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Abstract

We study how husbands' weekday domestic work affects wives' labor supply among couples with children aged 9 or younger. To address endogenous selection, we use a control-function approach that exploits bunching at zero in husbands' weekday domestic work hours. Using Japanese panel data, we find that the positive association between husbands' domestic work and wives' labor supply disappears after correcting for selection on unobservables. This suggests that the association is largely driven by selection. At the same time, husbands' domestic work increases wives' weekday domestic work, suggesting complementarities in couples' domestic work time.

JEL Classification: J22, J13, J16, D13.

Keywords: labor supply, domestic work, childcare, time use, control function.

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1 Introduction

Women perform more unpaid domestic work than their husbands do (see Appendix Figure A.1a). This gender imbalance may help explain women's underrepresentation in the labor market. As shown in Appendix Figure A.2, countries where women perform more unpaid work tend to exhibit larger negative gaps in time spent on paid work. A similar pattern emerges for wages: wider unpaid-work gaps are associated with wider gender pay gaps (Hersch and Stratton, 2002).

Having children exacerbates the gender imbalance in unpaid housework within couples (see Appendix Figure A.1b). According to the literature, the transition to parenthood may account for a significant portion of the persistent gender gap (e.g., Aguilar-Gomez et al., 2026; Angelov et al., 2016; Kleven et al., 2019; Laun and Wallenius, 2021). The negative impact of motherhood is particularly pronounced in Japan, where employment rates decrease sharply and labor income declines markedly around childbirth (e.g., Guo and Xie, 2024; Kleven et al., 2024).

To address the gender imbalance in unpaid work, many developed countries are promoting family-friendly policies such as paternity leave to encourage fathers to participate in housework and childcare. Previous studies show that the introduction and expansion of paternity leave policies lead fathers to take more leave and become more involved in domestic work.[1] However, they report mixed evidence on whether this greater involvement promotes wives' employment (e.g., Cools et al., 2015; Cortés and Pan, 2023; Ekberg et al., 2013; Patnaik, 2019). Therefore, a key question is whether husbands' greater involvement in domestic work increases wives' labor supply.

This study examines whether husbands' involvement in domestic work affects wives' labor supply and time allocation. Our analysis focuses on couples whose youngest child is in elementary school (grades 1–3) or younger. We use panel data on Japanese women, which include detailed records of the actual time they and their husbands spend on housework and childcare while raising young children. To address endogeneity in domestic work decisions, we apply a control function approach proposed by Caetano et al. (2024b). This approach leverages bunching at zero hours of husbands' domestic work on weekdays.

We find that the positive association between husbands' domestic work hours and wives' labor supply declines substantially once we account for selection on unobservables using a control-

[1] See also Kohara and Maity (2021), who report no statistically significant effect of Japan's family-friendly ("work–life balance") policies on married men's domestic work on weekdays.

function approach. This result suggests that selection on unobservables is a key driver of the observed positive association. We also find that, after accounting for selection, an increase in husbands' domestic work hours increases wives' domestic work hours on weekdays. This pattern suggests complementarities in couples' domestic work time.

Our study contributes to the literature in two main ways. First, we use a control-function approach to show that endogenous selection plays a central role in interpreting the relationship between husbands' weekday domestic work and wives' labor supply. The observed positive association appears to arise mainly from latent household characteristics that shape spouses' market work and home production decisions, rather than primarily from variation in husbands' domestic work. These characteristics may capture work-schedule constraints, preferences, and gender norms shaped in part by education (see, e.g., Cortés and Pan, 2023; Hara and Rodríguez-Planas, 2025; Rodríguez-Planas and Tanaka, 2022). While the bunching-based control-function framework has mainly been used to study child outcomes (e.g., Caetano et al., 2024a,c, 2025), we show that it is also useful for analyzing labor supply and intrahousehold time allocation.

Second, we provide new evidence on how husbands' domestic work affects wives' own time allocation. After correcting for selection, an increase in husbands' domestic work raises wives' weekday domestic work and reduces their time spent on basic activities of daily living, suggesting complementarities in spouses' time use rather than simple substitution. This pattern helps explain why an increase in husbands' domestic work does not necessarily translate into higher wives' labor supply. Prior work, including studies of paternity leave reforms, has paid limited attention to wives' time use. An exception is Patnaik (2019), who finds that paternity leave increases fathers' domestic work and wives' employment while also increasing wives' domestic work, as the increase in childcare outweighs the decline in housework. This positive within-couple association in domestic work is consistent with our findings and with related evidence on complementarities in spouses' labor supply (e.g., Goux et al., 2014; Ma and Shi, 2020) and joint childcare (Cosaert et al., 2023).

The remainder of this paper is organized as follows. Section 2 presents our data. Section 3 discusses our empirical approach. Section 4 presents our main empirical findings. Section 5 discusses the robustness of our main findings. Finally, Section 6 concludes.

2 Data

Our main data are based on the Japanese Panel Survey of Consumers (JPSC). The JPSC was initiated in 1993 with a nationally representative sample of young Japanese women. The survey consists of five cohorts: the original 1,500 women aged 25–34 years in 1993; an additional 500 women aged 24–27 years in 1997; 836 women aged 24–29 years in 2003; 636 women aged 24–28 years in 2008; and 625 women aged 24–28 years in 2012. The survey was conducted between October 1 and 31 of each year. The survey asks respondents about their marital status; fertility; and their own and their husbands' education, employment, earnings, working hours, and time spent on domestic work. Domestic work is reported as the total time spent on housework and childcare.

