# Market Wages, The Price of Childcare and Mothers' Time Allocation in China[1][2]

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Abstract: Using CHNS dataset from the 2004 to 2009, we will study time choices by mothers who have children aged below 6 years old. We estimate a five-equation system in which the dependent variables are the minutes used in home production, active leisure, market work, child care-giving and sleeping. The results based on the pooled individual observations suggest that childcare is distinct from both leisure and home production, and should be considered separately when doing the time allocation research of mothers. With women' own wage increases, employment minutes are increased while all the other four time patterns were decreased, assuming that the substitution effect is greater than the income effect. The trade-off between employment time and childcare time is larger than the trade-off among employment, home-production and leisure. Informal childcare substitution, such as female elders who lived closely, shows more substantial impact on mothers' time allocation than the formal ones. Besides, sleeping time of new mothers will also react to the wages and the childcare substitutions and should be considered when doing time research.

Key Words: leisure, sleeping, mother's time allocation

[1] This very preliminary draft is just for the AEEA meeting in 2014 and please do not quote.
[2] This study is supported by National Natural Science Foundation of China, Project 71173126, 71103212.
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# I. Introduction

In modern society, a great many women are faced with the conflict between family and work. On the one hand, women have attained more and more education and become an important part of the labor force, and therefore spend considerable time and effort in income-earning working; on the other hand, production and reproduction activities which are carried out inside family, such as taking care of children, looking after sick or old family members, and all kinds of household chores, are still regarded mostly as women's responsibilities in various parts of the world. In response to economic arguments that women and men rationally allocate time to fulfill necessary tasks, such as paid and unpaid work, some scholars of gender emphasize the additional influence of gendered time constraints (Bianchi, Milkie, Sayer, and Robinson 2000) and practices of "doing gender" (South and Spitze 1994; West and Zimmerman 1987). They contend that gendered expectations and practices, rather than pure economic rationality, mean that women are burdened with a greater "second shift" of unpaid household work (Hochschild and Machung 2003), even though male partners' contributions to tasks like childcare have risen in recent years (Bianchi, Milkie, Sayer, and Robinson 2000; Sayer 2005). These additional responsibilities could limit career opportunities and reduce women's access to discretionary time. Needless to say, such predicament is extremely severe for women who have young children. It is quite common in many countries, especially in developed economies that working women shift to part time jobs, or temporarily quit their jobs due to child birth and care responsibilities, while those who remain in working often get help from child care services, including public and private daycare centers or kindergartens in community or working place, and employed domestic workers.

In China, like in anywhere else, women with young children undertake a heavy double burden, too, but it is very hard for them to ease their lives by reducing paid work time, or temporarily giving up job, or outsourcing childcare tasks. For one thing, part-time jobs or flexible working schedules are not very common for women to facilitate family-work balance in China. According to the statistics based on 2008 Time Use Survey of China, employed women spend an average of about 6 hours (364 minutes) per day doing paid work, only slightly (22 minutes) less than their male counterparts (NSBC 2010). For another, whilst it is true that Chinese women's labor participation rate has been in decline during China's transformation towards market economy, it is still as high as 64% in 2012, ranking the fortieth among 184 countries and regions (data source: WDI). There are still millions of women with young children who have to keep on working to support their families in China. Apart from the influence of the institutional legacy from the pre-reform era, it is the low level of labor income that seriously restricts Chinese women's choice of quitting their jobs. Moreover, because of the low income level, the feasibilities of employing domestic workers or use private child care services are very limited for most Chinese families as well. Meanwhile, as Cook and Dong (2011) point out, much is the Chinese government's concern to boost the growth of productive economy, the support of the government and the employer for care provision has been substantially cut back. Consequently, the pressure on women with young children to play the dual role as mothers and income earners is intense. A lot of women have to resort to their parents, in most instances, their parents-in-law, to make it possible for them to continue to work when their children are young. A previous study has documented a high rate of co-residence between young grandchildren and grandparents, along with an extensive childcare involvement by co-residential and non-coresidential grandparents (Chen, Liu, and Mair, 2011).

Given the growing attention paid to child care and women's welfare in literature, the time allocation of women with young children has yet been adequately investigated. However, it is obvious that child raising, especially raising preschool children, is one of life's major challenges and plays a central role in a woman's life course. Analyzing how women behave under such a most rigid family burden will enable us to deepen our understanding about the linkage between labor market and family, and help to improve public policies concerning care provision.

This study focuses on the time allocation pattern of women with young children aged 0 to 6 years old in China. Using China Health and Nutrition Survey (CHNS) data, we first describe how women with children under 6 years old among five categories of activities: paid work, childcare, housework, leisure, and sleeping. Our time-use categories are different from those in previous studies in that we not only distinguish childcare from other home production activities, but also separate sleeping from leisure time. Further, we conduct multivariate regressions to analyze how these women's time allocation varies in association with economic, demographic, and social factors.

Our results show that unlike housework time, women's caregiving time is inelastic to all economic factors but their own labor income, and the wage elasticity of caregiving time is negative. The increase of the young child's age and the presence of the women's mother or mother-in-law can largely reduce women's caregiving time. Conditions at community level, including the average daily wage of baby-sittings, the existence and the monthly fee of private childcare institutions, have no significant effect on women's caregiving time. Nevertheless, community-level factors have some influence on women's time spent on other activities. In addition, we find that women's sleeping time indicate some different pattern than leisure time in response to the variation of influencing factors.

The rest of this paper is organized as follows. Section II reviews the economic literature on time allocation in a simple way. Section III outlines a behavioral model of five distinct time uses for mothers of young children, while Section IV introduces our estimation strategy. Section V discusses the CHNS data. Section VI presents our results and Section VII summarizes the findings.

