

# Parental Care and Married Women's Labor Time Allocation in Rural China

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**Abstract:** During the past three decades, China has undergone the transition of industrialization and urbanization. The burdens of family care shouldered by Chinese women are compounded by the rapid growth of the aging population and the rural-urban male labor migration. In this paper, we estimate the impact of parental care on married women's labor time allocation in rural China with data derived from the *China Health and Nutrition Survey* for the period from 2000 to 2006. Our results show that the number of total labor hours of women who take care of the older parents is more than that of women who do not provide parental care. The number of farm work hours is less, although not significant. In terms of off-farm work, however, caring for parents does not affect the caregiver's off-farm work hours, whereas caring for parents-in-law has a significant, sizable negative effect on the caregiver's hours of off-farm work. This finding lends support to the contention that traditional patrilineal familial norms still play a role in shaping intra-household allocation in rural China. In addition, with comparing the results between assumption of exogeneity and the 2SLS estimation, there are good reasons to hypothesize that the endogeneity of parental care with respect to women's time allocation of farm and off-farm work should be small in recent rural China.

**Key Words:** Parental care, Married women in rural China, Labor time allocation, Patrilineal familial norms

## Introduction

During the past three decades, China has undergone the transition of industrialization and urbanization. In the process of labor force transition, the decisionmaking of the household is based on the utility maximizing and the comparative advantage. Compared with male, female would suffer from a relatively

lower market wage rate if they are employed in urban area and their earned income could not compensate the economic loss of the household activity in terms of home production, farm work and caregiving responsibility etc. Therefore, the majority of married women would prefer to stay at home and their husbands migrate to the urban area and participate in the employment. As a country with a Confucian culture heritage, family members and adult children, primarily women, are the principal caregivers for frail elders in China (Zhan and Montgomery, 2003). In rural China, it is the sons' family to be responsible for caregiving to the old parents and it is particularly the daughter-in-law to take the great responsibility of caregiving in case of the social norm and the urban-rural migration. The population aging in recent years will intensify the strain of caregiving on Chinese rural women further. According to official statistics, the proportion of the Chinese population aged 65 years and above rose from 4.9 percent in 1982 to 9.1 percent in 2005. Analysts project that China's aged-dependent ratio will surpass that of industrial countries in 2020 and become the highest of any population in the world by the mid-21<sup>st</sup> century.<sup>1</sup> The migration has not changed the traditional social norms that women take care of the elderly, thus the burdens of family care shouldered by rural women are compounded by the rapid growth of the aging population and the rural-urban male labor migration. The rising conflict among women's multiple roles as farmer, income earners, home producer and caregivers has important implications for gender equality.

Since the introduction of time to the economic analysis as one of the constraint conditions by Becker (1965), much more economists have recognized that the welfare of individual and household not only depends on the income and consumption, but depends on the time allocation as well (Floro, 1995). Empirical studies have been performed mostly for developed countries in the west, showing that informal caregiving for the elderly has either no effect or a negative effect on labor supply. Of the selected studies for the United States, Stone and Short (1990) find that informal care has a strong negative effect on employment. In contrast, Boaz and Mueller (1992) find that unpaid care services have no effect on working hours for part-time work but have a small negative effect for full-time work. Wolf and Soldo (1994) find a negative but insignificant effect of informal care on work hours. The findings of Ettner (1995) and Kolodinsky and Shirey (2000) show that co-residence with a disabled parent significantly reduces work hours. Ettner (1996) finds that providing non-residential care to an elderly parent has a significant negative effect on women's labor hour

supply but has no effect on men's work hours. Carmichael and Charles (1998) and Ehshan Latif (2006) are among a small body of studies based on data from other developed countries. Using data from the United Kingdom General Household Survey, Carmichael and Charles present evidence that informal care reduces labor force participation only when it requires a substantial time commitment. Latif's analysis of data from the Canadian General Social Survey concludes that informal care has no impact on labor force participation but has a significant negative effect on the number of work hours for women.

However, little is known about how elder care burdens have affected the labor hour supply of women with disabled parents in rural China. In this paper we extend the empirical investigation of parental care and women's time allocation from developed countries in the west to rural China. We aim to fill this knowledge gap by examining the impact of parental care on married women's time allocation in rural China with a nationally representative dataset for the period from 2000 to 2006.<sup>2</sup> The paper tries to answer the following research questions: how does parental care influence the women's labor hour supply of farm work and off-farm work? Does the parental care have the effect on the total labor hour of women? Is there difference between the effect of caring for parents and in-law on the women's labor hours? Section II outlines the framework of household decision-making on labor supply in rural China and the theoretical properties of a general model of time allocation especially for women. Section III and IV present the empirical methodology and data descriptions respectively. Section V summarize the results of the estimation of effect of parental care on labor hour supply with respect to farm work, off-farm work and total labor hours. Section VI summarize the implications for policy of the results of section V.

## **Framework**

In rural China, the decisionmaking of production depends on the preference and natural endowment of the household rather the maximizing profit because the market construction is not perfect currently. In this case, the household in rural China prefer to produce the good and services to avoid the market risks to realize the utility maximization. Compare with the male, female have the comparative advantages on the unpaid care work and home production. Thus, women will choose to stay at home for farm work, home production and care work even though they might increase the household income.

The New Home Economics models of the early 1960s acknowledged that a substantial portion of time not spent in paid employment is home production time, not leisure. According to Becker's approach (1965) the consumer maximizes welfare subject to the time and budget constraints where welfare is a function of commodities, which are produced using market goods and time (Gronau, 1977). It was Mincer (1962) who first pointed out that, at least in the case of women, one should distinguish between work at home and leisure. From the theoretical point of view, Gronau (1977) challenged the justification for aggregating leisure and work at home into one entity, nonmarket time or home time.<sup>3</sup> Since then, alternative approaches have focused on expanding the traditional two-dimensional time allocation model to three or more uses of time with the hope of disentangling activities that are unpaid but produce substantial outcome utility (and can be traded across members of a household) from the leisure time category.

Gronau (1977) and Graham and Green (1984) stratified time outside the labor market into home production and pure leisure. Gronau (1977) establishes two criteria for aggregating time uses and concludes that leisure time and home production time should not be combined. In the study of mothers' time choices, Kimmel and Connelly (2006) suggested for studying the time use of mothers, the best solution is to expand the Gronau trinity into a model with five aggregated uses of time: (paid) market work, (unpaid) home work, child care, leisure and other.<sup>4</sup> The other category includes sleep, personal care time, education, and job-seeking endeavors and can be loosely thought of as personal investment time. Family members' allocation of time is shaped by specialization within the household. Economic factors (e.g., wage differentials) reinforce (or perhaps shape) traditions which result in role differentiation within the family. The husband's comparative advantage lies in work in the market, while the wife specializes in work at home.

