Online Appendix for "Are Spousal Labor Supplies Substitutes? Evidence from the Workweek Reduction Policy in China"

Yueyuan Ma Xinzheng Shi

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Part A. Impact of the Workweek Reduction Policy on Income

As described in Section 2, the workweek reduction policy described in this study did not involve any income changes. To provide evidence, we estimate the following equation:

$$\mathrm{Ln}(income_{it}) = \alpha_i + Year_{97} + \mu_1 * Employed_{i93}^{own} * Year_{97}$$
$$+\mu_2 * Employed_{i93}^{spouse} * Year_{97} + \mu_3 * X_{it} + \varepsilon_{it} \qquad \text{(A1)}$$

In Equation (A1), $\ln(income_{it})$ is the logarithmic form of the annual income for individual *i* in year *t*. For employed workers, the income is individual income (including wages and bonuses) from the primary job, based on which we define employed and self-employed workers (see Section 3); for the self-employed workers, because CHNS only asked questions about total income from each self-employed job, then the individual income is defined as average income from the primary job (total income from this job divided by total number of family members involved). Other variables in Equation (A1) are defined as they are in the main text.

The estimation results are shown in Table A. From this table, we can see that the coefficients of $Employed_{i93}^{own} * Year_{97}$ are not significant. This finding shows that compared with self-employed workers, the policy had no significant impact on the income of employed workers.

Table A. Impact of Workweek Reduction Policy on Incomes

	(1)	(2)
Dependent Variable: Ln (individual annual income)		
	Male	Female
Employed in 1993*Year1997	0.003	-0.083
	(0.037)	(0.057)
Spouse employed in 1993*Year1997	-0.003	0.007
	(0.048)	(0.047)
Year 1997	0.581***	0.911***
	(0.066)	(0.130)
Spouse age squared	0.000	0.001*
	(0.000)	(0.000)
Age squared	-0.001***	-0.003***
	(0.000)	(0.000)
Constant	10.015***	10.265***
	(0.466)	(0.777)
Observations	2,112	2,106
R-squared	0.677	0.650

Robust standard errors in parentheses are calculated by clustering over community; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: (1) In all regressions, individual fixed effects are controlled. Household demographic structure, including the family size, ratios of male family members aged 0-6, 7-18, 19-60, and 60 plus, and the ratios of female family members aged 0-6, 7-18, and 19-60 are also included in all regressions. The ratio of female family members aged above 60 is omitted to avoid collinearity.

(2) For employed workers, annual income is total wages and any bonus from a primary job; for self-employed workers, annual income is average income from a primary job.

Part B. Theoretical Derivation

The household maximization problem is shown below:

$$\max_{\{c,v_m,v_f,h_m,h_f\}} \mathrm{u}(c,h)$$

$$c = Y_m + Y_f + w_m v_m + w_f v_f$$

$$h = H(h_m, h_f)$$

$$e_m + v_m + h_m = 1$$

$$e_f + v_f + h_f = 1$$

This maximization problem can be transformed to

$$\max_{\{h_m,h_f\}} \mathrm{u}(Y_m + Y_f + w_m(1 - e_m - h_m) + w_f(1 - e_f - h_f), H(h_m, h_f))$$

The first-order conditions are

$$u_c'(-w_m) + u_h' H_m' = 0 \quad (1)$$

$$u_c'(-w_f) + u_h' H_f' = 0 \quad (2)$$

Taking the derivative of Equation (1) with respect to e_f gets

$$\frac{\partial h_m}{\partial e_f} = \frac{-u_{cc}'' w_m w_f + w_m u_{hc}'' H_f' + w_f u_{hc}'' H_m' - u_{hh}'' H_f' H_m' - u_h' H_{mf}''}{w_m^2 u_{cc}'' - 2 w_m u_{hc}'' H_m' + u_{hh}'' H_m'^2 + u_h' H_{mm}''} \frac{\partial h_f}{\partial e_f} + \frac{w_f u_{hc}'' H_m' - u_{cc}'' w_m w_f}{w_m^2 u_{cc}'' - 2 w_m u_{hc}'' H_m' + u_{hh}'' H_m'^2 + u_h' H_{mm}''} \stackrel{\text{def}}{=} \beta_m \frac{\partial h_f}{\partial e_f} + Constant_m$$

