90	41.98	45.35	41.82
Children						
Number of living children [a,]*						
1	6.26	1.01	11.37	2.05	2.64	2.08
2	10.58	5.52	14.95	7.40	7.67	7.48
3+	83.16	93.47	73.68	90.55	89.69	90.44
Number of living sons [a,]*						
0	6.16	4.31	8.62	5.72	5.47	5.79
1	24.93	22.08	29.22	22.26	21.70	22.45
2	31.98	32.01	29.42	30.85	30.88	30.94
3+	36.93	41.59	32.73	41.17	41.95	40.82
Number of living daughters						
0	15.27	5.55	18.74	7.28	8.49	7.36
1	28.96	223.87	31.05	23.45	22.33	23.71
2	27.71	28.27	25.96	29.42	30.25	29.75
3+	28.06	42.30	24.25	39.86	38.93	39.18
Gender of first living child*						
Female	44.50	49.47	44.75	49.13	49.94	48.99
Male	55.50	50.53	55.25	50.87	50.06	51.01
Index of distance from children						
0-1	14.65	0.00	19.50	0.00	13.14	0.00
1-2	60.27	14.68	58.25	15.17	62.58	15.09
2-3	20.48	54.90	18.48	56.90	21.38	56.79
3-4	4.60	21.32	3.78	19.71	2.89	19.87
4-5	0.00	6.37	0.00	5.66	0.00	5.66
5-5	0.00	2.73	0.00	2.55	0.00	2.58
Living conditions						
Home ownership*						
Self or spouse	57.48	58.96	39.11	39.99	40.57	40.13
Others	42.52	41.04	60.89	60.01	59.43	59.87
Tap water*						
Having tap water	46.90	38.94	43.30	41.29	43.14	41.19
No tap water	53.10	61.06	56.70	58.71	56.86	58.81

(Cont.)	Weighted		Unweighted			
	Overall untreated (N=4,503)	*Overall treated (N=1,608)*	*Overall untreated (N=4.503)*	*Overall treated (N=1,608)*	*Matched untreated (n=1,590)*	*Matched treated (n=1,590)*
Main source of financial support from children						
No	43.99	43.56	28.74	28.98	27.36	28.99
Yes	56.01	56.44	71.26	71.02	72.64	71.01
Economic stress						
without stress	72.82	66.53	74.13	73.57	75.72	73.65
with stress	27.18	33.47	25.87	26.43	24.28	26.35
Lack of fruits						
almost everyday	6.27	5.57	4.66	5.47	5.22	5.47
often	22.58	23.17	21.94	22.08	23.46	22.14
occasionally	42.52	43.71	42.11	43.53	40.44	43.46
Never or Rarely	28.63	27.55	31.29	28.92	30.88	28.93
Receiving government assistance						
No	92.93	96.02	86.48	87.31	86.98	87.36
Yes	7.07	3.98	13.52	12.69	13.02	12.64
Pension						
Have pension	7.92	9.69	5.91	7.84	6.29	7.86
No pension	92.08	90.31	94.09	92.16	93.71	92.44
Whether work or not						
No	51.98	51.78	75.57	76.06	74.78	75.85
Yes	48.02	48.22	24.43	23.94	25.22	24.15
Health status of elderly						
Self-reported health (1=good, 3=bad)						
good	52.96	51.24	49.37	51.24	50.50	51.13
fair	31.03	33.70	33.64	33.27	32.33	33.33
bad	16.02	15.06	16.99	15.49	17.17	15.53
Activities of daily living (ADL)						
without limitation	95.49	95.57	83.79	80.85	84.53	81.08
have limitation	4.51	4.43	16.21	19.15	15.47	18.93
Index of emotional distress						
0-1	36.02	36.38	30.67	34.45	32.26	34.40
1-2	54.44	56.12	57.27	56.72	56.92	56.73
2-4	9.53	7.50	12.06	8.83	10.82	8.87
Serious illness in past two years						
No	84.33	81.92	83.63	81.09	83.33	81.19
Yes	15.67	18.08	16.37	18.91	16.67	18.81

* variables predicting propensity score ; [a] Pretreated sample difference, Chi-2 Test, p-value <0.05

