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GENDER INEQUALITIES IN LABOR MARKET OUTCOMES OF INFORMAL CAREGIVERS NEAR RETIREMENT AGE IN URBAN CHINA

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ABSTRACT

This study examines the impacts of unpaid family care on labor supply and earnings of women and men near retirement age in urban China. Using the 2011 China Health and Retirement Longitudinal Study (CHARLS) and ordinary least squares (OLS) and instrumental variable approaches, it finds that grandchild care is negatively associated with both women's and men's labor force participation, while there are no effects for eldercare. For women caregivers, caring for grandchildren substantially lowers paid labor hours compared to noncaregivers. No significant relationships are found between eldercare and paid labor hours of women workers. For men workers, neither grandchild care nor eldercare is significantly associated with labor hours. The study also finds no statistically significant relationships between grandchild care and labor earnings for either women or men. Eldercare, however, is positively associated with the earnings of men workers.

KEYWORDS

Informal care, childcare, eldercare, labor supply, earnings, China

JEL Codes: I11, J1, J22

INTRODUCTION

Care work – including cooking, laundry, cleaning, shopping, and care of children, the elderly, and the sick within the household – is crucial to social reproduction, economic development, and human well-being (Razavi 2007). In developed countries, market-based care services are a growing sector of the economy. However, in many developing countries, much of the care burden is informal and unpaid and is the responsibility of women family members. The importance of informal care has increased in some developing countries because of the collapse of public care systems due to market-oriented reforms. In China, to promote productivity and market competition, enterprises have stopped providing onsite childcare

since the reform of state-owned enterprises (SOEs) in the 1990s (Cook and Dong 2017). Furthermore, the share of public kindergartens declined from 83 percent to 33 percent from 1998 to 2013 (Cook and Dong 2011).

The burden of informal care work that disproportionately falls on women has substantial implications for gender relations and inequalities. Evidence from China has established that care responsibilities have adverse consequences for women, who are often the primary caregivers, including gender discrimination in the labor market, earning losses, gender wage gaps, time poverty, and exclusion of women from the public domain (Jia and Dong 2013; Qi and Dong 2013; Dong and An 2015; Qi and Dong 2016). To achieve gender equality and empower all women and girls, as per the United Nations' Sustainable Development Goal 5, society should explicitly recognize the adverse effects of the care burden on women (Körösi and Kamau 2014).

While there is a growing body of literature on informal care, few studies pay attention to one particular group of caregivers: women and men near retirement age (45–64 years). The well-being implications of the care burden on this group could be more consequential, as they are more likely to bear double burdens – care of grandchildren as well as elderly parents – relative to other age groups. Meanwhile, they are also under considerable pressure to earn income for old-age security. To fill the void in the literature, this study examines the impact of informal family care, including care of grandchildren (grandchild care) and care of either elderly parents or elderly parents-in-law (eldercare), on labor market outcomes among women and men near retirement age in urban China.

Using data from the 2011 national baseline survey of the China Health and Retirement Longitudinal Study (CHARLS), we find that:

(1) Grandchild care is negatively associated with labor force participation for both women and men.
(2) There is no statistically significant relationship between eldercare and labor force participation for either women or men.
(3) Women caregivers with a grandchild care burden have substantially lower paid labor hours than noncaregivers, while women caregivers with double care burdens have higher paid labor hours than non-caregivers. There are no statistically significant relationships between grandchild care and labor hours of men paid workers.
(4) Eldercare has no statistically significant relationship with the weekly hours of paid work for either women or men.
(5) Grandchild care has no statistically significant relationship with labor earnings for either women or men. Eldercare, however, is positively related to the labor earnings of men workers.

This study is closely related to the literature on the relationship between unpaid informal care work and labor supply for paid work. According to the neoclassical theory of labor supply, informal care has either an income effect or a substitution effect on labor supply (Killingsworth and Heckman 1986; Pencavel 1986; Heitmueller and Inglis 2007). Assuming that the costs of informal care are purely hourly and do not have a fixed component, the care burden will reduce the real wage rate and, thus, affect the labor supply of caregivers through both the income effect and the substitution effect among those already working for pay.[1] Usually, the substitution effect dominates, leading to a negative effect of caregiving on labor supply, as illustrated by Rachel Connelly (1992) and Charles Michalopoulos, Philip K. Robins, and Irwin Garfinkel (1992), who study the relationship between childcare and maternal labor supply in the United States. Those not in the labor force will still stay out of the labor force, as the substitution effect dominates in the participation decision. Assuming that the costs of family care are purely fixed, that is, that caregivers must be paid a certain amount per day in the labor market no matter how many hours they are required to spend on care work, there will only be an income effect among those already doing paid work; thus, the care burden increases the labor supply of caregivers. This argument is also supported by some empirical studies in the US (Cogan 1980; Blau and Robins 1988; Robins 1988). Again, those initially not in the labor force are discouraged from joining the labor force. In conclusion, the theoretical prediction for the impacts of informal care on a caregiver's labor supply is ambiguous.