# II. Literature Review

In order to get an in-depth understanding of the time-allocation behavior, it is necessary to define time-use categories in accordance with the goal of research. The initial and most general time allocation model contains only two categories: labor and leisure (Robins, 1930). Later, by differentiating household production from leisure, standard neoclassical model of household time use assume people allocate their time between three basic activities: market work, home production, and pure leisure (Becker, 1965; Gronau, 1977; Graham and Green, 1984). From then on, researchers have introduced various additional time categories into the neoclassical trichotomy framework.

Among all kinds of the new time categories, child care is the most frequently studied and has the greatest policy relevance. From an economic perspective, it is desirable to separate child care from other household work, because unlike other household productions, child care cannot be perfectly substituted by market goods, and parents can obtain utilities from the caregiving process (Kimmel and Connelly, 2007). The differences between child care and other household work has been supported by empirical evidence, which shows that they are different in subjective experience, gendered pattern, relationship with educational attainment, time trend, and so on (Sullivan, 2013).

While many time allocation studies are about couples, often dual earner households (Kooreman and Kapteyn, 1987; Nock and Kingston, 1988; Van den Brink, Maassen, and Groot 1997; Sousa-Poza, Schmid and Widmer, 2001; Hallberg and Klevmarken 2003), some other studies concentrate on women, the prime care giver and the most affected by caregiving. The results of the later group of studies illustrate how women's caregiving time varies subject to a series of personal, family, community and labor market characteristics. Miller and Charles (2000) find that in Austrilia, better educated women allocate significantly more time to child care than less-educated women. Kim (2001) demonstrats that in the US, there is a crowding-out effect between school expenditure and mother's child care: facing an increase in school expenditure, lower-educated mothers decrease their child care time. Sivakami (2010) reports that Indian working women spend significantly less time on childcare activities overall compared to non-working women, but the gap is mainly comprised of time playing with children. Shin (2013) finds that Mexican single mothers benefit from coresiding with female extended family members in terms of their time for child care and domestic work.

Closest to our study is Kimmel and Connelly (2007), which investigates mothers' time allocation between four activities: time: (paid) market work, (unpaid) home work, child care, leisure and other using data from the 2003 and 2004 American Time Use Survey. They find that mothers' caregiving time increases with the number of children, decreases with age of the child, and increases with the price of child care. They also find substantial positive wage elasticity for caregiving time, while both leisure and home production time declines with increased wages.

In this study, we aim to describe the pattern, and examine the influencing factors, of the time allocation of Chinese women with children under 6. A major difference of our approach from previous studies is that we separate sleeping time from leisure time, hence extend the time categorization from four to five. Commonly being regarded as a basic physiological need, sleeping is indeed affected by economic factors. Sociologists have much to add to what is currently a largely biomedical literature that examines sleep as a health risk factor, by exploring how gender stratification in day to day responsibilities as parents, workers, and spouses shapes access to adequate sleep (Patel 2007). Researchers have provided novel empirical evidence of women's greater likelihood of sleep interruption for care-giving work, particularly among parents of young children (Burgard, Ailshire and Hughes, 2010). Biddle and Hamermesh (1990) find that higher wage rates reduce sleep time among both men and women, though among women the wage effect on sleep is very small. Also, sleep time is significantly associated with work and family responsibilities and time spent on other activities, as Burgard and Ailshire (2013) find out in their recent study.

Our emphasis on sleep time is based on observation of real life, too. Chinese women with young children are greatly troubled by lack of sleep. According to Chinese tradition, young child generally shares a bed with the mother during night, and the mother has to take care of the child from time to time. Unless there is someone else who can perform the mother's role in night, usually a grandmother or a nanny, the mother will suffer from sleep deprivation for years after the baby's birth. Needless to say, lack of sleep during long periods will inevitably lead to fatigue, exerting negative effect on women's physical and mental health. Therefore, it would be useful to take sleep time into account when we study women's welfare.

# III. Theoretical model

The standard neoclassical utility maximizing problem is:

$$maxU = U(T_r, CW, G)$$

Where mother's utility is a function of rest time ($T_r$), children' welfare($CW$), and aggregated adult consumption of final goods and services ($G$).

Mothers' total rest time should include leisure ($t_L$) and sleeping time ($t_s$), $T_r = t_L + t_s$; Adult consumption goods, G, are home produced with a combination of home production time, $t_{hp}$, and purchased intermediate goods $X$: $G = G(t_{hp}, X; \theta)$. $\theta$ is an efficiency parameter which is affected by differences in ability, but also by differences in personal investment including sleeping time and educational endeavors. Children's welfare (CW) is determined by mother's care and childcare substitution, formal or informal, $CW = f(t_{mcc}, CS; \vartheta)$. ).Like $\theta$, $\vartheta$ is an efficiency parameter, which might affected by mother's characters, such as education level, and the nature of childcare substitution.

Mothers' time constraint and a budget constraint are:

$$T = t_{em} + t_{hp} + t_{mcc} + t_L + t_s$$

$$P_X X + P_{cs} CS + P_G G = wt_{em} + V$$

where, total time ($T$) can be divided into market-paid time ($tem$ ), home-production time ($thp$), care giving time ($tmcc$), leisure ($t_L$) and sleeping time ($t_s$).

Firstly, we should consider the availability of the informal and formal childcare services: $CS_I$ and $CS_F$. Conditioning on the availability of childcare substitution, the above constraints result in three distinct costs of a mother's time: the cost of time in the labor market should be the price of childcare substitutions minus market wages, i.e., $\emptyset(\mathrm{CS}, \mathrm{Pcc}) - \mathrm{w}$, where Pcc is the price of the childcare substitution; when children are cared by mothers themselves, the cost of childcare time shoule be the market wage, w; when the mother is engaged in leisure, sleeping or home production activities while children are cared by an alternative caregiver, the price of time should be wage plus the price of childcare, i.e. $\mathrm{w} + \emptyset(\mathrm{CS}, \mathrm{Pcc})$.