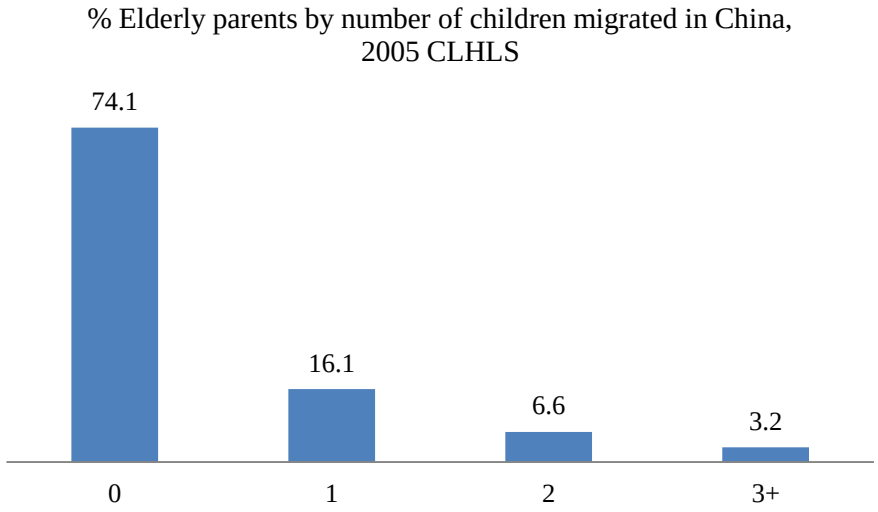


Fig 1. Percent of elderly parents by number of children migrated in rural areas 2005

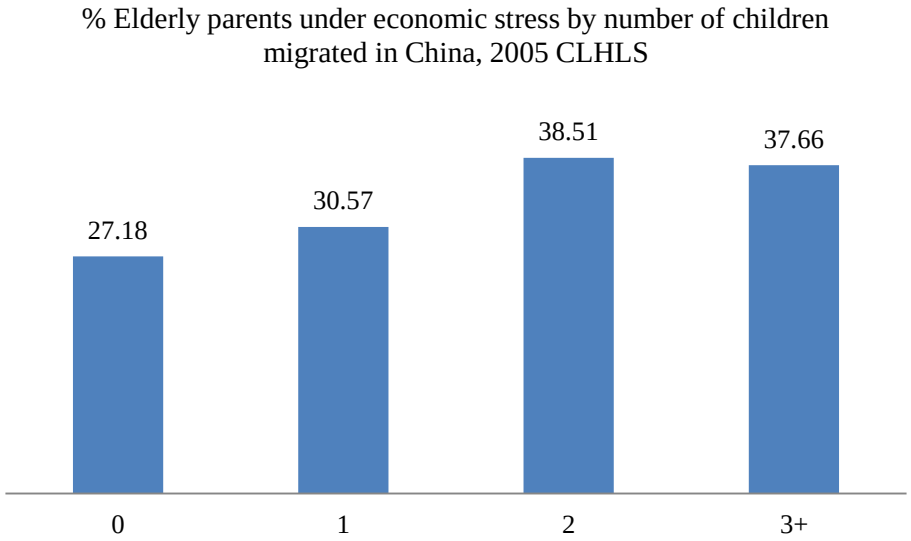


Fig 2. Percent of elderly parents living under economic stress by number of children migrated in rural areas 2005.

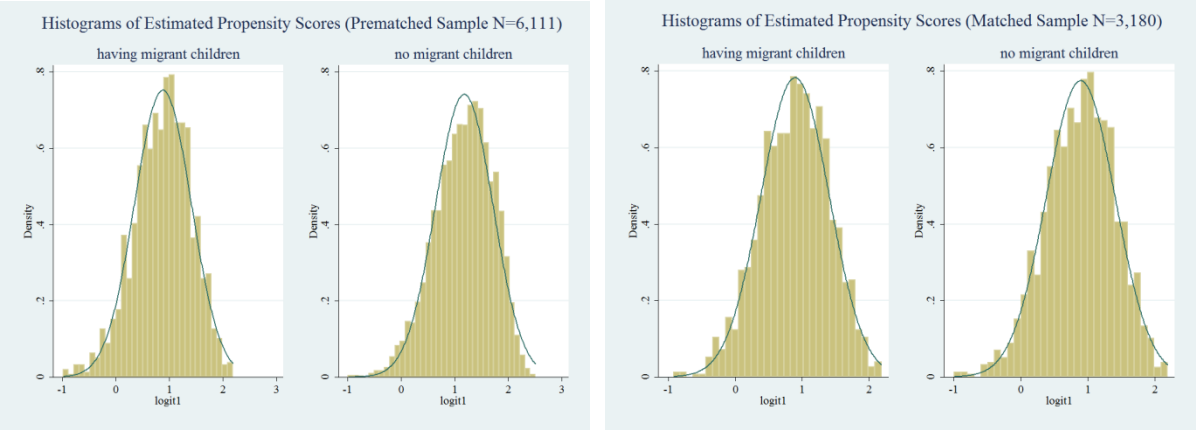


Fig 3. Distribution of the probability of having children migrated (before and after matching) in 2005 CLHLS.

