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GENDER PATTERNS AND VALUE OF UNPAID CARE WORK: FINDINGS FROM CHINA'S FIRST LARGE-SCALE TIME USE SURVEY

BY XIAO-YUAN DONG*

University of Winnipeg

AND

XINLI AN

National Bureau of Statistics of China

Using data from the 2008 China Time Use Survey, this paper examines the gender patterns of time allocation over paid work, unpaid care work, and non-work activity and estimates the monetary value of unpaid care work. A seemingly unrelated regression (SUR) technique is applied to explore the tradeoff between the three types of activity. The estimates show that, holding constant individual characteristics and regional effects, the total work time of women is higher than that of men by 7 hours per week in the rural sector and by 10.5 hours per week in the urban sector. The monetary value of unpaid care work is estimated by five methods. Depending on the method used, the value assigned to unpaid care work varies from 25 to 32 percent of China's GDP, from 52 to 66 percent of final consumption, and from 63 to 80 percent of the gross products of tertiary industry.

JEL Codes: D13, E01, J16

Keywords: China, gender inequality, time use, unpaid care work

1. INTRODUCTION

Women throughout the world bear the primary responsibility for unpaid care work, which includes housework and taking care of people at home and in communities for no explicit monetary reward. Unpaid care work is essential to human capabilities and well-being. Through its contribution to human and social capital formation, unpaid care work also plays a pivotal role in generating and sustaining economic growth (Folbre and Nelson, 2000). However, due to time constraints, unpaid care work limits women's ability to participate equally with men in the labor market and reduces the time available to them for self-care, human capital investment, socialization, political participation, and relaxation (Cagatay *et al.*, 1995). Despite its important implications for well-being and gender equality, unpaid care work is not counted in conventional income and labor force statistics.

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*Correspondence to: Xiao-yuan Dong, 515 Portage Avenue, University of Winnipeg, Manitoba R3B 2E9, Canada (x.dong@uwinnipeg.ca).

The provision of household and care services, viewed as "the natural duty of women," is commonly taken for granted in policy making (Benería, 2003). It is therefore not surprising that unpaid care work has been identified as a key source of policy interventions for gender equality by the United Nations. The Beijing Platform for Action, adopted at the 1995 United Nations Fourth World Conference on Women, calls for countries to take measures to recognize the value of unpaid care work, reduce the burden of unpaid care work on women, and encourage a more equitable distribution of unpaid care work between men and women (United Nations, 1996).

The purpose of this paper is to document the gender patterns of unpaid care work, examine how unpaid care work interacts with paid work and non-work activity, and estimate the monetary value of unpaid care work using data from China's first large-scale time use survey. Time use surveys (TUS) provide information on how people spend their time in a given day or week through time diary instruments. TUS have a great advantage over conventional household surveys for analyzing unpaid care work and the interdependence of work and non-work activities (Esquivel *et al*., 2008). In conventional surveys, data on time allocations are typically obtained through such questions as how much time the respondent spent on a list of selected activities during a reference period. The conventional survey method usually does not count all the activities, although it may double count the activities that take place simultaneously. Until recently, most of the large-scale TUS have been conducted in developed countries. In developing countries, empirical studies on time allocations primarily relied on data gathered from conventional household surveys.[1] Over the last two decades a growing number of developing countries have undertaken large-scale TUS with the time-diary approach. The availability of more reliable and representative TUS data has made it possible to evaluate the contribution of women's unpaid work to the national economy and take a closer look at the effect of domestic and care responsibilities on women's time autonomy in developing countries. Blackden and Wodon (2006) and Bardasi and Wodon (2010) analyzed the patterns of time poverty associated with women's dual roles as income earners and care givers using TUS data for Sub-Saharan African countries. From the recent TUS for Argentina, Nicaragua, India, South Korea, South Africa, and Tanzania, a group of authors estimated the determinants of unpaid care work and computed the monetary value of unpaid care work for these countries (Budlender, 2010). The National Bureau of Statistics (NBS) of China launched its first national representative TUS in 2008. Following the survey, NBS (2009a) published a large volume of summary statistics on how Chinese people spent their time on various activities by gender, age, education, occupation, and so on. The information provided by this publication has been utilized to analyze time use patterns in China and make international comparisons

[1]For example, Chang *et al*. (2011a, 2011b) examined the impacts of economic development and migration on the time use patterns of working-age rural populations, elderly people, and school-age children using data from the China Health and Nutrition Survey (CHNS). The authors analyzed three types of activities: farm work, off-farm work, and domestic work. The data on domestic work cover only cooking, cleaning, grocery shopping, and caring for pre-school children. The analyses were confined to work activities because, as with many conventional household surveys, CHNS provides no information on non-work activities.

(Miranda, 2011; Zhou *et al*., 2012). The present paper applies the raw data of the 2008 China TUS to tackle some of the issues on unpaid care work that cannot be adequately addressed with conventional survey data or secondary time-diary data.

The reminder of the paper is organized as follows. In the next section we briefly describe the 2008 China TUS and the classification of time use activities adopted by this paper. In Section 3 we document the gender patterns of time spent on three types of activity: paid work, unpaid care work, and non-work activity. In Section 4 we apply a seemingly unrelated regression (SUR) technique to estimate the tradeoff between the three types of activity. In Section 5 we evaluate the monetary value of unpaid care work and compare the results with a range of macroeconomic indicators. Section 6 concludes the paper.

2. The 2008 China Time Use Survey and Activity Classification

The 2008 China TUS covers 37,142 individuals aged between 15 and 74 years from 16,661 households in 10 provinces, including Beijing, Hebei, Zhenjiang, Anhui, Henan, Guangdong, Sichuan, Yunnan, and Gansu (NBS, 2009a). The sample consists of 19,621 urban residents and 17,521 rural residents, and it includes 18,215 males and 18,927 females. The survey used a time-diary approach in which respondents were asked to report what they did in each 10-minute interval of the previous 24 hours on a weekday and a weekend day. The time diary gathered information on the primary activities as well as the secondary activities that were conducted simultaneously, the location where the primary activity took place, whom the person was with when the primary activity started, and modes of transportation if travel was involved. The information was subsequently post-coded according to a standard list of activities. Using a questionnaire instrument, the survey also obtained complementary information on respondents' age, sex, ethnicity, marital status, relationship to head of household, educational attainments, occupation, income of the previous month (by a categorical measure), and the distance from home to the workplace or school. The summary statistics of respondents' characteristics are presented in Table A1 in Appendix I.

