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ABSTRACT

How Has the Two-Day Weekend Policy Affected Labour Supply and Household Work in China?*

This paper examines the effects of working time reduction policy on labour supply (hours of work and whether an individual takes a second job) and household production, by exploiting the Chinese Two-Day Weekend Policy, which effectively reduced weekly working days from six to five in May 1995, as a natural experiment. We construct a theoretical model that predicts a decline in labour supply in both private and public sectors as work hours were reduced. In theory, the time spent on household production may increase or decrease or the time spent on the second job may increase or decrease depending on how much agents care about household production or the income from a second job. Using the China Health and Nutrition Survey, we adopt a difference-in-differences strategy to estimate the policy effects on work hours of wage earners in both public and private sectors. Relative to the control group deemed unaffected by the policy change, our estimates show that the Two-Day Weekend Policy significantly reduced the working hours of wage earners by 4 percent and the public sector by 5 percent while increasing the probability of having a second job by 3 percent and reducing the time spent on household work by 98-107 minutes per week. The results are robust to different specifications and a propensity score matching technique.

JEL Classification: J22, J28

Keywords: labour supply, time allocation, work hours, household production, second job, China

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How Has the Two-Day Weekend Policy Affected Labour Supply and Household Work in China?

I. Introduction

The effect of working time legislation on labour supply and household work has drawn considerable attention from researchers due to the related theoretical insights, empirical challenges, and policy implications. The standard income-leisure model tends to ignore the time input in the consumption process that may lead to misleading conclusions in that both cooking a meal and taking a vacation, for example, require the input of valuable time in addition to such materials as raw foods and airline tickets.

This paper utilizes a unique longitudinal dataset, the Chinese Health and Nutrition Survey (CHNS), and difference-in-differences and propensity score matching methods to examine the impact of the Chinese Two-Day Weekend Policy change in 1995 on various dimensions of labour supply (changes in working hours in both public and private sectors and in the public sector only and changes in probabilities of holding a second job) and on household production (changes in hours spent on household production and time spent on detailed tasks of household production). Our identification strategy relies on the key assumption of parallel trend of the difference-in-differences model that the treatment groups have similar trends to the control groups in the absence of treatment. Figure 1 provides a visual evidence of such trend, showing that the treatment and control groups (defined as fulltime wage earners vs. non-wage earners in panel A and public sectors vs. private sectors in panel B) have a common trend in average weekly hours worked prior to the Two-Day Weekend Policy change in 1995. Since then, however, worked hours of the treatment groups dropped markedly but not the control groups. As expected in our empirical analysis, the change from the One-Day Weekend Policy to the Two-Day Weekend Policy in 1995 consistently and significantly reduced hours of work for the primary job in both public and private

sectors and in the public sector only across different model specifications. Perhaps somewhat surprisingly, the policy change also significantly reduced the time (measured in minutes) spent on household production and on almost all frequent and time-intensive detailed tasks of household production (buying food, preparing food, and washing clothes) with one notable exception – the time spent on the less frequent task of housecleaning increased. We contend that such a decrease in household production time can be explained by the significant increase in taking a second job among Chinese workers after the policy change, which is consistent with the stage of Chinese economic development in which Chinese workers place a higher value on labour market earnings than on other every life tasks, such as household production.

In addition, it is of direct policy interest to investigate how the exogenous increase in leisure time as a result of changing working time policy while controlling labour earnings can lead to various potential outcomes, including increasing total consumption and changes in types of consumption, such as preparing meals at home, dining out, recreational expenditure, and home services (nanny fees, household maintenance expenditure); creation of new jobs or an increase in second jobs; productivity enhancement as a result of increase in leisure time; and an increase or decrease in time spent on household production and the detailed tasks of household production. For example, the Two-Day Weekend Policy was intended in part to encourage consumption, stimulate the economy, and create jobs for those who had been laid off from state-owned enterprises (SOEs) since 1993 as a result of major structural reforms in the SOE sector. However, the extent of the overall effects of this policy change on labour supply and household work is indefinite, depending on the stage of economic development and tradeoffs between leisure, consumption, and wage-earning opportunities.

The remainder of this paper is organized as follows. Section 2 reviews the background of the Two-Day Weekend Policy and the relevant literature. Section 3 provides theoretical frameworks and develops research hypotheses to be tested. Section 4 describes the data and research design. Section 5 presents and discusses the empirical results; finally, section 6 provides concluding remarks and policy lessons.

II. Literature Review

The existing scheme of working time in China dates back to May 1995, as shown in *Figure 2*, when the State Council of China reduced the weekly working days from six to five through Executive Order 174. The road to the reform of working hours had been long and controversial. When Communist China was first founded in 1949, people throughout the country were enthusiastic and tirelessly devoted to the construction of their new homes; they willingly worked overtime without receiving much leisure time or equivalent compensation. However, the shortcomings of such a system were revealed gradually. Workers might take time to read newspapers, temporarily leave a position without permission, slow down, etc., during official business hours, primarily due to the lack of rest under the "6-1" (six days of work and one day off per week) policy. To address the problem of declining workforce productivity, policy makers in the Chinese government conducted a national survey in 1986, aiming to gauge workers' preferences between leisure and income; however, it remained unclear how the participants would actually allocate an extra day of non-working time or whether they simply preferred more flexible life-work arrangements. In February 1994, the State Council of China launched a new policy, making Saturday a public holiday every other week, to reduce the average weekly working hours from 48 to 44. As a transitional policy, it faced some difficulties in the real world because of the inconsistency and lasted only until the next update was made in May 1995. In the meantime, China

was experiencing one of its most important reforms, of which the primary task was to shift the industrial structure from SOEs to privately owned enterprises. This reform was a strong signal that China was integrating its economic and social system with the mainstream systems of the world and making a transition from a central planning economy to a market-oriented economy. The working time structure in China was therefore expected to be consistent with international standards. A non-negligible goal of the implementation of this policy was to reduce the unemployment caused by the industrial structural reform by reallocating reduced working hours to the employment of workers laid off from the SOE sector. However, this notion has undergone considerable debate (Lin and Yang, 2003; Calmfors, 1985; Hart 1987). Another policy objective was to advance productivity given that the efficiency of working time was considered substantially low before the working time policy was changed in 1995 (Ortega 2003). It was widely expected that people would transfer much working time to leisure or household work, leading to lower proportions of actual working time than in most developed economies. In addition, on the supply side, the reduction in working time theoretically may also promote undertaking secondary jobs (Wielers et al., 2014). With the demand for reform, China's working time system has undergone drastic changes and become more sophisticated, and such working time reform provides an excellent natural experiment to estimate the effects of changes in working time on labour supply, household production, and labour productivity.