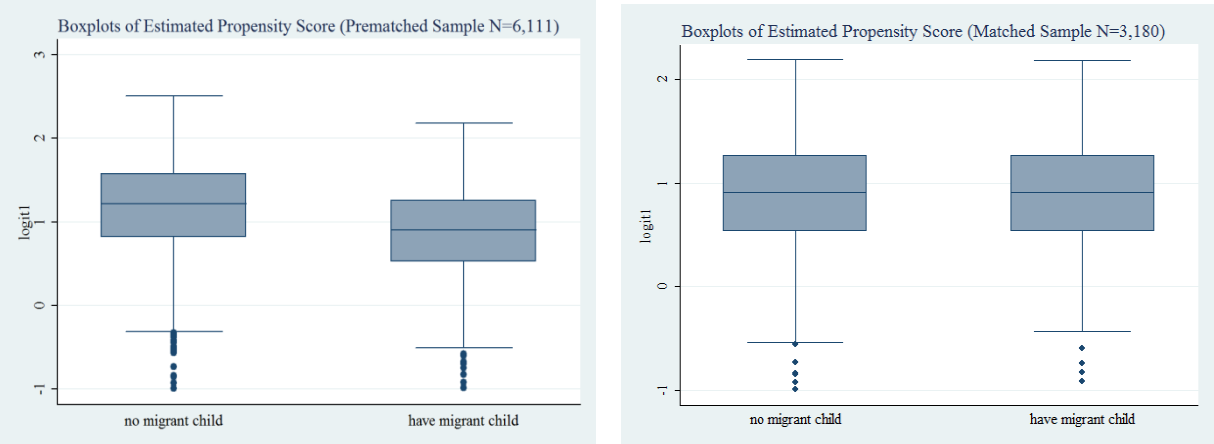
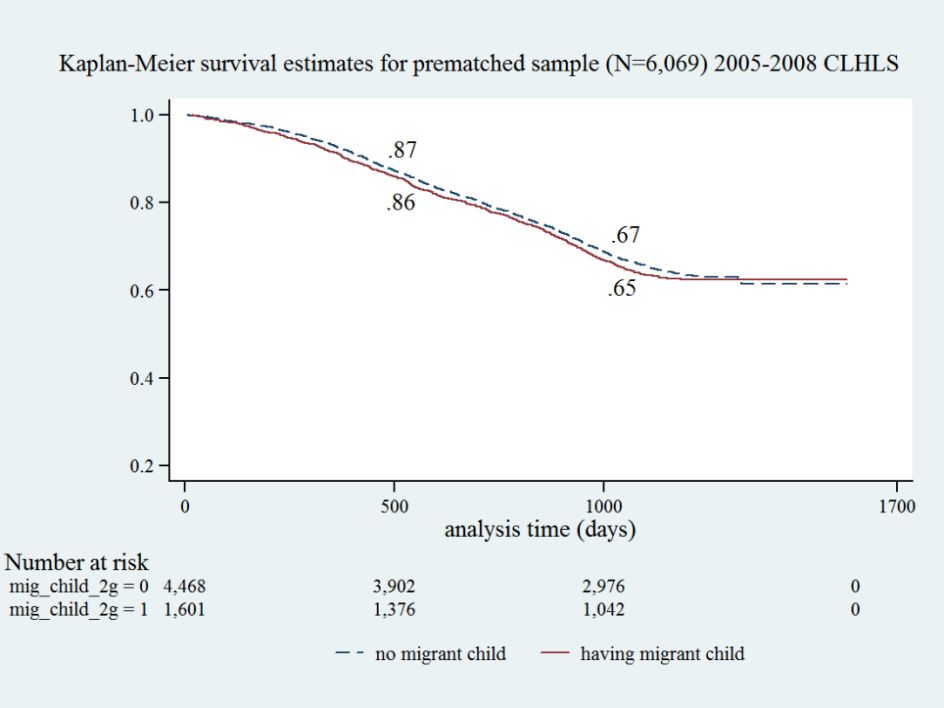


Fig 4. Distribution of estimated propensity score of having children migrated (before and after matching) in 2005 CLHLS.

