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UNPAID CARE WORK'S INTERFERENCE WITH PAID WORK AND THE GENDER EARNINGS GAP IN CHINA

Liangshu Qi and Xiao-yuan Dong

ABSTRACT

This paper examines the effects of unpaid care work on the earnings of men and women in China by using data from the 2008 China Time Use Survey, the country's first, large-scale time-use survey. The study introduces three indicators to measure the degree to which unpaid care work may "interfere" with paid work, either by directly disrupting it or by being intertwined with it. The regression estimates show that while the amount of time spent on unpaid care work negatively affects the earnings of both men and women, the interference of unpaid work with paid work lowers earnings more for women than for men. Quantitatively, the gender differences in the time spent on unpaid care work and its interference with paid work account for 28 percent of the gender earnings gap in China.

KEYWORDS

INTRODUCTION

The significant number of women entering the labor market worldwide in recent decades have drawn wide attention to the work-family conflict women face and the subsequent impact on women's well-being. A large body of literature has emerged to investigate the effects of unpaid care work on the wages of men and women (for a recent survey, see Sholeh A. Maani and Amy A. Cruickshank [2010]).[1] However, the existing literature concentrates on developed countries. Therefore, our knowledge is very limited regarding developing countries and transition countries. To fill in this knowledge gap, this study documents the gender patterns of unpaid care work and paid work and estimates the effects of unpaid care work on the earnings of men and women in China, using data from the country's first, large-scale time-use survey, which was conducted in 2008.

Due to China's socialist legacy, Chinese women's labor force participation rates are high. Most working-age women join the labor force on a full-time basis after completing school. While women work nearly as many hours as men in the workplace, domestic chores and care for children and other family members remain primarily the responsibilities of women. Analysts estimate that the economic value of unpaid care work amounted to approximately one-third of China's gross domestic product (GDP) in 2008, and more than 70 percent of that value was contributed by women (Xiao-yuan Dong and Xinli An 2014). However, the value of unpaid care work to human well-being, and that unpaid care work requires both time and energy, are considerations that are often overlooked by policymakers.

China embarked on the transition from a centrally planned economy to a market economy in the late 1970s. In the post-transition period, the pressure on women to continue playing their dual roles as income earners and caregivers has intensified (Sarah Cook and Xiao-yuan Dong 2011). Economic deregulation and privatization have made paid work even more demanding (Xiao-yuan Dong, Jianchun Yang, Fenglian Du, and Sai Ding 2006). Under pressure to increase profits, employers are increasingly reluctant to accommodate workers' caregiving needs; as a consequence, caring for family members places the caregiver at the risk of losing earnings or being dismissed from her job. Economic reforms have also led to a substantial decline in state and employer support for social reproduction in the forms of on-site nursing facilities, subsidized daycare programs, and paid maternity leave (Cook and Dong 2011). The growing tension between work and family has important implications for women's status in the labor market.

In China, as in other countries, women earn lower wages than men, and a large portion of the gender wage gap cannot be explained by conventional human capital characteristics.[2] The gender wage gap has steadily increased in the post-reform period (Margaret Maurer-Fazio, Thomas G. Rawski, and Wei Zhang 1999; Björn Gustafsson and Shi Li 2000; Pak-Wai Liu, Xin Meng, and Junsen Zhang 2000; Scott Rozelle, Xiao-yuan Dong, Linxiu Zhang, and Andrew Mason 2002; Wei Chi and Bo Li 2008). Yuping Zhang, Emily Hannum, and Meiyan Wang (2008) find that women's family responsibilities play a more important role in affecting the rise of gender wage gaps in the urban labor market in post-reform China than do their disadvantages in human capital. Nan Jia and Xiao-Yuan Dong (2013) find that, in China's emerging private sector, mothers earn substantially less than childless women with the same human capital characteristics. In this paper, we estimate the effects of unpaid care work on the earnings of men and women in China and evaluate the extent to which the gender earnings gap is attributable to gender differences in unpaid care work. In addition to the amount of time spent on unpaid care work, we take into account the fact that unpaid care work may "interfere" with paid work, either by directly

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disrupting it or by being performed right before or after it. We find that both the amount of time spent on unpaid care work and its "interference" with paid work have negative effects on men's and women's earnings and contribute to the gender earnings gap in China.

LITERATURE REVIEW

Mainstream economists and feminist scholars have proposed several theories to explain how unpaid care work may affect wages. Using the term "household production," Gary S. Becker (1985) explains the impact of unpaid care work on wages with a model in which each individual allocates not only a fixed amount of time but also a fixed amount of effort (or energy) among different activities. Because household production requires effort and consumes energy, workers bearing greater household responsibilities expend less effort on the job and therefore earn lower wages. Jens Bonke, Nabanita Datta Gupta, and Nina Smith (2005) emphasize the role of the timing and flexibility of household production. They argue that many housework tasks have to be performed at regular points in time. If these tasks are performed at times that interfere with paid work, then workers' productivity and wages will be adversely affected. Another mechanism through which unpaid care work may affect wages is that individuals who bear higher housework burdens may seek jobs that offer convenient hours, flexible working schedules, or require less intensive effort. In accordance with the theory of compensating wage differentials (Sherwin Rosen 1986), workers have to accept lower wages to compensate employers for accommodating their preferences (Becker 1985; Joni Hersch 1991). Lastly, Joan C. Williams (2000) argues that workers who do unpaid care work may receive lower wages because their employers believe they would be tired and distracted at work and therefore be less productive than other workers. This study will follow the tradition of the first three theories in considering unpaid care work as a source of potential "interference" in paid work. That said, we recognize that engagement in unpaid care work could lower wages through a channel of discrimination as well as through a channel of lowered productivity.

Analysts have examined empirically the impact of unpaid care work on wages through standard wage equations augmented by various measures. Most existing studies focus on the amount of time spent on unpaid care work. There is consistent evidence that an increase in the amount of time spent on unpaid care work has a negative effect on wages for women, while the evidence for men is mixed.[3] The empirical literature also shows that the inclusion of a variable for unpaid care work time in the wage equation considerably increases the explained component of the gender wage gap.