Numerous studies have been conducted to analyse the effects of working time reduction. Hart (1987) theoretically and empirically analysed the relationship between the reduction in working hours and the degree of employment, pointing out that the employment effects depended on the type of unemployment and the production function and that many other factors and a policy that focused on reducing working time did not lead to a significant reduction in unemployment. Scott

and Spadavecchia (2011) argued the drawbacks of a 48-hour week for British industrial workers, indicating that prolonged working time is a critical factor in depressing workers' productivity. They investigated three major export industries in Britain and analysed how the change in the working time structure would influence industrial productivity in the short term. The findings showed that these typical three industries did not experience significant productivity loss from the reduction in working hours since the rise in employees' incentives advanced productivity; hence, the loss in hours was correspondingly compensated.

Some scholars have also studied this issue at the national level. Ngok (2008) reviewed the changes in labour policy and labour legislation after the new Chinese government was established in 1949 and suggested that such labour policy changes were driven primarily by the unemployment crisis of the 1970s and 1980s. The reduction of weekly working hours from 48 to 40 in 1995 was the most important working time reform in China because it coincided with the period of China's employment system reform, which transformed lifelong employment to contract-based employment and replaced the government-assigned employment system with a competitive labour market. Such examples can be also found in the United States and European countries. Research on working time restrictions indicated that more US employees prefer working fewer hours to making more income (Altonji and Paxson 1988; Martinez-Granado 1999). However, restrictions on working hours to some extent prohibited employees from freely moving to another job with satisfactory working hours. Böheim and Taylor (2004) used British panel data and obtained similar results. They concluded that working time constraints significantly reduced employees' utility by lowering the extent of labour mobility. Tijdens (2003) focused on the banking sector in the Netherlands and surveyed the employees of different groups to collect their opinions on the reduction of working time. The results of the survey and regression analyses indicated that low-

income workers, part-time workers and supervisors tended to be less in favour of working time reductions, while female workers showed high enthusiasm for such a reduction.

III. Conceptual Framework

A. The Effect of Working Time Reduction on Labour Supply and Household Work

Calmfors (1985) discussed the effects of a reduction in working time on wages and employment and found that the effect is unclear when overtime is considered a proxy for employment. By using German individual data across industries, Hunt (1999) found that standard hours reductions may reduce employment while increasing the hourly wage rate. Marimon and Zilibotti (2000) used a general equilibrium model with search-matching frictions to analyse the impact of working time reduction and found that a small reduction in working time helps improve employment, but a great reduction in working time is not helpful. After a mandatory reduction in working hours from 40 to 39 hours a week in France, Crepon and Kramarz (2002) found that workers who worked 40 hours or more per week were more likely to lose their jobs than those who worked fewer hours.

In China, the Chinese Urban Household Survey (UHS) has been conducted for more than two decades. Moreover, on 1 May 1995, the Chinese government reduced the number of working days in a week from six to five. This exogenous change in working hours provides an excellent opportunity to check how the reduction of working hours affects labour supply and consumption from the supply side of employment. In this paper, therefore, we propose to build a theoretical model to investigate the impact of working hours reduction on labour and consumption and use empirical estimates to examine the influence of this reduction on the economy using Chinese microdata.

In Chang et al. (2007), the demand side of employment is considered in the discussion of how a reduction in working time affects the demand for newly hired workers and employment stock. However, the supply side of employment is absent. In this paper, we consider the supply side of employment and discuss how a reduction in working time affects employment in a partial equilibrium model.

Following Chang et al. (2007), we consider two sectors: the private sector, in which agents can decide their labour supply, and the state sector, in which the labour supply is fixed and determined by labour law. Furthermore, we follow Chang et al. (2007) and assume that the actual working hours in the state sector, h_{1s}, is equal to a constant number of working hours, $\bar{h}$, and that agents earn a salary, w_s, for their constant labour supply, while the actual number of working hours in the private sector, h_{1p}, is greater than $\bar{h}$, and agents can receive an overtime premium for $h_{1p} - \bar{h}$ such that their labour income equals $w_p h_{1p} + \emptyset w_p(h_{1p} - \bar{h})$, where w_p is the hourly wage rate and $\emptyset$ captures the degree of the overtime premium.

In the private sector, agents can work overtime. Their preference is as follows:

$$U = \max_{(h_{1p}, h_{2p})} \theta_1 ln\ _{1p} + \theta_2 ln(H - h_{1p} - h_{2p}) + (1 - \theta_1 - \theta_2) ln c_{2p} \quad (1)$$

s.t.

$$c_{1p} = w_p h_{1p} + \emptyset w_p(h_{1p} - \bar{h}) \quad (2)$$

$$c_{2p} = h_{2p}^{\gamma} \quad (3)$$

where c_{1p} denotes pure consumption, such as dining in restaurants, buying clothing, etc.; c_{2p} denotes the consumption of household production, such as preparing and eating meals at home, or the consumption from the income of a second job; H is the total time endowment; h_{1p} is the labour supply for earning wage income; household production is a concave function of time, h_{2p}, with $0 < \gamma < 1$; and $L_p \equiv H - h_{1p} - h_{2p}$ is pure leisure, such as exercising, reading, watching movies, travelling, etc. Agents may enjoy h_{2p}, such as preparing meals at home; however, for simplicity,

we consider only the enjoyment of c_{2p} because h_{2p} can be interpreted as a second job performed by agents in addition to the main job. Thus, h_{2p}^{γ} is the income from the second job, and it is used for consumption, c_{2p}.

Substituting (2)-(3) into (1) gives

$$U = \theta_1 \, ln\left(w_p h_{1p} + \emptyset w_p\left(h_{1p} - \bar{h}\right)\right) + \theta_2 ln\left(H - h_{1p} - h_{2p}\right) + (1 - \theta_1 - \theta_2)\gamma ln h_{2p} \quad (4)$$

F.O.C. wrt h_{1p} and h_{2p} gives

$$\frac{(1+\emptyset)\theta_1}{h_{1p}+\emptyset\left(h_{1p}-\bar{h}\right)} - \frac{\theta_2}{H-h_{1p}-h_{2p}} = 0 \quad (5)$$

and

$$-\frac{\theta_2}{H-h_{1p}-h_{2p}} + \frac{(1-\theta_1-\theta_2)\gamma}{h_{2p}} = 0 \quad (6)$$

By (5) and (6), we obtain Lemma 1.