Previous empirical studies can be categorized into two strands: one strand focuses on childcare while the other focuses on eldercare. Most previous studies on eldercare use data from either the US or Europe and only focus on working-age women (see Lilly, Laporte, and Coyte [2007] for an excellent review). These studies generally find a significant negative relationship between eldercare and labor supply. Our study is more closely related to studies that focus on individuals near retirement age. Using data from the US, Eliza K. Pavalko and Julie E. Artis (1997) examine the effects of caregiving on labor supply among women ages 46–62 and demonstrate that caregivers retire far earlier than noncaregivers. Emma Dentinger and Martin Clarkberg (2002), also using data from the US, expand their study to include both men and women. They show that care of a spouse or parent causes women working for pay to retire earlier but has no notable effects for men. These researchers focused on individuals ages 50–72, near retirement age. Using the Health and Retirement Study (HRS) data, Richard W. Johnson and Anthony T. Lo Sasso (2006) show that care of elderly parents significantly reduces hours worked for pay among women ages 50–72. They explicitly note that care of parents is endogenously determined and that the ordinary least squares (OLS) estimator could be biased, something that had been ignored in previous studies. They employ the instrumental variable

(IV) approach to avoid potential endogenous bias. Contrary to findings in the US, two studies using data from the United Kingdom show that women caregivers are more likely to be employed than noncaregivers (Carmichael and Charles 1998; Henz 2004). Among these studies, Carmichael and Charles (1998) is the only one to cover childcare in addition to eldercare.

A larger body of literature examines the effects of childcare on the labor supply of parents with young children. Most of these studies hypothesize that childcare increases the cost of labor supply and, thus, decreases the labor supply of mothers with young children; these studies generally find supportive empirical evidence.[2] However, almost all these studies use data from developed countries; studies using data from developing countries are limited. As one of a few exceptions, Fenglian Du and Xiao-yuan Dong (2013) examine the consequences of care system reform on women's care and labor supply decisions in China and argue that the collapse of the formal care service system since the 1980s has resulted in a more informal care burden on women and has reduced their labor supply. In previous studies, childcare generally refers to care of young children by parents; few studies account for the care of grandchildren by middle-aged and elderly grandparents, which is quite prevalent in East Asian countries. Margaret Maurer-Fazio et al. (2011), who also use data from China, show that co-residence with elderly parents increases the labor supply of mothers with young children, suggesting that mothers benefit from the care provided by their parents. Similarly, Rachel Connelly, Margaret Maurer-Fazio, and Dandan Zhang (2014) find that elderly people who co-reside with their adult children in rural China have a lower labor force participation rate.

This study adds to the literature by providing further evidence of the effects of informal care work on gender inequalities in labor market outcomes in China. Several studies have investigated the effects of family care on women's labor market attainments in China (Liu, Dong, and Zheng 2010; Maurer-Fazio et al. 2011; Jia and Dong 2013; Qi and Dong 2013, 2016; Dong and An 2015). Most of them focus only on women and, in particular, mothers with preschool-age children. We expand this literature in two ways. First, we look at both women and men, allowing us to explore gender differences. Second, we focus on a particular group: those near retirement age. Women and men in this group have, arguably, a heavier care burden and confront a more acute trade-off between caregiving and their own needs for old-age security. The relationship between informal family care and labor market outcomes is also particularly relevant in China. Close family ties are an important feature of China's traditional culture, and providing informal care for family members is quite prevalent. The notion that family care is women's responsibility is ingrained in China due to a patriarchal cultural tradition. Therefore, an informal care burden is more likely to hurt the well-being of women and create gender inequalities.

CHINA'S CARE SYSTEM REFORM AND THE GENDERED DIVISION OF HOUSEHOLD LABOR

During China's era of the centrally planned economy (1949–76), the care systems consisted of three components. First, the government provided service centers, such as public kindergartens, nurseries, and nursing homes. Second, employers provided caring centers, which mainly served young children. Third, neighborhood committees (*juweihui* or *cunweihui*) provided childcare and eldercare services. The employer-provided caring centers are the most important component in urban areas and have long been regarded as important welfare packages provided by employers. This comprehensive care system has substantially facilitated women's engagement in the labor market. The labor force participation rate of married women in China from 1949 to 1976 was much higher than in any other developing country (Croll 1983).

In the post-reform period, the Chinese government has been restructuring its SOEs to promote economic efficiency. One aspect of these reforms is eliminating a firm's responsibility for providing social support through onsite childcare centers, schools, and hospitals. Support for retirees has also been transferred to the government. The government has declared that it will return these functions to society, meaning, the market. However, the growth of private sector commercial care services is very slow and will likely never fill the void left by the collapse of the public service system. The responsibility for carrying out the functions once provided by the public sector has fallen to families.

While family members' responsibility for care has rapidly increased in the post-reform period, it does not fall on all family members equally. With a strongly patriarchal cultural tradition in China, families believe it is women's responsibility to take care of children, the elderly, and the sick. According to data from the China General Social Survey (CGSS), conducted in 2010, approximately 66 percent of respondents agree that men's role is primarily outside the household and women's role is inside, with only 32 percent of adult respondents fully agreeing that men and women should share the household work equally. It is interesting that men and women do not report substantial differences regarding their values concerning gender roles.

As the education level of Chinese women rapidly increases, their opportunity costs of undertaking household chores increase. To compensate, their retired parents are undertaking more of the care work. Increasing numbers of retired people are helping their married daughters and sons by taking care of young grandchildren. This is the so-called "skip-generation care" phenomenon in China. Besides taking care of grandchildren, these older caregivers may also need to take care of their elderly parents. These double care burdens make them a "sandwich" group.

While there is a growing body of literature on family care, few studies pay attention to these older caregivers, those around retirement age. This study aims to fill this void by providing new evidence on the effects of informal family care on labor market outcomes among women and men near retirement age.