The availability and price are different for different kinds of childcare substitutions. We assume the price of care by elders is zero and all concerned in our analysis framework is if this kind of childcare service is available. While for the baby-sitting, the only thing should be concerned is only the price. For the childcare institutions, we will consider the availability and price at the same time.

Since the cost of time is different for all kinds of time patterns, the wage and the price of child care must appear separately in any estimation model.

Then the time-demand functions can be written as:

$$t_j = f(w, CS, P_{cs}, V | Z, H, C) \quad for\ j = em, hp, mcc, L, s$$

Time use is related to factors reflecting the value of time, including the wage and the availability and the prices of different kinds of non-parental childcare for women, the amount of non-labor income available to the mother, all of which are expected to be related to personal characteristics of the mother, Z, characteristics of the household in which she resides, H, and characteristics of the community, C, such as the situation of the local labor market.

# IV. Empirical Strategy

Our basic estimation model is a system of five linear time use equations based on the time-demand equations:

$$t_j^* = \beta_{0j} + \beta_{wj}' w + \beta_{csj}' CS + \beta_{cj}' X^C + \beta_{mj}' X^m + \beta_{Dj}' D + \varepsilon_j \quad \text{for } j = em, hp, mcc, L, s$$

where tj is the latent number of minutes in a week a mother would choose to spend in activity j.

The income variables $w$ include the hourly wage of mothers[4], the maximum hourly income of other persons in the household[5], and the non-labor income of the household. The variables $CS$ include both the availability and the price of childcare substitutions. The $X^c$ include standard demographic characteristics of the children, i.e., the children's number, gender and age. The $X^m$ contains mother's characters including mother' education year and age. The model also includes district-specific dummy variables and year dummy variables. The definitions of all explanatory variables are given in table A1 in the appendix.

As there might be a fraction of individuals have zero values for many kinds of activities in the time use data, researches incline to find an approach to dealing with these zero-value observations. Researchers have used OLS(Foster and Kalenkoski,2008), a two-part model similar to the one proposed by Cragg (1971) (Cawley and Liu, 2007), and Tobit (Foster and Kalenkoski,2008; SouzaPoza, Schmid, and Widmer, 2001; Kalenkoski, Ribar, and Stratton, 2005; Kimmel and Connelly, 2007). Some authors report estimates from more than on estimation procedure (Hamermesh, 2009; Price, 2008). Although Tobit has been the predominant approach in more-recent studies, , Stewart(2009) noted that estimated marginal effects from Tobits are biased, and the two-part model performs significantly better but generates biased estimated in certain circumstances, while only OLS generates unbiased estimates in all of the simulations considered here.

In our case, we must account for the fact that five observed time uses come from the same sample respondent. More time used in one activity likely means less time used in some other activity. We assume that ε the error terms are correlated across equations due to unobserved household characteristics in the following way:

$$\begin{pmatrix} \varepsilon_L \\ \varepsilon_{cc} \\ \varepsilon_{hp} \\ \varepsilon_{em} \\ \varepsilon_s \end{pmatrix} \sim N\left( \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_L^2 & \rho_{Lcc}\sigma_L\sigma_{cc} & \rho_{Lhp}\sigma_L\sigma_{hp} & \rho_{Lem}\sigma_L\sigma_{em} & \rho_{Ls}\sigma_L\sigma_s \\ \rho_{Lcct}\sigma_L\sigma_{cc} & \sigma_{cc}^2 & \rho_{cchp}\sigma_{cc}\sigma_{hp} & \rho_{ccem}\sigma_{cc}\sigma_{em} & \rho_{ccs}\sigma_{cc}\sigma_s \\ \rho_{Lhp}\sigma_L\sigma_{hp} & \rho_{cchp}\sigma_{cc}\sigma_{hp} & \sigma_{hp}^2 & \rho_{hpem}\sigma_{hp}\sigma_{em} & \rho_{hps}\sigma_{hp}\sigma_s \\ \rho_{Lem}\sigma_L\sigma_{em} & \rho_{ccem}\sigma_{cc}\sigma_{em} & \rho_{hpem}\sigma_{hp}\sigma_{em} & \sigma_{em}^2 & \rho_{ems}\sigma_{em}\sigma_s \\ \rho_{Ls}\sigma_L\sigma_s & \rho_{ccs}\sigma_{cc}\sigma_s & \rho_{hps}\sigma_{hp}\sigma_s & \rho_{ems}\sigma_{em}\sigma_s & \sigma_s^2 \end{pmatrix} \right)$$

Using the information about the error correlation in the estimation procedure is expected to increase the precision of the parameter estimator. Considering the nature of our pooled data, it will be safer to do the estimates using OLS and considering the contemporaneous (in the same time period) cross-equation error correlation at the same time. That's why we will use the Seemingly Unrelated Regression (SURE) to do the estimates[6] and will use yearly dummy variables and

[4] The hourly wage of mothers are entered following the subsequent rules: we will use the real one for the mothers who having labor income and the predicted wages for the mothers who do not enter the labor market using Heckman two-stage method. The preliminary result of Heckman two-stage estimation can apply from the author.

[5] As a large part of the information of husbands in our sample is missing, we use the maximum hourly income of other persons in the household to be a proxy of the income of husband.

[6] About the worrying for the censored nature of the time use data, we will use multivariate Tobit estimates to do the sensitive analysis and find the results between SURE and Multivariate Tobit is very similar. The results of

covariate to test the structural change of the system across time.