Lemma 1: *The optimal labour supply and time spent on household production are given as follows:*

$$h_{1p}^{*} = \frac{(1+\emptyset)\theta_1 H + \emptyset\bar{h}(\theta_2+(1-\theta_1-\theta_2)\gamma)}{(1+\emptyset)(\theta_1+\theta_2+(1-\theta_1-\theta_2)\gamma)} \quad (7)$$

$$h_{2p}^{*} = \frac{(1-\theta_1-\theta_2)\gamma\left(H-h_{1p}^{*}\right)}{\theta_2+(1-\theta_1-\theta_2)\gamma} = \frac{(1-\theta_1-\theta_2)\gamma(H+(H-\bar{h})\emptyset)}{(1+\emptyset)(\theta_1+\theta_2+(1-\theta_1-\theta_2)\gamma)} \quad (8)$$

From (2), (3), (7) and (8), we observe that an exogenous change in $\bar{h}$ can affect h_{1p}^{*}, h_{2p}^{*}, $c_{1\mathrm{p}}$ and $c_{2\mathrm{p}}$, respectively. Next, we discuss how it affects them in turn.

Differentiating (7) wrt $\bar{h}$ gives

$$\frac{\partial h_{1p}^{*}}{\partial \bar{h}} = \frac{\emptyset(\theta_2+(1-\theta_1-\theta_2)\gamma)}{(1+\emptyset)(\theta_1+\theta_2+(1-\theta_1-\theta_2)\gamma)} > 0 \quad (7a)$$

Equation (7a) tells us that as $\bar{h}$ decreases, h_{1p}^{*} also decreases. That is, agents supply less labour when the government reduces working days from six to five. This finding is consistent with the finding of Chang et al. (2007) that if firms can determine the amount of overtime worked, the employment will decrease as $\bar{h}$ decreases. However, Equation (7a) also shows that the decrease in

h_{1p}^* depends significantly on parameter values such as $\theta_1, \theta_2, \gamma, \emptyset$. In particular, the overtime premium,$\emptyset$, is more critical than other parameters. In the private sector, if the employer pays no or little overtime premium, especially after the reduction in working days, then the impact of this working day reduction policy may have little impact on h_{1p}^*. If, instead, as argued by Hunt (1999), the overtime premium is large, then the decrease in h_{1p}^* will be large as $\bar{h}$ decreases.

Taking the logarithm of (7a) and differentiating it wrt γ gives

$$\frac{\partial}{\partial \gamma} ln\left(\frac{\partial h_{1p}^*}{\partial \bar{h}}\right) = \frac{\theta_1(1-\theta_1-\theta_2)}{(\theta_2+(1-\theta_1-\theta_2)\gamma)(\theta_1+\theta_2+(1-\theta_1-\theta_2)\gamma)} > 0 \qquad (7b)$$

Equation (7b) tells us that if the return from household production or the second job is high, i.e., γ is large, then h_{1p}^* decreases rapidly with $\bar{h}$. This finding implies that the more agents can benefit from household production or a secondary job, the more they will be likely to reduce their labour supply when the government reduces working days.

Equation (8) tells us that as $\bar{h}$ decreases, h_{2p}^* increases. That is, agents will spend more time in the second job after the working days reduction as they put more weight on the revenue from the second job, i.e., high $(1-\theta_1-\theta_2)$, or the return from the second job is high, i.e., high γ. The term c_{2p} can also include consumption from household production. If agents place little weight on it (or even negative weight if they value the second job very highly) or the return is low, the time spent on household production could decrease with lower $\bar{h}$. Overall, h_{2p}^* increases as $\bar{h}$ decreases. Workers in China are more likely to take a second job because the average income in China is still low compared with that in developed countries. Chinese workers may seek a second job while reducing the time spent on household production when they have two-day weekends. This analysis has lacked attention in the literature. In the empirical section, we test it explicitly.

By Equations (7) and (8), we obtain leisure as follows:

$$L_p = \frac{\theta_2(H+(H-\bar{h})\emptyset)}{(1+\emptyset)(\theta_1+\theta_2+(1-\theta_1-\theta_2)\gamma)}. \quad (9)$$

Equation (9) tells us that as $\bar{h}$ decreases, L_p increases. That is, agents have more leisure time as working days are reduced. The parameter θ_2 captures the substitution effect between consumption and leisure, while the parameter $\emptyset$ captures the income effect. Thus, if agents do not care much about leisure, i.e., θ_2 is low, or if the degree of overtime premium is low, i.e., $\emptyset$ is low, then their leisure may not increase much in response to a decrease in $\bar{h}$.

Substituting (7) in (2) yields

$$c_{1p} = \frac{w_p\theta_1(H+(H-\bar{h})\emptyset)}{\theta_1+\theta_2+(1-\theta_1-\theta_2)\gamma} \quad (10)$$

This equation tells us that as $\bar{h}$ decreases, c_{1p} increases for a given w_p because $\bar{h}$ increases more rapidly than h_{1p}^*, and the agent's income increases so that the agent can consume more. It also implies that after a reduction in working days, the labour cost in the private sector increases. Thus, to reduce labour cost, employers may reduce wage rates, w_p, or working hours, resulting in a negative impact on c_{1p}. Thus, the overall effect of the policy is ambiguous.

Equations (3) and (8) tell us that c_{2p} will increase as $\bar{h}$ decreases because agents may have more time to work in a second job after a reduction in working days.

In the state sector, agents cannot decide their working hours, which are determined by labour law. Their wages are paid at a fixed monthly rate, which remained constant even after changing the policy to extend the weekend from one day to two days.

In the state sector, the agent's preference is the same as in (1), subject to the following budget constraints:

$$c_{1s} = w_s \quad (11)$$

and function c_{2s} is the same as in (3) except that h_{2p} is replaced by h_{2s}.

Substituting (11) and (3) in (1) gives

$$U = \theta_1 ln(w_s) + \theta_2 ln\left(H - \bar{h} - h_{2s}\right) + (1 - \theta_1 - \theta_2)\gamma ln h_{2s} \quad (12)$$

F.O.C. wrt h_{2s} gives

$$-\frac{\theta_2}{H-\bar{h}-h_{2s}} + \frac{(1-\theta_1-\theta_2)\gamma}{h_{2s}} = 0 \quad (13)$$

Lemma 2: *The optimal time spent at a second job or on household production satisfies*

$$h_{2s}^* = \frac{(1-\theta_1-\theta_2)\gamma}{\theta_2+(1-\theta_1-\theta_2)\gamma}\left(H - \bar{h}\right) \quad (14)$$

Below, we discuss how an exogenous change in $\bar{h}$ can affect h_{2s}^* and c_{2s}.