EMPIRICAL METHODOLOGY

We first estimate the impacts of grandchild care and eldercare on labor supply and labor earnings, doing so separately for men and women. We measure the labor supply at both the extensive margin (a binary decision in labor force participation) and the intensive margin (paid working hours of current workers). In either case, we employ the OLS estimation method to obtain benchmark results.[3] Specifically, we estimate the following equations using the OLS method:

$$LP = \alpha_0 + \alpha_1 IfYcare + \alpha_2 IfOcare + \alpha_3 Bothcare + X'\gamma + u \quad (1)$$

$$LP\_hours = \alpha_0 + \alpha_1 IfYcare + \alpha_2 IfOcare + \alpha_3 Bothcare + X'\gamma + u \quad (2)$$

where *LP* is a binary variable indicating whether the respondent is active or not,[4] and *LP_hours* denotes weekly hours of paid work for those currently employed. *IfYcare* denotes whether the respondent provides grandchild care or not, while *IfOcare* denotes whether he or she provides eldercare or not; either is a dummy variable.[5] *Bothcare* denotes simultaneously providing grandchild care and eldercare. *X* is a set of control variables, including age and its squared term, education level measured by a set of dummies, marriage status, *hukou* (household registration) status,[6] household wealth, whether the respondent has a retirement scheme,[7] self-reported health status, whether the respondent has difficulties in activities of daily living (ADLs) or instrumental activities of daily living (IADL), whether the respondent has bodily pain, and number of sons and daughters. *u* is a disturbance term.

We use the following equation to estimate the effect of caregiving on labor earnings:

$$LgEarnings = \alpha_0 + \alpha_1 IfYcare + \alpha_2 IfOcare + \alpha_3 Bothcare + X'\gamma + u \quad (3)$$

where *LgEarnings* denotes the self-reported annual labor earnings in log form, and all other variables are the same as in Equations 1 and 2.

The OLS estimators could be biased because of either reverse causality or omitted variables. Retired grandparents are more likely to take care of grandchildren than nonretired grandparents because of the lower opportunity cost, which will lead to an overestimate of the negative effects of caregiving on labor supply. Some unobservable factors, like preference

for leisure, could also bias the estimation. Those who cherish leisure time more would be less likely to provide family care and engage in paid work, which leads to an underestimate of the negative effects of caregiving on labor supply. To test the robustness of the OLS estimation results, we conducted IV estimation. We instrument grandchild care with the presence of grandchildren younger than age 16,[8] and instrument eldercare with the presence of living elderly parents, whether one of the parents reports poor health status, and the presence of a nursing home within the community.[9] The presence of young grandchildren induces the demand for family care but is not directly related to the supply-side driving forces of caregiving and, thus, is less likely to suffer from reverse causality. Also, since the presence of young grandchildren is primarily determined by the younger generation, it is less likely to be correlated with the leisure preference of the grandparents.[10] Similarly, the presence of living elderly parents and their health status are demand-side determinants of eldercare, which are arguably exogenous to the supply decision of eldercare. Whether there is a nursing home nearby is a valid candidacy because a nursing home acts as a formal caregiver for eldercare and, thus, is probably negatively associated with the probability of providing eldercare among middle-aged and elderly people. Also, the presence of a nursing home within a community is unlikely to be correlated with individual-level characteristics of potential caregivers. These arguments are supported by our first-stage estimation results, reported in Table A1 in the Appendix. The table shows that the presence of young grandchildren substantially increases the likelihood that middle-aged and elderly people will take care of grandchildren, while the presence of living elderly parents, the health status of living parents, and access to nursing homes are all economically and statistically significantly related to the likelihood of providing eldercare.

DATA AND DESCRIPTIVE STATISTICS

The data used here are from the national baseline survey of CHARLS, a newly completed nationwide household survey in China, conducted during 2011–12 (CHARLS n.d.).[11] The sample consists of 10,257 households, containing 17,587 main respondents ages 45 and over and their spouses. The CHARLS baseline data include detailed information concerning respondents and their living spouses. The main questionnaire includes information on basic demographics, family, health status, social insurance, employment, and household economy (income, consumption, and wealth). CHARLS data have a couple of merits for studying the relationship between informal care and labor supply of older Chinese. First, CHARLS is the only nationally representative household survey targeting older Chinese, and, thus, it allows us to draw conclusions for all the middle-aged and elderly population in China. Second, as a household

survey targeting middle-aged and elderly Chinese, CHARLS contains comprehensive information on the socioeconomic status and behavior of the country's older generations.

Since we are primarily interested in labor market outcomes, we restrict our sample to working-age people, that is, those age 65 or below.[12] We also restrict our sample to urban residents. Most rural residents are self-employed and engage in agricultural production. They are less likely to be confronted with the conflict between informal family care and market jobs. Our final sample consists of 2,611 women and 2,351 men. The primary outcome variables of interest include labor supply and earnings, while the key explanatory variables are two types of informal care service: grandchild care and eldercare.