We pool all data from 1993 to 2019 and restrict the sample as follows. First, we restrict the sample to women with spouses living with them. Second, we include couples living with their youngest child, who is preschool-aged or in the first three years of primary school. We then restrict the sample to couples whose first child was born when they were between the ages of 20 and 45 years. Third, we exclude women who did not have labor market work experience before the first round of the survey because their labor supply may be inelastic to their husbands' involvement in domestic work. Fourth, to standardize the time restrictions on weekdays, we exclude women whose husbands are not employed or are employed part-time. Therefore, our sample includes husbands who are regular employees (full-time workers) or self-employed husbands. Finally, we restrict the husbands' domestic work hours to five hours or less, which is approximately the 95th percentile of the distribution. This is because spending more than five hours on home production during weekdays is uncommon for full-time workers, whose standard workdays are typically eight hours. Accordingly, the upper tail of the distribution beyond five hours is extremely sparse.

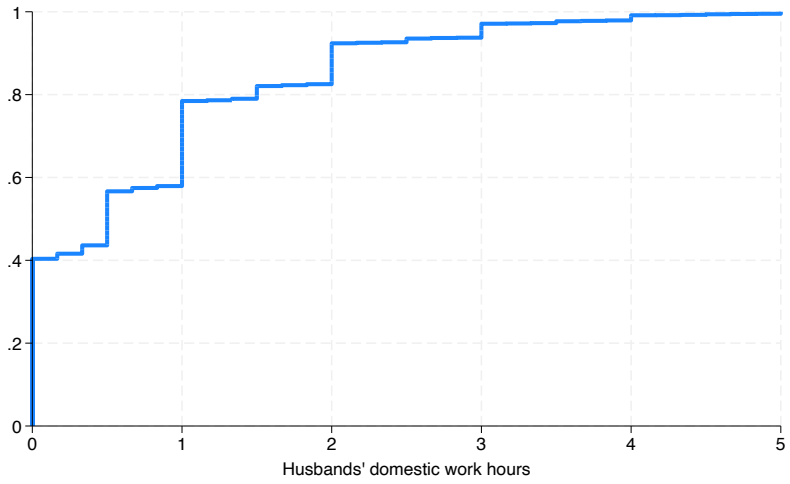
The resulting sample consists of 1,971 women, each observed for an average of 6.44 years, yielding up to 12,699 observations.

2.1 Treatment Variable

Our treatment variable is the number of hours that the husband spends on domestic work on a typical weekday. Time use is reported by the wife because all items in the survey are answered by the respondent women. As such, the data reflect how the wife perceives and evaluates her spouse's time, making it more directly relevant to her labor supply choices.

Our identification strategy exploits bunching at zero for the treatment variable. Figure 1 shows the empirical cumulative distribution function (CDF) of the treatment variable. The CDF is fairly smooth overall for positive values; however, approximately 40% of the observations are bunched at zero. The 50th, 75th, and 95th percentiles are 0.5, 1, and 3 hours, respectively.

Figure 1: Cumulative distribution function of the treatment variable



Note: This figure shows the cumulative distribution function of husbands' domestic work hours.

2.2 Outcome Variables

We focus on three sets of outcome variables. First, we are primarily interested in the wives' labor supply. The JPSC records weekly market work hours using categorical responses. Based on this, we construct a binary indicator that equals one if the woman works 22 hours or more per week. In our sample, approximately 29% of observations meet this threshold.[2] Second, to assess how husbands' involvement affects their wives' domestic burdens, we examine wives' domestic work hours on a typical weekday. Third, to explore how husbands' involvement influences their wives' overall time allocation, we consider wives' time spent on basic activities of daily living, such as eating, dressing, bathing, and sleeping.

Appendix Table A.1 reports the summary statistics and variable definitions for the main outcomes and covariates. In our sample, 29.3% of wives work at least 22 hours per week. On average, wives spend approximately 8.8 hours on domestic work and 10.2 hours on basic activities

[2]We use 22 hours as the benchmark but confirm that our results also hold for alternative, lower thresholds as well.

of daily living on a typical weekday. Appendix Figure A.3 shows the cumulative proportion of wives who work at least h hours per week for $h = 1, \ldots, 49$, as well as the overall employment rate, counting those on leave as employed. Appendix Figure A.4 shows the CDF of wives' domestic work hours on a typical weekday. The 5th, 25th, 50th, 75th, and 95th percentiles are 2.5, 5.0, 8.8, 12.0, and 16.0 hours, respectively. Appendix Figure A.5 shows the CDF of wives' basic activities of daily living on a typical weekday. The 5th, 25th, 50th, 75th, and 95th percentiles are 7.0, 8.8, 10.0, 11.5, and 15.0 hours, respectively.

2.3 Covariates

Our covariates (control variables) include a set of dummies for wives' and husbands' birth years, for two-year college or university (four-year college) education, age of the youngest child, and number of children. We also control for a set of dummies for survey years and for the eight regions (Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, and Kyushu) $\times$ three types of city sizes (urban city [*seirei shitei*], other cities, and rural [*cho-son*]).

Appendix Table A.1 reports that 40.2% of wives and 42.6% of husbands completed at least junior college (two-year) or a four-year university degree. The youngest child is aged 0–1 in 33.2% of observations, 2–3 in 26.4%, 4–6 in 23.3%, and is in grades 1–3 of elementary school in 17.1%. The number of children is one in 33.1% of the observations, two in 51.3%, and three or four in 15.6%.