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In addition, empirical evidence supports the hypothesis that the timing and flexibility of unpaid care work is an important determinant of wages for women. Hersch (1991) finds that, in the state of Oregon in the United States, unpaid care work on workdays has a significant negative effect on wages for women, but it has no significant effect if performed on a weekend day. Mary C. Noonan (2001) and Joni Hersch and Leslie S. Stratton (2002), in their studies on men's and women's wages in the US, divide unpaid care work into "female-type" and "male-type" tasks, taking into consideration whether the task needs to be performed frequently or at specific times. Female-type tasks include preparing meals, washing dishes, cleaning the house, and washing clothes, while male-type tasks consist of home and yard maintenance and auto repairs. The estimates obtained from the two studies indicate that only time spent on typically "female" tasks has a negative effect on wages. Bonke, Gupta, and Smith (2005) find that Danish women who spend more time on unpaid care work or perform domestic chores immediately before or after paid work earned lower wages. Moreover, the correlation of wages with the indicators for the timing and flexibility of unpaid care work is stronger than the correlation with the amount of time spent on unpaid care work.

In this paper, we expand the existing literature by estimating the effects on earnings of the amount of time spent on unpaid care work and its interference with paid work. As we discuss later, in order to cope with long working hours and heavy domestic burdens, many Chinese workers schedule unpaid care work around paid work. Some workers perform unpaid care work immediately before or after paid work, while others attend to domestic chores during working hours by either forgoing work breaks or directly disrupting paid work. We introduce three indicators to measure the degree to which unpaid care work interferes with paid work. Using the three indicators, we test the hypothesis that unpaid care work's interference with paid work has a negative effect on earnings. Work disruption is certainly not the only channel through which unpaid care work may adversely affect job performance; as argued in the literature, workers who spend more time on unpaid care work have less time and energy for paid work, even if all unpaid care work activities are performed during nonworking hours. Hence, our analysis takes into account the effects of both work disruption and the amount of time spent on unpaid care work.

A main empirical concern of our analysis is the potential endogeneity of the unpaid care work variables in the earnings equation, as these variables may correlate with unobserved individual characteristics or be determined by the level of earnings. Theoretically, the opportunity costs of unpaid care work are higher for those who earn higher wages. These workers are therefore more likely to substitute market services for household production, reducing time spent on unpaid care work. This reverse

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causality can lead to an overestimation of the negative effect of unpaid care work on wages. However, feminist scholars have long recognized that the sensitivity of men's and women's time allocation to economic incentives is limited by structural constraints such as social norms and gender roles, the availability of affordable market services, and policy environments (Michael Bittman, Paula England, Nancy Folbre, Liana Sayer, and George Matheson 2003; Nancy Folbre 2004; Jennifer L. Hook 2006).

Existing studies have obtained mixed evidence regarding the effects of wages on unpaid care work. For instance, Sanjiv Gupta and Michael Ash (2008) and Alexandra Killewald and Margaret Gough (2010) show that US women's time spent on unpaid care work decreases as their earnings increase, whereas Thomas Aronsson, Sven-Olov Daunfeldt, and Magnus Wikström (2001) and Daniel Hallberg and Anders Klevmarken (2003) find that the effects of wages on housework and childcare are statistically insignificant in Sweden. In their study of the impact of housework on wages among married workers in the US, Joni Hersch and Leslie S. Stratton (1997) apply the two-stage least squares (TSLS) method to address the potential endogeneity problem of unpaid care work. Comparing the ordinary least squares (OLS) and TSLS estimates of the effect of unpaid care work on wages, they find the difference between the two estimates is not large enough to reject the hypothesis that unpaid care work is exogenously determined.

Chinese men's and women's time autonomy is constrained by a number of factors. In China, as in Central and Eastern European countries and the former Soviet Union, economic transition has created a backlash against the women's movement, and traditional gender norms have become more entrenched in society as a result (Xiao-yuan Dong 2014). Moreover, work arrangements are more rigid in China than in established market economies. The use of part-time wage employment is limited among Chinese enterprises, and employers determine the working hours of full-time employees. "Family-friendly" workplace practice, an idea widely adopted in developed countries, has little influence on enterprises in China. Furthermore, the lack of social support for care provisioning impedes the ability of workers from low-income families to outsource unpaid care work (Bohong Liu, Yongying Zhang, and Yani Li 2008). By limiting the influence of economic incentives, these structural constraints may act to minimize the potential endogeneity bias of unpaid care work in our analysis.

DATA AND MEASURES OF WORK INTERFERENCE

This study uses data from the 2008 China Time Use Survey (CTUS). The National Bureau of Statistics of China conducted this survey in ten provinces: Beijing, Hebei, Heilongjiang, Zhejiang, Anhui, Henan,

Guangdong, Sichuan, Yunnan, and Gansu. The survey covers 37,142 individuals ages 15 to 74 years from 16,616 households in both urban and rural areas. Using a time-diary instrument, the survey gathered information on what each respondent did during each 10-minute interval of two 24-hour periods on a weekday and a weekend day. Additionally, the survey provides complementary information on respondents' age, sex, marital status, educational attainments, job category, monthly earnings (by a categorical measure), and the distance from home to the workplace or school.

For the purposes of this paper, we focus on men and women between 21 and 50 years of age who engage in paid work either on a weekday or on a weekend day in nonagricultural sectors. After omitting observations that were missing information, we remained with a sample of 6,460 men and 5,339 women for analysis. The job categories in which the largest proportions of workers are employed are manufacturing (22 percent of the men, 18 percent of the women) and clerical (22 percent of the men, 27 percent of the women). Twenty-two percent of the men and 23 percent of the women are public servants or staff members in public organizations in education, sciences, culture, and health fields. Twenty-two percent of the men and 15 percent of the women are from rural areas. The vast majority are wageworkers: only 7 percent of the men and 6 percent of the women are self-employed or own businesses.