Taking the derivative of Equation (2) with respect to e_m gets

$$\frac{\partial h_f}{\partial e_m} = \frac{-u_{cc}'' w_m w_f + w_f u_{hc}'' H_m' + w_m u_{hc}'' H_f' - u_{hh}'' H_f' H_m' - u_h' H_{mf}''}{w_f^2 u_{cc}'' - 2 w_f u_{hc}'' H_f' + u_{hh}'' H_f'^2 + u_h' H_{ff}''} \frac{\partial h_m}{\partial e_m} + \frac{w_m u_{hc}'' H_f' - u_{cc}'' w_m w_f}{w_f^2 u_{cc}'' - 2 w_f u_{hc}'' H_f' + u_{hh}'' H_f'^2 + u_h' H_{ff}''} \stackrel{\text{def}}{=} \beta_f \frac{\partial h_m}{\partial e_m} + Constant_f$$

Because the two first-order conditions (Equations (1) and (2)) can be regarded as the best response of h_m to h_f (h_f to h_m) as well as the exogeneous variables (e_m, e_f). They could be expressed respectively as $h_m = F(h_f, e_m, e_f), h_f = G(h_m, e_m, e_f)$. Then $\frac{\partial h_m}{\partial e_f} = \frac{\partial h_m}{\partial h_f}\frac{\partial h_f}{\partial e_f} + F_3$, $\frac{\partial h_f}{\partial e_m} = \frac{\partial h_f}{\partial h_m}\frac{\partial h_m}{\partial e_m} + G_3$. Therefore, β_m and β_f are equivalent to $\frac{\partial h_m}{\partial h_f}$ and $\frac{\partial h_f}{\partial h_m}$. We know

$\frac{\partial h_m}{\partial h_f} = \frac{\partial(1-h_m)}{\partial(1-h_f)}$, $\frac{\partial h_f}{\partial h_m} = \frac{\partial(1-h_f)}{\partial(1-h_m)}$, and $(1-h_m)$ and $(1-h_f)$ represent husband and wife's market time, so β_m and β_f capture the effect of spousal market working time on one's own market working time, which is what we are interested in.

Proposition 1: When the non-market time of spouses are not complementary, the decrease in spouse's market working time leads to an increase in one's own market working time.

Proof. We consider β_m and the proof can be similarly applied to β_f. Since $\beta_m = \frac{-u''_{cc}w_m w_f + w_m u''_{hc}H'_f + w_f u''_{hc}H'_m - u''_{hh}H'_f H'_m - u'_h H''_{mf}}{w_m^2 u''_{cc} - 2w_m u''_{hc}H'_m + u''_{hh}H'^2_m + u'_h H''_{mm}}$, we can see that the denominator $w_m^2 u''_{cc} - 2w_m u''_{hc}H'_m + u''_{hh}H'^2_m + u'_h H''_{mm}$ is negative because $w_m > 0$, $u''_{cc} < 0$, $u''_{hc} > 0$, $H'_m > 0$, $u''_{hh} < 0$, $u'_h > 0$, and $H''_{mm} < 0$. In the numerator, $-u''_{cc}w_m w_f + w_m u''_{hc}H'_f + w_f u''_{hc}H'_m - u''_{hh}H'_f H'_m$ is positive because $u''_{cc} < 0$, $w_m > 0$, $w_f > 0$, $u''_{hc} > 0$, $H'_f > 0$, $H'_m > 0$, and $u''_{hh} < 0$. Therefore, whether the numerator is positive or negative depends on $-u'_h H''_{mf}$. When the non-market time of spouses is not complementary, that is, $H''_{mf} \leq 0$, then the numerator of β_m, $-u''_{cc}w_m w_f + w_m u''_{hc}H'_f + w_f u''_{hc}H'_m - u''_{hh}H'_f H'_m - u'_h H''_{mf}$, is positive. Because the denominator of β_m is negative, therefore β_m is negative. As argued above, β_m is equivalent to $\frac{\partial(1-h_m)}{\partial(1-h_f)}$, therefore $\frac{\partial(1-h_m)}{\partial(1-h_f)}$ is negative. In other words, the decrease in spouse's market working time increases one's own market working time.