3 Empirical Strategy

3.1 Selection Equation

We use the control function approach proposed by Caetano et al. (2024b). This approach uses the presence of bunching in the treatment variable, husbands' domestic work hours. We observe the actual realized domestic work hours only if they take positive values because a natural lower bound exists on the time spent at zero. This selection is expressed by the following equation:

$$X = X^* \cdot \mathbf{1}\{X^* \geq 0\}, \tag{1}$$

where $\mathbf{1}\{\cdot\}$ is the indicator function, P is the probability operator, X is the treatment variable, and X^* is the selection variable, assuming the bunching condition $0 < P(X^* < 0) < 1$.

X^* indicates a latent variable for husbands' domestic work time, indexing the "type" of each household. Thus, it includes all unobserved confounders that are associated with both wives' work and husbands' domestic work hours, such as wives' and husbands' preferences for labor supply and childcare, and relative productivity in home production. It also includes restrictions affecting their benefits and costs of domestic work, such as adjustments, commuting costs, and accessibility to formal and informal childcare.

3.2 Outcome Equation

We examine the effect of husbands' domestic work hours on outcomes and how it varies with the observed characteristics. The following outcome equation is considered:

$$Y = f(X, Z; \beta) + m(W) + U, \tag{2}$$

where β is the vector of parameters and Y denotes the outcome variable. Z denotes a set of indicator variables used to capture effect heterogeneity (e.g., the youngest child's age group, an indicator of the wife's college degree, and birth cohort indicators for wives and husbands). W is the full covariate vector with Z as a subset, and U is the remaining error.

3.3 Control Function

To identify the effect of X on Y, we need to address endogeneity concerns due to unobserved confounders in U. Note that X^* is a sufficient index of all confounders because, by definition in equation (1), $E[U \mid X^*]$ captures all endogenous variation in $E[U \mid X]$. Following the literature, we assume a linear form for $E[U \mid X^*, W]$. Let π and δ be parameters.

Assumption 1 (Linearity)**.** $E[U \mid X^*, W] = W'\pi + \delta(Z)X^*$.

Under Assumption 1, we can write equation (2) as

$$Y = f(X, Z; \beta) + m(W) + W'\pi + \delta(Z)X^* + \epsilon, \tag{3}$$

where $\epsilon \equiv U - E[U \mid X^*, W]$.

The selection equation (1) implies $X^* = X + X^* \cdot \mathbf{1}\{X = 0\}$. Substituting this for X^* in equation (3) and taking the conditional expectation,

$$E[Y \mid X, W] = f(X, Z; \beta) + m(W) + W'\pi + \delta(Z)\left(X + E\left[X^* \mid X = 0, W\right]\mathbf{1}\left\{X = 0\right\}\right). \quad (4)$$

Equation (4) suggests using $X + E\left[X^* \mid X = 0, W\right]\mathbf{1}\left\{X = 0\right\}$ as the control function to correct for the endogeneity of X. Since $E\left[X^* \mid X = 0, W\right]$ is unknown, we impose an additional assumption to determine its value. We assume one of the following restrictions on the shape of the conditional distribution of X^*.

Assumption 2 (Normal Distribution)**.**

$$X^* \mid W \sim \mathcal{N}\left(\mu(W), \sigma^2(W)\right),$$

where μ denotes the mean and σ^2 denotes the variance.

Assumption 3 (Tail Symmetry)**.** Let $q(W)$ be the $(1 - P(X = 0 \mid W))$-th quantile of the conditional distribution of X^* given W. For all $x \leq 0$,

$$P(X^* \leq x \mid W) = P(X^* \geq q(W) - x \mid W).$$

3.4 Estimation

To estimate $E[X^* \mid X = 0, W]$, we first discretize W. Let $\{\hat{\mathcal{C}}_1, \ldots, \hat{\mathcal{C}}_K\}$ be a finite partition of the support of W into K sets. We then write the K-th dimensional vector of the indicators of the sets as $\hat{C}_K = \left(\mathbf{1}\{W \in \hat{\mathcal{C}}_1\}, \ldots, \mathbf{1}\{W \in \hat{\mathcal{C}}_K\}\right)'$. We substitute W with $\hat{C}_K$ and use a two-step estimator $\hat{E}[X^* \mid X = 0, \hat{C}_K]$.[3]

We consider two specifications for the outcome model. For the baseline, we use a homogeneous

[3]Specifically, we discretize W into 50 sets by using hierarchical clustering with the Gower measure of distance and Ward's linkage. Under Assumption 3, for each set $K = k$, we nonparametrically estimate the probability of bunching $\hat{p}_k = \hat{P}(X = 0 \mid W \in \hat{\mathcal{C}}_k)$. Then, we calculate the $(1 - \hat{p}_k)$-th quantile of X among the observations in set k, $\hat{q}_k$. Finally, we estimate $\hat{E}[X^* \mid X = 0, W \in \hat{\mathcal{C}}_k] = X_{\hat{q}_k} - \hat{E}[X \mid X \geq X_{\hat{q}_k}, W \in \hat{\mathcal{C}}_k]$ where $X_{\hat{q}_k}$ is the $\hat{q}_k$-th quantile of the distribution of the husbands' domestic work hours. We apply this procedure to all k such that $\hat{p}_k \leq 0.5$. For the set with $\hat{p}_k > 0.5$ or under Assumption 2, we estimate a Tobit model of X on a constant for each set k. Then, we get $\hat{E}[X^* \mid X = 0, W \in \hat{\mathcal{C}}_k] = \hat{\mu}_k - \hat{\sigma}_k\lambda(-\hat{\mu}_k/\hat{\sigma}_k)$, where $\hat{\mu}_k$ and $\hat{\sigma}_k$ are the estimated intercept and standard deviation from the Tobit regression, and $\lambda(\cdot)$ is the inverse Mills ratio.