The institutional context of employment in China differs in important ways from that found in many other countries. Due to China's socialist legacy, women's labor force participation is high. According to the 2008 CTUS, 74 percent of the women between 15 and 64 years of age are in the labor force, and over 90 percent of the women work full time. Wages for most workers are specified on a monthly basis rather than by hourly rates. As a reflection of this practice, China's minimum wage for full-time workers is also stipulated by month, not by hour. The Chinese government introduced the five-workday and overtime-pay regulations in 1995. However, these regulations are implemented mainly in the public sector; most workers in nonpublic sectors work six days a week and often receive no overtime pay. As a result, workers in nonpublic sectors tend to work longer hours but receive lower wages as compared to public-sector employees. Prior to the public sector restructuring in the late 1990s, state-owned enterprises and public organizations provided employees with subsidized housing near the workplace. Due to this history, 26 percent of the workers in our sample live within one kilometer of the workplace, allowing them to go home to deal with domestic chores during the lunch break. Traditionally, lunch is the main meal of the day for Chinese families. While this tradition has begun to change in large cities, many workers in small cities and rural areas, especially those with school-age children, still go home to make lunch; and they spend a fair amount of time on this activity. For instance, 41 percent of the women in our sample report making lunch

on a weekday, and these workers, on average, spend 0.64 hours on this activity.

Guided by the International Standard Activity Classifications introduced by the United Nations Statistics Division (UNSD) and Eurostat, CTUS divides human activities into 9 one-digit, 61 two-digit, and 113 three-digit categories. The one-digit activities are (1) personal care and self-maintenance; (2) paid employment; (3) production activity in primary industries; (4) household-based production in manufacturing and construction industries; (5) household-based services to generate income; (6) housework for households' own consumption; (7) care for household members (children and the elderly, sick, or disabled), help to other households, and community volunteer services; (8) study and training; and (9) recreation, leisure, and social contact. We focus on primary activities and aggregate the nine one-digit activities into three categories – paid work, unpaid care work, and nonwork activity because information on secondary activities is inadequately collected. Paid work consists of the activities in categories 2, 4, and 5; unpaid care work consists of the activities in categories 6 and 7; and nonwork activity consists of the activities in categories 1, 8, and 9. The measures based on primary activities would understate the amount of unpaid care work and the degree of work interference if some paid work and unpaid care activities were performed simultaneously. This potential downward bias is likely to be small for our sample, given that nearly 95 percent of the workers are employed in the wage sector where the workplace is separated from the home. It is difficult for workers to perform paid and unpaid care work at the same time in this setting.

To streamline the presentation, the following empirical analysis focuses on the indicators of work time and interference measured over the duration of a week. Weekly measures are more accurate than indicators for a weekday only, given that 51 percent of the men and 42 percent of the women in our sample engage in paid work on a weekend day. The number of work hours per week is defined as the sum of the number of hours on a weekday times five and the number of hours on a weekend day times two. Admittedly, this aggregation method may understate or overstate the number of weekly working hours for individual workers.

Nevertheless, the average values of weekly measures are accurate for a typical man or woman in the sample because diary days are randomly assigned. Indeed, the average weekly work hours of 49 hours for men and 45 hours for women in our sample (see Table 1) are close to the respective values of 46 and 43 obtained from the 2008 China Labor Force Survey that covers all thirty-two provinces. Because the earnings gap decomposition is based on the average values of observed characteristics, the effect of the shortcoming of our aggregation method on decomposition results should be limited.

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Table 1 Time spent on paid work and unpaid care work (hours)

	Men		Women	
	Weekday[a]	*Weekly*[b]	*Weekday*[a]	*Weekly*[b]
Paid work				
Mean	8.41	49.04	7.95	44.86
Median	8.50	45.83	8.08	42.50
Unpaid care work				
Mean	0.97	9.45	2.31	20.59
Cooking	0.38	3.04	1.04	7.96
Cleaning	0.07	0.54	0.22	1.56
Laundry/sewing	0.03	0.41	0.20	2.00
Shopping	0.11	1.56	0.22	2.90
Caring for pets or plants	0.01	0.08	0.01	0.08
Repairing	0.02	0.17	0.00	0.03
Household management	0.04	0.21	0.17	0.90
Childcare	0.17	1.53	0.36	2.89
Eldercare	0.01	0.10	0.01	0.13
Help others/volunteer work	0.02	0.18	0.02	0.19
Other activities	0.12	1.63	0.07	1.95
Median	0.50	7.00	2.17	19.67
% doing unpaid care work	63.34	82.48	90.95	96.98
Total work time				
Mean	9.38	58.49	10.26	65.44
Median	9.00	57.67	10.25	65.50
Observations	6,359	6,460	5,238	5,339

Notes: [a]This column includes those who participate in paid work on a weekday. [b]This column includes those who participate in paid work either on a weekday and/or on a weekend day. The weekly hours are the sum of the number of hours spent on a weekday $\times 5$ and the number of hours spent on a weekend day $\times 2$.
Source: 2008 CTUS.

Table 1 presents summary statistics for the amount of time spent on paid work and unpaid care work on a weekday and, subsequently, in a week. Like men, a majority of women in the sample work full time. Nevertheless, in China, just as in other countries, women spend less time on paid work and more time on unpaid care work than men (Michael Burda, Daniel S. Hamermesh, and Philippe Weil 2007). Specifically, men, on average, spend 49 hours on paid work and 9.5 hours on unpaid care work each week, while women spend 45 hours and 20.5 hours, respectively. Adding up the time spent on the two types of work, we note that the women's total work time is higher than that of men by 0.9 hour on a weekday and 7 hours per week. Turning to the gender difference in the types of unpaid care work, we note
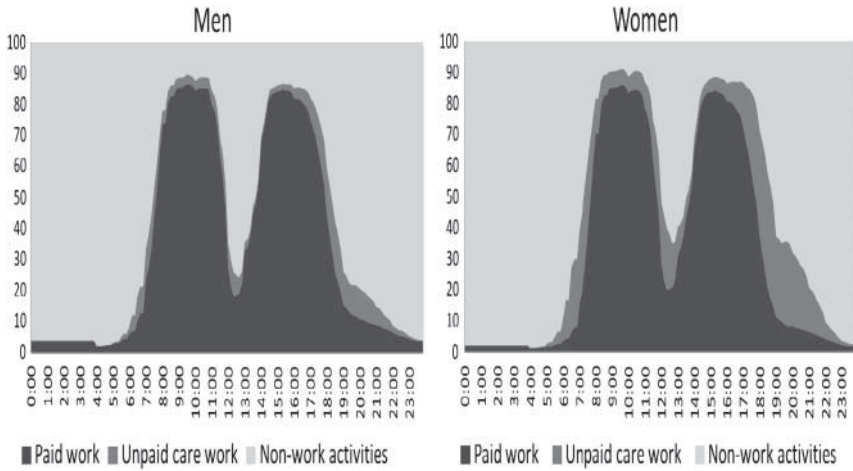
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Figure 1 Men's and women's participation rates in paid work, unpaid care work, and nonwork activities on a weekday

that the gender difference in the time spent on unpaid care work is the starkest in daily routine tasks such as cooking, cleaning, grocery shopping, and taking care of children. These tasks need to be performed regularly and at particular times of the day, and they are therefore more likely to interfere with paid work.