Guided by the International Standard Activity Classifications introduced by the United Nations Statistics Division (UNSD) and EUROSTAT, the 2008 China TUS divides human activities into nine one-digit, 61 two-digit, and 113 three-digit categories. The nine one-digit categories are: personal care and self maintenance (0); paid employment (1); household production in primary industry (2); household-based production in manufacturing and construction industries (3); household-based services to generate income (4); housework for households' own consumption (5); care for household members (children and the elderly, sick or disabled), help to other households, and community volunteer services (6); study and training (7); and recreation, leisure, and social contact (8).

Following the approach taken by Budlender (2010), we focus on primary activities and aggregate the nine categories of activity into three broader groups. We first distinguish productive (work) and non-productive (non-work) activity by defining productive activity as an activity that, conceptually speaking, one could pay someone else to do in accordance with Reid's (1934) third party principle. Based on this principle, the activities of categories 0, 7, and 8 are non-productive

TABLE 1

Labor Force Participation, Unemployment, and Distribution of Paid Working Hours for Chinese Men and Women Aged 15–74 Years

	All		Urban Sector		Rural Sector	
	Male	Female	Male	Female	Male	Female
Labor force participation rate (%)	81.6	70.7	73.4	60.4	90.4	82.6
By age (%)						
Age 15–24	43.2	46.1	29.1	35.2	55.7	56.2
Age 25–34	95.2	89.4	94.1	88.4	96.7	91.1
Age 35–44	95.8	89.2	94.6	86.3	97.2	92.4
Age 45–54	93.8	72.9	90.5	58.5	97.3	88.3
Age 55–64	71.9	45.2	44.4	13.7	92.9	74.0
Age 65–74	36.8	23.8	6.9	5.6	78.8	56.4
Unemployment rate (%)	2.8	4.3	5.3	8.5	0.6	0.7
Distribution over paid working hours (%)						
Part-time 1–34 hours/week	19.6	32.4	22.3	29.9	17.3	34.6
Full-time 35–48 hours/week	27.6	29.8	42.7	43.4	14.4	18.3
Over-time ≥49 hours/week	52.8	37.7	35.0	26.7	68.3	47.1

Source: 2008 China TUS.

activities (termed as non-work activity) and the rest are productive activities. We next divide productive activities into those that would or would not be included in calculations of GDP based on the System of National Accounts (SNA). The SNA includes in its calculation all production of goods, regardless of whether the goods are sold on the market or not, but it includes only the services that are performed for the purpose of generating income. Thus, the activities in categories 1 to 4 that are included in the calculations of GDP are classified as paid work, but the activities in categories 5 and 6 (housework, care of persons, and voluntary community services), which are excluded from SNA, are classified as unpaid care work.[2]

3. Gender Patterns of Time Use

This section presents basic patterns of time use for Chinese women and men. Table 1 reports the data on labor force participation, unemployment, and modes of employment in terms of part-time (working less than 35 hours per week), standard full-time (working between 35 and 48 hours per week), and over-time (working more than 48 hours per week). As in many countries, gender differences in these areas are observed in China: men have higher labor force participation rates than women (81.6 versus 70.7 percent), their unemployment rates are lower

[2]Household-based production and services for sales, that is, the activities in categories 2, 3, and 4, are often called "unpaid work" in the literature. We consider these activities as "paid work" in that their monetary values at the household level are recognized by the SNA, even though individual members do not receive financial compensation directly. With respect to unpaid care work, admittedly, not all voluntary community services are related to care activities. But its inclusion in unpaid care work would not overstate the size of the "care" economy by any discernible margin, given that Chinese women and men, on average, only spent less than a half hour on voluntary work each week (see Table 2).

TABLE 2
MEAN TIME SPENT ON ACTIVITIES (HOURS/WEEK)

	All		Urban		Rural	
	Male	Female	Male	Female	Male	Female
Paid work	42.0	30.7	33.0	25.0	51.7	37.3
Unpaid care work	10.6	27.3	12.9	27.6	8.1	26.9
Non-work activities	115.2	109.8	121.8	115.2	108.0	103.6
Unpaid care work						
Housework	8.1	22.3	10.0	22.5	6.1	21.9
Child care	1.3	3.6	1.5	3.2	1.0	4.0
Adult care	0.2	0.2	0.2	0.3	0.1	0.1
Volunteer	0.4	0.4	0.3	0.4	0.5	0.4
Proportion of time spent on unpaid work in total working time (%)	20.2	47.1	28.1	52.4	13.5	41.9

Source: 2008 China TUS.

than women's (2.8 versus 4.3 percent), and the proportion of part-time workers is lower for men than for women (19.6 versus 32.4 percent). Dividing the sample in terms of rural versus urban sectors, we note that labor force participation rates for both sexes are higher in the rural sector than in the urban sector, while the opposite pattern is observed for unemployment rates. Noticeably, the between-sector difference in labor force participation for women (22.2 percentage points) is greater than the gender difference within each sector (13.7 percentage points lower for women than for men in the urban sector, and 7.8 percentage points lower for women than for men in the rural sector). Much of the between-sector difference in labor force participation for women occurred among the youngest group (15 to 24 years old) and the older groups (45 years old and above), reflecting the fact that young urban women are more likely than their rural counterparts to study in school instead of entering the labor force and that urban women tend to withdraw from the labor force at a much younger age.

Table 2 presents the mean time that a man or a woman would spend in paid work, unpaid care work, and non-work activity. In this table, the number of hours for the three types of activity adds up to 168, which is the total number of hours in a week. As in other countries, in China men spend more time than women on paid work, and women spend more time than men on unpaid care work. The female–male time gap for paid work is –11.3 hours per week, while the gap for unpaid care work is 16.7 hours per week. The gender gap in each type of work is more pronounced for the rural sector than for the urban sector. Overall, women spend 5.4 fewer hours per week on non-work activity than do men. Dividing unpaid work into four components (housework, childcare, adult care, and volunteer work), we note that women spend markedly more time than men on housework and childcare, while the mean number of hours spent on adult care and volunteer work is similar between women and men.