Table 1 reports summary statistics of the final sample. The average age of the respondents under study is 54.6 years, and few of the respondents are high school graduates. Eighty-six percent of the respondents live with a spouse. More than half of the respondents have rural *hukou* status.[13] Approximately 18 percent of the respondents report poor health status, 16 percent report having difficulties in daily activities, and 25 percent report

Table 1 Summary statistics

	Total	*Women*	*Men*	*Difference*
A: Key variables of interest				
Labor force participation (yes = 1)	0.63	0.54	0.74	-0.20***
Employment rate	0.26	0.18	0.36	−0.18***
Weekly working hours (conditional)	43.96	40.74	45.75	−5.01***
Weekly working hours for employed (conditional)	40.72	37.52	42.49	−4.97***
Labor earnings (1,000 RMB)	8.61	4.72	12.95	−8.23***
Labor earnings (1,000 RMB; without 0s)	24.35	19.50	27.08	−7.59***
Taking care of grandchildren (yes = 1)	0.46	0.52	0.38	0.14***
Taking care of elderly parents (yes = 1)	0.17	0.18	0.17	0.01
Both grandchild care and eldercare (yes = 1)	0.07	0.08	0.07	0.02
Yearly hours for childcare (conditional)	2015.33	2130.99	1824.96	306.03*
Yearly hours for eldercare (conditional)	1234.65	1270.48	1189.59	80.89
Yearly hours for childcare and eldercare (conditional)	1863.32	1980.93	1690.50	290.42*
B: Control variables				
Age	54.64	54.44	54.85	−0.41*

(*Continued*)

Table 1 Continued.

	Total	*Women*	*Men*	*Difference*
Ages: 45–49	0.29	0.30	0.28	0.02
Ages: 50–54	0.16	0.16	0.16	0.01
Ages: 55–59	0.27	0.27	0.27	0.00
Ages: 60–65	0.22	0.21	0.23	−0.02*
Has not finished elementary school (yes = 1)	0.27	0.35	0.18	0.18***
Elementary school (yes = 1)	0.20	0.18	0.21	−0.02*
Junior middle school (yes = 1)	0.29	0.25	0.33	−0.08***
High school or above (yes = 1)	0.24	0.21	0.28	−0.07***
Married with spouse present (yes = 1)	0.86	0.84	0.87	−0.03***
Married but not living with spouse (yes = 1)	0.07	0.07	0.08	−0.01
Divorced/widowed/never married (yes = 1)	0.07	0.09	0.05	0.04***
Urban (yes = 1)	0.48	0.47	0.48	−0.01
Household wealth (1,000 RMB)	291.97	298.41	284.84	13.57
Has retirement scheme (%)	29.54	26.85	32.53	5.68***
Self-rated poor health (yes = 1)	0.18	0.20	0.16	0.04***
Disabled (yes = 1)	0.16	0.18	0.13	0.05***
Having bodily pain (yes = 1)	0.25	0.30	0.19	0.11***
Number of sons	1.08	1.11	1.05	0.06*
Number of daughters	0.96	0.98	0.93	0.05
Has young grandchildren (yes = 1)	0.61	0.63	0.58	0.05***
Has living elderly parents (yes = 1)	0.62	0.59	0.64	−0.05***
Has both young grandchildren and elderly parents (yes = 1)	0.33	0.33	0.33	−0.00
N	5,007	2,633	2,374	

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Restricted to respondents ages 45–65.

Source: CHARLS baseline survey 2011, urban sample.

having bodily pain. On average, the respondents have one son and one daughter. Sixty-one percent of the respondents have at least one grandchild younger than age 16, and 62 percent of the respondents have elderly parents who are alive.

EMPIRICAL RESULTS

Family care and labor supply

Before regression analysis, we first show some descriptive evidence on informal family care, labor supply, and labor earnings, paying special

attention to gender gaps (see Table 1). Table 1 shows that 63 percent of the respondents were active at the survey time, while 26 percent were employed.[14] There are substantial gender gaps in labor supply. The share of active women is lower than that of men by 20 percentage points, and the share of women who are employed is lower than that of men by 18 percentage points. Among current workers, women spend substantially less time on paid work than men. The gender gap in labor earnings is striking, as women workers earn 64 percent less than male workers. Fifty-two percent of women take care of grandchildren, while only 38 percent of men do. Among caregivers, women spend more time on caring than men. However, there is no statistically significant gender difference in providing eldercare.

We now turn to regression analysis, which allows us to estimate the relationship between caregiving and labor supply, with observable covariates explicitly controlled. The first two columns in Table 2 present the OLS estimation results. The results in column 1 suggest that the labor force participation rate of women caring for grandchildren, though not

Table 2 OLS estimates of labor force participation rate and working hours

	Labor force participation rate		*Weekly working hours*	
	Women	*Men*	*Women*	*Men*
IfYcare	−0.058***	−0.039	−10.928***	−3.220*
	(0.021)	(0.024)	(1.909)	(1.854)
IfOcare	0.024	0.041*	−0.463	−0.195
	(0.027)	(0.024)	(2.155)	(1.771)
Bothcare	0.009	−0.059	10.210**	7.545*
	(0.050)	(0.051)	(4.322)	(4.057)
Control variables	Yes	Yes	Yes	Yes
Mean of Y	0.537	0.740	39.147	44.072
P-value of *F*-test for *Ifycare* and its interaction	0.014	0.034	0.000	0.101
P-value of *F*-test for *Ifocare* and its interaction	0.507	0.213	0.036	0.136
P-value of *F*-test for all care variables	0.018	0.046	0.000	0.172
Observations	2,605	2,341	1,251	1,581
R-squared	0.260	0.233	0.113	0.080