To depict the timing of work activities, we calculate men's and women's participation rates in paid work, unpaid care work, and nonwork activities at each hour of a weekday. We present the participation rates in Figure 1. Compared to men, fewer women do paid work, but more women do unpaid care work at any moment of the day, except at night. Furthermore, many more women than men do unpaid care work between 7:00 a.m. to 6:00 p.m. Given that regular paid work hours in China are between 8:00 a.m. and 5:00 p.m., the timing profiles presented in Figure 1 indicate that more women than men do unpaid care work around or during working hours. Specifically, approximately 48 percent of the women perform some unpaid care work activity between 7:00 a.m. and 8:00 a.m., 38 percent do so between 12:00 p.m. and 1:00 p.m. (lunch break), 41 percent do so between 5:00 p.m. and 6:00 p.m.; and 49 percent do so between 8:00 p.m. and 12:00 a.m. or between 1:00 p.m. and 5:00 p.m. The rates of men's participation in unpaid care work during these respective intervals are all lower: 22, 15, 19, and 25 percent, respectively. Clearly, women's unpaid care work is more intertwined with their paid work than is men's.

To measure the extent to which unpaid care work interferes with paid work, we construct three indicators. The first indicator, termed *MAX,* is the maximum duration of time spent on paid work and nonwork activities

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that is not interrupted by unpaid care work from the beginning to the end of paid work on a given day. We adopt a weekly measure by choosing the longer one of the two longest durations on a weekday and weekend day. *MAX* captures both the degree of continuity of paid work and the need for workers to take a break to regain energy for work. We expect *MAX* to be positively correlated with productivity and earnings.

The second indicator is a binary variable, *RUPT*, which is shorthand for interruption. This takes on the value of one if unpaid care work occurs between two episodes of paid work at least once during a given day; otherwise, it takes on the value of zero. The weekly measure of *RUPT* is equal to one if there is a work interruption on a weekday or a weekend day; it is zero otherwise. *RUPT* is a measure of the lack of continuity of paid work time, which is expected to have a negative effect on productivity and earnings.

The third indicator, termed *SWITCH*, is the number of times an individual switches between paid work and unpaid care work throughout a given day. Unlike *RUPT* that only captures the interruptions that occur during the paid work period on a given day, *SWITCH* also takes into account whether a worker performs unpaid care work right before the paid workday starts or right after it ends. To illustrate the difference between the two variables, consider a worker who dropped off her child at daycare on the way to work and then picked up her child after paid work but did not perform any unpaid care activity during the paid work period. For this worker, *RUPT* is equal to zero while *SWITCH* is equal to two. However, if this worker also undertook domestic chores during lunch break right after finishing her paid work in the morning, then *RUPT* is equal to one, while *SWITCH* is equal to three. A weekly measure of *SWITCH* is the sum of the number of times an individual switched activities on a weekday times five and the number of times an individual switched activities on a weekend day times two. The number of times activities are switched measures the extent to which a worker is juggling paid work with unpaid family responsibilities. Thus, *SWITCH* is expected to be negatively correlated with productivity and earnings.[4]

Table 2 presents summary statistics of the maximum duration of uninterrupted paid work time on a weekday and in a week by gender. For the purpose of comparison, the first half of Table 2 presents the maximum durations of paid work time neither interrupted by unpaid care work nor by nonwork activities, and the second half presents the maximum duration of time on paid work and nonwork activities combined not interrupted by unpaid care work. We can see that the maximum durations of both types of uninterrupted paid work time are longer for men than women. However, the gender differences are much larger in paid work and nonwork activities combined than in paid work time alone. This contrast indicates that much

Table 2 Maximum durations of uninterrupted paid work time (hours)

	Men		Women	
	Weekday	*Weekly*	*Weekday*	*Weekly*
Maximum duration of paid work time not interrupted by unpaid care work or nonwork activity				
Mean	3.79	3.96	3.64	3.79
Median	3.83	4.00	3.67	3.83
Maximum duration of time on paid work and nonwork activity combined not interrupted by unpaid care work (*MAX*)				
Mean	6.42	6.77	5.71	5.97
Median	5.50	6.17	4.50	4.83
Observations	6,359	6,460	5,238	5,339

Table 3 Performing unpaid care work between the start and the end of daily paid work

	Men		Women	
	Weekday	*Weekly*	*Weekday*	*Weekly*
Percent performing unpaid care work during the paid work period (*RUPT*)[a]				
	21.19	25.48	45.61	48.44
Amount of time spent on unpaid care work (hours)[b]				
Total	0.18	1.09	0.44	2.49
Cooking	0.09	0.52	0.25	1.39
Cleaning	0.01	0.06	0.03	0.18
Laundry/sewing	0.00	0.03	0.02	0.14
Shopping	0.02	0.15	0.06	0.33
Caring for pets or plants	0.00	0.01	0.00	0.00
Repairing	0.00	0.03	0.00	0.00
Household management	0.01	0.03	0.02	0.12
Childcare	0.01	0.09	0.03	0.15
Eldercare	0.00	0.01	0.00	0.01
Help others/volunteer work	0.01	0.05	0.01	0.07
Other activities	0.02	0.14	0.02	0.09
Percent in total unpaid care work time	18.66	11.58	18.93	12.11
Observations	6,359	6,460	5,238	5,339

Notes: [a]This percentage refers to the proportion of those who report performing unpaid care work during the paid work period among those who perform paid work. [b]The amount of time spent on unpaid care work on a given day is for those who perform paid work on that day. The weekly measure is the sum of the time spent on a weekday × 5 and the time spent on a weekend day × 2 for those who perform paid work either on a weekday or on a weekend day.