While the gendered division of labor in paid and unpaid care work is almost universal, the extent of gender differences varies across countries in accordance with each country's history, cultural norms, level of development, and public policy. To place the time allocation of Chinese women and men in a comparative

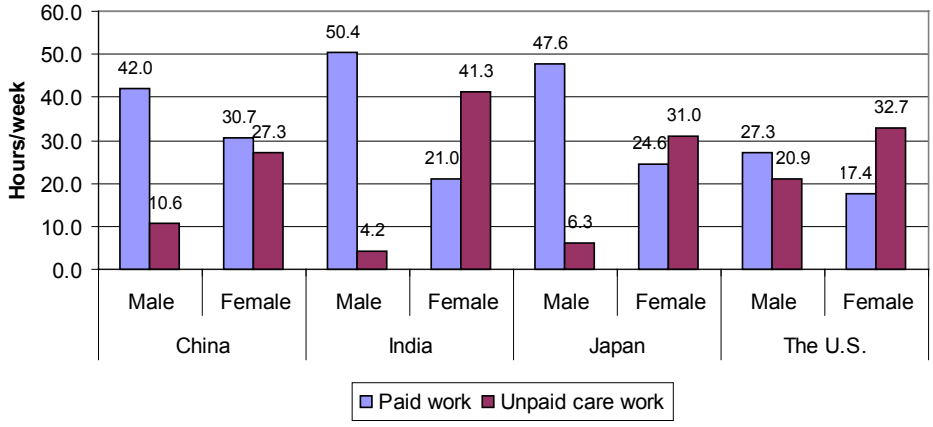

Figure 1. Mean Time Spent on Paid and Unpaid Care work, China, India, Japan, and the U.S.

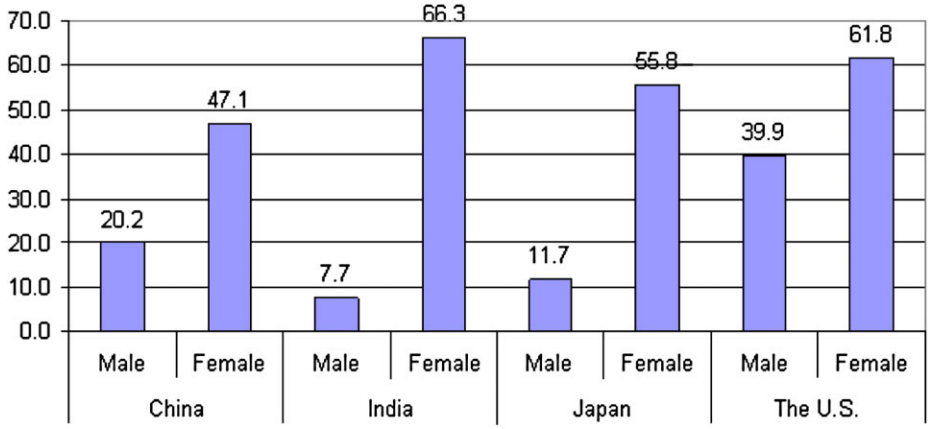

Figure 2. Proportion of Unpaid Care Work in Total Work Time by Women and Men in China, India, Japan, and the U.S.

perspective, we present time use statistics for China, India, Japan, and the U.S. in Figures 1, 2, and 3. The statistics for India and Japan were obtained from Budlender (2010), and the statistics for the U.S. are derived from the 2006 American Time Use Survey. Figure 1 displays the mean hours spent on paid and unpaid care work for the four countries. The gender difference in both paid work and unpaid care work for China is smaller than the difference for India and Japan, but it is larger than the difference for the U.S.

Figure 2 presents a comparison in the proportion of unpaid care work in total work time for women and men in four countries. We note that the proportion of unpaid care work for Chinese women is the lowest among the four countries, while the proportion for Chinese men is lower than that for American men but higher than that for Indian and Japanese men.

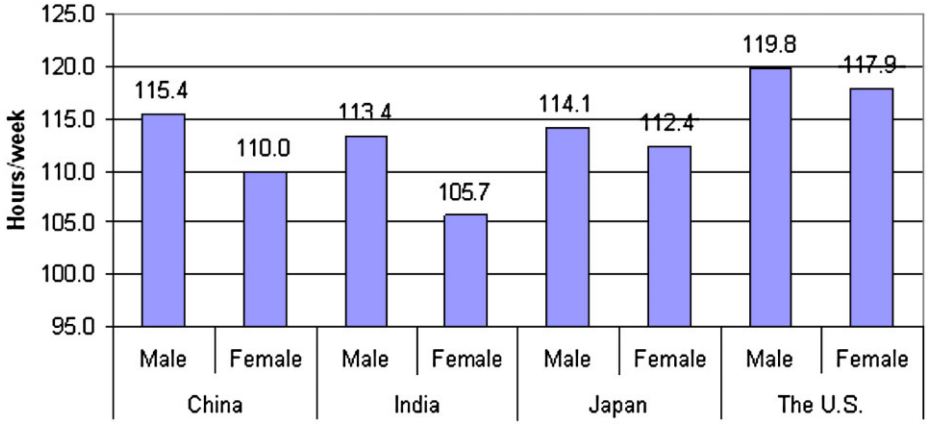

Figure 3. Mean Time Spent on Non-Work Activity by Women and Men in China, India, Japan, and the U.S.

Figure 3 presents the mean number of hours spent on non-work activity by women and men in the four countries. The amount of time available for non-work activities such as self-care and leisure has important implications for the quality of life, and the distribution of non-work time between women and men is a crucial dimension of gender equality (Fraser, 1997). As Figure 3 shows, women in all four of the comparison countries spend fewer hours on non-work activity than their male counterparts. However, the size of the gender gap in non-work time appears to vary in accordance with the level of development as the gap is larger in the two developing countries (–5.4 in China and –7.7 in India) than in the two developed countries (–1.7 in Japan and –1.9 in the U.S.).

4. The Determination of Time Allocation

In this section, we examine the determination of time allocation between activities. The analysis seeks to address the following questions: How does the time use of women and men vary with their demographic and socio-economic characteristics? Do women and men have the same degree of flexibility to tradeoff one type of activity for another? The answers to these questions shed light on the work–family conflicts facing women and men in China.

Becker's (1965) theory of time allocation provides a neoclassical economic framework for analyzing how women and men allocate time between market work and home production. According to this theory, men specialize in market work and women in home production because men receive a higher market wage than women and women are more productive than men in home production (Becker, 1985; Gronau, 1986). Assuming that family members are altruistic toward each other and that they all dislike work and enjoy leisure, Becker's theory of time allocation suggests that while women and men may play different roles in market work and home production, the total work time (or its obverse, the non-work

time) should be evenly distributed between women and men (Bittman and Wajcman, 2000). To achieve gender equality in total work, however, women and men should have the same degree of flexibility to substitute one type of work for the other. Feminists have contested the neoclassical interpretation, arguing that the role that women and men play in the household is assigned by social norms and is not solely determined by economic considerations (Folbre, 2004). According to this view, the traditional norm that men are the breadwinners and women the homemakers affects the preferences and choices of women and men, which tends to give men greater flexibility to substitute paid work for housework and care giving, compared to women. The societal expectation on women to place the welfare of children and other family members above their own imposes a constraint on women's inclination to negotiate a more equal distribution of time allocated to domestic work and leisure activities. As a result, women who allocate more time to paid work may do so at the expense of their leisure time instead of a commensurate reduction in time spent on unpaid care work. Nevertheless, gender norms are changeable. Burda *et al*. (2007) argue that as a country becomes more developed, gender specific norms on leisure time will be replaced by gender neutral norms. Discrepancies in the gender division of labor are also observed among individuals at the different life stages and with different socio-economic characteristics, as well as across regions with different regulatory and economic contexts (Anxo *et al*., 2007).