Proposition 2: When the non-market time of spouses are complementary, the decrease in spouse's market working time possibly leads to a decrease in one's own market working time. This is more likely to happen for high-income households.

Proof. We consider β_m and the proof can be similarly applied to β_f. As shown in the proof to Proposition 1, whether the numerator of β_m is positive or negative depends on $-u'_h H''_{mf}$. When the non-market time of spouses is complementary, that is, $H''_{mf} > 0$, if $u'_h > \frac{-u''_{cc}w_m w_f + w_m u''_{hc}H'_f + w_f u''_{hc}H'_m - u''_{hh}H'_f H'_m}{H''_{mf}}$, the numerator of β_m is negative such that β_m is positive. In other words, a decrease in spouse's market working time leads to a decrease in one's own market working time. Since u'_h is larger for rich households because $u''_{hc} > 0$, therefore β_m is more likely to be positive for rich households. In other words, it is more likely

that a decrease in spouse’s market working time induces a decrease in one’s own market working time.

Part C. Supplementary Tables and Robustness Checks

Table B. Impact of Spousal Working Hours on Own Work Status, OLS

	(1)	(2)
Dependent variable	Having a job	
	Male	Female
Spousal working hours	-0.000**	-0.001***
	(0.000)	(0.000)
Employed in 1993*Year1997	-0.016**	-0.134***
	(0.006)	(0.029)
Year1997	0.038	0.177***
	(0.030)	(0.049)
Age squared	-0.000	-0.001**
	(0.000)	(0.000)
Spousal age squared	0.000	0.000
	(0.000)	(0.000)
Constant	1.037***	1.958***
	(0.190)	(0.215)
Observations	2,576	2,572

Robust standard errors in parentheses are calculated by clustering over community.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Note: In all regressions, individual fixed effects are controlled. The household demographic structure, including family size, the ratios of male family members aged 0-6, 7-18, 19-60, and 60 plus, and the ratios of female family members aged 0-6, 7-18, and 19-60 are also included in all regressions. The ratio of female family members aged above 60 is omitted to avoid collinearity.

Table C. Effect of Spousal Working Hours on Own Working and Housework Hours: OLS

	(1)	(2)	(3)	(4)
	Male Sample		Female Sample	
Dependent variables (per week)	Working hours	Housework hours	Working hours	Housework hours
Spousal weekly working hours	0.520***	-0.005	0.522***	0.045***
	(0.024)	(0.003)	(0.018)	(0.007)
Employed in 1993*Year1997	-5.205***	0.940**	-3.444***	2.056
	(0.967)	(0.422)	(1.025)	(1.440)
Year1997	1.036	-3.665**	13.240***	-11.553***
	(1.210)	(1.754)	(1.411)	(2.137)
Age squared	-0.003	0.009	-0.052***	0.063***
	(0.011)	(0.008)	(0.009)	(0.013)
Spousal age squared	0.001	0.002	0.011	-0.030*
	(0.014)	(0.010)	(0.008)	(0.015)
Constant	15.408***	-34.676**	62.350***	-37.891
	(5.078)	(16.213)	(5.290)	(25.882)
Observations	2,286	2,212	2,286	2,110
R-squared	0.694	0.605	0.701	0.606

Robust standard errors in parentheses are calculated by clustering over community.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: In all regressions, individual fixed effects are controlled. The household demographic structure, including family size, the ratios of male family members aged 0-6, 7-18, 19-60, and 60 plus, and the ratios of female family members aged 0-6, 7-18, and 19-60 are also included in all regressions. The ratio of female family members aged above 60 is omitted to avoid collinearity.