The behavioral model underlying our empirical specification is the standard neoclassical individual-based utility maximizing model and the agricultural household model.<sup>5</sup> Women's utility is expressed as a function of leisure,  $t_L$ , eldercare,  $ES$ , and aggregated adult consumption of final goods and services excluding eldercare services in market,  $G_m$  and on farm,  $G_a$ .

$$(1) \max U = U(t_L, ES, G_a, G_m)$$

Household commodities,  $G_m$ , are home produced with a combination of household

production time,  $t_{hp}$ , and purchased intermediate goods,  $X_m$ ,  $G_m = G(t_{hp}, X_m; \theta_1)$ ; the consumption commodities,  $G_a$ , are farm produced with a combination of farm work time,  $t_{fw}$ , and agricultural staple,  $X_a$ ,  $G_a = G(t_{fw}, X_a; \theta_2)$ .  $\theta_1$  and  $\theta_2$  are the efficiency parameters which are affected by differences in ability, but also by differences in personal investment including sleep time and educational endeavors. Eldercare services,  $ES$ , are also home produced, but with a combination of the women's caregiving time,  $t_{wec}$ , non-feminine eldercare time (including that provided by male or other household members),  $t_{ec}$ , and market-produced elderly goods,  $EX$ ,  $ES = ES(t_{wec}, t_{ec}, EX; \phi)$ . Like  $\theta$ ,  $\phi$  is an efficiency parameter. On the constraint side of the model, there is a women's time constraint, Equation 2, and a budget constraint, Equation 3.

$$(2) T = t_{em} + t_{hp} + t_{wec} + t_{fw} + t_L + t_s$$

$$(3) P_m X_m + P_{ec} t_{ec} + P_{EX} EX = P_a X_a + wt_{em} + N - P_v V$$

The women's total time can be divided into market-paid time,  $t_{em}$ , home-production time,  $t_{hp}$ , farm work time,  $t_{fw}$ , caregiving time,  $t_{wec}$ , leisure,  $t_L$  and investment time,  $t_s$ . In the budget constraint equation,  $P_m$  and  $P_a$  are the prices of the market-purchased goods and the staple;  $P_{ec}$  and  $P_{EX}$  are the prices of non-feminine eldercare and market-produced elderly goods;  $w$  is the market wage rate of the women;  $N$  is the non-earned income of the household;  $V$  is a variable input (for example, fertilizer);  $P_v$  is the variable input's market price.

The behavioral model described above results in time-demand functions for the six different uses of time, as well as the more standard consumption good demand functions for  $G$  and  $EX$ . Equation 4 presents a general functional representation of the time-demand functions.

$$(4) t_j = f(w, P_{ec}, N | Z, H, D) \text{ for } j = em, hp, wec, fw, L, s$$

Time use is related to factors reflecting the value of time, including the wage and the hourly prices of non-feminine eldercare for women, the amount of nonlabor income available to the women, preferences, and institutional structure, all of which are expected to be related to personal characteristics of the women,  $Z$ , characteristics of the household in which she resides,  $H$ , and characteristics of the diary day,  $D$ .

## Empirical Methodology

We examine the impact of parental care on married women's supply of labor hours using multivariate regression analysis. Following the empirical studies we reviewed in the introduction, we extend the standard model of labor supply determination to include the role of informal parental care. We hypothesize that, other things being equal, (1) Caring for the old parents has either no effect on labor hour supply, or has the negative effect. (2) The negative effect of caring for the old parents on the off-farm work is more than that on the farm work, because it is more difficult to balance caregiving and off-farm work than to balance caregiving and farm-work. In order to assess the impact of patrilineal familial norms, we also estimate the differences between taking care of parents and parents-in-law. Thus we assume (3) Caring for parents has a smaller negative effect on the caregiver's labor hour supply than does caring for parents-in-law.

Let *Care* stand for informal parental caregiving, *FHours* for labor hour supply for farm work, *OHours* for labor hour supply for off-farm work, and *THours* for total labor hours. The variable *Care* is a categorical variable that differentiates care patterns by the identity of care recipients —parents or parents-in-law.<sup>6</sup> The labor hour supply of a married woman are specified as a function of *Care* and a vector of covariate control variables, *X*, which include the variables reflecting personal characteristics of the women, and characteristics of the household in which she resides, and characteristics of the diary day.<sup>7</sup>

$$(5) \quad FHours = \alpha_1 PCare + \beta_1 LCare + \gamma_1 X + u_1$$

$$(6) \quad OHours = \alpha_2 PCare + \beta_2 LCare + \gamma_2 X + u_2$$

$$(7) \quad THours = \alpha_3 PCare + \beta_3 LCare + \gamma_3 X + u_3$$

where the Greek letters are unknown parameters and  $u_i$ ,  $i = 1, 2, 3$  are the error terms. The structural parameters of  $\alpha_1$ ,  $\alpha_2$  and  $\alpha_3$  are the primary interest of the present empirical investigation. The variables in *X* are common determinants of the labor hour supply, such as education and age (and its squared term) of the woman and her husband, the age distribution of their children, unearned income, household total assets, household land, local average wages for paid caregivers and female and male workers, and time and provincial dummy variables.

A major empirical issue with this model is the potential endogeneity of caregiving. Ettner (1995, 1996) argues that informal care can be viewed as exogenously determined under three assumptions. Those assumptions are: the allocation of care responsibilities among family members is independent of the employment status of the children; the family does not allow the needs of parents with disabilities to remain unmet; and substitutes to familial care are unavailable. She contends that those assumptions are unrealistic for the decision process of informal caregivers with regard to caring responsibilities and labor supply in developed countries like the United States, where economic development has substantially eroded the traditional norm of familial care and institutionalized care services are widely available as substitutes for familial care. The violation of any one of the three assumptions would lead to an overestimation of the negative effect of caregiving on labor supply. Hence, Ettner (1995, 1996) and Wolf and Soldo (1994) carried out adjustments for the potential endogeneity of caregiving in their investigation.

The justifications for treating informal caregiving as an exogenous variable are arguably not as implausible in the case of China as they are for developed countries in the west, given the powerful influence of the Confucian ethic of filial piety and the underdevelopment of institutionalized care services in this country. Nevertheless, the emergence of private care markets does allow high earning women to use paid care services to meet their needs for elder care. Moreover, women who have difficulty finding employment may take on more informal care in exchange for financial supports from relatives as Heying Jenny Zhan (2002) argued. In the following analysis, we take into account both possibilities concerning the endogeneity of informal care and test for the presence of simultaneous bias.