Empirical evidence of the tradeoff between work and non-work activities is mixed. Some studies show that women's massive entry into the labor force in recent decades has not been followed by a more even distribution of the responsibility for domestic chores and care between women and men (Hochschild, 1989). As a result, women's participation in paid work has been associated with an increased double burden, decreased leisure, and lower well-being (Elson, 1995; Floro, 1995; Koggel, 2003). Other studies indicate that while there remain marked gender gaps in paid and unpaid work in almost all countries, gender differences in the total amount of work have declined with the rise in per capita income, and an equal distribution of total work between women and men has actually been achieved in a number of high income countries (Burda *et al*., 2007).

Much of the research on these issues has focused on developed countries, and empirical studies on the tradeoff between different activities for developing countries are sparse. Using survey data on workers in Township and Village Enterprises (TVEs) in China, MacPhail and Dong (2007) examined how the paid work of women and men affects their hours of domestic labor. The estimates in that study show that, holding constant other factors, an increase in the number of hours spent in paid work is associated with a reduction in the hours spent in domestic work for men, but not for women. Chang *et al*. (2011b) investigated the impact of economic development on the gender total work time gap in rural China between 1991 and 2006. The analysis shows that economic development created new employment opportunities in the off-farm sector and induced an increase in the amount of total work time for both women and men. Because men had a greater opportunity to work in the off-farm sector than women did and changes in time spent on domestic work were small for both sexes, the gender total work time gap has declined.

In this paper, we examine the interdependence of paid work, unpaid care work, and non-work activity using the SUR model.[3] In the SUR model, the three types of activity are determined by the same set of explanatory variables and are estimated jointly as a system. Two restrictions are imposed on the SUR model to capture the interdependence of these activities; that is, under the time constraint, variations in the amount of time in one activity triggered by a change in an exogenous variable must be compensated by changes in the other activities. The first restriction is that the sum of intercepts of the three equations is equal to the total number of hours per week, i.e., 168 hours; and the second one is the sum of coefficients of each explanatory variable over all activities is equal to zero.[4]

The regression model is written below:

$$H_{ji} = \beta_{j0} + X_i \beta_{j\gamma} + u_{ji} \tag{1}$$

$$\sum_{j=1}^{3} \beta_{j0} = 168 \quad \text{and} \quad \sum_{j=1}^{3} \beta_{j\gamma} = 0 \text{ for all } \gamma = 1, 2, \ldots K$$

where $j = 1$, 2, and 3 represents paid work, unpaid care work, and non-work activity, respectively; i is the index for individuals; γ is the index for explanatory variables; H is number of hours per week; X is a vector of explanatory variables; β_0 is the intercept; β_γ is a vector of slope coefficients; and u is the error term.

The explanatory variables in X include marital status, presence of children aged 6 years or younger, household size, age, years of schooling, unearned income in log form, predicted wage rates in log form, employment status, and province dummy variables. Marital status is a dummy variable which is equal to one for married individuals, and zero otherwise. Because there is no information on household members younger than 15 years or older than 74 years in the dataset, the variable for young children present is derived from the information on whom the individual was with at the beginning of an activity recorded by the survey; this variable is defined as equal to one if any household member reports being with a child aged 6 years or younger, and zero otherwise. Household size is defined as the number of household members aged between 15 and 74 years plus the dummy variable for children present. We acknowledge that the variable of household size may understate the actual size of a household if the household has more than one child younger than 15 years of age or if it has adults older than 74 years of age. Unearned income, measured in *yuan* per month, is the sum of income earned by household members, calculated as the middle-point of each income class, except

[3]The empirical analysis presented in this section follows the procedure first introduced by Neuwirth (2007). Kimmel and Connelly (2007) applied a SUR Tobit-type model to analyze the determinants of time allocation. Following Neuwirth (2007), we adopted a SUR OLS-type approach because time use specialists have suggested that OLS is statistically more appropriate than Tobit for analyzing time diary data (Stewart, 2009).

[4]We assume that the sum of the changes in three activities with respect to a change in the explanatory variable X_γ in equation (1) is equal to zero, holding constant other explanatory variables, that is, $\left(\sum_{j=1}^{3} dH_j\right) = \left(\sum_{j=1}^{3} \beta_{j\gamma}\right) dX_\gamma = 0$ for $dX_\gamma \neq 0$. By imposing this constraint, we can tell from the estimates whether a rise in the time spent on one type of work is compensated by a fall in the time spent on another type of work or in the time on non-work activity.

for individual *i*. Predicted wage rates, measured in *yuan* per hour, are derived from the estimates of wage equations presented in Table A2 in Appendix II.[5] Because our analysis is based on cross-sectional time use surveys and is not longitudinal, one needs to be cautious with the interpretation of the results and bear in mind the usual limitations of cross-section analysis for identifying causal effects.

The SUR model represents an alternative approach to the method adopted by MacPhail and Dong (2007). The SUR approach captures the interdependence of three activities by imposing restrictions on the parameters of three seemingly unrelated regression equations. In contrast, MacPhail and Dong estimated the tradeoffs between paid work and domestic work time by regressing domestic work on paid work and a host of covariates. They used instrumental variables to address the simultaneity bias stemming from the fact that the amounts of time spent on two types of work activity are jointly determined.

Table 3 presents the SUR estimates of equation (1) by sector. The main purpose of the regressions presented in this table is to estimate ceteris-paribus gender differences in time allocation and explore the differences between the urban and rural sectors. The intercepts measure the mean weekly hours spent on each type of activity by a male in a given sector who is not married, has no young children, is aged between 15 and 24 years, is employed, and resides in Beijing,[6] with the continuous covariates equal to zero. Comparing the intercept estimates for the rural and urban sectors, we note that urban males with the aforementioned characteristics spent 5.1 fewer hours on paid work each week and 8.3 more hours on non-work activity than their rural counterparts did. We next examine the estimates for gender, which is our primary interest. The estimates indicate that other things being equal, urban women spent 3 fewer hours on paid work each week, 13.5 more hours on unpaid care work, and 10.5 fewer hours on non-work activities than urban men. A similar pattern of gender differences is observed for the rural sector, with the female–male gaps of −11.3 hours for paid work, 18.3 hours for unpaid care work, and −7 hours for non-work activity. These estimates are in line with the proposition that women's propensity or ability to substitute one type of work for another is more limited than men's and that women therefore have to cope with the dual demands of market work and domestic responsibility by having less time for self care and leisure than what is available to men. While the gender patterns are qualitatively the same for the urban and rural sectors, there are noticeable differences in the size of the gap between the two sectors. Compared with the urban sector, the gender gap in unpaid care work is larger for the rural sector. Rural women appear to make up for more hours of unpaid care work by spending fewer hours than urban women in paid work and by reducing the time spent on non-work activities by a smaller amount. The between-sector differences may partly reflect the fact that the nature of paid work is more flexible in the rural sector than in the urban sector. An alternation interpretation may be that biological needs and social norms set a lower limit to the amount of time that is needed