Table 2. OLS estimates for the number of children migrated on the Log net monetary transfers for the rural elderly parents, 2005 CLHLS (Prematched sample)

VARIABLES	Model 1 (coef.)	Model 2 (coef.)	Model 3 (coef.)
Total number of children migrated	0.196***	0.207***	0.074*
	(0.035)	(0.035)	(0.036)
Demographics of elderly parents			
Age		0.001	0.006*
		(0.003)	(0.003)
Female		-0.116	-0.141*
		(0.069)	(0.068)
Minority		-1.153***	-1.154***
		(0.106)	(0.104)
Years of schooling (1-5 yrs)		0.163*	0.180*
		(0.077)	(0.076)
Years of schooling (6+ yrs)		-0.342**	-0.274*
		(0.115)	(0.113)
Low occupational status		0.807***	0.722***
		(0.173)	(0.170)
Marital status (current married – reference)			
Divorced		-1.856**	-1.360*
		(0.682)	(0.671)
Widowed		-0.049	0.029
		(0.073)	(0.072)
Never married		-5.504*	-5.148*
		(2.264)	(2.224)
Geographical areas (east- reference)			
Central		-0.012	-0.023
		(0.068)	(0.067)
West		-0.119	-0.094
		(0.083)	(0.081)
Total number of living son			0.081**
			(0.029)
Total number of living children			0.209***
			(0.022)
Constant	5.912***	5.205***	3.909***
	(0.033)	(0.303)	(0.310)
Observations	6,111	6,111	6,111
R-squared	0.005	0.036	0.070

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05



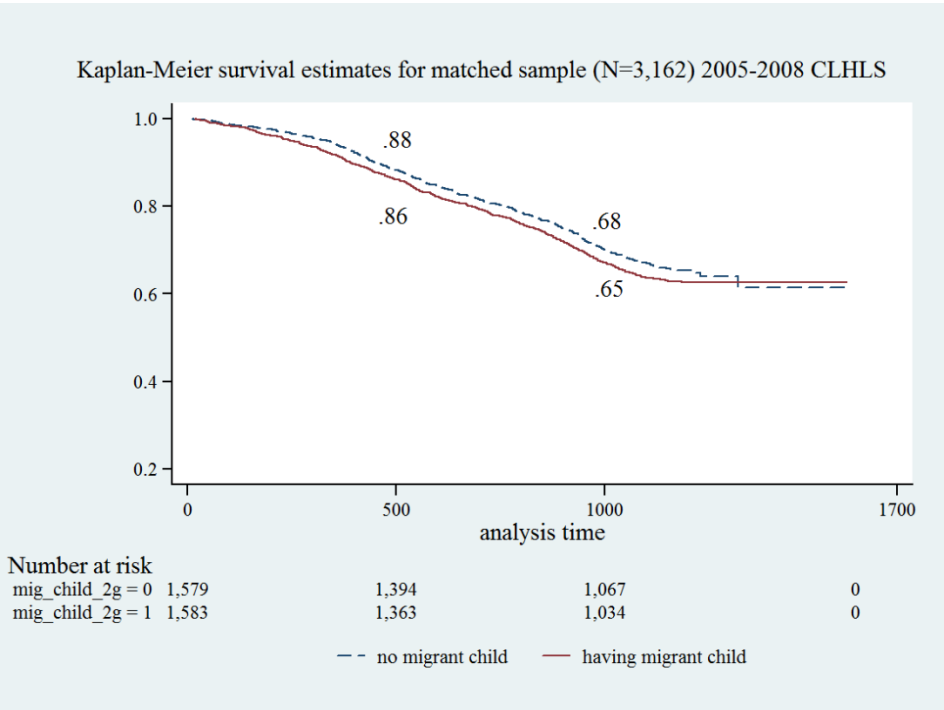


Fig 5. Kaplan-Meier survival estimates by treatment
(before and after matching) in 2005-2008 CLHLS

Table 3. Cox proportional hazards regression for elderly parents in rural China matched sample in 2005-2008 CLHLS

	Hazard Ratios			
	Model 1	Model 2	Model 3	Model 4
Having children migrated	1.109	1.192*	1.209*	1.185*
	(0.0663)	(0.0909)	(0.0922)	(0.0910)
Distance from parents		0.934	0.931	0.930
		(0.0413)	(0.0409)	(0.0411)
Log net money transfer		1.026	1.028	1.024
		(0.0149)	(0.0149)	(0.0148)
Poor self-reported health				1.044
				(0.0456)
Ability of daily living impairment				2.707***
				(0.188)
Emotional distress				1.118
				(0.0641)
Receiving governmental assistance			1.739***	1.608***
			(0.136)	(0.126)
Lack of fruits			1.082*	1.039
			(0.0383)	(0.0379)
Inadequacy of medical care				1.209*
				(0.106)
Observations	3,162	3,162	3,162	3,162

*** p<0.001, ** p<0.01, * p<0.05

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