Table D. Testing for Pre-existing Time Trends

	Male Sample		Female Sample	
	Working Hours	Housework Hours	Working Hours	Housework Hours
	1989 and 1991			
	(1)	(2)	(3)	(4)
Spouse employed in 1993*Year1989	1.164	-0.024	-0.918	-2.621
	(2.304)	(1.149)	(3.048)	(1.880)
Spouse employed in 1993*Year1991	-0.146	0.612	-1.319	-1.804
	(1.964)	(1.444)	(2.699)	(2.744)
Employed in 1993*Year1989	-1.462	0.714	0.114	2.582
	(2.736)	(0.926)	(3.123)	(1.903)
Employed in 1993*Year1991	-0.997	-0.319	-1.446	-0.063
	(2.527)	(1.277)	(2.731)	(2.638)
Year 1989	-7.178	-4.526**	-6.611	-19.161***
	(5.789)	(2.193)	(5.702)	(4.565)
Year 1991	-3.965	0.282	-0.139	-1.854
	(3.447)	(1.304)	(3.179)	(2.875)
Age squared	0.006	0.006	-0.040	-0.042
	(0.030)	(0.014)	(0.042)	(0.026)
Spousal age squared	-0.022	-0.018	0.024	-0.001
	(0.035)	(0.014)	(0.037)	(0.027)
Constant	62.626**	29.319*	55.530*	91.127***
	(29.501)	(16.574)	(29.557)	(26.633)
Observations	5,430	5,258	5,430	5,129

Robust standard errors in parentheses are calculated by clustering over community.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: In all regressions, individual fixed effects are controlled. The household demographic structure, including family size, the ratios of male family members aged 0-6, 7-18, 19-60, and 60 plus, and the ratios of female family members aged 0-6, 7-18, and 19-60 are also included in all regressions. The ratio of female family members aged above 60 is omitted to avoid collinearity.

Table E. Sample of Spouses Without Changing Employment Type During the Policy Change

	Male Sample		Female Sample	
	(1)	(2)	(3)	(4)
Dependent variables (per week):	Working Hours	Housework Hours	Working Hours	Housework Hours
Spousal working hours (Spouse employed in 1993*Year1997 as an IV)	-0.499*	0.349***	-0.117	0.353***
	(0.284)	(0.108)	(0.085)	(0.053)
Employed in 1993*Year1997	-9.544***	2.299***	-5.923***	3.543***
	(1.385)	(0.439)	(1.108)	(1.027)
Year1997	18.343***	-8.782***	18.183***	-11.962***
	(4.425)	(1.792)	(1.873)	(1.181)
Age squared	-0.002	0.008	-0.050***	0.070***
	(0.013)	(0.005)	(0.009)	(0.008)
Spousal age squared	-0.055**	0.019**	-0.009	-0.034***
	(0.025)	(0.007)	(0.011)	(0.009)
Constant	132.552***	-79.062***	140.719***	-47.344**
	(29.151)	(15.978)	(14.037)	(21.753)
Observations	2,236	2,164	2,184	2,045

Robust standard errors in parentheses are calculated by clustering over community.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: In all regressions, individual fixed effects are controlled. The household demographic structure, including family size, the ratios of male family members aged 0-6, 7-18, 19-60, and 60 plus, and the ratios of female family members aged 0-6, 7-18, and 19-60 are also included in all regressions. The ratio of female family members aged above 60 is omitted to avoid collinearity.