[5]Wage rates were obtained by dividing the mid-point of each income class by the number of hours spent in paid work per month. Wage equations were estimated by OLS, separately, for women and men with positive incomes. We did not correct for potential selection bias because we did not have adequate information on excludable variables.

[6]There are many rural counties under the jurisdiction of Beijing.

TABLE 3

SUR Estimates of the Determinants of Time Allocation by Sector

	Urban Sector			Rural Sector		
	Paid Work	Unpaid Care Work	Non-Work	Paid Work	Unpaid Care Work	Non-Work
Constant	36.127***	–1.735*	133.608***	41.317***	1.381	125.302***
	1.155	0.876	1.128	1.636	1.049	1.363
Female	–3.022***	13.554***	–10.532***	–11.254***	18.334***	–7.080***
	0.340	0.257	0.332	0.483	0.310	0.403
Married	0.812	4.429***	–5.241***	2.045**	4.547***	–6.591***
	0.494	0.375	0.482	0.745	0.478	0.621
Child 0–6 years	–1.290***	5.405***	–4.115***	–5.383***	7.009***	–1.626***
	0.332	0.251	0.324	0.411	0.264	0.342
Household size	1.132***	–1.633***	0.501*	0.247	–1.173***	0.926***
	0.218	0.165	0.213	0.220	0.141	0.183
Age 25–34	6.821***	11.078***	–17.899***	4.080***	3.527***	–7.607***
	0.757	0.574	0.739	1.000	0.641	0.833
Age 35–44	5.450***	13.180***	–18.630***	4.939***	2.383***	–7.322***
	0.860	0.652	0.840	1.073	0.688	0.894
Age 45–54	1.273	13.556***	–14.828***	3.781***	3.367***	–7.148***
	0.857	0.650	0.837	1.055	0.677	0.879
Age 55–64	–5.982***	16.491***	–10.509***	1.046	5.613***	–6.659***
	0.829	0.628	0.809	0.951	0.610	0.793
Age 65–74	–8.674***	14.509***	–5.835***	–4.821***	6.104***	–1.284
	0.802	0.608	0.782	1.131	0.726	0.943
Schooling	–0.858***	–0.302***	1.161***	–0.723***	–0.194***	0.918***
	0.115	0.087	0.112	0.085	0.055	0.071
Log unearned income	–0.340***	0.140***	0.199***	0.189**	0.005	–0.194***
	0.051	0.038	0.049	0.066	0.042	0.055
Log wage rate	6.133***	0.820	–6.954***	8.494***	1.348	–9.844***
	0.823	0.624	0.803	1.235	0.792	1.029
Unemployed	–27.901***	12.227***	15.674***	–29.237***	4.182**	25.054***
	0.637	0.483	0.621	2.345	1.504	1.955
Inactive	–24.899***	8.090***	16.809***	–26.496***	4.215***	22.280***
	0.370	0.280	0.361	0.577	0.370	0.481
Provinces	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.453	0.368	0.400	0.284	0.340	0.306
χ^2	16,278.8	11,426.6	13,221.7	6,964.1	9,015.8	7,822.7
p value	0.0	0.0	0.0	0.0	0.0	0.0
N	19,621			17,521		

Notes: Figures presented below the coefficient estimates are standard errors. ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively. The omitted groups include those who are unmarried, male, aged 15–24 years, employed, have no children under 7 years present, and reside in Beijing.

for self care and leisure, which prevents rural women from cutting their non-work time any further to offset the extra time that they spend on domestic labor. Indeed, summing up the between-sector differences in both the intercepts and gender effects, we note that rural workers of both sexes spent more time working than urban workers and the amount of time in non-work activity is the smallest for rural women relative to other groups.

Turning to the other estimates, we find that most results are relatively similar between the two sectors. With respect to age effects, the estimates show that in both urban and rural sectors, the amount of time spent in paid work varies with age in an inverted U-shaped pattern; the amount of time in non-work activity varies with age in a U-shaped pattern; and the amount of time spent in unpaid care work increases more or less monotonically with age. Moreover, an increase in years of schooling reduces the amount of time spent on work of either type and increases the amount of time spent on non-work activity. Additionally, as we would expect, a change in wage rates is positively related to the amount of time spent on paid work and is negatively related to the amount of time spent on non-work activity.

Table 4 presents the SUR estimates of equation (1) for women and men separately. The purpose of the regressions presented in that table is to explore how the gender difference in time use varies with individual characteristics. The intercepts presented here measure the mean weekly hours spent in each type of activity by a rural resident of a given sex who is not married, has no young children, is aged between 15 and 24 years, is employed, and resides in Beijing, with the continuous covariates equal to zero. The estimates indicate that rural women with the characteristics described above spent 36.7 hours each week on paid work, 10.0 hours on unpaid work, and 121.7 hours on non-work activity, while for rural men, these estimates are 50.2 hours, 1.8 hours, and 115.9 hours, respectively. The estimates for the urban dummy variables suggest that gender differences in paid work and unpaid care work are smaller in the urban sector than in the rural sector while the difference in non-work activity is greater in the former than in the latter, other things being equal. As expected, marriage decreases paid work time for women and increases paid work time for men. However, marriage increases unpaid care work time for both women and men, but the increase is greater for women than for men by a wide margin. Overall, marriage increases women's total work time more than men's, thereby resulting in a greater reduction in women's non-work time. Having young children reduces paid work time and increases unpaid care work time for both women and men, but once again, it results in a greater reduction in non-work time for women than for men. Living in a larger household decreases unpaid care work hours and increases non-work hours for both sexes, but the effects are stronger for men than for women. With respect to age effects, the estimates show that both women and men spend more time on non-work activity at the two ends of the life course and more time on paid work in the middle phase, while their time in unpaid care work increases monotonically with age. Despite the similarities, women in every age group from 25 years onward appear to spend three to four fewer hours per week on non-work activities than their male counterparts.