# V. Data

The data used in this study come from the Chinese Health and Nutrition Survey (CHNS), jointly conducted by the University of North Carolina and the Chinese Academy of Preventive Medicine, Beijing. The survey took place over a 3-day period using a multistage, random cluster process to draw a sample of about 4400 households with a total of 26,000 individuals in nine provinces, say, Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong, that vary substantially in geography, economic development, public resources, and health indicators. In addition, detailed community data were collected in surveys of food markets, health facilities, family planning officials, and other social services and community leaders. The survey is currently composed of nine waves, from 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011.

Not all kinds of time use pattern were surveyed in each specific survey year, which constrained our total useful sample number. Since the questionnaires of the time allocation part before 2000 are quite different from those used after 2004, and the PE data in 2011, which is used to generate the leisure time, is not released yet, only three waves are used in our analysis. Besides, as the childcare time only surveyed for people having children less than 6 years old, we will focus on the mothers who have children younger than 6 years old. After dropping the missing variable of our key variable, such as time categories, the predict women's labor income, and the characters of women and children, we have total number of 1329 samples, with 445 in 2004, 415 in 2006 and 469 in 2009 separately.

Seen from Table 1, the proportion of time allocation on childcare is pretty large, partly due to the young mother sample. Young mothers spent most time on sleeping, then on working, childcare, leisure and housework. Different time usages have experienced different changes from 2004 to 2009. It shows gradual decline in working time, increasing leisure time and childcare time, while little changes in times spent on housework and sleeping. Comparing the results shown in Figure 1 and Table 1, working hours decreased with the decline in labor force participation rates and also in working hours of existing workers. Contrary to it, time spent on leisure and childcare was increasing.

# VI. Empirical Results

Considering the nature of our pooled data, it will be safer to do the estimates using OLS and considering the contemporaneous (in the same time period) cross-equation error correlation at the same time. The Breusch-Pagan LM test for diagonal covariance matrix shows that we should not ignore the correlation between error terms of all five time use patterns and it is necessary to capture five kinds of time use patterns employing by the methods of the Seemingly Unrelated Regression (SURE) to do the estimates[7]. As we use pooled data, we will use yearly dummy

multivariate Tobit can be asked from the author.

[7] About the worrying for the censored nature of the time use data, we will use multivariate Tobit estimates to do the sensitive analysis and find the results between SURE and Multivariate Tobit is very similar. The results of

variables and covariate to test the structural change of the system across time. Table 2 shows the SURE results.

## A. wage effects

Childcare is distinct from both leisure and home production. Unlike housework time, women's caregiving time is inelastic to all economic factors but their own labor income, and the wage elasticity of caregiving time is negative. Different sources of income have showed different effects on mothers' time use choice.

With women' own labor income increases, employment minutes are increased and all the other four time patterns were decreased, just as in the standard neoclassical model, assuming that the substitution effect is greater than the income effect. The maximum hourly labor income of other persons in the household shows significant effect on the leisure, working and home production, while have no significant effect on sleeping and childcare. The negative effect of other person's labor income is because it not only represents the pure income effect but the relative bargaining power of women.The non-labor income, which shows the pure income effect, have significant positive effects on leisure and negative effect on home production. Sleeping time indicate some different pattern than leisure time in response to the variation of income.

## B. the effects of childcare services

Childcare is also distinct from both leisure and home production when we considering the availability and the price of childcare substitution. Conditions at community level, including the average daily wage of baby-sittings, the existence and the monthly fee of private childcare institutions, have no significant effect on women's care-giving time. Nevertheless, community-level factors have some influence on women's time spent on other activities.

Women's time choices are more sensible to the availability of informal childcare services and the babysitting fees, not the formal childcare institution. The existence of informal childcare, i.e. female elderly living closely, will significantly relax women's time constraints, including increasing the working time and decreasing the childcare time and home-production.

The increasing of babysitting wages in the community will decrease the working time of women sharply and might be one possible reason for the declining of women's labor force participation. The availability of care institution instead of the fee will have impact on women's time choice. The existence of care institution for children below 3 shows no significant effects, while that for children between 4 and 6 might help to release the time burden of women with positive impacts on women's leisure and housework choice.

Sleeping time also indicate some different pattern than leisure time in response to the variation of influencing factors, as it will react to the existence of informal childcare while leisure would not and show a negative but slightly small reaction to the babysitting fees.

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multivariate Tobit can be asked from the author.

## C. The effects of other characteristics

The effect of children's age on time use is to increase employment time and leisure time, and decrease the childcare time , while has no effect on home production and sleeping time. Besides, it seems that there are trade-off between childcare time and other kinds of time use and most part of the decreased childcare time has changed to the working time.

The gender of child(boy=1) has no significant effect on time use, except for the sleeping time. Educated mothers have more leisure time and less home production time, while mothers' education level has no significant effects on childcare time. The unemployment rate in the district will have negative impact on the working and sleeping time. Mothers in urban neighborhood and suburban village has more leisure and working time, while less sleeping time than the rural mothers.

### Correlation Between Time Use

The Table3 shows the estimated correlations between the five uses of time. The trade-off between employment time and home-production time is a little larger than it between em and leisure, but much smaller than it between working time and childcare time. This is still further evidence that childcare time is behaving like neither home-production nor leisure.

### test the structural change of the system across time

As we use pooled data to do the estimate, we want to check if there are significant structural changes across years. We add cross term of year dummy to the function and finally find that there is almost no difference across years. Chow test showed no significant difference between individual years.