We first assume that caregiving is exogenously determined and estimate equations (5) - (7) as an OLS and tobit model, respectively. We then relax this assumption and estimate the three labor hour supply equations by the two-stage instrumental variables (IV) procedure laid out by Ettner (1995). Following Ettner's identification strategy, the instrumental variables for *Care* include proxy variables for the care needs of parents and parents-in-law and the availability of other family members to share caregiving responsibilities. These variables are valid IVs given that they influence the behavior of caregiving but have no direct effect on labor hour supply after *Care* and other covariates are controlled for. We first estimate a multinomial logit equation for *Care* using all of the exogenous variables in the system as regressors. We then apply

linear probability regression for each of the two caregiving categories using the predicted probabilities from the multinomial logit model as identifying instruments.<sup>8</sup> The predicted probabilities from the linear regressions are then used as instruments for the variable *Care* in equations (5) - (7), which are estimated, respectively, as a two-stage least square estimation and a two-stage tobit model. The two-stage IV estimates of the structural caregiving effects are consistent, but they are inefficient if caregiving is exogenously determined. Hence, we test the endogeneity of informal caregiving using the Hausman test procedure.

## **Data**

The dataset used in this study is derived from the China Health and Nutrition Survey (CHNS).<sup>9</sup> The survey was carried out for the years 1989, 1991, 1993, 1997, 2000, 2004, and 2006. Each survey covers about 3800 households and 14,000 individuals in both urban and rural areas from nine provinces, namely, Heilongjiang, Liaoning, Shandong, Henan, Jiangsu, Hubei, Hunan, Guizhou, and Guangxi. The survey provides rich socioeconomic information on individuals, households and communities in the sample.

We use data on demographics, employment, and caregiving activities to analyze married women's time allocation to farm work, off-farm work and the total labor time, and care of elderly parents in the available years 2000, 2004 and 2006.<sup>10</sup> We restrict our analysis to married women aged between 35 and 51 years old in urban areas. Adult children aged 35 or older are more likely "at risk" for providing care to an old relative than those in the younger age group. The upper age limit is imposed due to the fact that the variables for parental care needs and care patterns are derived from the Survey of Ever-Married Women Under Age 52—a supplementary survey of the CHNS, and hence, they are available only for those younger than 52. Although the data include a panel of individuals, they are analyzed as repeated cross-sections to avoid biases related to attrition and cohort as the panel ages over time.<sup>11</sup> After omitting observations with missing information, we have a sample of 1,918 observations for analysis.

The survey for ever-married women aged under 52 years asks the respondent the following questions: (1) if each of her mother, father, mother-in-law and father-in-law is alive; (2) if each of the four parents needs to be taken care of; (3) if the respondent helped each of the four parents in daily life and shopping during the past week, and (4) how many brothers and sisters do you and your husband have. Based on the responses



to question (3) the variable Care is defined as equal to 0 if the woman does not give care, 1 if the woman takes care of one or two of her own parents only, 2 if the woman takes care of one or two of her parents-in-law only, and 3 if the woman takes care of at least one parent and one parent-in-law. Because the number of observations in the last category is too small to identify the parameters of the multinomial logit caring equation, categories 2 and 3 are combined into one group, which is referred to as “caring for parents-in-law” in the remainder of the paper. Four dummy variables are derived from question (2) to measure the care needs of each of the four parents, and from question (1), another four dummy variables are derived for the survival status of each parent. The latter variables provide information on whether any parent may be able to share the caregiving responsibility with the daughter or the daughter-in-law. Two quantitative variables are derived from question (4) to measure the numbers of the siblings of the wife and husband respectively. These two variables reveal whether any brothers or sisters of the couple may be able to share the caregiving responsibility with the married woman. The two sets of dummy variables for parental care needs and family caregiving resources, as well as the numbers of brothers and sisters of the couple serve as instruments for the Care variables in equations (5), (6) and (7).<sup>12</sup>

We calculate the labor hours on farm work, off-farm work and the total labor hours to get the dependent variables in the equation. In the CHNS survey, farm work includes the home gardening, household farms, farming collectives, raising livestock and poultry, collective and household fishing. We make the definition of the off-farm work as the sum of small handicraft, small commercial household business and the wage employment. The total labor of the women include the housework, care work, farm and off-farm work.

Most measures for the exogenous variables in X are straightforward. Education is measured by years of schooling. The age distribution of children is described using counts of co-residing children in each of two age categories for both boys and girls: 0-6, and 7-14. Non-earned income is a sum of husband’s wage, subsidies, rental payments for household assets, welfare funds and cash income received from other relatives. The population structure of the household is measured by the numbers of male and female in different age group of 0-6, 7-14, 15-25, 26-55, and 56 years old or over. Household’s total asset is the total value of the household’s houses, tools, equipment, electrical appliances and other goods. Household’s land is measured by the numbers of mu of land that the household cultivate last year. The variables of local

paid caregivers' wages, female wages, and male wages, measured as yuan per year, are obtained from the database for local communities. Female and male wages are introduced to control for local labor market conditions. The variables of unearned income, caregivers' wages, and male and female wages are discounted by the consumer price index at the provincial level with 2000 as the base year. The price index is obtained from *China Statistical Yearbooks* of various years. The descriptive statistics of the exogenous variables by caregiver status are presented in Appendix A.

## **Results**

Table 1 presents average values of time used for various unpaid and paid activities during the week preceding the survey by caregiver status. Of the 1,918 observations, about 9 percent take care of at least one of the four parents, with 4.64 percent caring for parents and 4.74 percent for parents-in-law. Comparing columns (2) and (4) with column (1), we note a striking difference between caring for parents and for parents-in-law. For both all women and those participate the market work, there is no appreciable difference in childcare and off-farm work between the two types of caregivers and non-caregivers. However, caregivers for parents spent 1.42 extra hours per week on elder care and worked 0.62 hours fewer than non-caregivers on farm, 0.51 hours more on off-farm work, whereas the comparative figures for caregivers for parents-in-law are 1.90 more hours for elder care and 0.47 and 0.25 hours fewer for farm work and off-farm work. In terms of housework, caregivers for parents spend 0.09 less hours, and caregivers for in-law spend 0.31 significantly more hours. Overall, caregivers worked 1.22 significantly more hours per week than non-caregivers. Turning to those women who participate the off-farm work, we find that compared to the non-caregivers, both types of caregivers spent about 1.3 to 1.8 extra hours per week on elder care. Caregivers spend less hours on farm work and off-farm work, but the difference is insignificant. The caregivers for parent spend 0.18 fewer hours on housework, and 0.05 more hours on childcare. For those caring for in-law, they spend 0.39 more and 0.27 fewer hours respectively. The results present the support that caregivers for parents have less time for leisure, and more time for housework with respect to women caring for in-law than those who not provide eldercare, and that the different patterns of time allocation between the two types of women caregivers may be a reflection of their husbands' attitudes toward who are the care recipients.