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. All regressions control for province-level fixed effects. Other control variables include age, age squared term, education, marriage status, *hukou* status, household wealth, health status, and number of children. Robust standard errors are in parentheses.

caring for elderly parents, is statistically significantly less than that of non-caregivers, by 5.8 percentage points (10.7 percent at the mean level), while the labor force participation rate of men caring for grandchildren, though not caring for elderly parents, is 3.9 percentage points (5.3 percent at the mean level) lower than that of noncaregivers. The labor supply effect on female caregivers is quite large, as a one-year increase in age only decreases the labor force participation rate by 2 percentage points when workers are age 60. However, we find no statistically significant relationships between eldercare and labor force participation for women, although there is a marginally significant positive relationship for men. The positive effect of eldercare could be due to the increased economic pressure of supporting elderly parents. Taking care of elderly parents requires both financial support and time. For grandchild care, however, financial support is primarily provided by the grandchild's parents. Having double care burdens – that is, caring for both the elderly and grandchildren – reduces the labor force participation rate more for men than for women.

If caregivers are closely attached to the labor market, such as people having a high wage rate, caregivers may not exit the labor market but reduce their labor time input. Thus, we estimate the effects of caregiving on working hours among current workers. We present the estimation results in the last two columns of Table 2. The results show that grandchild care is negatively associated with weekly hours of work among women workers, while there is no such statistically significant relationship between eldercare and paid work hours. Interestingly, there are no statistically significant differences in the number of working hours between women with a double care burden and non-caregivers. There are similar results for men, but the effects are much smaller in magnitude.[15] Also, male caregivers with double care burdens have significantly higher labor time input than caregivers who only care for grandchildren. The lack of negative effects of double care burdens on labor supply, or even a positive effect, probably reflects higher economic pressure due to caring costs. Caregivers with heavy care burdens must work harder to support their families.

Table 3 reports the IV estimation results.[16] For both women and men, the results consistently show that grandchild care reduces labor force participation. Furthermore, the effect is much larger if caregivers simultaneously undertake eldercare. However, there are no statistically significant effects of eldercare on labor force participation, for either women or men. Among current workers, a childcare burden significantly reduces the weekly hours of paid work for women. However, women caregivers with double care burdens have more labor time input. This probably reflects higher economic pressure due to caring costs. Neither grandchild care nor eldercare has significant effects on the paid working hours of men workers.

Table 3 2SLS estimates of labor supply and working hours

	Labor force participation rate		*Weekly working hours*	
	Women	*Men*	*Women*	*Men*
Ifycare	−0.082	−0.120	−14.999**	2.783
	(0.077)	(0.101)	(6.961)	(8.535)
Ifocare	0.009	0.114	−0.737	2.471
	(0.114)	(0.123)	(9.466)	(8.037)
Bothcare	−0.400	−0.307	26.369	−22.004
	(0.298)	(0.373)	(23.934)	(26.512)
Control variables	YES	YES	YES	YES
P-value of *F*-test for *Ifycare* and its interaction	0.000	0.001	0.051	0.527
P-value of *F*-test for *Ifocare* and its interaction	0.279	0.615	0.452	0.701
P-value of *F*-test for all care variables	0.001	0.003	0.076	0.732
P-value of Hansen J statistic	0.741	0.386	0.882	0.175
Observations	2,605	2,341	1,251	1,581
R-squared	0.225	0.214	0.098	0.042

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. All regressions control for province-level fixed effects. Other control variables include age, age squared term, education, marriage status, *hukou* status, household wealth, health status, and number of children. Robust standard errors are in parentheses.

Family care and labor earnings

We have shown that grandchild care has substantially negative effects on the labor force participation rates of near-retirement-age people and reduces the paid labor hours of women workers. This result suggests an earning loss due to the labor supply response at the extensive margin. Caregivers who are closely attached to the labor market may undertake informal care and paid jobs simultaneously. If labor productivity is negatively affected by care burdens, and the wage rate is determined competitively, we should observe negative effects of caregiving on wage earnings among current workers. We test this by estimating the effects of caregiving on labor earnings, restricting our sample to current workers. The first two columns of Table 4 present the OLS estimation results. The results show that grandchild care is statistically significantly related to women's labor earnings but has no significant relationship with men's labor earnings.[17] There is no significant relationship between eldercare and labor earnings, for either men or women. The last two columns of Table 4 present the 2SLS estimation results, where the model specification of the first-stage equation is the same

Table 4 OLS and 2SLS estimates of annual earnings

	Dependent variable: Log(annual earnings)			
	OLS		*2SLS*	
	Women	*Men*	*Women*	*Men*
Ifycare	−0.394***	−0.104	−0.641	−0.118
	(0.139)	(0.075)	(0.518)	(0.345)
Ifocare	−0.061	0.018	0.505	0.710**
	(0.097)	(0.070)	(0.425)	(0.313)
Bothcare	0.112	0.101	1.077	0.211
	(0.309)	(0.178)	(1.221)	(1.082)
Control variables	Yes	Yes	Yes	Yes
P-value of *F*-test for *Ifycare* and its interaction	0.010	0.383	0.439	0.927
P-value of *F*-test for *Ifocare* and its interaction	0.805	0.734	0.197	0.026
P-value of *F*-test for all care variables	0.026	0.530	0.180	0.062
P-value of Hansen J statistic	–	–	0.457	0.560
Observations	634	1,123	634	1,123
R-squared	0.352	0.262	0.282	0.190

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. All regressions control for province-level fixed effects. Other control variables include age, age squared term, education, marriage status, *hukou* status, household wealth, health status, and number of children. Robust standard errors are in parentheses.

as that in Table A1. We find no statistically significant effects of grandchild care on labor earnings for either women or men but do find a positive effect of eldercare on labor earnings of male workers. Again, the positive earning effects of eldercare are probably due to the increased economic pressure caused by the care burden. For grandchild care, the parents undertake this economic burden.