### Disaggregating the time use category

Not so much different on the determinants on leisure time between the weekdays and weekends. Much difference among the specific actions of home production: Cooking time is the most sensitive to all the control variables, and will decrease with women's self wages, household non labor income, women's education level and whether female elders lived closely. Educated women has less cooking time with others, while have no significant difference with cleaning and washing time. The female elders lived closely has the biggest effect on the cooking time, which will decrease the cooking time of mothers for about 12 minutes per day.

# VII. Summary and conclusions

In this study, we focuse on the time allocation pattern of women with young children aged 0 to 6 years old in China. We identify the determinants of mothers' time choices among leisure, working, housework, childcare, and sleeping, and examine how the availability and costs of childcare substitutions affect competing time choices of new mothers. We found that the determinants of mothers' time allocation in China are much different with the mechanism of the developed countries.

Firstly, as for mothers, childcare is distinct from both leisure and home production, which means childcare time and home production should be considered separately when doing the time allocation research for mothers. Unlike housework time, women's care-giving time is inelastic to all economic factors but their own labor income, and the wage elasticity of care-giving time is negative.

Secondly, women's sleeping time indicate some different pattern than leisure time in response to the variation of influencing factors. At lease for the women with young children, sleeping time should not be seen simply as the basic physiological need and also be separated from the leisure time when doing time use analysis.

Thirdly, women's working time are more sensitive to her own wage compared to other kinds of income and to all the other time use. The trade-off between employment time and childcare is biggest comparing all the others.

Finally, women's time choice are more sensitive to the informal childcare substitution, such as old people in the family, compared to the formal childcare institution, just as the tradition. Elders living closely might help to release young mothers' time pressure sharply through the channel of helping mothers to take care of children and cooking. Informal childcare substitution, such as female elders in the household, shows more substantial impact on mothers' time allocation than the formal ones.

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# Appendix

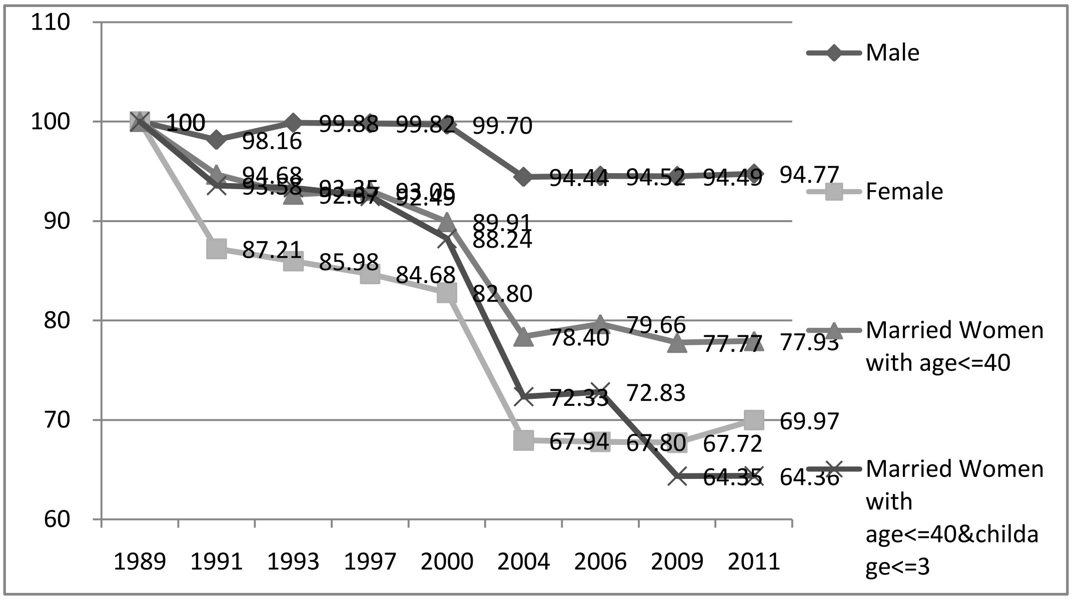
Table A1 Variable definitions

| variable name | label |
|---|---|
| leisure | leisure time, mins/week |
| working | working time, mins/week |
| housing | Home production time, mins/week |
| childcare | Childcare time, mins/week |
| sleeping | sleeping time, min/week |
| lfhinc | hourly labor income(log) |
| lmaxohinc | maximum hourly labor income of other persons in the household(log) |
| lhhnlinc | household non-labor income(log) |
| childnum | If the mother bear more than one child(yes=1) |
| minage_c | age of the smallest child |
| minage_csq | age of the smallest child(sq) |
| childgender | gender of the smallest child(boy=1) |
| age | mother's age in years |
| agesq | mother's age in years squared |
| eduyear | education years of mother |
| fold | mother's mom or mother in law live in the same household/next door or adjacent to household/same neighborhood/village |
| lbsdwage | Average dayly wage of baby-sittings in the community(log) |
| pcc03 | private childcare institution for children aged 0-3 in the community, yes=1 |
| pcc46 | private childcare institution for children aged 4-6 in the community, yes=1 |
| plcfee | the monthly fee of private childcare institution(log) |
| umrate | Umemployrate in the district, counted value |
| comm_d1 | comm_type==1. urban neighborhood |
| comm_d2 | comm_type==2. suburban village |
| comm_d3 | comm_type==3. county town neighborhood |
| comm_d4 | comm_type==4. rural area |
| year_d1 | 2004 |
| year_d2 | 2006 |
| year_d2 | 2009 |