We next look at human capital and economic variables. The estimates show that education has a negative effect on the time women spend on both paid and

TABLE 4

SUR Estimates of the Determinants of Time Allocation by Gender

	Female			Male			Female–Male Difference in Change in Non-Work Time
	Paid Work	Unpaid Work	Non-Work	Paid Work	Unpaid Work	Non-Work	
Constant	36.743***	9.986***	121.270***	50.244***	1.830**	115.925***	5.345
	1.177	0.915	1.034	1.222	0.697	1.116	
Urban	−9.447***	0.995*	8.453***	−14.143***	3.092***	11.052***	−2.599
	0.582	0.452	0.511	0.593	0.338	0.542	
Married	−1.902***	9.050***	−7.148***	3.886***	1.066**	−4.952***	−2.195
	0.575	0.447	0.505	0.645	0.368	0.589	
Child 0–6 years	−5.382***	9.252***	−3.870***	−1.057**	3.308***	−2.251***	−1.619
	0.365	0.284	0.321	0.377	0.215	0.344	
Household size	0.300	−0.778***	0.477**	0.390	−1.353***	0.964***	−0.487
	0.206	0.160	0.181	0.211	0.120	0.193	
Age 25–34	5.203***	9.057***	−14.260***	6.575***	4.500***	−11.075***	−3.185
	0.822	0.638	0.722	0.890	0.508	0.813	
Age 35–44	4.923***	10.411***	−15.333***	5.139***	5.777***	−10.916***	−4.417
	0.868	0.675	0.763	0.991	0.565	0.906	
Age 45–54	1.506	11.883***	−13.389***	3.172**	5.765***	−8.937***	−4.452
	0.860	0.669	0.756	0.982	0.560	0.897	
Age 55–64	−3.208***	14.276***	−11.067***	−2.015*	8.966***	−6.951***	−4.116
	0.836	0.650	0.735	0.926	0.528	0.846	
Age 65–74	−4.885***	11.256***	−6.371***	−9.118***	10.708***	−1.590	−4.781
	0.928	0.721	0.816	0.955	0.544	0.872	
Schooling	−0.733***	−0.129*	0.862***	−1.071***	0.038	1.033***	−0.171
	0.079	0.061	0.069	0.112	0.064	0.102	
Log unearned income	0.088	−0.137**	0.049	−0.074	0.058	0.017	–
	0.061	0.048	0.054	0.055	0.031	0.050	
Log wage rate	8.331***	−1.218*	−7.113***	5.330***	0.691	−6.022***	−1.091
	0.790	0.614	0.694	0.894	0.510	0.817	
Unemployed	−27.859***	13.474***	14.385***	−28.240***	7.405***	20.835***	−6.450
	0.901	0.700	0.792	1.042	0.594	0.952	
Inactive	−25.006***	7.692***	17.315***	−27.117***	4.013***	23.104***	−5.789
	0.404	0.314	0.355	0.496	0.283	0.453	
Provinces	Yes	Yes	Yes	Yes	Yes	Yes	
_cons	36.743***	9.986***	121.270***	50.244***	1.830**	115.925***	–
	1.177	0.915	1.034	1.222	0.697	1.116	
R^2	0.368	0.220	0.382	0.409	0.133	0.394	
χ^2	11,043.4	5,335.9	11,780.5	12,622.9	2,792.8	11,999.5	
p value	0.0	0.0	0.0	0.0	0.0	0.0	
N	18,927			18,215			

Notes: Figures presented below the coefficient estimates are standard errors. ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively. The omitted groups include those who are unmarried rural residents, aged 15–24 years, employed, have no children aged under 7 years present, and reside in Beijing. The female–male differences in non-work time associated with regional effects are omitted in the last column.

unpaid care work and a positive effect on their non-work hours. For men, education has a negative effect on the time spend in paid work and a positive effect on non-work time, but has no significant effect on men's unpaid care work. Additionally, unearned income has a negative effect on women's unpaid care work hours but no effect on men's. Furthermore, as one would expect, wage rates are positively correlated with paid work hours and negatively correlated with non-work hours for both sexes. Although higher wage rates are associated with a decline in women's unpaid care work hours, they have no effect on men's unpaid care work. These estimates suggest that women who are more educated, come from families with higher incomes, and receive higher market wages have a greater ability to lighten their domestic work burdens and enjoy more time autonomy. Interestingly, improved economic standing does not appear to have induced any discernible change in men's behavior at home as it is evident that that none of the variables on education, unearned income, and wages has a significant effect on men's time spent on unpaid care work. Finally, a change in one's status from employment to unemployment or economic inactivity induces both women and men to spend more time on unpaid care work and non-work activity. While these changes reduce paid work by almost the same amount for both sexes, unemployed or economically inactive women take on more unpaid care work and consequently have five to six fewer hours per week for non-work activities than their male counterparts.

The estimates presented in Table 4 confirm that gender differences in time allocation vary with individual demographic and socio-economic characteristics. Marriage and pre-school children reinforce the gender gap in time allocation, particularly for participation in domestic chores and care activities, whereas an improvement in economic standing in terms of better education, more family incomes, or higher wages contributes to lowering women's housework and care burden and increasing their leisure time. Nevertheless, the estimates show that almost all the individual characteristics considered in the analysis are associated with a widening of the female–male difference in total work time and a decrease in the time for self-care and leisure that is available to women relative to the time available to men (see the last column of Table 4). Evidently, gender inequality in total work time (or its obverse, non-work time) is rather pervasive in Chinese society.

5. The Monetary Value of Unpaid Care Work

The objective of this section is to assign a monetary value to unpaid care work and to compare the values that result with a range of macroeconomic indicators. While the valuation of unpaid care has become a regular statistical undertaking in developed countries, this type of endeavor has just started to emerge in developing countries (Budlender, 2010). The remainder of this paper provides the first estimation of the monetary value of unpaid care work for China using national representative time diary data.[7]

[7]The results presented in this section have been cited in a policy-briefing article published in a Chinese journal (An and Dong, 2012).

5.1. *Methods of Valuating Unpaid Work*

The value of unpaid care work can be determined using either an output or an input approach. The idea behind the output approach is to assign a value to the output produced by unpaid care work by multiplying the quantity of the output by the price of a corresponding good produced in the market. This method requires that a market price be found for each of the services provided and that data be made available relating to the quantity of the services provided and consumed. The data requirements associated with the output-based method represent a severe constraint for the adoption of this method, particularly in the case of developing countries (Charmes and Unni, 2004).