CONCLUSIONS

Using nationally representative household survey data, this study examined the effects of informal family care on the labor supply and earnings of Chinese, ages 45–65, residing in cities. We find that care of grandchildren substantially reduces both the labor force participation rate of middle-aged people and the paid labor hours of women workers. We find eldercare not to have a substantial effect on labor supply. Using the OLS estimation method, we find a negative relationship between grandchild care and the labor earnings of women caregivers. However, we find no statistically

significant effects of caregiving on labor earnings for both women and men when we use the IV approach to mitigate potential endogenous bias of the OLS estimators.

The findings of our analysis have important policy implications. Because of rapid population aging, the Chinese government is reforming its retirement scheme to encourage older workers to remain in the labor force. However, such a policy conflicts with the increasing care burdens that have fallen on older people. Without well-developed care systems, postponing the age of retirement may remove family care burdens from older people to mothers with young children and, thus, decrease the labor supply of young caregivers. The net labor supply effect of postponing retirement age at the macro level is ambiguous. One recent study has already shown that the presence of grandparents as family caregivers increases the labor supply of young women (Maurer-Fazio et al. 2011). In addition, the early withdrawal of middle-aged and elderly people from the labor force and the earnings loss resulting from family care responsibilities would result in smaller pensions. Thus, the market-oriented care system reforms are incompatible with concerns over increasing old-age support. Recognizing such policy conflicts, the government needs comprehensive policies to take into account both care system reform and retirement system reform.

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NOTES

[1] We provide a simple theoretical framework in the Appendix to illustrate the effects of care burden on labor supply.

[2] See Heckman (1974); Blau and Robins (1988); Ribar (1991, 1992, 1995); Berger and Black (1992); Connelly (1992); Leibowitz, Klerman, and Waite (1992); Michalopoulos, Robins, and Garfinkel (1992); and Kimmel (1998), who use survey data from the US.

[3] We use the linear probability model (LPM), rather than nonlinear models, such as probit or logit, because the results of LPM are easier to interpret. Also, we use the instrumental approach in resolving potential endogenous problems, and the IV estimation in the linear model is more robust than that in nonlinear models (Angrist and Pischke 2009). Nevertheless, we also try the two-stage residual inclusion (2SRI) approach, which is an IV-based approach used in nonlinear models, and obtain similar results.

[4] The respondent is defined as active if he or she is self-employed, employed, or unemployed and currently looking for a job.

[5] In one recent study, Lu Chen et al. (2017) emphasized the intensity of caregiving. To check whether our conclusions are robust to the definition of caregiving, we also use a more restrictive definition of caregiving: that is, if the respondent spends at least 20 hours per week on caring. The results are qualitatively the same as those obtained when we measure the care burden in terms of whether *any* care services are provided. The results are available upon request.

[6] *Hukou* is the household registration status in China. The type includes agricultural and nonagricultural.

[7] Approximately 30 percent of respondents in our sample have a retirement scheme, which may lead to different patterns of retirement decisions. Thus, we explicitly control for whether the respondents have a retirement scheme.

[8] Ideally, we would use the existence of younger grandchildren, who are more likely to need intensive care. However, the CHARLS data only record the main respondents' numbers of grandsons and granddaughters who are younger than age 16.

[9] Elderly parents include both parents and parents-in-law.

[10] We have also controlled for the number of sons and daughters, which is the main determinant of the existence of young grandchildren.

[11] CHARLS is a biennial survey conducted by the National School of Development at Peking University, aiming to be representative of Chinese residents ages 45 and older and their spouses. CHARLS is part of a set of longitudinal aging surveys that include the HRS in the US, the English Longitudinal Study of Ageing (ELSA), the Survey of Health, Ageing, and Retirement in Europe (SHARE), the Korean Longitudinal Study of Aging (KLoSA), the Japanese Study of Aging and Retirement (JSTAR), and the Longitudinal Aging Study in India (LASI). More details can be found at CHARLS (n.d.); please also see Yaohui Zhao et al. (2013) for a complete discussion.

[12] China has a mandatory retirement policy, requiring men and women workers in formal sectors to retire at ages 60 and 50, respectively. The labor force participation rate of workers older than age 65 in urban areas is less than 7 percent in the CHARLS sample.

[13] Urban and rural in China can be defined either by *hukou* status or by type of residence. While the *hukou* status often refers to urban or rural, it is officially recorded as agricultural or nonagricultural in the government system of household registration. The *hukou* status is typically classified by whether the household owns agricultural land or not. The type of residence, which refers to urban areas or rural areas, is classified by local economic development level. Since the labor market is more closely related to the local development level, we restrict our sample to those living in urban areas.

[14] The gap between active and employed includes those self-employed and unemployed.

[15] To explicitly test the gender differences in the effects of caregiving on labor supply, we conducted a joint model analysis and present the results in Appendix Table A2. As shown in columns 2 and 4, the effects of grandchild care on paid work hours are statistically different by gender. However, we find no statistically significant gender-specific differences in the effects of grandchild care on labor force participation and labor earnings. There are also no statistically significant differences by gender in the effects of eldercare.