model that does not depend on Z. Specifically,

$$f(X, Z; \beta) = f(X; \beta) = \beta_1 X,$$
$$\delta(Z) = \delta. \tag{5}$$

For the heterogeneous model, we allow β and δ to vary across the value of $Z = z$:

$$f(X, Z; \beta) = \beta_1 X + \sum_{Z \neq 1} \beta_{2,z} X \cdot \mathbf{1}\{Z = z\},$$
$$\delta(Z) = \sum_z \delta_z \mathbf{1}\{Z = z\}. \tag{6}$$

We then specify $m(W) = W'\gamma + \sum_{k=1}^{K} \alpha_k \mathbf{1}\{W \in \hat{\mathcal{C}}_k\}$ and estimate the parameters of the regression model from equation (4) using ordinary least squares. We also report wild bootstrap confidence intervals clustered at the individual (the respondent woman) level, based on the procedure of Cameron et al. (2008).

4 Results

4.1 Selection

The condition (1) implies that observations with $X^* \leq 0$ report that the husbands' domestic work hours are zero, $X = 0$. Among observations with $X = 0$, there are two groups. One group consists of wives with $X^* = 0$; thus, they choose $X = 0$ as their solution. These wives are indifferent between their husband spending zero time and a marginal amount of time on domestic work. The other group consists of wives of type $X^* < 0$; thus, they choose $X = 0$ as the corner solution. These wives may believe that the opportunity cost of their husbands' spending on chores is high, and they are willing to exchange one hour of chores for one extra hour of work. However, such an exchange is not possible because their husbands already spend zero hours on chores. Therefore, they choose zero hours because time cannot be negative.

The presence of observations in the corner solution implies that the mean value of X^* should be discontinuous at $X = 0$. Although we cannot observe this discontinuity in the latent variable of X^*, we observe it indirectly by examining whether the main observed variables that are likely to be associated with X^* are discontinuous at $X = 0$. Figure 2 shows the sample mean and local

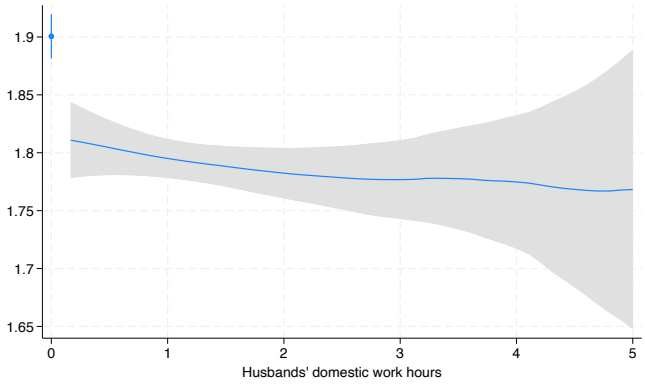
linear regression fits of the main observed control and outcome variables in the subsample with $X = 0$ and in the subsample with $X > 0$, respectively.

Figure 2a shows that the mean number of children declines as husbands' domestic work hours increase over the positive range. At the same time, there is a discontinuity at zero. Couples in which husbands report zero weekday hours have, on average, more children than those in which husbands report slightly positive hours.

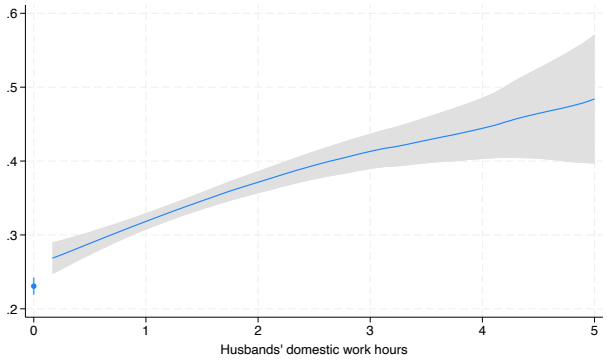
For the outcome variable, we also find a discontinuity at $X = 0$, consistent with the corner solution. Figure 2b shows a clear discontinuity at $X = 0$ in the probability that wives work more than 22 hours per week. This indicates that wives whose husbands spend slightly positive amounts of time on domestic work are more likely to work than wives whose husbands spend zero hours. Figure 2c shows the corresponding plot for the residualized outcome after controlling for covariates. A positive discontinuity remains at $X = 0$, suggesting selection on unobservables. This finding suggests the need to correct for endogeneity using the control function approach.

Figure 2: Discontinuity at the zero hour of the husbands' domestic work hours

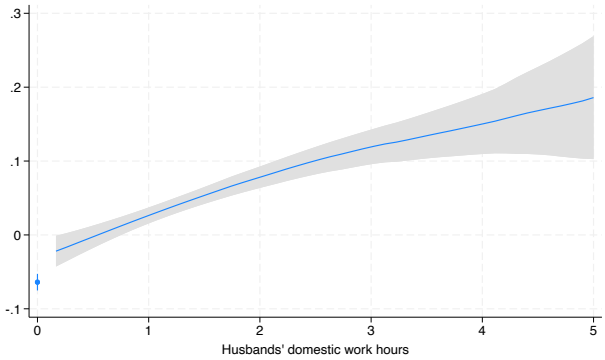
(a) Number of children



(b) Wives' labor supply



(c) Residuals of the wives' labor supply



Notes: This figure shows the local linear regression of either a control or an outcome variable on husbands' domestic work hours X for $X > 0$, together with the sample mean of the dependent variable at $X = 0$, along with the 95% confidence intervals. The dependent variables are as follows. Panel A uses the number of children as a key control variable. Panel B uses an indicator equal to one if wives work more than 22 hours per week as the outcome variable, Y. Panel C uses the residualized outcome after controlling for covariates, defined as $Y - \hat{m}(W)$. The bandwidth for the local linear regression is 1 hour.