**Table 1 Time allocation of married women by caregiver status (hours per week)**

	Non-caregivers	Caregivers for own parents	(2)-(1)	Caregivers for in-law or both	(4)-(1)
	(1)	(2)	(3)	(4)	(5)
<b>All women</b>					
Housework	2.53	2.44	-0.09	2.84	0.31*
Childcare	0.34	0.37	0.03	0.07	-0.27
Eldercare	0.00	1.42	1.42***	1.90	1.90***
Farm work	2.24	1.62	-0.62**	1.77	-0.47*
Off-farm work	3.00	3.51	0.51	2.75	-0.25
Total	8.04	9.26	1.22***	9.26	1.22***
No. observation	1738	89	—	91	—
Percent observations	90.62	4.64	—	4.74	—
<b>For those participation in off-farm work:</b>					
Housework	2.47	2.29	-0.18	2.86	0.39*
Childcare	0.32	0.37	0.05	0.05	-0.27
Eldercare	0.00	1.38	1.38***	1.77	1.77***
Farm work	1.80	1.41	-0.39	1.58	-0.22
Off-farm work	4.98	4.88	-0.10	4.72	-0.26
Total	9.47	10.20	0.73	10.87	1.40**
No. observation	1048	64	—	53	—
Percent observations	89.96	5.49	—	4.55	—

*Note:* Information presented in this table is for the activities undertaken during the week preceding the period in which the survey was carried out. Housework includes buying food, prepare and cook food, wash and iron clothes, and clean the house. \*\*\*, \*\* and \* denote significance level of 1, 5, 10 percent, respectively, for the difference in mean values between caregivers and non-caregivers.

*Source:* CHNS (2000-2006).

In Table 2, we take a look at the multinomial logit estimates of the reduced-form caregiving equation. The estimates show that most of the variables for elderly care needs and survival status are statistically significant, but the number of the siblings is not significant. These results indicate that these variables are correlated with the variable *Care* and therefore meet one of the two crucial IV requirements. The multinomial logit estimates also provide insights into the care patterns. We note that the needs of parents-in-law have a slightly stronger positive effect on the probability of care being provided than the needs of parents—0.177 and 0.130, respectively, for the needs of mother-in-law and father-in-law versus 0.174 and 0.094 for the needs of mother and father. Moreover, while the survival status of mother or father has no

effect on caregiving of either type, having a living mother-in-law reduces the probability of providing care for parents (by 1.2 percent) but increases the probability of caring for parents-in-law (by 1.3 percent). This result suggests that patrilineal norms may play a role in prioritizing care provision responsibilities by the adult children. In addition, having a living father-in-law reduces probability taking care of parent by 0.3 percent, and increases that of caring in-law by 0.7 percent, but not significantly. The estimates of the variables for children do not reveal the tensions between the competing demands of childcare and eldercare. In short, the estimates of the reduced-form caregiving equation show that the parental caregiving responsibilities of married women are determined primarily by the care needs of the elderly and the availability of informal caregiving resources.

**Table 2 Multinomial logit regression estimates of care determination**

Dependent variables	Care for parents		Care for parents in-law	
	Marginal effect	Standard error	Marginal effect	Standard Error
Explanatory variables				
Mother needs care	0.174	0.050***	0.006	0.012
Father needs care	0.094	0.039**	0.014	0.015
Mother-in-law needs care	-0.012	0.007*	0.177	0.049***
Father-in-law needs care	0.006	0.018	0.130	0.062**
Mother alive	-0.005	0.006	-0.001	0.005
Father alive	0.004	0.006	0.005	0.006
Mother-in-law alive	-0.012	0.006**	0.013	0.007*
Father-in-law alive	-0.003	0.006	0.005	0.007
Number of Wife's brothers	-0.000	0.002	0.002	0.002
Number of Wife's sisters	0.001	0.001	0.000	0.002
Number of Husband's brothers	0.000	0.002	-0.002	0.002
Number of Husband's sisters	0.001	0.002	-0.000	0.002
Education	0.001	0.001	-0.000	0.001
Age	-0.018	0.011*	0.002	0.012
Age <sup>2</sup>	0.000	0.000	-0.000	0.000
Education (Husband)	0.000	0.001	-0.000	0.001
Age (Husband)	0.012	0.007*	0.006	0.008
Age <sup>2</sup> (Husband)	-0.000	0.000*	-0.000	0.000
Non-earned income	0.021	0.013	0.024	0.012**
Household's land	-0.001	0.001	0.000	0.000
Household's total assets	-0.001	0.002	0.001	0.002
Number of boys aged 0-6	-0.004	0.010	-0.021	0.013
Number of girls aged 0-6	0.003	0.010	-0.013	0.011
Number of boys aged 7-14	-0.008	0.007	-0.004	0.007
Number of girls aged 7-14	0.004	0.006	-0.004	0.007

Number of male aged 15-25	-0.006	0.005	-0.006	0.004
Number of female aged 15-25	-0.009	0.005*	-0.001	0.004
Number of male aged 26-55	-0.003	0.006	0.005	0.006
Number of female aged 26-55	-0.009	0.009	0.003	0.005
Number of male aged 56 or over	0.011	0.007	-0.002	0.009
Number of female aged 56 or over	0.007	0.006	0.014	0.006**
Local paid caregiver's wage	-0.038	0.045	0.024	0.024
Local female wage	0.170	0.140	-0.004	0.070
Local male wage	-0.127	0.126	0.041	0.024*
2004	0.009	0.008	0.001	0.006
2006	0.007	0.009	-0.001	0.006
Provincial dummies	Yes		Yes	
Pseudo R <sup>2</sup>	0.32			
No. observations	1,918			

*Note:* Multilogit estimates of marginal effects are presented with standard errors corrected for heteroscedasticity as well as for clustering by individuals. \*\*\*, \*\* and \* denote significance level of 1, 5, 10 percent, respectively. In order to avoid the coefficients and standard errors being equal to zero, here we measure non-earned income, family total assets, local paid caregiver's wage, local female wage and local male wage with "100 thousand Yuan per year".

*Source:* CHNS (2000-2006).