[16] See Appendix Table A1 for the first stage estimation results.

[17] We also explicitly test the gender differences in the effects of caregiving on labor earnings with a joint model analysis. The results are presented in Table A3. Although the results generally suggest a smaller effect of caregiving on labor earnings for men, the gender-specific differences are not statistically significant due to large standard errors.

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APPENDIX

Modeling the relationship between care burden and labor supply

We briefly illustrate the effects of care burden on labor supply among those already employed. For those initially not in the labor force, the labor market implications of costs of care are quite straightforward.

Fixed costs of care

Without the care costs, the caregiver's utility was maximized at point X on an indifference cure U_1, a point at which H_1 paid hours are worked. When the costs of care generate the constraint *acd*, the caregiver's utility will be maximized at point Y on U_2, and he or she will increase hours of paid work to H_2. In short, for those already employed, the fixed costs of care have an income effect that pushes them toward more hours of paid work.

Note that the caregiver depicted in Figure A1 remains in the labor force. For caregivers with strong preference for leisure, they could eventually withdraw from the labor force, as shown in Figure A2. For a caregiver with daily unearned income equal to *ab*, without costs of care, he or she maximized utility at point X' on U_1'. With the fixed costs of care equal to *bc*, utility will be maximized at point Y' on U_3' if the caregiver chooses to work, but maximized at point b on U_2' if not. Since U_2' is above U_3', the caregiver will exit the labor force with fixed costs of care.

Hourly costs of care

If the care costs are purely hourly and have no fixed component, they simply reduce the hourly take-home wage of an employed caregiver. For those already employed, these costs create an income effect and a substation effect that work in opposite directions on the desired hours of paid work. If the income effect dominates, the care costs should increase the hours of paid work, and vice versa if the substitution effect dominates.

In conclusion, the analysis above suggests that care burdens would have a theoretically ambiguous effect on the hours of paid work among those already in the labor force, but a theoretically clear effect on labor force participation rates. In general, care burdens should decrease the labor force participation rates among caregivers.

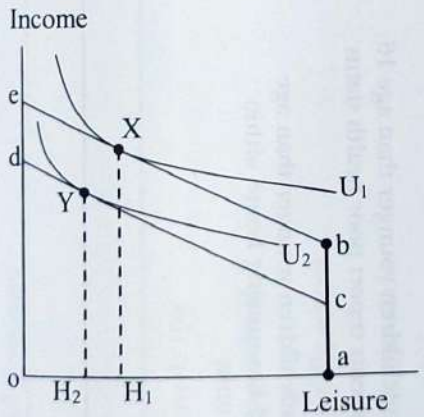

Figure A1

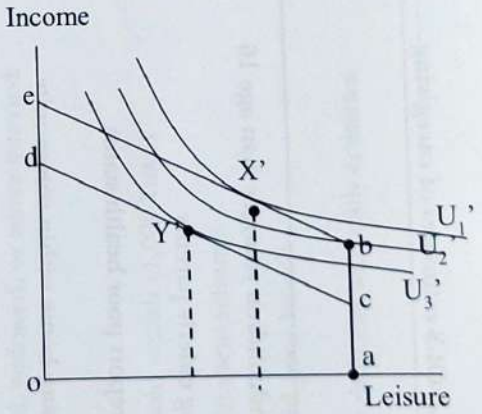

Figure A2

Figure A1 and A2 Fixed costs of care

Table A1 OLS estimates of caregiving

	IfYcare		*IfOcare*		*Bothcare*	
	Women	Men	Women	Men	Women	Men
Has grandchildren younger than age 16	0.503***	0.378***	−0.005	0.006	0.048***	0.042***
	(0.026)	(0.027)	(0.022)	(0.022)	(0.010)	(0.010)
Has living elderly parents	0.005	0.027**	0.216***	0.193***	−0.009	−0.000
	(0.013)	(0.013)	(0.026)	(0.024)	(0.006)	(0.004)
Parents report poor health status	−0.012	−0.017	0.092**	0.071*	−0.001	0.004
	(0.013)	(0.013)	(0.041)	(0.039)	(0.004)	(0.004)
Has nursing home within community	0.080***	0.081***	−0.071**	−0.040	0.009	0.013**
	(0.026)	(0.024)	(0.032)	(0.030)	(0.006)	(0.006)
Has grandchildren younger than age 16 and has living elderly parents	0.036	0.017	−0.056*	−0.038	0.101***	0.074***
	(0.029)	(0.030)	(0.031)	(0.030)	(0.015)	(0.014)
Has grandchildren younger than age 16 and parents report poor health status	−0.015	0.005	−0.057	−0.073	0.013	0.004
	(0.038)	(0.038)	(0.051)	(0.050)	(0.025)	(0.024)
Has grandchildren younger than age 16 and has nursing home within community	−0.052*	−0.029	0.024	−0.014	−0.040***	−0.047***
	(0.031)	(0.032)	(0.035)	(0.034)	(0.014)	(0.013)
Age	0.134***	0.020	0.028	0.031	0.018	0.014
	(0.030)	(0.029)	(0.027)	(0.029)	(0.015)	(0.014)

(*Continued*)

Table A1 Continued.