4.2 Effects on Wives' Labor Supply

We begin with the effects of husbands' domestic work hours on wives' labor supply, which is the outcome of our primary interest. Figure 3 presents the effects on wives working more than 22 hours per week, based on the specification of the model (5). In Figure 3a, the uncorrected panel reports the results without correcting for endogeneity. This shows that a one-hour increase in the treatment variable is significantly associated with a 6.5-pp increase in the probability of the wife working 22 hours or more.

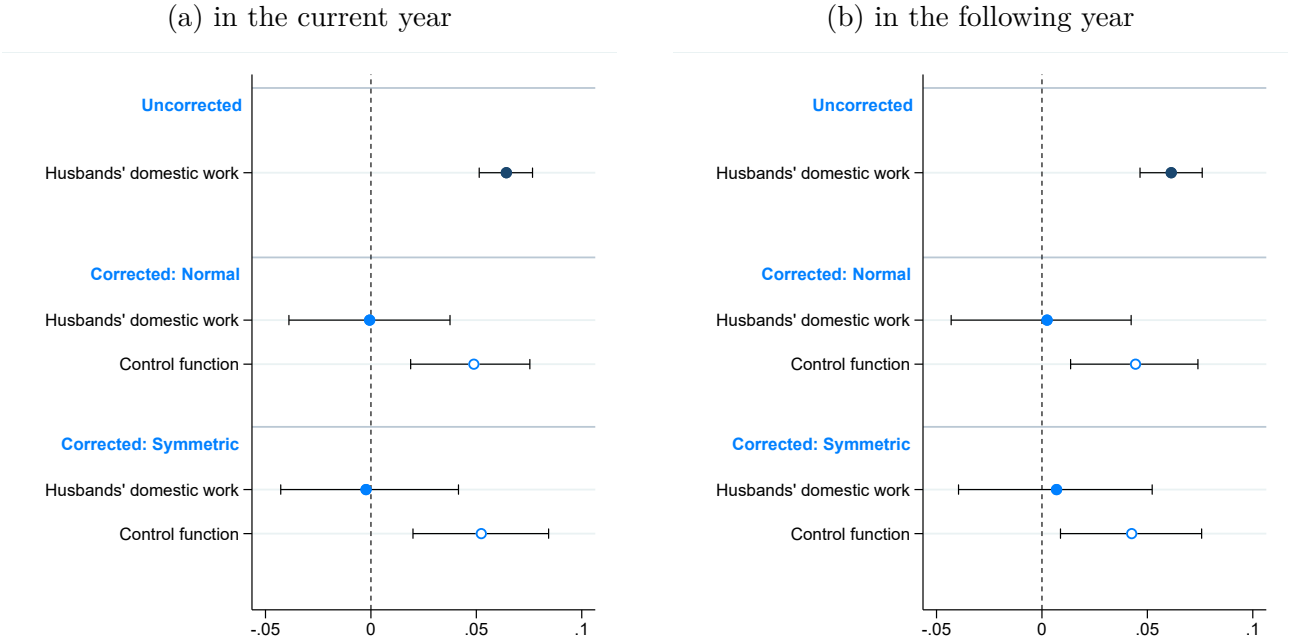
The corrected panels report the results after correcting for endogeneity using the control function. They suggest a negative but very small and statistically insignificant effect. Under the normal distribution assumption, an additional hour of the treatment reduces the probability of the wife working more than 22 hours by 0.1 pp, while the 95% confidence intervals include zero. A similar result is found without a full distributional assumption, with an insignificant effect of 0.2 pp under the symmetric-tails assumption.

The panels also show the effect of the control function, which captures the impact of X^*, and thus of the unobserved confounders indexed by X^*, on the outcome. These estimates are positive and statistically significant. The control function is positively associated with the probability that wives work more than 22 hours per week by 4.9 pp under the normal distribution assumption and by 5.2 pp under the symmetric-tails assumption. This suggests that women whose husbands spend more time on domestic work are more likely to be positively selected into employment than those whose husbands spend less time.

Husbands' domestic work hours in a given year may be jointly determined with wives' working hours in that year. Therefore, in Figure 3b, we examine whether the treatment variable affects wives' likelihood of working in the following year. We obtain similar results. The positive effect of husbands' involvement on wives' likelihood of working becomes close to zero and statistically insignificant once we account for the influence of unobserved confounders through the control function.

Correcting for selection using the control function changes the magnitude of the effect of husbands' involvement on wives' labor supply. The effect is close to zero and statistically insignificant. Therefore, the positive association between wives' work and husbands' domestic work hours is due to positive selection and may not be causal.

Figure 3: Wives working 22 hours or more per week



Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

4.2.1 Heterogeneity

We now examine the heterogeneity in the effects by age of the youngest child, mother's educational attainment, and birth cohort of wives and husbands based on the specification of the model (6). In this analysis, we present the marginal effect evaluated at $X = 1$, which represents the effect of a one-hour increase in husbands' domestic work hours for each value of $Z = z$.[4]

Age of the youngest child Figure 4a shows the effect by the youngest child's age group. Without correcting for selection, the treatment variable has a statistically significant positive effect on wives' labor supply for all age groups. The magnitude of the effect is smaller for the 0–1 age group than for the older groups. However, these positive associations disappear when the control function is added to the model. Under the symmetric distribution assumption, the effect of the control function is positive and statistically significant only for the 4–6 and 6–9 age groups.