Tables 3 and 4 present, respectively, regression estimates of women's farm and off-farm labor hour supply on parental care.<sup>13</sup> In each table, we report the estimation results under both the exogeneity and endogeneity assumptions of informal elderly caregiving and the results of the Hausman test for this assumption. In table 3, the first two columns present coefficient and standard errors of OLS and 2SLS, and the last one column present the statistics of tobit model. As can be seen from the table, the two sets of coefficient estimates are fairly similar, although the standard errors of the two-stage IV estimates for caregiving variables are twice as large as those of OLS estimates. The Hausman test presented at the bottom of Table 3 cannot reject the null hypothesis that parental caregiving is exogenously determined at any conventional level of significance.<sup>14</sup> For OLS, 2SLS and tobit models, caring for parents has a small negative effect on the woman's labor hours on farm work, reducing the labor time on farm work 0.148, 0.913 and 0.284 hours per day respectively. Caring for in-law will also reduce the farm work hours of the women by 0.063, 0.317 and 0.030 respectively, but the effect is statistically insignificant.

Turning to the covariates that are statistically significant, we note that women with greater educational attainment or married to better-educated husbands have fewer hours on farm work, with the respective estimates of 0.108 to 0.152 hours, and 0.041

to 0.061 hours for one additional year of schooling. Women whose household have more non-earned income and total assets participate farm work with significantly few hours per day, and those whose household possess much more land have significantly more hours on farm work. Moreover, the population structure has a significant effect on the labor hour supply of farm work for all the three models. The number of boys aged 7-14, male aged 15-25, and female aged 15-25 in the household has a positive effect on the labor hour supply on farm work. The time dummies reveal a slight decline in women's farm work hours (by 0.364 hours per day between 2000 and 2006). For both the 2SLS and tobit equations, the Hausman test cannot reject the null hypothesis that parental caregiving is exogenous to the labor hour supply on farm work.

**Table 3 Regression estimates of women's farm labor hour supply on parental care**

	<b>OLS</b>	<b>2SLS</b>	<b>Tobit</b>
Care for parents	-0.148 (0.263)	-0.913 (0.766)	-0.284 (0.227)
Care for parents-in-law or both	-0.063 (0.182)	-0.317 (0.486)	-0.030 (0.234)
Education	-0.108 (0.014***)	-0.108 (0.014***)	-0.152 (0.015***)
Age	-0.532 (0.275*)	-0.561 (0.277**)	-0.412 (0.254)
Age <sup>2</sup>	0.006 (0.003**)	0.007 (0.003**)	0.005 (0.003*)
Education (Husband)	-0.041 (0.016***)	-0.041 (0.016***)	-0.061 (0.015***)
Age (Husband)	0.175 (0.122)	0.200 (0.125)	0.117 (0.142)
Age <sup>2</sup> (Husband)	-0.002 (0.001)	-0.002 (0.001*)	-0.001 (0.002)
Non-earned income	-1.757 (0.331***)	-1.719 (0.334***)	-2.366 (0.421***)
Household's land	0.054 (0.011***)	0.053 (0.011***)	0.056 (0.006***)
Household's total assets	-0.215 (0.070***)	-0.213 (0.072***)	-0.661 (0.123***)
Number of boys aged 0-6	0.031 (0.258)	0.016 (0.259)	0.237 (0.211)
Number of girls aged 0-6	0.194 (0.271)	0.196 (0.273)	0.268 (0.231)
Number of boys aged 7-14	0.593	0.575	0.712

	(0.140***)	(0.141***)	(0.120***)
Number of girls aged 7-14	0.241	0.242	0.295
	(0.141*)	(0.142*)	(0.122**)
Number of male aged 15-25	0.706	0.692	0.821
	(0.112***)	(0.113***)	(0.093***)
Number of female aged 15-25	0.236	0.227	0.334
	(0.088***)	(0.089**)	(0.079***)
Number of male aged 26-55	0.121	0.126	0.084
	(0.186)	(0.187)	(0.162)
Number of female aged 26-55	-0.248	-0.265	-0.158
	(0.141*)	(0.142*)	(0.144)
Number of male aged 56 or over	-0.061	-0.042	-0.218
	(0.218)	(0.219)	(0.183)
Number of female aged 56 or over	-0.248	-0.234	-0.299
	(0.154)	(0.155)	(0.153*)
Local paid caregiver's wage	-1.058	-1.089	-0.935
	(0.547*)	(0.573*)	(0.867)
Local female wage	-4.197	-4.013	-3.297
	(1.910**)	(1.932**)	(2.059)
Local male wage	2.937	2.862	2.550
	(1.140***)	(1.140**)	(1.086**)
2004	-0.293	-0.279	-0.301
	(0.146**)	(0.145*)	(0.125**)
2006	-0.364	-0.355	-0.336
	(0.159**)	(0.160**)	(0.139**)
No. observations	1,918	1,918	1,918
OLS R <sup>2</sup>	0.25		
OLS F statistic	19.04	P value	0.000
2SLS Hausman test: F statistic	0.77	P value	0.46
IV overidentifying $\chi^2$ test	13.43	P value	0.27
Tobit Hausman test: F statistic	1.13	P value	0.32

*Note:* OLS, 2SLS and Tobit estimates of marginal effects are presented with standard errors in parenthesis. The Standard errors are corrected for heteroscedasticity and also for clustering by individuals. \*\*\*, \*\* and \* denote significance level of 1, 5, 10 percent, respectively. In order to avoid the coefficients and standard errors being equal to zero, here we measure non-earned income, household's total assets, local paid caregiver's wage, local female wage and local male wage with "100 thousand Yuan per year".

*Source:* CHNS (1997-2006).

In Table 4, the first two columns present coefficient and standard errors of OLS and 2SLS, and the last one column present the statistics of tobit model with respect to the effect of the parental care on the labor hour supply on farm work. As with the OLS,

2SLS and tobit equations, the Hausman test cannot reject the null hypothesis that parental caregiving is exogenous to the labor supply decision. Once again, the estimates show that caring for parents has no significant effect on off-farm work hours, whereas the effect of caring for parents-in-law is consistently negative and significant. Numerically, taking care of parents-in-law reduces the number of off-farm hours by 0.661, 1.479 and 0.589 hours per day in OLS, 2SLS and tobit model respectively. In contrast, we note that women with greater educational attainment or married to better-educated husbands have more hours on off-farm work, with the respective estimates of 0.08 hours, and 0.04 hours for one additional year of schooling. Women whose household have more total assets participate off-farm work with significantly more hours per day, and those whose household possess much more land have significantly fewer hours on off-farm work.

In addition, the estimates of the variables for children also reveal the tensions between the competing demands of childcare and employment of off-farm work. The population structure has also a significant effect on the labor hour supply of farm work for all the three models. The number of girls age 0-6, boys aged 7-14, girls aged 7-14 and people aged 15-25 in the household has a negative effect on the labor hour supply on off-farm work. The results show that the employment of labor force in the household from rural to urban area significantly reduces the hour supply on off-farm work of the women. The time dummies reveal sharp increase in women's labor hours on off-farm work (by 2-3 hours per day between 2000 and 2006).