	IfYcare		*IfOcare*		*Bothcare*	
	Women	Men	Women	Men	Women	Men
Age squared/100	−0.121***	−0.015	−0.029	−0.030	−0.018	−0.013
	(0.028)	(0.027)	(0.025)	(0.026)	(0.014)	(0.013)
Elementary school	0.007	−0.065**	0.021	0.020	0.011	0.009
	(0.025)	(0.028)	(0.019)	(0.022)	(0.013)	(0.013)
Junior middle school	0.008	−0.046*	0.047**	0.023	0.026*	0.010
	(0.024)	(0.026)	(0.021)	(0.022)	(0.013)	(0.012)
High school or above	−0.013	−0.062**	0.099***	0.045*	0.018	0.008
	(0.027)	(0.029)	(0.027)	(0.026)	(0.015)	(0.014)
Married but not living with spouse	−0.017	−0.164***	−0.027	−0.057**	−0.013	−0.008
	(0.032)	(0.027)	(0.028)	(0.026)	(0.016)	(0.013)
Divorced, widowed, or never married	0.030	−0.052	0.031	0.008	−0.011	−0.010
	(0.029)	(0.034)	(0.023)	(0.032)	(0.011)	(0.015)
Urban	−0.046*	−0.019	−0.003	0.005	−0.005	−0.001
	(0.026)	(0.024)	(0.018)	(0.020)	(0.011)	(0.011)
Household wealth (1,000 Yuan)	0.000***	0.000	0.000**	0.000	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Has retirement scheme	0.023	0.036*	−0.006	0.029	0.005	0.012
	(0.021)	(0.020)	(0.021)	(0.020)	(0.011)	(0.010)
Self-rated poor health	−0.030	−0.006	−0.029	−0.011	−0.023**	−0.016*
	(0.023)	(0.024)	(0.018)	(0.020)	(0.011)	(0.009)
Has any difficulty with daily activities	−0.057**	0.033	0.003	−0.008	0.010	0.003
	(0.024)	(0.026)	(0.019)	(0.021)	(0.012)	(0.011)

(*Continued*).

Table A1 Continued.

	IfYcare		*IfOcare*		*Bothcare*	
	Women	Men	Women	Men	Women	Men
Has bodily pain	0.035*	−0.036*	0.045***	0.004	0.025**	0.007
	(0.019)	(0.022)	(0.017)	(0.020)	(0.010)	(0.010)
Number of sons	−0.024**	−0.021*	0.009	−0.000	−0.000	−0.003
	(0.012)	(0.012)	(0.009)	(0.010)	(0.006)	(0.005)
Number of daughters	−0.049***	−0.049***	0.001	−0.001	−0.010**	−0.010**
	(0.011)	(0.011)	(0.008)	(0.009)	(0.005)	(0.004)
Constant	−3.587***	−0.566	−0.662	−0.764	−0.470	−0.373
	(0.816)	(0.768)	(0.754)	(0.808)	(0.403)	(0.376)
F-statistic of all excluded instruments	112.36	67.53	29.89	22.69	16.69	11.45
Observations	2,608	2,342	2,605	2,341	2,605	2,341
R-squared	0.357	0.306	0.147	0.107	0.103	0.085

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at community are in parentheses.

Table A2 OLS and 2SLS estimates of labor force participation rate and weekly paid work hours

	OLS		2SLS	
	(1)	(2)	(3)	(4)
	Labor force participation rate	Weekly working hours	Labor force participation Rate	Weekly working hours
IfYcare	−0.073***	−11.200***	−0.087	−15.497**
	(0.021)	(1.793)	(0.077)	(6.671)
IfOcare	0.023	−0.097	0.080	−1.295
	(0.027)	(2.079)	(0.110)	(9.166)
Bothcare	0.002	10.405**	−0.518*	26.961
	(0.050)	(4.230)	(0.300)	(23.777)
*IfYcare**men	0.035	8.323***	−0.028	18.970*
	(0.031)	(2.428)	(0.121)	(9.693)
*IfOcare**men	0.023	−0.546	−0.011	2.138
	(0.035)	(2.669)	(0.157)	(11.847)
*Bothcare**men	−0.054	−3.035	0.361	−47.579
	(0.071)	(5.829)	(0.460)	(34.113)
Men	0.194***	2.189*	0.191***	0.999
	(0.016)	(1.256)	(0.041)	(3.294)
Observations	4,946	2,832	4,946	2,832
R-squared	0.262	0.096	0.234	0.070

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors are in parentheses. All regressions include the same control variables as those in Table 2.

Table A3 OLS and 2SLS estimates of annual earnings

	Dependent variable: Log(annual earnings)	
	OLS	2SLS
	(1)	(2)
IfYcare	−0.316**	−0.582
	(0.125)	(0.501)
IfOcare	−0.078	0.268
	(0.097)	(0.424)
Bothcare	−0.099	0.592
	(0.317)	(1.191)
*IfYcare**men	0.195	0.567
	(0.142)	(0.580)
*IfOcare**men	0.094	0.548
	(0.118)	(0.537)
*Bothcare**men	0.219	−0.445
	(0.361)	(1.641)
Men	0.408***	0.318**
	(0.064)	(0.155)
Constant	6.058**	6.436**
	(2.856)	(3.055)
Observations	1,757	1,757
R-squared	0.308	0.244

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors are in parentheses. All regressions include age, age squared term, education, marriage status, *hukou* status, household wealth, health status, number of children, and province fixed effects.