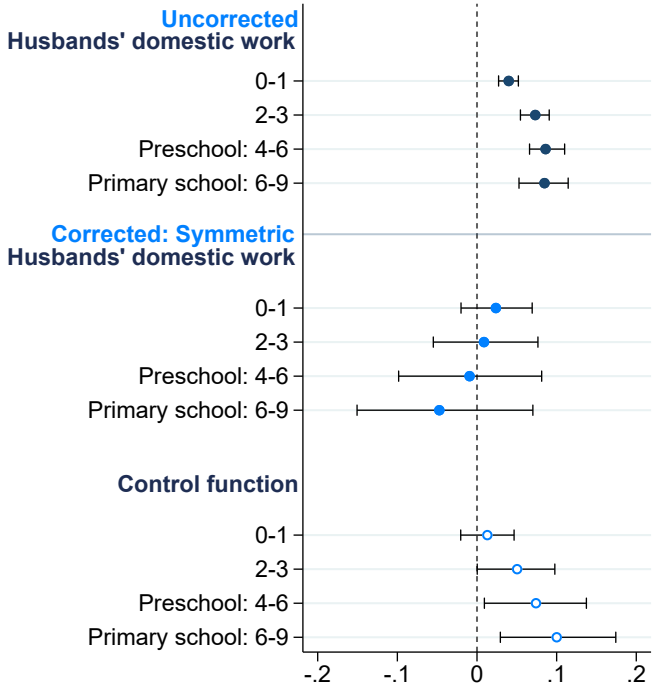
Wives' educational attainment Figure 4b shows the effects by the groups with and without wives' college education. When we do not correct for the selection on unobservables, the treatment variable has a statistically significant positive effect on wives' labor supply. The magnitude

[4]Because of space constraints, only the corrected estimates under the symmetric-tails assumption are reported.

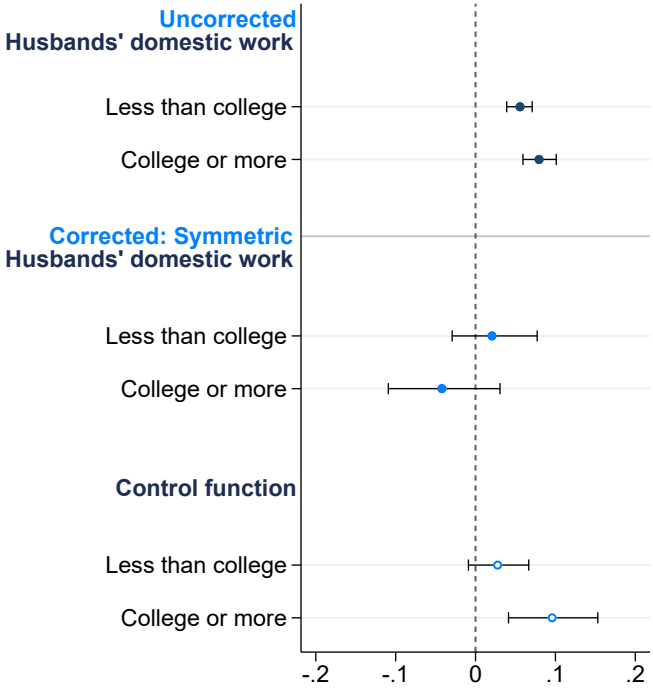
is slightly larger for wives with a college education. However, correcting for selection dramatically changes the result. The effect is negative for college-educated wives, although it is not statistically significant for either group. This is because the effect of the control function explains the positive correlation between husbands' domestic work hours and wives' labor supply. The effect is statistically significant for college-educated wives, suggesting that the positive selection for labor market attachment is substantial for college-educated wives.

Figure 4: Wives working 22 hours or more per week

(a) by age of the youngest child



(b) by wives' educational attainment



Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Overall, our results are consistent with specialization in domestic work driven by a potential shift in wives' comparative advantages in home production (see, e.g., Browning et al., 2014). When women's wages decrease relative to men's wages after childbirth, as the child penalty literature suggests, their opportunity costs of home production decrease, especially in Japan (e.g., Kleven et al., 2024; Okuyama et al., 2025). Consequently, women's labor supply is relatively unresponsive to changes in their husbands' involvement at home. The increased time husbands spend on domestic work reflects their wives' strong motivation to work, as seen among college-educated women.

Wives' and husbands' birth cohorts Appendix Figure A.6a reports the estimates by wives' birth cohorts. With control function correction, husbands' domestic work is insignificant across all cohorts. This aligns with the results shown in Figure 3a, although the effect of the control function is significant only for the 1970–1979 cohort. We find no evidence of heterogeneity in the effects across wives' birth cohorts.

Appendix Figure A.6b shows the estimates by husbands' birth cohorts. After applying the control function, the statistically significant positive association with wives' employment is no longer observed. For the 1947–1959 cohort, the effect of husbands' domestic work is significantly negative. The effects of the control function are significant, except for the 1960–1969 cohort. In summary, the control function addresses the selection on unobservables for all birth cohorts, and we find no clear evidence of heterogeneity in effects across birth cohorts.