**Table 4 Regression estimates of women's off-farm labor hour supply on parental care**

	<b>OLS</b>	<b>2SLS</b>	<b>Tobit</b>
Care for parents	0.067 (0.289)	0.743 (0.915)	0.177 (0.334)
Care for parents-in-law or both	-0.661 (0.355*)	-1.479 (0.628**)	-0.589 (0.294**)
Education	0.081 (0.019***)	0.080 (0.019***)	0.080 (0.019***)
Age	1.318 (0.337***)	1.333 (0.339***)	1.323 (0.365***)
Age <sup>2</sup>	-0.015 (0.004***)	-0.015 (0.004***)	-0.015 (0.004***)
Education (Husband)	0.039 (0.019**)	0.038 (0.019*)	0.039 (0.020**)
Age (Husband)	-0.067 (0.169)	-0.064 (0.170)	-0.156 (0.196)



Age <sup>2</sup> (Husband)	-0.000 (0.002)	-0.000 (0.002)	0.001 (0.002)
Non-earned income	-0.191 (0.490)	-0.191 (0.492)	0.251 (0.511)
Household's land	-0.055 (0.010***)	-0.055 (0.010***)	-0.076 (0.012***)
Household's total assets	0.354 (0.171**)	0.368 (0.164**)	0.353 (0.096***)
Number of boys aged 0-6	-0.414 (0.318)	-0.422 (0.317)	-0.381 (0.325)
Number of girls aged 0-6	-0.850 (0.299***)	-0.871 (0.300***)	-0.824 (0.355**)
Number of boys aged 7-14	-0.575 (0.177***)	-0.568 (0.180***)	-0.649 (0.182***)
Number of girls aged 7-14	-0.441 (0.166***)	-0.451 (0.166***)	-0.379 (0.185**)
Number of male aged 15-25	-0.617 (0.127***)	-0.608 (0.128***)	-0.593 (0.138***)
Number of female aged 15-25	-0.271 (0.129**)	-0.260 (0.129**)	-0.184 (0.116)
Number of male aged 26-55	0.248 (0.258)	0.249 (0.256)	0.301 (0.238)
Number of female aged 26-55	-0.160 (0.250)	-0.151 (0.249)	-0.139 (0.203)
Number of male aged 56 or over	0.471 (0.272*)	0.469 (0.273*)	0.285 (0.256)
Number of female aged 56 or over	0.126 (0.212)	0.170 (0.213)	0.176 (0.214)
Local paid caregiver's wage	2.680 (1.412*)	2.770 (1.418*)	-2.671 (1.143**)
Local female wage	4.478 (2.883)	4.273 (2.911)	2.504 (2.896)
Local male wage	-2.541 (1.368*)	-2.397 (1.360*)	-1.990 (1.550)
2004	1.380 (0.192***)	1.370 (0.193***)	2.261 (0.214***)
2006	2.146 (0.209***)	2.141 (0.211***)	3.214 (0.247***)
No. observations	1,918	1,918	1,918
OLS R <sup>2</sup>	0.20		
OLS F statistic	18.53	P value	0.000
2SLS Hausman test: F statistic	1.33	P value	0.27
IV overidentifying $\chi^2$ test	10.25	P value	0.51

Tobit Hausman test: F statistic	1.05	P value	0.35
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*Note:* OLS, 2SLS and Tobit estimates of marginal effects are presented with standard errors in parenthesis. The Standard errors are corrected for heteroscedasticity and also for clustering by individuals. \*\*\*, \*\* and \* denote significance level of 1, 5, 10 percent, respectively. In order to avoid the coefficients and standard errors being equal to zero, here we measure non-earned income, household's total assets, local paid caregiver's wage, local female wage and local male wage with "100 thousand Yuan per year".

*Source:* CHNS (1997-2006).

The regression estimates of total labor hour of married women on parental care are presented in table 5. In OLS and tobit model, both caring for parents and in-law increase nearly the same total labor hour of married women (by 1.24 and 1.39 hours per day). Number of young children has a significantly positive effect on the total hour supply. Numerically, the total labor time increase by nearly 1.7 hours for one additional child in the age group of 0-6 for both boys and girls. The time dummies reveal an increase in women's total labor hours (by 1.8 hours per day totally between 2000 and 2006). The Hausman test for both the 2SLS and tobit presented at the bottom of Table 5 cannot reject the null hypothesis that parental caregiving is exogenously determined at any conventional level of significance.

**Table 5 Regression estimates of total labor hour of married women on parental care**

	OLS	2SLS	Tobit
Care for parents	1.238 (0.437***)	0.910 (1.240)	1.235 (0.425***)
Care for parents-in-law or both	1.393 (0.433***)	0.280 (0.915)	1.392 (0.424***)
Education	-0.026 (0.024)	-0.026 (0.024)	-0.026 (0.024)
Age	0.118 (0.448)	0.095 (0.452)	0.115 (0.456)
Age <sup>2</sup>	-0.001 (0.005)	-0.001 (0.005)	-0.001 (0.005)
Education (Husband)	-0.013 (0.025)	-0.013 (0.025)	-0.011 (0.025)
Age (Husband)	-0.013 (0.214)	0.022 (0.218)	-0.021 (0.243)
Age <sup>2</sup> (Husband)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.003)
Non-earned income	-1.688 (0.594***)	-1.640 (0.604***)	-1.708 (0.660***)

Household's land	-0.002 (0.013)	-0.002 (0.013)	-0.002 (0.012)
Household's total assets	0.176 (0.132)	0.192 (0.125)	0.176 (0.126)
Number of boys aged 0-6	1.681 (0.577***)	1.655 (0.577***)	1.654 (0.401***)
Number of girls aged 0-6	1.706 (0.624***)	1.689 (0.622***)	1.681 (0.434***)
Number of boys aged 7-14	0.167 (0.229)	0.151 (0.231)	0.167 (0.223)
Number of girls aged 7-14	-0.110 (0.218)	-0.118 (0.217)	0.105 (0.226)
Number of male aged 15-25	0.267 (0.185)	0.257 (0.188)	0.267 (0.169)
Number of female aged 15-25	0.086 (0.159)	0.085 (0.160)	0.093 (0.145)
Number of male aged 26-55	0.145 (0.325)	0.152 (0.324)	0.155 (0.301)
Number of female aged 26-55	-0.445 (0.283)	-0.458 (0.284)	-0.449 (0.264*)
Number of male aged 56 or over	0.140 (0.339)	0.162 (0.339)	0.145 (0.327)
Number of female aged 56 or over	-0.274 (0.292)	-0.215 (0.294)	-0.296 (0.275)
Local paid caregiver's wage	2.254 (1.507)	2.301 (1.492)	2.274 (1.489)
Local female wage	2.091 (3.544)	2.129 (3.584)	2.077 (3.713)
Local male wage	0.239 (1.607)	0.281 (1.622)	0.272 (2.086)
2004	1.304 (0.255***)	1.311 (0.256***)	1.263 (0.234***)
2006	1.824 (0.257***)	1.830 (0.258***)	1.789 (0.259***)
No. observations	1,918	1,918	1,918
OLS R <sup>2</sup>	0.10		
OLS F statistic	6.19	P value	0.000
2SLS Hausman test: F statistic	1.07	P value	0.34
IV overidentifying $\chi^2$ test	17.57	P value	0.09
Tobit Hausman test: F statistic	0.85	P value	0.43