Equation (14) shows that as $\bar{h}$ decreases, h_{2s}^* increases. That is, agents will spend more time on household production or the secondary job. As argued in Jacobson and Ohlsson (2000), policy makers should be able to influence the actual working time to increase employment. In the state sector in China, the government can control working time directly and strictly. Thus, as shown by Equation (14), our study confirms the argument of Jacobson and Ohlsson (2000). Thus, Equation (3) shows that the consumption of household production or the income from the second job increases accordingly. Similar to h_{2p}^*, if agents place little weight (or even negative weight) on the consumption from household production or the return from household production is low, agents may decrease their h_{2s}^* in response to $\bar{h}$ reduction. In contrast, if agents put much weight on the second job, overall, h_{2s}^* increases as $\bar{h}$ decreases.

Since the labour supply is determined by labour law and fixed at a constant level, $\bar{h}$, a decrease in $\bar{h}$ reduces the labour supply of agents who work in the state sector. However, the labour income is paid at a fixed monthly rate. Thus, the consumption, c_{1s}, does not change.

By (14), we obtain leisure as follows:

$$L_s = \frac{\theta_2}{\theta_2+(1-\theta_1-\theta_2)\gamma}\left(H - \bar{h}\right). \quad (15)$$

This equation shows that as $\bar{h}$ decreases due to the policy change, L_s increases accordingly. The parameter θ_2 captures the substitution effect between consumption, c_{1s}, and leisure. Thus, if agents do not care much about leisure, i.e., θ_2 is small, then their leisure may not increase much in response to a decrease in $\bar{h}$.

B. Summary of Empirical Predictions

In short, our model predicts that as working hours are reduced, 1) the labour supply in both private and public sectors will decline; 2) if agents care more about their household production or a second job, they are more likely to reduce their labour supply; 3) if agents place little weight or even negative weight on household production, the time spent on household production will decrease; and 4) agents will spend more time on a second job after the reduction in working days if they place much weight on the income generated by the second job.

In the following empirical section, we test these predictions by using the CHNS data.

IV. Data

A. Work Hours, Jobs, and Time Use Data

To rigorously examine the effects of the Two-Day Weekend Policy, our empirical analysis is based on individual-level longitudinal survey data from the CHNS for the years 1989, 1991, 1993, 1997, 2000, 2004, 2009, and 2011, preceding and following the year in which the policy was established in 1995. The CHNS is an international collaborative project between the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute for Nutrition and Health at the Chinese Centers for Disease Control and Prevention. The survey adopts a multi-stage, random cluster process to draw a sample of approximately 7,200 households with over 30,000 individuals in 15 provinces and municipalities that vary substantially in geography, economic development, public resources, and health indicators. Figure 3 shows the geographic

coverage of the CHNS across the county, which includes four economic regions that are either provinces or municipalities, such as Beijing, Shanghai, Shandong, Jiangsu, and Zhejiang in the east; Heilongjiang and Liaoning in the northeast; Henan, Hubei, Hunan, and Guangxi in the centre; and Yunnan, Chongqing, Guizhou, and Shaanxi in the west. The survey was designed to examine the effects of health, nutrition, and family planning programmes; how individual time is allocated for household work (such as preparing food, washing clothes, housecleaning, etc.); and how the social and economic transformation of Chinese society affects the health and nutritional status of its population.

We use several longitudinal master files from the CHNS: the master ID file, which contains individual characteristics such as birth date, gender, hukou status, marital status, and previous IDs for people who have lived in multiple households; the income- and job-related files, which cover education, wages, work hours and occupation (primary and secondary), household businesses, subsidies and other income, and household assets; the individual education file, which covers completed years of schooling and the highest level of educational attainment; and the urbanization index file and time use file, which contain the amount of time individuals spend on caring for their home, parents, and children. Then, we link all the data files by a unique personal identification number and obtain longitudinal data for 35,703 individuals over nine years – with a total of 156,645 observations. Our analysis restricts the sample to individuals aged 16 to 60 years old who report positive work hours. Annual wages are adjusted for inflation (using 2000 as the base year) and differential costs of living across provinces are accounted for by applying the PPP-adjusted deflator developed by Brandt and Holz (2006).[1] After removing observations with missing values for any of the key variables in the analysis (hours worked per week, time spent on household

[1] The updated version (extended to 2014) was downloaded from Carsten Holz's website: http://carstenholz.people.ust.hk/SpatialDeflators.html.

production activities, and primary/secondary occupations), our final analysis data consist of 21,232 observations in total.[2]

B. Summary Statistics

Table 1 reports the summary statistics for the main variables of interest based on the sample used for the baseline analysis. The sample means indicate that the mean age was 36, and 58 percent were male. Individuals had, on average, 10 years of schooling; 64 percent were married with a spouse present; and 59 percent had urban hukou. Of the worker class, 58 percent worked for another person or firm as a permanent employee. After adjusting for inflation and differential costs of living across provinces, the mean real annual wage (using 2000 as the base year) was 9608 rmb, or approximately 800 rmb a month.

For our main variables of interest, the average hours worked per week was 45.3 over the 1989-2011 period, covering the years before and after 1995, when the government began to implement the Two-Day Weekend Policy. On average, 82 percent worked in the public sector, in which we expected a stronger effect than in the private sector, where the policy was less binding.[3] The mean probability of our second dependent variable, whether individuals had a second job, was approximately 6 percent with a substantial amount of variation (standard deviation 23 percent).

The third dependent variable is the time allocation of household production. We are interested in how and to what extent the policy affects individuals' time use allocation when work hours are reduced. As argued in Section III, people may use the extra time to work a second job or to perform household work. Table 1 shows that the time spent on household production activities, as defined

[2] We deleted any individual whose hours worked per week were less than 10 or greater than 70 as well as extreme values in the time spent on household production variables, which were less than 0.1 percent of the total observations. To deal with the outliers commonly reported in wage and income variables, we also winsorized the real wage at the 3rd and 97th percentiles. We conducted a series of sensitivity tests and found the results to be consistent.

[3] The public sector is defined as the type of work unit for a worker's primary occupation being either government, state service/institute, state-owned enterprise, or small or large collective enterprise.

previously, was approximately 543 minutes per week. Among other activities, each week, individuals spent an average of 50 minutes buying food, 256 minutes preparing food, 37 minutes washing clothes, 58 minutes housecleaning, and 143 minutes caring for children.

The lower section of Table 1 reports the information related to primary occupation. The sample means indicate that 20 percent of the sample were in less-skilled occupations compared with 15 percent in skilled occupations. Approximately 13 percent were service workers, the third-most-common occupation. The distribution in other professional occupations was about one-third of the sample: senior professional/technical (7 percent) and junior professional/technical (8 percent), administrator/executive/manager (8 percent), and office staff (10 percent).