Table F. Potential Effects of SOE Reform on Working Hours of SOE Employees

	(1)	(2)
Dependent Variable: Weekly working hours		
	Male Sample	Female Sample
Employed by SOE in 1993*Post	-10.109***	-7.929***
	(1.454)	(1.258)
Employed by Non-SOE in 1993*Post	-8.385***	-4.529*
	(0.923)	(2.416)
Spouse employed in 1993*Post	3.062*	0.423
	(1.532)	(0.798)
Post	8.875***	17.593***
	(1.570)	(2.410)
Age squared	0.002	-0.062***
	(0.017)	(0.011)
Spouse age squared	-0.030**	0.006
	(0.014)	(0.014)
Constant	60.456***	94.487***
	(6.172)	(7.326)
Observations	2,286	2,286
R-squared	0.580	0.590
F-value for null hypothesis: Coef. (Employed by SOE in 1993*Post) = Coef. (Employed by Non-SOE in 1993*Post)	1.820	1.501
Prob > *F*	0.186	0.228

Robust standard errors in parentheses are calculated by clustering over community.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: In all regressions, individual fixed effects are controlled. The household demographic structure, including family size, the ratios of male family members aged 0-6, 7-18, 19-60, and 60 plus, and the ratios of female family members aged 0-6, 7-18, and 19-60 are also included in all regressions. The ratio of female family members aged above 60 is omitted to avoid collinearity.

Table G. Testing the Existence of Crowding Out Effects

	(1)	(2)	(3)	(4)
	Male Sample		Female Sample	
Dependent variables (per week)	Working hours	Housework hours	Working hours	Housework hours
Spouse self-employed in 1993*Year1997	-0.909	-0.773	-1.016	0.645
	(3.207)	(0.737)	(4.060)	(2.808)
Employed in 1993*Year1997	-7.897***	1.872***	-4.271	4.383
	(0.632)	(0.303)	(2.895)	(8.251)
Year1997	8.725***	-5.505***	17.770***	-7.720***
	(1.829)	(0.466)	(1.397)	(0.904)
Age squared	-0.007	0.002	-0.069***	0.062***
	(0.011)	(0.004)	(0.020)	(0.004)
Spousal age squared	-0.021**	0.015***	0.012	-0.040***
	(0.009)	(0.005)	(0.021)	(0.003)
Constant	53.548***	-30.751***	79.003***	-0.741
	(6.969)	(1.457)	(9.354)	(7.482)
Observations	1,772	1,730	1,598	1,470
R-squared	0.568	0.622	0.588	0.591

Robust standard errors in parentheses are calculated by clustering over community.

*** p<0.01, ** p<0.05, * p<0.1.

Note: In all regressions, individual fixed effects are controlled. Household demographic structure, including family size, ratios of male family members aged 0-6, 7-18, 19-60, 60 plus, and ratios of female family members aged 0-6, 7-18, 19-60 are also included in all regressions. Ratio of female family members aged above 60 is omitted to avoid collinearity.

Table H. Effect of Spousal Working Hours on Own Working and Housework Hours: Using Matched Sample

	(1)	(2)	(3)	(4)
	Male Sample		Female Sample	
Dependent variables (per week)	Working hours	Housework hours	Working hours	Housework hours
Spousal working hours (Spouse employed in 1993*Year1997 as an IV)	-0.431*	0.373**	0.048	0.346***
	(0.224)	(0.159)	(0.048)	(0.112)
Employed in 1993*Year1997	-9.539***	4.033***	-6.253***	5.736***
	(1.393)	(1.211)	(1.118)	(1.642)
Year1997	24.192***	-7.681***	18.061***	-26.928***
	(3.476)	(2.751)	(2.542)	(3.190)
Age squared	0.073**	-0.010	-0.086***	0.071***
	(0.030)	(0.017)	(0.010)	(0.012)
Spousal age squared	-0.156***	0.031	0.029***	0.000
	(0.036)	(0.020)	(0.009)	(0.009)
Constant	114.046***	-45.473	102.207***	-151.856***
	(13.626)	(29.983)	(14.049)	(13.534)
Observations	1,008	970	1,330	1,234

Robust standard errors in parentheses are calculated by clustering over community.

*** p<0.01, ** p<0.05, * p<0.1.

Note: In all regressions, individual fixed effects are controlled. Household demographic structure, including family size, ratios of male family members aged 0-6, 7-18, 19-60, 60 plus, and ratios of female family members aged 0-6, 7-18, 19-60 are also included in all regressions. Ratio of female family members aged above 60 is omitted to avoid collinearity.