*Note:* OLS, 2SLS and Tobit estimates of marginal effects are presented with standard errors in parenthesis. The Standard errors are corrected for heteroscedasticity and also for clustering by individuals. \*\*\*, \*\* and \* denote significance level of 1, 5, 10 percent, respectively. In order to

avoid the coefficients and standard errors being equal to zero, here we measure non-earned income, household's total assets, local paid caregiver's wage, local female wage and local male wage with "100 thousand Yuan per year".

*Source:* CHNS (1997-2006).

## **Conclusions**

The transition of industrialization and labor force migration in China make the married women take more responsibility of farm work and caregiving by increasing their total labor time. And the burden of caregiving is reinforced by the rapid growth of the old population. In this paper, we estimate the impact of parental care on married women's labor time allocation in rural China with data derived from the *China Health and Nutrition Survey* for the period from 2000 to 2006. Our results show that the number of total labor hours of women who take care of the older parents is more than that of women who do not provide parental care. The number of farm work hours is less, although not significant. In terms of off-farm work, however, caring for parents does not affect the caregiver's off-farm work hours, whereas caring for parents-in-law has a significant, sizable negative effect on the caregiver's hours of off-farm work. All of these results prove the hypothesis mentioned in the introduction. Our research also find that married women spend much more time on farm work and fewer hours on off-farm work as a result of young labor force aged 15-25 moving to urban area for earned income. Moreover, the caregiving of children aged 0-6 and 7-14 will reduce the hour supply of off-farm work.

The results present that the married women who provide caregiving have more total labor hours, whereas fewer hours on the leisure and individual development. For those who take care of parent-in-law, caregiving would restrict women's employment for earned income. This means the loss of the wage income and employment-based entitlements to social welfare and security. This finding lends support to the contention that traditional patrilineal familial norms still play a role in shaping intra-household allocation in rural China. In addition, with comparing the results between assumption of exogeneity and the 2SLS estimation, there are good reasons to hypothesize that the endogeneity of parental care with respect to women's time allocation of farm and off-farm work should be small in recent rural China.

The findings of our analysis have important policy implications. In rural China, the elder support of family-based is the main patterns. The migration of rural labor force and the responsibility of caregiving strengthen the negative effect of married women

on mental, physical, income and social welfare. Government should make the relative policies to balance the crisis of eldercare and the off-farm employment of married women as to improve women's capacity of market participation preventing them from the time poverty. It is necessary to make the changes of the policies on labor force market and eldercare. These policies include encouraging the male to contribute more time on unpaid care work; promoting household with low income to access to relative eldercare and childcare facilities; improving the community services of elderly support and developing the non-government funded institution of elderly support.

**Appendix Table A Mean values of the exogenous variables by caregiver status**

	Non-care provider	Care for parents	Care for parents In-law or both
Number of observations	1738	89	91
Percent observations	90.62	4.64	4.74
Mother needs care	0.06	0.44	0.14
Father needs care	0.05	0.36	0.18
Mother-in-law needs care	0.04	0.03	0.49
Father-in-law needs care	0.02	0.06	0.25
Mother alive	0.60	0.71	0.60
Father alive	0.46	0.62	0.53
Mother-in-law alive	0.57	0.43	0.88
Father-in-law alive	0.40	0.36	0.53
Number of Wife's brothers	1.88	1.88	1.89
Number of Wife's sisters	1.87	1.91	1.93
Number of Husband's brothers	1.82	1.79	1.70
Number of Husband's sisters	1.75	1.74	1.79
Education	6.84	7.48	7.33
Age	43.27	43.60	43.38
Education (Husband)	8.59	9.15	8.89
Age (Husband)	44.93	45.45	44.96
Non-earned income	12805.00	16707.92	15986.00
Household's land	4.46	2.27	4.51
Number of boys aged 0-6	26568.89	29001.24	46167.61
Number of girls aged 0-6	0.05	0.03	0.02
Number of boys aged 7-14	0.04	0.06	0.02
Number of girls aged 7-14	0.25	0.16	0.20
Number of male aged 15-25	0.21	0.22	0.13
Number of female aged 15-25	0.62	0.52	0.57
Number of male aged 26-55	0.55	0.46	0.59
Number of female aged 26-55	1.06	1.07	1.07
Number of male aged 56 or over	1.11	1.08	1.11
Number of female aged 56 or over	0.11	0.13	0.15

Number of boys aged 0-6	0.13	0.16	0.29
Local paid caregiver's wage	5185.47	5629.58	6258.53
Local female wage	7820.75	8488.70	8341.62
Local male wage	10088.38	10203.40	10916.59

*Notes:* Earnings are discounted by consumer price index at the provincial level with 2000 as the base. We measure non-earned income, household's total assets, local paid caregiver's wage, local female wage and local male wage with "Yuan per year".

*Source:* CHNS (1997-2006)

## Reference

- Becker Gary, 1965, "A Theory of the Allocation of Time," *The Economic Journal*, 75(299), pp.493-517.
- Boaz, R.F. and C.F. Mueller. 1992. "Paid Work and Unpaid Help by Caregivers of the Disabled and Frail Elders." *Medical Care* 30(2): 149-159.
- Camichael, F., S. Charles. 1998. "The Labor Market Costs of Community Care." *Journal of health Economics* 17 (6): 747-765.
- Ettner, S.L. 1995. "The Impact of 'Parent Care' on Female Labor Supply Decisions." *Demography* 32(1): p. 63-80.
- Ettner, S.L., *The Opportunity Costs of Elder Care*. The Journal of Human Resources, 1996. 31(1): p. 189-205.
- Floro, Maria Sagrario. 1995. "Economic Restructuring, Gender and the Allocation of Time." *World Development* 23, (11): 1913-1929.
- Graham, John and Carole Green. 1984. "Estimating the Parameters of a Household Production Function with Joint Products." *Review of Economics and Statistics* 66 (2): 277-83.
- Gronau, Reuben. 1977. "Leisure, Home Production, and Work – Theory of the Allocation of Time Revisited." *The Journal of Political Economy* 85 (6):1099-1123.
- Heckman, James J. 1978. "Dummy Endogenous Variables in a Simultaneous Equation System." *Econometrica* 46(6), 931-59.
- Mincer, Jacob. 1962. "Labor Force Participation of Married Women." In *Aspects of Labor Economics*, edited by H. Gregg Lewis. Universities-National Bureau Conference Series, no. 14 Princeton, N.J.: Princeton Univ. Press.
- Kimmel and Connelly. 2007. "Mothers' Time Choices – Caregiving, Leisure, Home Production, and Paid Work." *The Journal of Human Resources* 42 (3): 643-681.
- Kolodinsky, J. and L. Shirey. 2001. "The Impact of Living with an Elder Parent on Adult Daughter's Labour Supply and Hours of Work." *Journal of Family and*

Economic Issues 21(3): 149-75.