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of the extra unpaid care work that women undertake during paid work hours is done by forgoing work breaks.

Table 3 presents summary statistics for unpaid care work performed during the paid work period on a weekday and in a week. Approximately 25 percent of the men and 48 percent of the women perform unpaid care work during paid work hours. The time spent during the paid work period accounts for 11 to 12 percent of the total amount of time spent on unpaid care work by the men and women who perform paid work on at least one of the two sample days. The amount of time spent on unpaid care work during the paid work period is higher for women than for men (2.5 versus 1.1 hours per week). As for the nature of unpaid care work, making lunch meals is the most common task performed during paid work periods.

Table 4 presents summary statistics of the number of times an individual made an immediate switch between paid work and unpaid care work by gender. As Table 4 indicates, women switch between the two types of work activity twice as frequently as men. For instance, for those who engage in paid work on a weekday, approximately 78 percent of women switch from one type of work to another at least once, while only 48 percent of men do so. Strikingly, approximately 46 percent of women switch between work activities two or more times on a weekday. Thus, unpaid care work interferes with and makes more fragmented women's paid work time.

Table 4 Number of times an individual switched between paid work and unpaid care work

	Men		Women	
	Weekday	*Weekly*	*Weekday*	*Weekly*
Total number of times activity was switched				
Mean	0.70	3.99	1.55	8.62
Median	0.00	0.00	1.00	7.00
% of 0 time	57.95	52.20	24.82	21.78
% of 1 time	23.87	–	29.13	–
% of 2 times	11.87	–	25.62	–
% of 3 times	4.07	–	12.31	–
% of > 3 times	2.23	–	8.11	–
Observations	6,359	6,460	5,238	5,339

Notes: Only immediate shifts from one type of work to another are counted. That is, if a person went to make lunch right after finishing paid work in the morning and then took a nap before going back to paid work in the afternoon, the person is considered to have switched work activities only once, not twice.

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EMPIRICAL METHODS

Following the standard approach in the literature, we estimate a human capital earnings equation specified below:

$$LN\_INC_i = \beta_0 + \beta_1 II_i + \beta_2 HH_i + X_i'\gamma + u_i$$

where *LN_INC* is the logarithm of monthly earnings; *II* is one of the three indicators of work interference measured over the duration of a week,[5] as described earlier; *HH* is the number of hours spent on unpaid care work per week; *X* is a vector of covariates that includes weekly paid work hours, education, experience and its squared term, marital status, job category, residential status (urban or rural), and provincial dummy variables; Greek letters represent unknown parameters; *u* is the error term; and the subscript *i* is the index of individuals.

The earnings variable from the survey is a categorical measure with six income classes. When the dependent variable is an interval variable, the interval regression is preferred to the conventional OLS, as the former takes into account interval censoring problems. However, there is no feasible method to decompose the earnings gap based on internal regressions. To facilitate the wage gap decomposition, we convert the earnings variable into a continuous measure by taking the mid-point of each class and estimate the earnings equation by OLS.[6] To take into account the possibility that people who work longer hours may earn more income, we include the number of hours spent on paid work per week as one of the covariates of the earnings equation.[7]

Like Bonke, Gupta, and Smith (2005), we treat the variables for unpaid work as exogenous variables. As we discussed earlier, these variables may be endogenous since they may be correlated with unobserved individual characteristics or determined by the level of earnings. In the literature, panel data are applied to eliminate unobserved individual effects, while instrumental variables (IV) are introduced to control for simultaneous bias (Maani and Cruickshank 2010). Regrettably, we are unable to address the concern about unobserved individual fixed effects with a single cross section of observations. Nevertheless, we performed the Hausman test to assess simultaneous bias using three demographic indicators as the IVs. These indicators include one dummy variable for individuals who live with children (under 15 years of age), termed *CHILD*; one dummy variable for individuals living with the elderly (ages 65 years or older) who is taken care of by a family member, termed *OLD*; and the number of household members between 21 and 64 years of age, termed *HELPER*.[8] We assume that these variables are correlated with the variables for paid work and unpaid care work in the earnings equation but have no direct effect on earnings when we control for the two types of work.[9] From the Hausman test results presented at the bottom of Table 6, we cannot reject the null hypothesis

that the variables for the two types of work are exogenously determined. Thus, our discussion below focuses on the OLS estimates.

Using the OLS estimates of the earnings equations, we apply the Blinder–Oaxaca decomposition technique to measure the degree to which gender differences in time spent on unpaid care work and the interference of unpaid care work with paid work explain the gender wage gap.

EMPIRICAL RESULTS

Correlates of work time and work interference

Before discussing the earnings effects of unpaid care work, we examine the correlates of the variables for paid work and unpaid care work, which are the OLS estimates of the first-stage, reduced-form equation obtained for the Hausman test. Table 5 presents the estimates for the amount of time spent on paid work and unpaid care work. For both men and women, the presence of children and elderly in need of care in the household has a significant negative effect on the amount of time on paid work and a positive effect on the amount of time on unpaid care work, and these effects are numerically large. For instance, the estimates show that the presence of children in the household reduces the time spent on paid work by 1.4 hours per week for men and 2.3 hours per week for women, while increasing their unpaid care work time by 4.3 and 7.3 hours per week, respectively. Compared to the estimates for having children present, the effects of living with the elderly are even stronger. Interestingly, the effects of children are stronger for women than men, whereas the opposite gender pattern is observed for the effects of the elderly. Additionally, the number of adults in the household is positively correlated with paid work time and negatively correlated with unpaid care work time. Both married men and women spend more time on unpaid care work than their unmarried counterparts, by 4 hours per week for women and 1.5 hours per week for men. For both sexes, more educated individuals spend less time on paid work and more on unpaid care work. The negative correlation between education and paid work time reflects the fact that individuals with more education are more likely to work in the public sector where the working-hour regulations are more effectively enforced, compared to working in nonpublic sectors (with more difficult workplace conditions and working hours as we mentioned earlier). The finding that educated individuals spend more time on unpaid care work is consistent with the evidence obtained for developed countries (Alan C. Acock and David H. Demo 1994; April Brayfield 1995; Jonathan Guryan, Erik Hurst, and Melissa Kearney 2008).