V. The Effect of the Two-Day Weekend Policy on Labour Supply and Household Work

A. Baseline Estimate: Difference-in-Differences Model

To evaluate the policy effect, we used a difference-in-differences regression model. We begin by defining our treatment group – individuals who are assumed to have been affected by the Two-Day Weekend Policy – as an indicator function such that

$$\begin{aligned} TREAT_i &= 1 \text{ if works for another person or enterprise as permanent employee} \\ &= 0 \text{ otherwise,} \end{aligned}$$

where we define the control group as $TREAT_i = 0$ if any individual reports positive work hours and is either a self-employed, independent operator with no employees, a contractor for other people or enterprises, a temporary worker, or a paid or unpaid family worker. These individuals are supposed to be unaffected by the policy. Analogously, we define $Post_t$ as a binary indicator that equals 0 in the period before the Two-Day Weekend Policy ($t < 1995$) and 1 in the post-policy period ($t \geq 1995$). The estimated equation is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Treat_i \times Post_t + \eta X_{it} + \sigma_p + \gamma_t + Z_{rt} + Trend_t + \varepsilon_{it}. \quad (1)$$

where Y_{it} denotes the labour supply and household work of individual *i* in year *t*, alternatively measured as log of hours worked per week of wages earners, log of hours worked per week of workers in the public sector, whether the worker has a second job, and minutes per week spent on household production activities. The matrix *X* represents individual-level controls, including log income, gender, years of schooling, age, age squared, marital status, hukou status, a set of dummy variables for occupations, and an urbanization economic component index to control for differing economic development across localities. We additionally include province fixed effects, σ_p, to capture time-invariant unobserved heterogeneity on the level of the province *p* and year fixed effects, γ_t, to control for unobserved factors that are time-varying but constant across entities. ε_{it} is the idiosyncratic error term. Furthermore, we include region × year fixed effects, Z_{rt}, to control for unobserved time-varying region-specific factors and province-specific linear time trends to relax the common time trend assumption of the most basic difference-in-differences model. The OLS estimate of the interaction term ($Treat_i \times Post_t$) catches the policy effect on labour supply and household work.

Table 2 reports the difference-in-differences estimates of the interaction term β_2 – the Two-Day Weekend Policy effect on labour supply and household production. Each regression, particularly in Model (1), contains a set of individual controls, as discussed in Section IV. To address unobserved omitted variables that could potentially bias our results, Model (2) includes province and year fixed effects, and Models (3) and (4) additionally control for region × year fixed effects and province-specific linear time trends. All standard errors are clustered at the household level.

Panel A of Table 2 presents the policy effect on hours worked per week for wage earners who worked for an enterprise or another person as permanent employees. The log-linear specifications

in all four models show that the policy resulted in a 4-5 percent reduction in hours worked per week, where all estimated effects are statistically significant at the 1 percent level. For an average of 45.3 hours per week in our sample, the empirical results imply an approximate reduction of 2 work hours per week. Panel B examines the effects on workers in the public sector, and the results consistently indicate a significant 5 percent reduction in working hours per week. The estimated coefficients are larger than those in panel A, which shows that the policy is more binding in the public sector than in the private sector.

Since the policy reduces work hours, we are interested in understanding the tradeoff regarding whether, in the Chinese context, workers are more likely to allocate the reduced work hours to working a second job or to spend the time on household work. Panels C and D of Table 2 report the effects of working time reduction on having a second job and household production, respectively. Panel C shows that, on average, workers were 3 percent more likely to have a second job after the Two-Day Weekend Policy was implemented; in contrast, individuals reduced their time on household work by approximately 98–107 minutes per week, depending on the specifications. The estimated coefficients in all specifications are statistically significant at the 1 percent level, showing that the policy encouraged workers to use the hours freed by not working on Saturdays to engage in a second job rather than participating in more household production activities.

B. Effects on Household Work by Category

In the last section, the empirical results show that the Two-Day Weekend Policy resulted in a reduction in the amount of time workers spent on household work. Thanks to the detailed information available from the CHNS data, we are able to examine further the reduction of time

spent on household work by category – buying food, preparing food, washing clothes, housecleaning, and caring for children.[4]

Table 3 reports the policy effect estimates with a full set of worker controls and fixed effects as well as time trends. The results show that after the policy was implemented, workers tended to reduce their time spent buying food by approximately 21 minutes/week, preparing food by 47 minutes/week, and washing clothes by 16 minutes/week and increased their time spent on housecleaning by 13 minutes/week. These estimates are statistically significant at the 1 or 5 percent level, depending on the category. In contrast, the time spent caring for children was reduced by 26 minutes/week, but the estimate is not statistically significant.

In sum, the outcome is consistent with the finding that workers responded to the policy by spending more time on a second job while reducing their time spent on household work such as buying food, preparing food, washing clothes, and caring for children (though the latter reduction is not significant). The explanation for the increased time spent on housecleaning could be that such household work is performed less frequently and can be completed all at once during the extended weekend as a result of the Two-Day-Weekend Policy.

C. Robustness: Hypothetical Policy Years

To examine whether the impact on labour supply and household work is attributable to the 1995 Two-Day Weekend Policy or other concurrent events, we check the robustness of our results by using the same data in two different hypothetical policy years – a few years before or after 1995 – by falsely assuming that the Two-Day Weekend Policy was implemented in 1992 or 1998 instead

[4] The CHNS also provides time allocation information for caring for elderly parents. However, the number of observations in this category was too small to obtain reliable estimates; thus, we decided not to include it in our analysis.

of in 1995. If our previous findings for 1995 are true, we should not observe any estimated effect in 1992 or 1998.

Table 4 shows the estimated outcomes for wage earners, workers in the public sector, whether a worker has a second job, and time spent on household production for the hypothetical years 1992 and 1998 in panel A and panel B, respectively. Estimates in each group contain a full set of worker controls, whereas the second specification includes province and year fixed effects, region × year fixed effects, and province linear time trends to control for unobserved factors that could contaminate our results. The estimates in panel A indicate that when we falsely assume that the policy was implemented in 1992, the difference-in-differences estimates using the actual data show no effects on labour supply and household production. Likewise, if we falsely assume that the policy was implemented in 1998, we find no significant effects on labour supply and household work in model with the full set of specifications.[5]

Taken together, this exercise of testing false policy years indicates that our findings from the baseline estimates are robust. The policy impacts on labour supply and household production are indeed attributable to the implementation of the Two-Day Weekend Policy that was implemented in 1995. The Two-Day Weekend Policy has a direct impact on labour supply and household work, and with this additional test, we show that the effects are unlikely to have been caused by other events or policies that may affect our outcome variables.