4.3 Effects on Wives' Hours for Domestic Work and Basic Activities of Daily Living

Why does an increase in the amount of time husbands spend on domestic work not increase the labor supply of wives? To explore one possible path to this result, we examine how husbands' time on domestic work affects their wives' time allocation. Figure 5a shows the effects on wives' domestic work hours on a typical weekday based on the specification of the model (5). Without controlling for selection by unobserved confounders, wives' and husbands' domestic work hours are significantly negatively associated. This suggests that husbands' time spent on domestic work can be substituted for that of wives'.

However, correcting for selection changes the sign of the effect of husbands' domestic work hours, which is now statistically significantly positive. For example, under the normal distribution assumption, an approximate increase of 0.40 hour (24 minutes) in wives' domestic work can be observed. This is due to the negative impact of the control function on the time spent by wives.

This result suggests a negative selection. Women who are more likely to specialize in home production are paired with men who are more likely to choose zero hours of domestic work on weekdays. This is consistent with findings in the literature suggesting that the arrival of children increases the demand for home production. The arrival of children also alters comparative advantage, inducing specialization between labor market work and home production within couples (see, e.g., Guo and Xie, 2024; Siminski and Yetsenga, 2022).

How do wives increase their domestic work time in response to increases in their husbands' domestic work time? Figure 5b shows the effect of husbands' domestic work on wives' time spent on basic activities of daily living. A one-hour increase in husbands' domestic work statistically significantly reduces wives' time spent on basic activities of daily living by approximately 0.22 hours (13.2 minutes). The sign and statistical significance of the estimates are robust to the inclusion of the control function. Thus, wives may reduce the time spent on themselves to compensate for the increase in time spent on domestic work.

One possible explanation is complementarities in couples' time use: when husbands contribute more to domestic work, wives increase rather than decrease their own domestic work time. For example, couples may derive utility from spending time together, particularly while parenting (Cosaert et al., 2023). Related studies, including Goux et al. (2014) and Ma and Shi (2020), show that when one spouse reduces work hours, the other tends to do the same, suggesting synchronized time allocation within households.

Another explanation involves task quality or efficiency. Husbands may participate in ways that require wives to supervise or redo their efforts. Wives may also place a higher value on childcare than on housework and choose to devote more time to it (Patnaik, 2019). These mechanisms may help explain why paternal involvement does not alleviate and may even increase the wives' domestic burden.

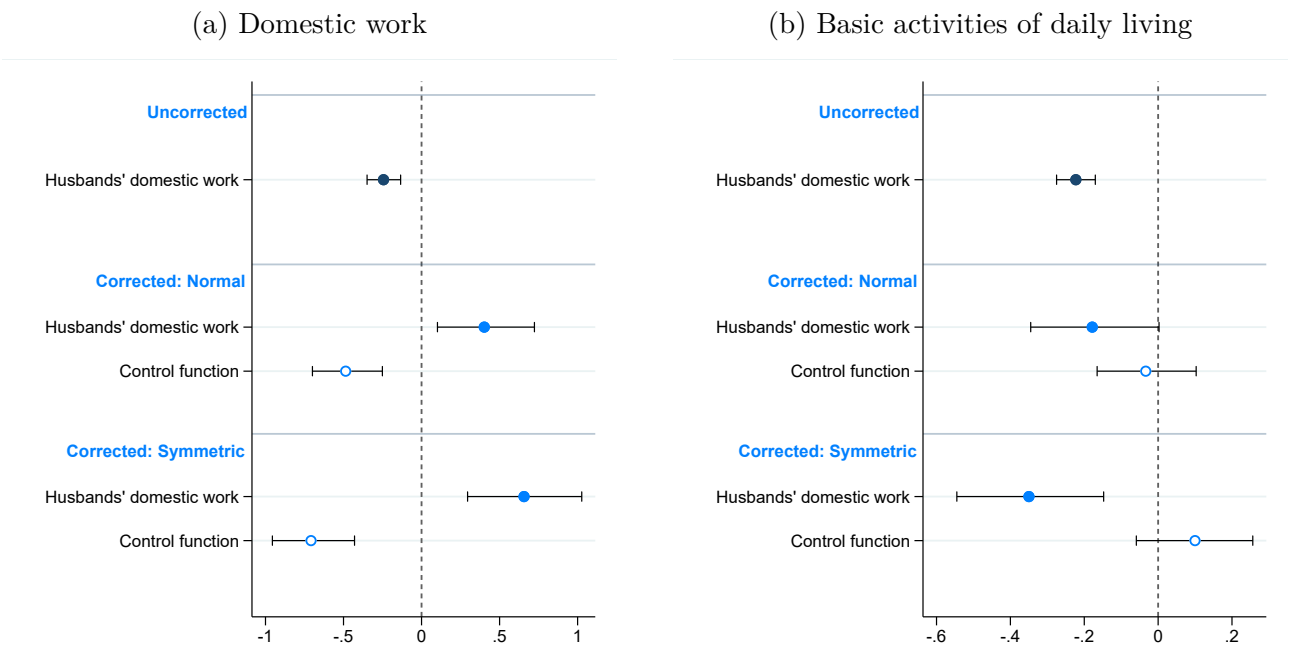
4.4 Effects on Husbands' and Couples' Outcomes

In Appendix Figures A.7 and A.8, we assess the effects of the treatment variable on husbands' and couples' time allocations and earnings using the specification in model (5). Figure A.7a shows how an increase in husbands' domestic work hours in the current year affects their time spent on the same activities in the following year. The results suggest a statistically significant positive effect, although part of the increase is explained by the control function.