The input approach calculates the value of the output produced by unpaid care work by focusing solely on the value of labor inputs. The value of unpaid care work as calculated by this method is equal to the time spent in various activities multiplied by the corresponding wage rates. The input approach may involve either an opportunity cost method or a replacement cost method. The opportunity cost method sets the value of unpaid care work equal to the income the person who performs this task could have earned in the labor market if he/she had performed paid work rather than unpaid care work. For individuals who are employed, the opportunity cost of unpaid care work is equal to the market wage rate that they earn. For non-employed individuals, the opportunity cost is estimated by either their "potential wages" (that is, the average wage of an employed person with the same observed productive characteristics) or by their "reservation wage" (that is, the wage rate at which a typical individual with the same productive characteristics would be indifferent between a unit of time assigned to paid work and a unit of time assigned to unpaid care work) (Sousa-Poza *et al.*, 2001). One drawback of the opportunity cost method is that it places a higher value on the domestic work of individuals whose market productivity is higher. One way to minimize this discrepancy is to use the average wage for all people (or all people of a particular sex) in the economy instead of the actual or predicted wage of the person who performed the unpaid care work (Budlender, 2010).

The replacement cost method calculates the value of unpaid care work by computing what it would cost to hire someone to do it. This method can be divided further by distinguishing between the generalist and the specialist approaches. While the generalist method sets the value of unpaid work at the wage of a housekeeper, the specialist method estimates market costs by first determining how much time is spent on each specific activity and then using the wage rates that apply to specialists (such as a cook, a gardener, or an accountant) to calculate the value of the time spent on these non-market activities. One concern about the replacement cost method is that the quality and productivity of the substitute hired from the market may differ from the quality and productivity of the person doing unpaid care work. On the one hand, the substitute from the market might be more productive as a result of having received special training. On the other hand, the market replacement method may fail to capture the value of "personal and emotional care" in domestic work (for example, the care one provides to one's own children), thus yielding values of unpaid care work that are too low (Folbre and Nelson, 2000). Another concern about the generalist method is that it may

generate a downward bias because the average earnings of domestic workers tend to be lower than the wages of most other occupations. Despite the shortcomings of this approach, the replacement cost method using the wages of generalist workers as the standard is generally preferred to other input-based methods because it has lower data requirements and its results are more consistent (Varjonen *et al.*, 1999).

The valuation of unpaid care work has proven to be more challenging in developing countries because of economic dualism and market limitations. It is difficult to estimate the opportunity costs for rural workers who typically work on family farms and do not earn wages. It is also unclear what would be the replacement cost of unpaid care work in rural areas where the markets for domestic services are either rudimentary or non-existent.

5.2. *The Approaches Used in This Paper*

We applied an input-based approach instead of an output-based approach because we did not have the data that would have been required for the latter approach. In light of the limitations of each input-based method discussed above, we adopted five methods to compute the monetary value of unpaid care work, and compared the results. We also computed the value of unpaid work for taking care of children and other family members and relatives (termed person-care work), separately. The first method applied is the opportunity cost method.[8] The calculation procedure is illustrated in Tables A3 and A4 in Appendix III. Using information from the 2008 Time Use Survey, we first calculated hourly earnings by dividing the mid-point of each income class by the number of hours spent on paid work per month. The mean earnings for each sex-disaggregated education class were then calculated using actual earnings for those who reported both positive earnings and positive paid work hours, and predicted earnings were calculated for those who reported zero earnings or zero hours spent on paid work. The predicted earnings were computed using the estimates of the sex-specific earnings regression which control for educational attainments, potential experience and its squared term, and dummy variables for urban residents and provinces. The earnings regressions are presented in Table A2 in Appendix II. We next calculated sex-specific average opportunity costs and mean hours on unpaid work per day, using the distribution of individuals in the sample over five education classes for each sex as the weights. The total value of unpaid work was obtained by multiplying the value of unpaid work hours per day per person by 365 days and the total population of each sex aged between 15 and 74 years of age[9] and then summing up the two sex-specific aggregates obtained. The opportunity cost method described above yields a value of 9028 billion *yuan* for total unpaid work and 1799 *yuan* for unpaid care work.

We next adopted two economy-wide mean earnings methods to evaluate unpaid care work. The calculation procedures are presented in Tables A5 and A6 of Appendix III. We first assessed the value of unpaid work using sex-specific mean earnings derived from the actual earnings of respondents in the sample who

[8]The calculation procedure is explained in Budlender and Brathaug (2002).

[9]Information on the total population is obtained from the *China Statistical Yearbook 2009* (NBS, 2009b); information on the population younger than 15 years and older than 74 years is from the *China Population and Employment Statistical Yearbook 2009* (NBS, 2010b).

reported both positive earnings and positive paid work hours. This method is expected to yield a higher unit price than the opportunity cost method for unpaid work because the expected market wages tend to be higher for the employed than the non-employed, but the opportunity cost method takes into account not only employed individuals but also non-employed individuals. The second economy-wide mean earnings method complements the first one by obtaining earnings information from an alternative source, that is, the *China Labor Statistical Yearbook 2009* (NBS, 2010a). Sector-disaggregated mean earnings were calculated to capture the rural–urban economic disparity.[10] The two economy-wide mean earnings methods generate fairly similar estimates of the value of unpaid work and care work (9894 and 1966 billion *yuan* versus 9871 and 1956 billion *yuan*). As expected, these values are higher than the estimates of the opportunity cost method (9028 and 1799 billion *yuan*).

Lastly, we applied two variants of the replacement cost approach. The calculation procedures are presented in Tables A7 and A8 of Appendix III. We first assigned a value to unpaid care work using the mean earnings of the urban household services sector from the *China Labor Statistical Yearbook 2009*. This method yields a value of 9791 billion *yuan* for unpaid work and 1936 billion *yuan* for unpaid care work. In studies involving developed countries, the value of unpaid work obtained by the opportunity cost method is typically higher than the value obtained by the replacement cost method using generalists' wages because the opportunity cost method takes into account all occupations and the replacement cost method considers only domestic workers whose pay is typically low. Contrary to this stylized pattern, our replacement cost method yields a higher estimate than the opportunity cost method, possibly because the mean earnings of urban domestic workers overstate the replacement costs for rural workers whose earnings are much lower. To take into account the rural–urban earnings disparity, we calculated the sector-disaggregated mean earnings of the household services sector using information from the 2008 China's Household Income Project (CHIP). The mean hourly earnings of urban workers in the household services sector was used to measure the replacement cost for urban residents, while the mean earnings of migrant workers in this sector were used for rural residents. The mean earnings of 9.3 *yuan* per hour for urban workers calculated from the 2008 CHIP are almost the same as those from the *China Statistical Yearbook 2009*, while the mean earnings for migrant workers are much lower (i.e., only 5.6 *yuan* per hour). As expected, the second replacement cost method results in lower estimated values (i.e., 7705 billion *yuan* for unpaid work and 1522 billion y*uan* for care work). These estimates can reasonably be considered the lower bounds of the value of unpaid care work and person-care work.