D. Matched Treatment and Control Groups

Certain researchers have voiced concerns about the comparability of the treatment and control groups as well as the selection of unobservable factors in a standard difference-in-differences

[5] The estimate without controlling fixed effects and time trend for the public sector in Panel B is marginally significant at the 10 percent level. However, our preferred results are those controlling for unobserved heterogeneity that could potentially bias our outcomes.

model setting. If such concerns were true in our case, they would make our results inconsistent and biased. Therefore, we follow the approach proposed by Heckman, Ichimura, and Todd (1997) and Blundell and Dias (2009), who first used a kernel-based propensity score matching (PSM) technique to obtain treatment and control groups that are comparable as far as observed individual characteristics are concerned. Once the potential selection bias has been removed, we then implement a difference-in-differences regression approach to estimate the effects of the introduction of the Two-Day Weekend Policy on labour supply and household work.

Table 5 shows the results of the estimation strategy that combines PSM with difference-in-differences regression analysis. Once again, we show the effects of the introduction of the Two-Day Weekend Policy for wage earners, workers in the public sector, whether a worker has a second job, and time spent on household production, with full sets of worker controls, fixed effects, and time trends. The same patterns of policy effects persist in Table 5, where the estimates are for wage earners, and workers in the public sector are negative and significant at the 5 percent level, once again indicating that the introduction of the Two-Day Weekend Policy reduced work hours by 3 percent for wage earners in both sectors and 5 percent in the public sector only. Moreover, the results showing an increase of 4 percent in having a second job and a decrease of 103 minutes/week in time spent on household production are consistent with our baseline estimates in the previous section. Since the treatment and control groups are much more similar after matching, our findings remain robust and consistent after removing potential selection bias.

VI. Conclusion and Policy Lessons

In this article, we constructed a theoretical model to discuss working time policy effects on the supply side of employment, in contrast to Chang et al. (2007), which focused on the demand side of employment, in response to the working hours reduction. The theory complements Chang et al.

(2007) and presents an analysis regarding the impact of the working day reduction on labour supply and household production/second job in the public sector only and in both private and public sectors. We find that our empirical results are consistent with the theoretical predictions.

We contribute to the literature by testing the theoretical predictions, taking advantage of the CHNS data, which contain primary and secondary job-related variables and detailed information from respondents regarding time allocation. For example, the data include time spent on household production activities, such as buying and preparing food, washing clothes, housecleaning, and caring for elderly parents and children. Such information is essential to disentangle the aggregate effect of the Two-Day Weekend Policy on work hours, having a second job, and time spent on household production. As we argue in the conceptual framework, such a policy change creates a tradeoff between income and substitution effects, resulting in an ambiguous overall effect that is an empirical question.

As expected from our theory, the change from the One-Day Weekend Policy to the Two-Day Weekend Policy in 1995 consistently and significantly reduced hours of work in both the public and private sectors and across different model specifications. Somewhat surprisingly, the policy change also significantly reduced the time (measured in minutes) spent on household production and on almost all routine and time-intensive detailed tasks of household production (buying food, preparing food, and washing clothes) with one notable exception – the time spent on the less frequent task of housecleaning increased. We contend that such decreases in household production time can be explained by the significant increase among Chinese workers in holding a second job after the policy change, which is consistent with the stage of Chinese economic development in which Chinese workers place a higher value on labour earnings than on other tasks of their lives, such as household production.

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Table 1 Summary Statistics, 1989-2011

Variable	Mean	S.D.	Min.	Max.
Age	36.01	10.68	16	60
Male	0.58	0.49	0	1
Years of schooling	9.96	3.70	0	18
Married with spouse present	0.64	0.48	0	1
Urban hukou	0.59	0.49	0	1
Works for another person or enterprise as permanent employee	0.58	0.49	0	1
Annual wage (real, rmb)	9608.06	9344.33	555.62	47541.30
Hours worked per week	45.30	11.24	10	70
Public sector	0.82	0.39	0	1
Has a second job	0.06	0.23	0	1
Time spent on household production (minutes per week)	543.35	913.71	7	7980
Buying food	49.82	168.25	10	2100
Preparing food	256.08	566.97	7	4200
Washing clothes	37.00	87.54	10	960
Housecleaning	57.71	124.22	7	2100
Caring for children	142.74	577.73	7	4600
Primary occupation (%)				
Senior professional/technical	6.92	Army officer, police officer		0.29
Junior professional/technical	7.85	Ordinary soldier, policeman		0.70
Administrator/executive/manager	7.98	Driver		3.27
Office staff	9.99	Service worker		13.27
Farmer, fisherman, hunter	11.59	Athlete, actor, musician		0.38
Skilled worker	14.73	Other		3.22
Non-skilled worker	19.80			

Note: The number of observations is 21,232. Wages have been adjusted for inflation (2000 base year) and the differing living costs among provinces accounted for by applying the PPP-adjusted deflator developed by Brandt and Holz (2006).

Table 2 Difference-in-Differences Estimates of the Two-Day Weekend Policy

	(1)	(2)	(3)	(4)
Panel A. Wage earner				
Dependent variable: log of hours worked per week				
Post× Treat	-0.048***	-0.045***	-0.044***	-0.044***
	(0.011)	(0.011)	(0.011)	(0.011)
Province & year fixed effects	No	Yes	Yes	Yes
Region× year fixed effects	No	No	Yes	Yes
Province time trend	No	No	No	Yes
N	21232	21232	21232	21232
Adj. R^2	0.048	0.060	0.062	0.062
Panel B. Public sector				
Dependent variable: log of hours worked per week				
Post× Treat	-0.054***	-0.051***	-0.052***	-0.052***
	(0.017)	(0.017)	(0.017)	(0.017)
Province & year fixed effects	No	Yes	Yes	Yes
Region× year fixed effects	No	No	Yes	Yes
Province time trend	No	No	No	Yes
N	21232	21232	21232	21232
Adj. R^2	0.048	0.063	0.063	0.063
Panel C.				
Dependent variable: Has a second job (dummy)				
Post× Treat	0.027***	0.028***	0.028***	0.027***
	(0.008)	(0.008)	(0.008)	(0.008)
Province & year fixed effects	No	Yes	Yes	Yes
Region× year fixed effects	No	No	Yes	Yes
Province time trend	No	No	No	Yes
N	21232	21232	21232	21232
Adj. R^2	0.082	0.088	0.088	0.088
Panel D. Household production				
Dependent variable: minutes per week				
Post× Treat	-107.398***	-106.454***	-99.304***	-97.687***
	(29.036)	(28.998)	(29.089)	(29.093)
Province & year fixed effects	No	Yes	Yes	Yes
Region× year fixed effects	No	No	Yes	Yes
Province time trend	No	No	No	Yes
N	21232	21232	21232	21232
Adj. R^2	0.099	0.100	0.100	0.100

Note: Each regression includes a full set of individual characteristics. Clustered standard errors at the household level in parentheses. Treat is a dummy equals one if works for another person or enterprise as permanent employees and zero otherwise; Post is a dummy equals one if year is greater than 1995 and zero otherwise. Post× Treat is the interaction term.