Table A2. Descriptive Statistics: Key Variables in Regressions

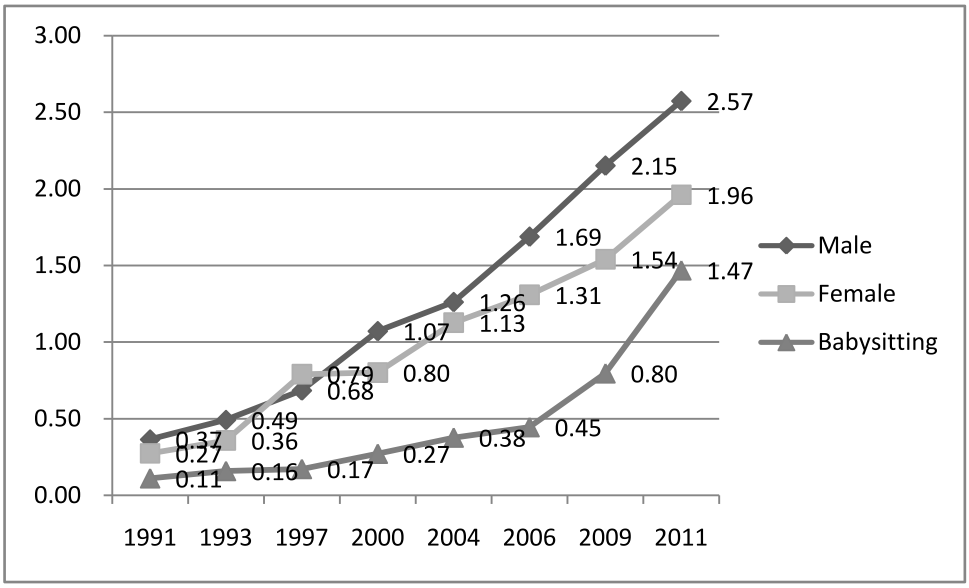
| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| leisure | 1329 | 1069.92 | 739.73 | 0 | 4560 |
| working | 1329 | 1844.36 | 1550.61 | 0 | 6720 |
| housing | 1329 | 920.33 | 648.42 | 0 | 4480 |
| childcare | 1329 | 1731.49 | 1814.89 | 0 | 8820 |
| sleeping | 1329 | 3474.09 | 438.10 | 1260 | 5880 |
| lfhinc | 1329 | 6.34 | 3.14 | 0.00 | 12.99 |
| lmaxohinc | 1329 | 7.46 | 2.50 | -2.33 | 14.30 |
| lhhnlinc | 1329 | 5.16 | 4.07 | 0 | 11.63 |
| childnumd | 1329 | 0.09 | 0.29 | 0 | 1 |
| minage_c | 1329 | 3.12 | 1.97 | 0 | 6 |
| minage_c2 | 1329 | 13.61 | 12.59 | 0 | 36 |
| childgender | 1329 | 0.51 | 0.50 | 0 | 1 |
| age | 1329 | 30.45 | 4.91 | 18 | 50 |
| age2 | 1329 | 951.44 | 308.44 | 324 | 2500 |
| eduyear | 1329 | 8.92 | 2.97 | 0 | 18 |
| fold | 1329 | 0.80 | 0.40 | 0 | 1 |
| lbsdwage | 1329 | 2.96 | 0.48 | 1.65 | 4.93 |
| pcc03 | 1329 | 0.30 | 0.46 | 0 | 1 |
| pcc46 | 1329 | 0.46 | 0.50 | 0 | 1 |
| plcfee | 1329 | 2.17 | 2.52 | 0 | 6.77 |
| umrate | 1329 | 5.76 | 4.20 | 0 | 23.13 |
| comm_d1 | 1329 | 0.09 | 0.28 | 0 | 1 |
| comm_d2 | 1329 | 0.19 | 0.40 | 0 | 1 |
| comm_d3 | 1329 | 0.14 | 0.35 | 0 | 1 |
| year_d1 | 1329 | 0.33 | 0.47 | 0 | 1 |
| year_d2 | 1329 | 0.31 | 0.46 | 0 | 1 |

Figure1. Substantial Decline in Labor Force Participation Rates of Chinese Females



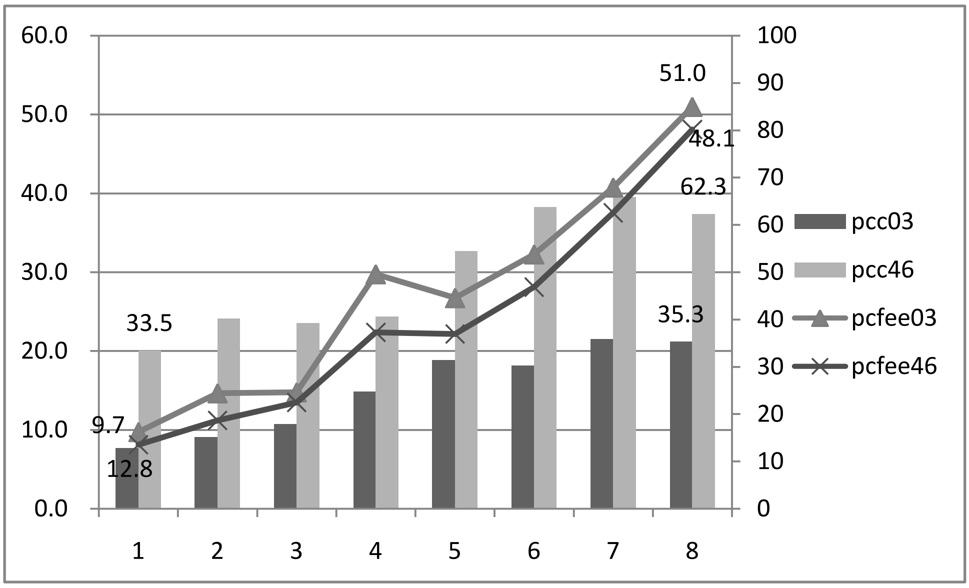

Data source: CHNS, 1989-2011

Figure2. Increasing Hourly Wages of Chinese Females, adjusted by CPI , in US dollars (Currency Change Rate in 2011)