Table 6 presents the estimates for the correlates of work interference indicators. The estimates of *CHILD*, *OLD*, and *HELPER* have expected signs for both men and women, and most of the estimates are statistically

Table 5 OLS estimates of the correlates of time spent on the two types of work

	Men		Women	
	Paid work (hours/week)	*Unpaid care work (hours/week)*	*Paid work (hours/week)*	*Unpaid care work (hours/week)*
CHILD	− 1.362***	4.309***	− 2.334***	7.345***
	(0.443)	(0.249)	(0.458)	(0.330)
	− 7.032***	9.721***	− 4.538***	7.300***
	(1.336)	(0.752)	(1.190)	(0.858)
HELPER	0.560*	− 1.205***	0.683**	− 1.622***
	(0.336)	(0.189)	(0.341)	(0.246)
MARRIED	0.857	1.511***	− 0.340	4.033***
	(0.825)	(0.464)	(0.738)	(0.532)
EDU	− 0.606***	0.189***	− 0.495***	0.223***
	(0.105)	(0.059)	(0.111)	(0.080)
EXP	0.109	0.077	− 0.286**	0.497***
	(0.127)	(0.072)	(0.119)	(0.085)
EXPSQ	− 0.004	0.000	0.005	− 0.007***
	(0.003)	(0.002)	(0.003)	(0.002)
RURAL	6.197***	− 2.346***	3.617***	− 0.908
	(0.729)	(0.410)	(0.868)	(0.626)
Job categories	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes
Constant	52.398***	6.763***	53.103***	9.278***
	(2.225)	(1.252)	(2.255)	(1.626)
Test for overall significance				
F statistic	51.76	44.00	32.04	58.38
P value	0.0	0.0	0.0	0.0
Adj. R^2	0.1642	0.1427	0.1269	0.2118
Observations	6,431	6,431	5,304	5,304

Notes: The estimates presented in this table are the first-stage equation of the 2SLS earnings regressions for those who participate in paid work either on a weekday or on a weekend day. Numbers in parentheses are heteroscedasticity-robust standard errors. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively, in a two-tailed test. The reference group consists of manufacturing workers who are unmarried and living in households in the urban area of Beijing with no children under age 15 and no persons older than age 65 in need of care.

significant. The sizes of these estimates are nontrivial. For instance, having a child reduces the maximum length of paid work time by nearly a half hour for women, increases the probability that paid work is interrupted by unpaid care work by 3.5 percent for men and 5.3 percent for women, and increases the number of times work is switched by 1.2 times for men and 2.1 times for women. As with unpaid care work time, living with a disabled elderly person is associated with a higher incidence of work interference

Table 6 OLS estimates of the correlates of the work interference

	Men			Women		
	MAX	*RUPT*	*SWITCH*	*MAX*	*RUPT*	*SWITCH*
CHILD	− 0.138	0.035***	1.246***	− 0.428***	0.053***	2.097***
	(0.089)	(0.012)	(0.154)	(0.087)	(0.015)	(0.222)
OLD	− 0.877***	0.027	1.251***	− 0.183	0.064*	1.205**
	(0.266)	(0.036)	(0.466)	(0.225)	(0.038)	(0.577)
HELPER	0.142**	− 0.046***	− 0.703***	0.173***	− 0.050***	− 1.179***
	(0.069)	(0.009)	(0.117)	(0.065)	(0.011)	(0.160)
MARRIED	− 0.235	0.045**	0.862***	− 0.350**	0.060***	1.961***
	(0.164)	(0.022)	(0.288)	(0.139)	(0.024)	(0.358)
EDU	− 0.059***	0.004	0.021	− 0.067***	0.009**	− 0.042
	(0.021)	(0.003)	(0.037)	(0.021)	(0.004)	(0.054)
EXP	− 0.000	0.006*	0.103**	− 0.054**	0.011**	0.245***
	(0.000)	(0.003)	(0.044)	(0.022)	(0.004)	(0.058)
EXPSQ	− 0.001	− 0.000	− 0.002*	0.000	− 0.000	− 0.003*
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)
RURAL	0.297**	0.104***	0.171	− 0.045	0.158***	1.805***
	(0.145)	(0.020)	(0.254)	(0.164)	(0.028)	(0.421)
Job categories	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.215***	0.073	1.805**	8.365***	0.098	4.004***
	(0.443)	(0.060)	(0.776)	(0.426)	(0.073)	(1.094)
Test for overall significance						
F statistic	18.81	13.11	17.30	23.73	17.98	27.04
P value	0.0	0.0	0.0	0.0	0.0	0.0
Adj. R^2	0.0645	0.0448	0.0594	0.0962	0.0737	0.1087
Observations	6,431	6,431	6,431	5,304	5,304	5,304

Notes: The estimates presented in this table are of the first-stage equation of the 2SLS earnings regressions for those who participate in paid work on either a weekday or a weekend day.

for men than for women. The estimates also show that unpaid care work interferes less with paid work for those who live in larger households but interferes more for married men and women than for unmarried individuals. The estimates of demographic variables indicate that demands for domestic chores and care services are an important determinant of interference with work.

Earnings and unpaid care work

Table 7 presents the OLS estimates of the earnings equation for men and women. The estimates show that individual earnings are positively

Table 7 OLS estimates of the earnings equation[a]

	Men			Women		
	(1)	(2)	(3)	(1)	(2)	(3)
MAX	0.015***			0.023***		
	(0.003)			(0.003)		
RUPT		− 0.090***			− 0.104***	
		(0.018)			(0.017)	
SWITCH			− 0.006***			− 0.005***
			(0.002)			(0.001)
Unpaid care work time	− 0.005***	− 0.004***	− 0.003***	− 0.004***	− 0.004***	− 0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Paid work time	− 0.002***	0.000	0.000	− 0.002***	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
MARRIED	0.047	0.045	0.046	0.051*	0.047*	0.051*
	(0.030)	(0.030)	(0.030)	(0.029)	(0.029)	(0.029)
EDU	0.054***	0.054***	0.054***	0.084***	0.085***	0.083***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
EXP	0.035***	0.036***	0.036***	0.007	0.007	0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
EXPSQ	− 0.001***	− 0.001***	− 0.001***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RURAL	− 0.421***	− 0.414***	− 0.422***	− 0.334***	− 0.327***	− 0.334***
	(0.027)	(0.027)	(0.027)	(0.034)	(0.034)	(0.034)
Job categories	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.722***	6.757***	6.763***	6.283***	6.361***	6.366***
	(0.076)	(0.076)	(0.076)	(0.087)	(0.086)	(0.086)
Test for overall significance						
F statistic	111.07	110.66	110.10	100.93	100.21	99.24
P value	0.0	0.0	0.0	0.0	0.0	0.0
Hausman test[b]						
F statistic	1.606	1.376	1.557	0.665	0.905	0.926
P value	0.19	0.25	0.20	0.57	0.44	0.43
Adj. R^2	0.2997	0.2989	0.2978	0.3202	0.3187	0.3165
Observations	6,431	6,431	6,431	5,304	5,304	5,304