Regardless of the method adopted, the estimates of unpaid care work we obtained are likely to contain a downward bias. Due to data limitations, our calculation is based on primary activities and ignores passive care-giving activities that occurred simultaneously with a reported primary activity.[11]

[10]Information on sex-specific earnings is unavailable in the *China Labor Statistical Yearbook 2009*.

[11]A study for Australia shows that nearly 75 percent of all time spent in childcare is spent while performing another activity (Bittman and Pixley, 1997). The information on secondary activities in the 2008 China TUS is very incomplete and the reported secondary activities are primarily leisure activities such as watching TV and smoking.

TABLE 5
VALUE OF UNPAID CARE WORK AND MACROECONOMIC INDICATORS

	Opportunity Cost Method	Economy-Wide Earnings I	Economy-Wide Earnings II	Replacement Cost Method I	Replacement Cost Method II
Unpaid care work					
Billion *yuan*	9028.0	9894.1	9870.7	9790.9	7705.5
% of GDP	29.4	32.2	32.2	31.9	25.1
% of final consumption	60.5	66.3	66.1	64.4	51.7
% of tertiary industry	73.4	80.4	80.2	78.0	62.6
% of paid work	51.59	56.5	56.3	54.8	44.0
Unpaid person-care work					
Billion *yuan*	1799.5	1966.6	1955.9	1936.4	1521.9
% of GDP	5.9	6.4	6.4	6.2	5.0

Notes: Opportunity cost method computes the value of unpaid care work and person-care work using sex-disaggregated mean earnings for each education class based on the information from the 2008 China TUS; the economy-wide mean earnings method I uses sex-disaggregated mean earnings using information from the 2008 China TUS; the economy-wide employment earnings method II uses sector-disaggregated mean earnings from the *China Labor Statistical Yearbook 2009*; replacement cost method I uses mean earnings of the urban household services sector from the *China Labor Statistical Yearbook 2009*; and replacement cost method II uses sector-disaggregated mean earnings of the household services sector obtained from CHIP 2008.

5.3. *Comparisons with Macroeconomic Indicators*

Table 5 presents the monetary values of unpaid care work and person-care work by five evaluation methods and provides comparisons with several macroeconomic indicators. In particular, we compare the value of unpaid care work to China's GDP, to its final consumption expenditures, and to the gross products of tertiary industries in 2008 to discern the contribution of unpaid work and the size of the care economy broadly defined.[12] We begin the comparison with GDP. The value of unpaid care work is estimated to be between 25.1 percent (using sector-disaggregated generalist mean earnings) and 32.2 percent (using two economy-wide mean earnings) of GDP. From a comparative perspective, the estimates of the relative size of unpaid care work to GDP for China are lower than those for developed countries in the west (for instance, 32–62 percent for the U.S., 44 percent for France, and 31–46 percent for Canada) but similar to the estimates for Japan (20–31 percent) and South Korea (19–29 percent).[13] It is noteworthy that an estimate at 25 percent (or 32 percent) means that the 2008 official GDP would have to be multiplied by a factor 1.25 (or 1.32) if the production that took place in both market and domestic sectors were taken into account. For unpaid person-care work, the value is estimated to be between 5.0 and 6.4 percent of the GDP.

We next compare the value of unpaid care work with final consumption expenditures and the size of the tertiary industry. The value of unpaid care work is estimated to be between 51.7 and 66.3 percent of consumption expenditures and

[12]China's GDP in 2008 is 30,686 billion *yuan*; final consumption expenditures are 14,911 billion *yuan*; and gross products of tertiary industry are 12,305 billion *yuan*. These statistics are obtained from the *China Statistical Yearbook 2009*.

[13]The estimates are from Sousa-Poza *et al*. (1999) for the U.S. and Canada, Fouquet and Chadeau (1981) for France, and Budlender (2010) for Japan and South Korea.

between 62.6 and 80.4 percent of GDP of the tertiary industry. Lastly, we compare the value of unpaid care work with the value of paid work. The value of paid work is calculated on the assumption that the population aged between 15 and 74 years in the urban and rural sectors, on average, spent 4.13 and 6.36 hours, respectively, on paid work each day and earned 13.0 and 6.1 *yuan*, respectively, per hour. The calculation yields a value of 17,515 billion *yuan*. Compared to this estimate, the value of unpaid care work is approximately 44–56 percent of the value of paid work. All the comparisons above suggest that unpaid care work represents a relatively large portion of work and value and that it therefore should not be neglected in policy making.

6. Conclusion

This paper has documented the gender patterns of unpaid care work, examined the interaction of unpaid care work with paid work and non-work activity, and evaluated the monetary value of unpaid care work and its contribution to the national economy using data from the 2008 China TUS. The analysis shows that as in many countries, in China, women bear primary responsibility for housework and care activities, while holding up half of the sky in the labor market. Compared to men, women encounter more rigid tradeoffs between paid work and unpaid care work. As a result, the total work time of women is much higher than that of men. The extent of gender disparity in time allocation varies with individual characteristics. Married women and women with pre-school children confront greater tensions between the dual tasks of paid and unpaid care work, whereas women who are more educated, come from families with higher incomes, and receive higher wages have greater time autonomy. Despite the variations, that women have less time for self-care and leisure than comparable men is a rather pervasive phenomenon in Chinese society. While the responsibility for housework and family care has made women more time poor than men, the macro-economic comparisons in the final sections of the paper show that unpaid care work represents a huge contribution to the national economic well-being.

Our analysis reveals the tension between paid and unpaid care work for women in China's new market economy. While both paid and unpaid care work are essential to national well-being, the overriding concern of the Chinese government in the post-reform period has been to improve the productivity of paid work and maximize growth of per capita GDP, assuming that the provision of domestic and care services will adjust itself accordingly (Cook and Dong, 2011). As a result, the role of the state and the employers as a provider of social goods and services has been eroded; responsibility for social reproduction and "care"—a domain principally of the state in the urban sector under the planned economy—has returned to the household. This process has considerable implications for the work and status of women in both the home and the marketplace. In the recent decade, the Chinese government began to address rising inequalities with a renewed interest in social policies (Wang, 2008). Undoubtedly, policy initiatives such as increasing investment in time-saving infrastructure in rural areas and expanding early childhood education programs will help to mitigate the work–family conflicts facing Chinese women. Hopefully, the new policy development will

provide opportunities and policy openings for acknowledging and supporting the care economy, thereby making China's new market economy work better for women.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

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