Data source: CHNS, 1991-2011

Figure3. Availability and Increasing Costs of Private Childcare Institutes for Children aged 0-3 and 3-6 in Community (in US Dollars)




Notes: Pc: availability of private childcare institution for children aged 0-3 or 4-6 years old

Pcfee: fee of private childcare institution

Data source: CHNS, 1991-2011

Table1. Average Minutes Spent per Week on Leisure, Childcare, Home Production, Sleeping and Employment for Women with Children Younger than 6

| | home production | childcare | working | leisure | sleeping |
|---|---|---|---|---|---|
| Year | | | Including Zeros | | |
| 2004 | 954.15 | 1622.43 | 1943.89 | 1025.23 | 3518.89 |
| 2006 | 896.57 | 1667.75 | 1930.13 | 1026.68 | 3480.73 |
| 2009 | 953.75 | 1741.66 | 1676.58 | 1150.03 | 3424.89 |
| | | | Without Zeros | | |
| 2004 | 1034.32 | 2059.94 | 2720.24 | 1100.90 | |
| 2006 | 1000.02 | 1989.77 | 2619.92 | 1073.35 | |
| 2009 | 1045.42 | 2070.11 | 2582.25 | 1182.11 | |

Table2. Marginal Effects of Determinants of Minutes per week spent on Leisure, home production, Working, Childcare and Sleeping (SURE model )

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | leisure | working | housing | childcare | sleeping |
| lfhinc | -21.04*** | 209.2*** | -29.70*** | -83.03*** | -13.92*** |
| | (7.011) | (13.52) | (6.195) | (16.33) | (4.250) |
| lmaxohinc | 17.92** | -62.57*** | 22.46*** | -21.18 | 5.734 |
| | (8.846) | (17.06) | (7.816) | (20.60) | (5.362) |
| lhhnlinc | 9.925* | 6.306 | -20.77*** | -7.473 | 2.420 |
| | (5.150) | (9.933) | (4.550) | (11.99) | (3.121) |
| childnum | -119.5* | -67.25 | 21.30 | -149.2 | -21.91 |
| | (67.88) | (130.9) | (59.98) | (158.1) | (41.14) |
| minage_c | 72.26* | 373.1*** | 5.815 | -602.0*** | 1.126 |
| | (39.78) | (76.73) | (35.15) | (92.62) | (24.11) |
| minage_c2 | -8.940 | -37.44*** | -1.054 | 40.40*** | 0.913 |
| | (5.891) | (11.36) | (5.205) | (13.72) | (3.571) |
| childgender | -3.542 | -54.48 | -7.129 | 79.61 | -48.21** |
| | (39.51) | (76.21) | (34.91) | (92.00) | (23.95) |
| age | -29.23 | 63.01 | 51.79 | 2.864 | -63.98*** |
| | (38.25) | (73.79) | (33.80) | (89.08) | (23.19) |
| age2 | 0.266 | -0.753 | -0.475 | -0.361 | 0.821** |
| | (0.603) | (1.163) | (0.533) | (1.404) | (0.366) |
| eduyear | 53.36*** | 4.704 | -14.36** | -1.157 | 1.141 |
| | (7.672) | (14.80) | (6.779) | (17.86) | (4.650) |
| fold | -0.659 | 218.4** | -120.0*** | -269.0** | -105.4*** |
| | (49.95) | (96.35) | (44.14) | (116.3) | (30.28) |
| lbsdwage | -97.04* | -234.4** | 83.76* | 88.38 | -52.09* |
| | (51.47) | (99.28) | (45.48) | (119.8) | (31.20) |
| pcc03 | -10.81 | 76.13 | -42.86 | 155.2 | -21.21 |
| | (62.77) | (121.1) | (55.46) | (146.2) | (38.05) |
| pcc46 | 105.3* | -107.7 | 81.28* | 192.4 | -4.839 |
| | (55.64) | (107.3) | (49.17) | (129.6) | (33.73) |
| plcfee | -4.777 | 5.736 | -16.71 | -39.83 | 9.884 |
| | (13.15) | (25.36) | (11.62) | (30.62) | (7.970) |
| umrate | -7.854 | -28.51*** | -4.194 | -4.081 | -7.969*** |
| | (5.038) | (9.718) | (4.451) | (11.73) | (3.054) |
| comm_d1 | 164.2** | 319.3** | 98.07 | -279.1 | -181.6*** |
| | (80.79) | (155.8) | (71.38) | (188.1) | (48.97) |
| comm_d2 | 111.7** | 274.2** | 82.55* | -203.0 | -72.14** |
| | (56.04) | (108.1) | (49.52) | (130.5) | (33.97) |
| comm_d3 | -25.76 | 125.3 | -10.43 | -152.1 | -95.00** |
| | (64.33) | (124.1) | (56.84) | (149.8) | (38.99) |

| | | | | | |
|---|---|---|---|---|---|
| year_d1 | -179.9*** | 45.37 | 52.31 | -175.1 | 42.02 |
| | (58.62) | (113.1) | (51.79) | (136.5) | (35.53) |
| year_d2 | -190.9*** | 8.128 | -46.39 | -86.31 | 35.44 |
| | (53.01) | (102.3) | (46.84) | (123.4) | (32.13) |
| Constant | 1,595*** | -263.3 | -115.3 | 4,274*** | 4,987*** |
| | (610.8) | (1,178) | (539.7) | (1,422) | (370.2) |
| Observations | 1,329 | 1,329 | 1,329 | 1,329 | 1,329 |
| R-squared | 0.111 | 0.247 | 0.096 | 0.199 | 0.068 |
| BP test chi2(10) | 306.162 | | | | |
| Pr | 0.0000 | | | | |