Notes: [a]The estimates presented in this table are for those who work either on a weekday or on a weekend day. [b]The Hausman test tests for the null hypothesis that the amount of time spent on the two types of work and work interference are exogenously determined. Therefore, we only report OLS estimates of the earnings equation in this table.

associated with *MAX* and negatively associated with *RUPT* and *SWITCH* for both men and women, as expected. All these estimates are statistically significant at the 1 percent level. Quantitatively, a one-hour reduction in the maximum duration of paid work time decreases monthly earnings by 1.5 percent for men and 2.3 percent for women. Compared to their counterparts whose paid work is uninterrupted, men and women whose paid work is interrupted by unpaid care work earn 9 and 10.4 percent less, respectively. Moreover, an additional switch between the two types of work decreases men's monthly earnings by 0.6 percent and women's monthly earnings by 0.5 percent. These estimates support the hypothesis that the interference of unpaid care work with paid work lowers the earnings of men and women. With respect to unpaid care work time, the estimates show consistently that the amount of time spent on unpaid care work is negatively correlated with earnings for both men and women; quantitatively, each additional hour of unpaid care work per week reduces monthly earnings by 0.4 to 0.5 percent. The effect of unpaid care work is quantitatively similar between men and women. It is evident that both the timing and the amount of time spent on unpaid care work matter.

We now turn to the covariates. In the equation with *MAX* present, the amount of time spent on paid work has a significant negative effect on earnings for both men and women, and the estimates show that spending 1 additional hour on paid work each week lowers men's and women's earnings by 0.2 percent. This result indicates that workers who work longer hours have lower monthly earnings, holding constant the maximum duration of uninterrupted time spent on paid work and nonwork activity. In the equations where *MAX* is replaced by *RUPT* or *SWITCH,* the negative effect of paid work time is offset by the positive effect of *MAX* that is not controlled for; as a result, the estimates show that the amount of time spent on paid work has no effect on the earnings of men and women. Turning to the other estimates, education, as we would expect, has a positive effect on the earnings of both men and women, although the returns on education are higher for women than for men – 8.4 percent per year for women and 5.4 percent for men. The estimates of experience display a standard concave relationship between experience and earnings for men but not for women. These results suggest that the prospect of career advancement for women is limited. Moreover, we note that rural workers earn substantially less than their urban counterparts, although the earning differentials between the two areas are greater for men than for women.

Decomposition of the gender earnings gap

We decompose the gender wage gaps using the Blinder-Oaxaca decomposition procedure and the estimates of the earnings equations for

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Table 8 Blinder–Oaxaca decomposition of the gender earnings gap

The gender earnings gap = 0.230

(1) Both unpaid care work hours and work interference
    indicators are excluded

	MAX	RUPT	SWITCH
Explained (%)	− 12.61		
Unexplained (%)	112.61		

(2) Unpaid care work hours are included, but work interference
    indicators are excluded

Explained (%)	9.88		
Unexplained (%)	90.12		

(3) Both unpaid care work hours and work interference
    indicators are included

	MAX	*RUPT*	*SWITCH*
Explained (%)	11.59	12.87	13.30
Unexplained (%)	88.41	87.13	86.7
Explained by (%)			
Work interference	5.19	9.18	11.73
Unpaid care work time	23.16	17.86	16.14
Paid work time	− 3.52	− 0.76	− 0.82
Education	− 3.15	− 3.16	− 3.14
Experience	2.83	2.86	2.78
Married	0.41	0.38	0.40
Job category	9.24	8.86	8.94
Rural	− 16.57	− 16.31	− 16.61
Region	− 6.00	− 6.03	− 6.12
Observations	11,735	11,735	11,735

Notes: The decomposition results presented in this table are derived using the OLS estimates of the earnings equations for those men workers who participate in paid work either on a weekday or weekend day.

men as well as women. The two sets of results are substantively similar. To streamline the presentation, we only present the results of using the earnings equation for men in Table 8. From Table 8, we note that the monthly earnings of the men in our sample are 23 percent higher than those of the women. We report the proportion of the gender earnings gap that is explained by observable characteristics in three regression models, first excluding both unpaid work time and work interference variables, next excluding work interference variables only, and last including both types of measure.

We note that the explained component of the earnings gap increases from -12.6 percent to 9.9 percent when unpaid care work time is included in the earnings equation, and it increases further to between 11.6 and 13.3 percent when both unpaid care work related indicators are included. Thus, we interpret that without controlling for unpaid care work effects,

women would earn more than men if their earnings were determined solely on the basis of observable characteristics. This result is not surprising given that the men in the sample have fewer years of schooling than the women, account for a larger share of nonagricultural workers in rural areas and in regions where the earnings are lower, and spend more time on paid work, while workers in low-paying jobs tend to have longer working hours.

Thus, including unpaid care work time alone in the earnings equation increases the explained portion of the gender earnings gap by 22.5 percentage points, and adding both unpaid care work time and work interference variables to the earnings equation increases the explained component by 24 to 26 percentage points. Overall, the two types of unpaid care work indicators jointly explain approximately 27 to 28 percent of the gender earnings gap, and the contribution of gender differences in unpaid care work time is greater than that of work interference by all three measures. Nevertheless, the effect of work interference is nontrivial. For instance, the gender difference in the number of times work is switched accounts for nearly 12 percent of the earnings gap, which is larger than the contribution of occupational segregation measured by job types.