Kooreman, Peter and Arie Kapteyn. 1987. "A Disaggregated Analysis of the Allocation of Time Within the Household." *The Journal of Political Economy* 95 (2): 223-49.

Latif, Ehsan. 2006. "Labor Supply Effects of Informal Caregiving in Canada." *Canadian Public Policy* 32(4): 413-429.

Singh, Inderjit, Lyn Squire, and John Strauss. 1986. "A Survey of Agricultural Household Models: Recent Findings and Policy Implications." *The World Bank Economic Review* 1 (1): 149-179.

Stone, R.I and P.F. Short. 1990. "The Competing Demands of Employment and Informal Caregiving to Disabled Elders." *Medical Care* 28(6): 513-526.

Van den Brink, Henriette Maassen and Wim Groot. 1997. "A Household Production Model of Paid Labor, Household Work and Childcare." *De Economist* 145 (3): 325-43.

Wolf, D.A. and B.J. Soldo, *Married Women's Allocation of Time to Employment and Care of Elderly Parents. The Journal of Human Resources*, 1994. **29**(4): p. 1259-1276.

Zhan, Heying Jenny. 2002. "Chinese Care Giving Burden and The Future Burden of Elder Care in Life-Course Perspective." *International Journal of Aging and Human Development* 54(4): 267-290.

Zhan, H.J. and R.J.V. Montgomery. 2003. "Gender and Elder Care in China: The Influence of Filial Piety and Structural Constraints." *Gender and Society* 17(2): 209-229.

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<sup>1</sup> Defining the aged dependency ratio as persons aged 60 or older divided by persons aged between 15 and 59, Dudley Poston and Chengrong Charles Duan (2000) project that China's aged dependency ratio will increase from 15.7 percent in 1999 to 26.1 percent in 2020 and 58.6 percent in 2050. In comparison, the aged dependency ratio of the United States is 26.6 percent in 1999 and is projected to be 46.3 percent in 2050.

<sup>2</sup> We confine our analysis to the rural sector because the labor market and social security system are distinctively different between the urban and rural sectors in China.

<sup>3</sup> Gronau (1977) argued that the aggregating can rest on two assumptions: (a) the two elements react similarly to changes in the socioeconomic environment and therefore nothing is gained by studying them separately; and (b) the two elements satisfy the conditions of a composite input, that is, their relative price is constant and there is no interest in investigating the composition of the aggregate since it has no bearing on production and the price of the output. He suggested that both assumptions are suspect.

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<sup>4</sup> Also see Van den Brink, Maassen and Groot (1997), and Kooreman and Kapteyn (1987).

<sup>5</sup> In terms of agricultural household model, see Singh, Squire, and Strauss (1986)

<sup>6</sup> The limitation of the categorical measure for care is noteworthy. The impact of elder care on labor hour supply depends upon the nature and intensity of care giving. The estimate of a given type of care giving reflects the nature and care intensity of a typical caregiver in the group. Regrettably, the survey provides no information on the nature of each type of care giving.

<sup>7</sup> They are Z, H, D separately which has been described in section of framework.

<sup>8</sup> The procedure that only consists of linear probability regressions for *Care* and IV estimation of equations (1) and (2) yields consistent but inefficient estimates of the structural parameters (Heckman, 1978). To acquire efficient estimates, the multinomial logit regressions are introduced. Ettner (1995) called estimates of the multinomial logit model “stage-zero” estimates and estimates of the linear probability model “stage-one” estimates.

<sup>9</sup> The CHNS is jointly sponsored by the Carolina Population Center at the University of North Carolina at Chapel Hill, the Institute of Nutrition and Food Hygiene of China and the Chinese Academy of Preventive Medicine. Detailed information about the CHNS is available at the website [www.cpc.unc.edu/china/home.html](http://www.cpc.unc.edu/china/home.html).

<sup>10</sup> The information of caregiving is from the Survey of Ever-Married Women Under Age 52. The sample in 2000, 2004 and 2006 has been included in our research as the information of the siblings could not be accessible in the year of 1989, 1991, 1993 and 1997 which would be the basis to construct the effective instrumental variables for the hours of caregiving.

<sup>11</sup> We adjust the standard errors of estimates for heteroscedasticity and also for clustering by cross-sectional units.

<sup>12</sup> Ettner (1995, 1996) and Wolf and Soldo (1994) use parents’ health status to measure the parents’ demand for caregiving and number of siblings for the availability of other family members to share caregiving responsibilities. Information on the health status of parents is unavailable in the CHNS, and information on siblings is unavailable for the 1993 and 1997 surveys. One limitation of using parents’ survival status as IVs for *Care* is its potential correlation with a woman’s labor supply. Arguably, those whose parents are still alive may need to work longer hours to support their parents. To check whether such a correlation exists, we added the four parental survival indicators to the labor force participation and labor supply equations. None of these variables were found to have any significant, appreciable impact on the labor supply variables. This result is not surprising; under the patrilineal influence, it is sons, not daughters, who are expected to provide financial support for older parents.

<sup>13</sup> Alternatively, we assume that the women simultaneously decide to participate in the farm work and off-farm work, consequently the error term of two labor hour equation is probably related with each other leading to the error of T-test. We also



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apply the methodology of 3SLS estimation from which the results that have not significant differences with those in Table 3-5 are derived.

<sup>14</sup> Based on the Hausman test, the assumption that care giving is determined by care needs and availability of care resources not by employment status seems a plausible assumption for the part of rural China under investigation. This is perhaps because reliable paid care services for the elderly are available mainly in large cities such as Beijing, Tianjin, Shanghai and Guangdong which are not covered by the CHNS survey and these services are also too expensive for a typical family in our rural sample. The finding that caring for parents-in-law has a significant impact on the caregiver's labor hour supply on off-farm work while caring for parents has no such effect also casts doubt on the view that women took on more informal care because they were unable to find employment.