* p<0.10, ** p<0.05, *** p<0.01.

Table 3 Difference-in-Differences Estimates of the Two-Day Weekend Policy on Household Work by Category

Dependent variable: minutes per week	Buying food	Preparing food	Washing clothes	House cleaning	Caring for children
Post× Treat	-20.892***	-47.340**	-15.903***	12.699***	-26.252
	(5.585)	(18.485)	(3.013)	(3.054)	(19.020)
Province & year fixed effects	Yes	Yes	Yes	Yes	Yes
Region× year fixed effects	Yes	Yes	Yes	Yes	Yes
Province time trend	Yes	Yes	Yes	Yes	Yes
N	21232	21232	21232	21232	21232
Adj. R^2	0.043	0.079	0.158	0.196	0.020

Note: Each regression includes a full set of individual characteristics and year fixed effects. Clustered standard errors at the household level in parentheses. Treat is a dummy equals one if works for another person or enterprise as permanent employees and zero otherwise. Post is a dummy equals one if year is greater than 1995 and zero otherwise. Post× Treat is the interaction term.
* p<0.10, ** p<0.05, *** p<0.01.

Table 4 Robustness check

	Wage earner		Public sector		Has a second job		Household production	
Dep. variable	log hrs per week		log hrs per week		dummy		minutes per week	
Panel A. Hypothetical year 1992								
Post× Treat	0.391	0.399	1.546	1.494	0.182	-0.054	-73.675	-80.105
	(0.611)	(0.610)	(1.168)	(1.169)	(0.664)	(0.780)	(48.626)	(48.943)
Province & year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Region× year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Province time trend	No	Yes	No	Yes	No	Yes	No	Yes
N	6259	6259	6259	6259	6259	6259	6259	6259
Adj. R^2	0.045	0.045	0.045	0.045	0.086	0.088	0.120	0.128
Panel B. Hypothetical year 1998								
Post× Treat	-0.297	-0.244	-1.588*	-1.411	-0.017	-0.016	-55.335	-57.659
	(0.607)	(0.614)	(0.963)	(0.973)	(0.013)	(0.013)	(43.094)	(43.678)
Province & year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Region× year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Province time trend	No	Yes	No	Yes	No	Yes	No	Yes
N	6529	6529	6529	6529	6529	6529	6529	6529
Adj. R^2	0.056	0.070	0.058	0.072	0.089	0.093	0.102	0.102

Note: Each regression includes a full set of individual characteristics. Clustered standard errors at the household level in parentheses. Treat is a dummy equals one if works for another person or enterprise as permanent employees and zero otherwise. Post is a dummy equals one if year is greater than 1995 and zero otherwise. Post× Treat is the interaction term.

* p<0.10, ** p<0.05, *** p<0.01.

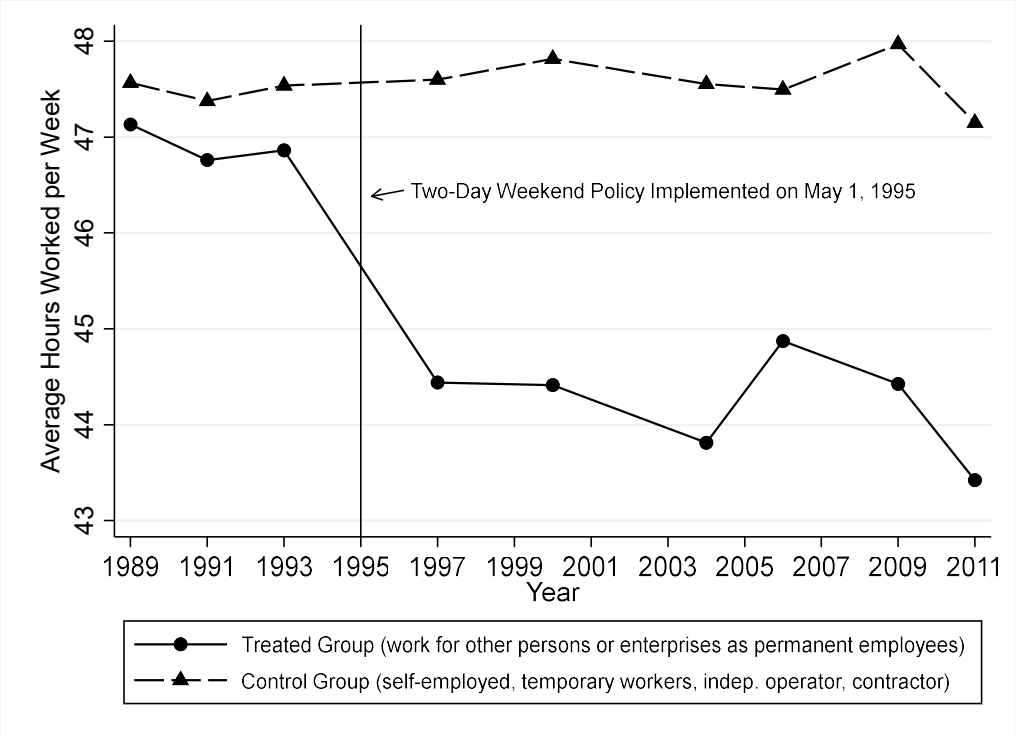
Table 5 Kernel Propensity Score Matching Difference-in-Differences

	Wage earner	Public sector	Has a second job	Household production
Dep. variable	log hrs/week	log hrs/week	dummy	minutes/week
Before				
Diff. (treated-control)	0.001	-0.010	-0.036***	114.848**
	(0.013)	(0.021)	(0.011)	(50.408)
After				
Diff. (treated-control)	-0.027***	-0.057***	-0.001	11.883
	(0.008)	(0.012)	(0.005)	(26.862)
Diff.-in-diff.	-0.028**	-0.047**	0.035***	-102.965*
	(0.014)	(0.021)	(0.011)	(55.789)
Province & year fixed effects	Yes	Yes	Yes	Yes
Region × year fixed effects	Yes	Yes	Yes	Yes
Province time trend	Yes	Yes	Yes	Yes
N	20919	20919	20919	20919
Adj. R^2	0.05	0.06	0.05	0.02