CONCLUSION

This paper provides the first empirical analysis of the impact of unpaid care work on the gender earnings gap in China. The analysis adds to the growing body of literature on this topic by introducing three new measures that capture unpaid care work's interference with paid work. Using data from the 2008 CTUS, China's first large-scale time-use survey, we find that while holding up half of the sky in the workplace, women also bear a major responsibility for domestic chores and caring for family members. Women not only spend a larger amount of time on unpaid care work than men, but unpaid care work is also more likely to interfere with their paid work. The pattern of time use does not only differ by gender. We also find that for both men and women workers, those with greater responsibilities for child- and eldercare not only spend more time on unpaid care work but are also more likely to interrupt paid work with unpaid care work activities. Moreover, we find that both the amount of time spent on unpaid care work and its interference with paid work have a negative effect on men's and women's earnings. While unpaid care work time's negative earnings effects are quantitatively similar between women and men, the work interruptions because of unpaid care work activities lower earnings more for women than for men. Using the estimates of the earnings equation, we assess the role of unpaid care work as a determinant of the gender earnings gap. The decomposition

results show that the gender differences in time spent on unpaid care work and work interference account for 27 to 28 percent of the gender earnings gap.

The findings of this paper provide empirical support for the feminist contention that gender inequality in unpaid care work is a major factor that disadvantages women in the labor market in terms of earnings and occupational choices (Diane Elson 1999). Our analysis also sheds new light on women's struggle with their dual roles as income earners and caregivers. Michael Bittman and Judy Wajcman (2000) argue that women's "double burden" cannot be accurately depicted by just adding the time spent on paid work and unpaid care work. According to their analysis, while men and women in Australia, on average, spend the same amount of time on paid and unpaid care work combined and therefore have an equal amount of leisure time, women's leisure time is more likely to be disrupted by unpaid care work than is men's.[10] Our analysis shows that unpaid care work not only decreases Chinese women's time available for leisure but also directly interferes with their paid work, thereby lowering their earnings and widening the gender earnings gap between men and women in China.

Our analysis raises the question of what can be done to minimize the negative effects of unpaid care work on the earnings of men and women in China. Many Chinese workers have to perform domestic chores during paid working hours because their weekly hours of paid work are quite long. According to the 2008 China Labor Force Survey, 55 percent of men and 54 percent of women in the manufacturing sector and 61 percent men and 59 percent of women in the service sector work 48 hours or longer per week. For these workers, policies that decrease working hours and shorten workdays along with measures to increase labor productivity would give workers more time to deal with family responsibilities during nonworking hours, thereby reducing their needs to perform domestic chores during paid work hours. Worker-oriented, flexible work-time policies, such as flexible daily start and finish times and paid leaves, can also help to decrease the interference of unpaid care work with paid work and mitigate its negative effect on earnings (Sangheon Lee, Deirdre McCann, and Jon C. Messenger 2007). Additionally, programs such as affordable, high-quality daycare, company-subsidized lunch programs, and school lunch programs can reduce the burdens of unpaid care work. Finally, to achieve greater gender equality in the labor market, social attitudes must change to encourage men to take on a larger share of unpaid care work. Our analysis demonstrates the value of time-use surveys for promoting gender-aware public policy. To deepen our understanding of the work–family conflicts in China, concerted efforts should be taken to improve the quality of information on secondary activities and family demographics in time-use surveys.

ARTICLE

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NOTES

[1] In this paper, the term "unpaid care work" refers to the services, such as domestic chores and care for people at home or in communities, which are performed for no explicit monetary reward. The term "paid work" refers to the activities performed to earn a living.

[2] For example, the unexplained components account for 53 to 63 percent of the gender wage gap in Björn Gustafsson and Shi Li (2000); 89 to 92 percent in Pak-Wai Liu, Xin Meng, and Junsen Zhang (2000); and 76 to 85 percent in Scott Rozelle, Xiao-yuan Dong, Linxiu Zhang, and Andrew Mason (2002).

[3] A selective list of such studies includes Shelley Coverman (1983), Beth Anne Shelton and Juanita Firestone (1988), Joni Hersch and Leslie S. Stratton (2002), Carla Shirley and Michael Wallace (2004), and Joni Hersch (2009) for the United States; Ian

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McAllister ([1990](#)) for Australia; Shelley Phipps, Peter Burton, and Lynn Lethbridge ([2001](#)) for Canada; and Mark L. Bryan and Almudena Sevilla-Sanz ([2011](#)) for Britain.

[4] The three indicators of work interference are correlated: the correlation coefficient is -0.32 between MAX and RUPT, -0.28 between MAX and SWITCH, and 0.61 between RUPT and SWITCH. The three indicators introduced do not capture the change of activity that takes place in the interval of less than 10 minutes because the respondents only report one activity over a 10-minute time interval.

[5] The regression results of using measures for a weekday are available on request from the authors.

[6] The estimates of interval regression are available on request from the authors.

[7] There is a discrepancy in the time dimension between the earnings variable and the variables for paid and unpaid work, with the former measured monthly and the latter defined over the period of a week. This discrepancy can be eliminated by either dividing the earnings variable by four or multiplying the work variables by four. We did not make this adjustment because doing so would only change the scale of the estimates, not the estimated result of how the earnings variable varies with each work indicator quantitatively (Jeffrey M. Wooldridge [2013](#)).

[8] Our demographic measures are not as refined as we wish because the 2008 CTUS does not provide detailed information on family composition. The child and elderly variables are derived based on whether the worker lives in a family in which some member reports spending time on caring for children or an elderly family member. We are not able to gather from the data how many children each family has and whether an adult is healthy.

[9] Admittedly, this assumption does not hold if the decisions on time allocation, fertility, and co-residence with elderly parents are jointly determined. Because our choice of IVs is very limited, we are unable to address this concern.

[10] Other authors have examined how paid work and working time regulations affect leisure time and family life in developed countries using time-diary data. A selective list of studies includes Kimberly Fisher and Richard Layte ([2004](#)); Michael Bittman ([2005](#)); Benoît Rappoport and Céline Le Bourdais ([2008](#)); Vanessa R. Wight, Sara B. Raley, and Suzanne M. Bianchi ([2008](#)); and Laurent Lesnard ([2008](#)).

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