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table3. Correlation matrix of residuals (SURE model )

| | leisure | working | housing | childcare | sleeping |
|---|---|---|---|---|---|
| leisure | 1 | | | | |
| working | -0.1572*** | 1 | | | |
| housing | 0.0266 | -0.2111*** | 1 | | |
| childcare | -0.0224 | -0.3521*** | 0.0523*** | 1 | |
| sleeping | 0.0479* | -0.1613*** | -0.0261 | 0.0648** | 1 |

Table4. Marginal Effects on the Leisure Time In Weekdays And Weekends, and On The Home Production Activities, Cooking, Cleaning, Washing (Minutes/day, SURE)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | exer_m | exer_s | cook | wash | buyfood | clean |
| lfhinc | -2.944** | -2.585** | -1.836*** | -0.961*** | -0.810*** | -0.740*** |
| | (1.202) | (1.207) | (0.503) | (0.296) | (0.246) | (0.203) |
| lmaxohinc | 2.253 | 3.499** | 1.758*** | 0.209 | -0.0579 | 0.841*** |
| | (1.516) | (1.523) | (0.637) | (0.375) | (0.312) | (0.257) |
| lhhnlinc | 1.915** | 1.261 | -1.149*** | -0.865*** | -0.580*** | -0.290* |
| | (0.883) | (0.887) | (0.368) | (0.216) | (0.180) | (0.148) |
| childnum | -20.60* | -20.83* | 6.839 | -0.982 | 0.789 | -4.834** |
| | (11.63) | (11.69) | (4.819) | (2.835) | (2.362) | (1.945) |
| minage_c | 7.718 | 15.11** | 0.252 | -1.452 | 1.984 | -0.0145 |
| | (6.817) | (6.850) | (2.838) | (1.670) | (1.391) | (1.146) |
| minage_c2 | -1.002 | -2.003** | 0.132 | 0.118 | -0.304 | 0.00462 |
| | (1.010) | (1.015) | (0.422) | (0.248) | (0.207) | (0.170) |
| childgender | -3.547 | 6.419 | -2.039 | -0.189 | -0.238 | 0.532 |
| | (6.771) | (6.804) | (2.834) | (1.667) | (1.389) | (1.144) |
| age | 1.683 | -3.411 | 2.867 | 2.958* | 1.226 | 1.408 |
| | (6.556) | (6.588) | (2.720) | (1.600) | (1.333) | (1.098) |
| age2 | -0.0479 | 0.0190 | -0.0219 | -0.0367 | -0.0111 | -0.0137 |
| | (0.103) | (0.104) | (0.0429) | (0.0252) | (0.0210) | (0.0173) |
| eduyear | 9.033*** | 9.373*** | -1.547*** | -0.507 | -0.00525 | 0.276 |
| | (1.315) | (1.321) | (0.549) | (0.323) | (0.269) | (0.222) |
| fold | 1.011 | -9.031 | -12.26*** | -2.058 | -3.335* | -1.063 |
| | (8.561) | (8.602) | (3.598) | (2.117) | (1.763) | (1.452) |
| lbsdwage | -4.999 | -18.64** | 2.203 | 1.154 | 3.796** | 4.454*** |
| | (8.821) | (8.863) | (3.680) | (2.165) | (1.803) | (1.485) |
| pcc03 | 1.677 | -3.922 | -7.135 | 2.065 | 0.656 | 1.085 |
| | (10.76) | (10.81) | (4.523) | (2.661) | (2.217) | (1.826) |
| pcc46 | 20.98** | 13.63 | 4.647 | 3.694 | 2.957 | 0.649 |
| | (9.536) | (9.582) | (4.003) | (2.355) | (1.962) | (1.616) |
| plcfee | -1.695 | -1.763 | -0.696 | -0.795 | -0.887* | -0.433 |
| | (2.254) | (2.264) | (0.953) | (0.561) | (0.467) | (0.385) |
| umrate | -0.703 | -1.398 | -0.354 | -0.153 | -0.131 | -0.0316 |
| | (0.863) | (0.868) | (0.359) | (0.211) | (0.176) | (0.145) |
| comm_d1 | 3.199 | 44.45*** | -5.241 | 6.028* | 4.636 | 5.722** |
| | (13.85) | (13.91) | (5.777) | (3.399) | (2.831) | (2.332) |
| comm_d2 | 7.506 | 34.39*** | -5.879 | 7.194*** | 3.593* | 4.942*** |
| | (9.605) | (9.651) | (4.013) | (2.361) | (1.967) | (1.620) |
| comm_d3 | -1.917 | 4.727 | -4.907 | 3.693 | 2.918 | -1.749 |
| | (11.02) | (11.08) | (4.633) | (2.726) | (2.271) | (1.870) |
| year_d1 | -28.66*** | -24.94** | 6.428 | -0.262 | 0.541 | 0.334 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (10.05) | (10.09) | (4.178) | (2.458) | (2.048) | (1.687) |
| year_d2 | -32.89*** | -31.74*** | 0.251 | -1.731 | -1.647 | -1.340 |
| | (9.085) | (9.129) | (3.800) | (2.235) | (1.862) | (1.534) |
| Constant | 105.1 | 227.9** | 5.134 | -6.197 | -8.637 | -17.68 |
| | (104.7) | (105.2) | (43.42) | (25.55) | (21.28) | (17.53) |
| Observations | 1,329 | 1,329 | 1,297 | 1,297 | 1,297 | 1,297 |
| R-squared | 0.095 | 0.120 | 0.102 | 0.047 | 0.050 | 0.070 |
| Breusch-Pagan test | 823.237 | | 510.729 | | | |
| P-value | 0.000 | | 0.000 | | | |