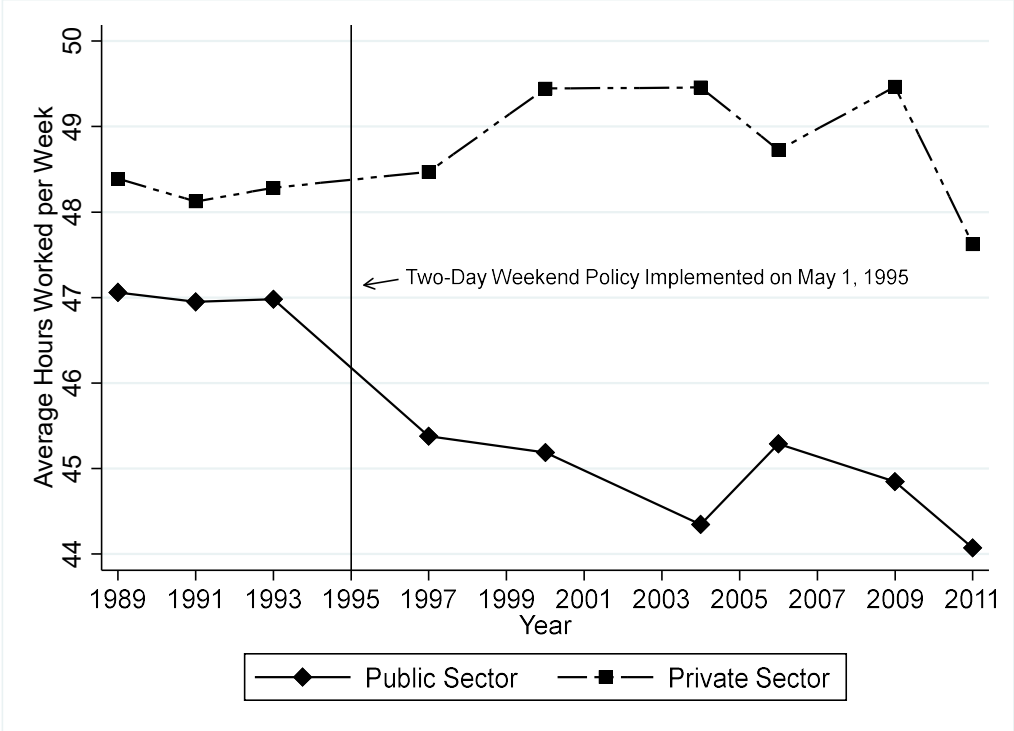
Note: Each regression includes a full set of individual characteristics. Clustered standard errors at the household level in parentheses.
* p<0.10, ** p<0.05, *** p<0.01.

Figure 1 Average Weekly Hours Worked by Group, 1989-2011

Panel A



Panel B



Average weekly hours worked are calculated from the 9 waves of CHNS over 1989-2011.

Figure 2 Evolution of Statutory Weekly Hours of Work in China

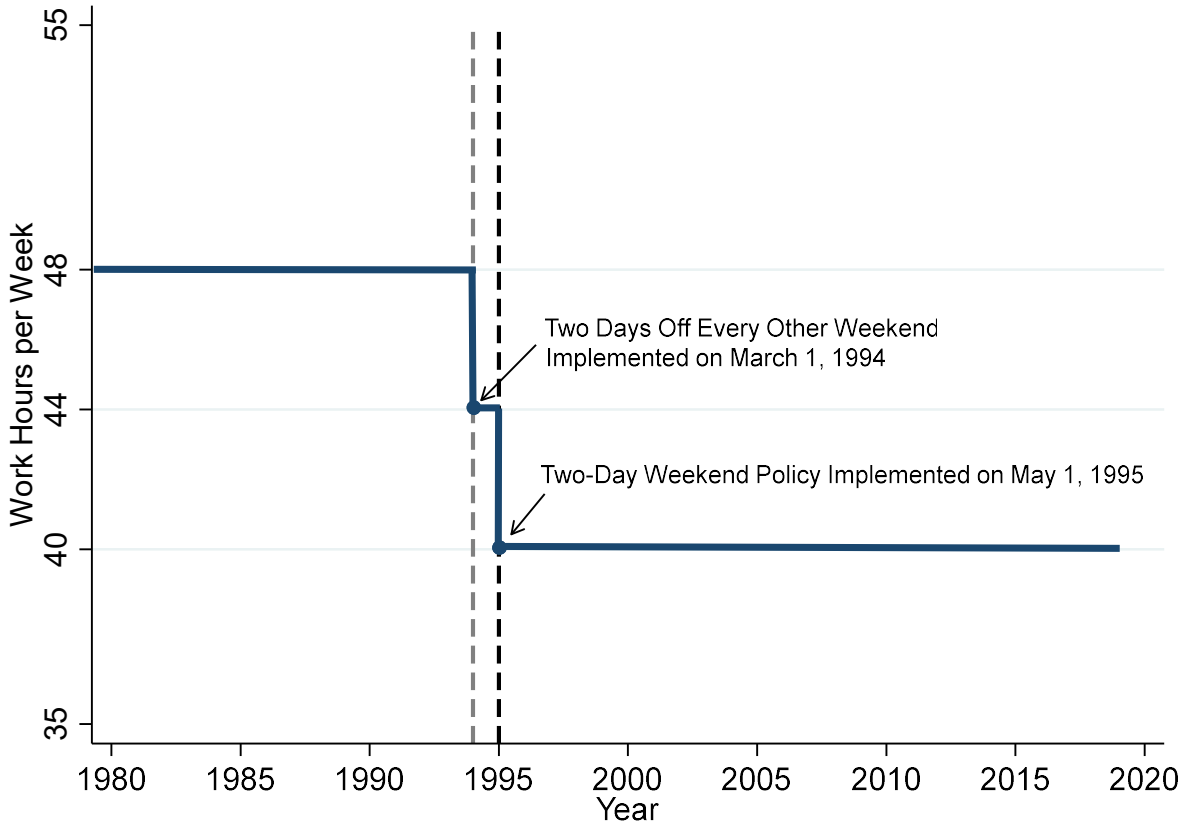


Figure 3 Coverage of the China Health and Nutrition Survey (CHNS)

The CHNS was conducted among the darker-green-shaded regions in the map. They are either provinces or municipalities, including Beijing, Chongqing, Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanghai, Yunnan, and Zhejiang.
Source: http://www.cpc.unc.edu/projects/China/about/proj_desc/Chinamap