Figure A.7b shows the effect on the husbands' time spent on basic activities of daily living. Husbands who spend an additional hour on domestic work tend to reduce their time spent on personal activities. Owing to positive selection, the effect is initially underestimated and becomes larger in magnitude once the control function is included.

Figure A.8a shows the effect on husbands' working hours, measured as a binary indicator of working 49 hours or more per week. In Japan, the standard full-time schedule is 40 hours

Figure 5: Wives' time use on a weekday



Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

per week. The results suggest that husbands' domestic work hours are negatively associated with working long hours. However, after controlling for selection using the control function, the effect becomes statistically insignificant, suggesting that the negative association partly reflects selection into jobs or work arrangements with greater discretion over weekday overtime.

Figure A.8b shows the effect on husbands' annual earnings. A one-hour increase in weekday domestic work is negatively associated with husbands' earnings in the uncorrected specification. After controlling for selection, the association remains negative and implies an estimated 3–5 percent decline in earnings, while the control function term itself is statistically insignificant.

Figure A.9 reports the effect on couples' annual earnings, defined as the combined labor earnings of the wife and husband. Neither the treatment variable nor the control function yields statistically significant estimates. We find no clear evidence of an effect on couples' annual earnings.

5 Robustness Check

5.1 Sensitivity to Sample Truncation

We examine the sensitivity of the main results on wives' labor supply to alternative upper bounds imposed on the treatment variable X. In the baseline sample, husbands' domestic work time is truncated at five hours, excluding the top 5 percent of the empirical distribution. This implies that the linearity assumption can be applied globally for $X^* \leq 5$. If this linearity approximation is inappropriate, truncation at different bounds would produce different estimates under nonlinearity in X^*. In Appendix Figure A.10, we therefore make this assumption more local by restricting the sample to smaller upper bounds. Using the baseline specification in equation (5), the estimates are quite similar across different upper bounds. Thus, our main results are insensitive to the alternative truncation bounds, suggesting that they may not be critically affected by possible nonlinearities.

5.2 Sensitivity to the Number of Covariate Discretization Sets

In our main analysis, we discretize the covariates into 50 sets to allow a flexible specification of the estimation models, following Caetano et al. (2024b,c).[5] Appendix Figure A.11 examines the sensitivity to this choice by varying the number of sets to 2, 5, and then in increments of 5 up to 100. Relative to our baseline of 50 sets, the estimates are similar across the different numbers of sets. Therefore, our main results are insensitive to the number of discretization sets of the covariates.

5.3 Alternative Definition of the Treatment Variable

The original specification defines the treatment variable as husbands' domestic work hours in the current year. In this robustness check, we use the average of husbands' domestic work hours over the current and previous years to account for husbands' past involvement. Appendix Figure A.12 shows the empirical CDF of the two-year average of husbands' weekday domestic work hours. The distribution remains smooth, and although the proportion of zero-hour observations decreases, approximately 30% of the sample remains bunched at zero. Figure A.13 presents the effects of the two-year average of husbands' weekday domestic work hours (years t and $t-1$) on wives

[5] See Section 3.4 for details.

working 22 hours or more per week, based on specification (5). The estimates are similar to those in Figure 3, suggesting that the main result is robust to an alternative definition of the treatment variable.

5.4 Alternative Definition of Outcome Variables

Since hours worked are recorded as a categorical variable, our main results, based on a 22-hour threshold for the labor supply dummy, may be sensitive to the choice of threshold. To assess this sensitivity, we estimate the model using alternative thresholds, as shown in Appendix Table A.2 for ease of comparison. Column (1) presents the estimates for wives' employment, including those who are currently on leave. Columns (2) and (3) present the results for lower thresholds. We find that the estimated effects on wives' labor supply largely follow the same pattern as those obtained using the 22-hour benchmark in Column (4), with the exception of Panel C, Column (3), where the effect of husbands' domestic work is slightly positive. By contrast, Column (5) shows the results for a higher threshold of 35 hours or more per week. Neither the treatment variable nor control function yields statistically significant effects at this threshold. Overall, these findings suggest that the main result is robust to alternative definitions of labor supply, particularly those based on employment status and shorter-hour thresholds.

We also assess robustness using time-use categorizations that are common in the collective model literature. Following studies using the JPSC, such as Guo and Xie (2024) and Lise and Yamada (2019), we classify time spent on work, commuting, and study/schoolwork as work time, and time spent on basic activities, hobbies, leisure, and social interactions as leisure. Since our primary outcome is wives' labor supply, measured as actual weekly hours in the labor market, rather than a composite measure of work-related time, we do not adopt this continuous work-time variable in the main analysis.[6]

Appendix Figure A.14a shows the effects on work time. The estimates follow the same pattern as those for the indicator "work 22 hours or more" in Figure 3a. Appendix Figure A.14b reports the effects on leisure. The estimates mirror those for basic activities of daily living in Figure 5b. The effect of the control function is statistically significant under the symmetric specification. Hence, the main results are robust to the alternative outcome definitions.

[6]Furthermore, the wording of the questionnaire item on time spent in "work activities" is ambiguous and may be interpreted more broadly than labor market work; thus, approximately 1.2% of non-employed wives report positive work time in this continuous measure.

5.5 Controlling for Husbands' Weekend Domestic Work

We further assess robustness by including husbands' weekend domestic work hours as an additional covariate. Because our primary focus is within-couple time allocation on weekdays, we do not include weekend time use in the main specification. Appendix Table A.3 shows that the pattern and magnitude of the estimates change slightly when weekend hours are controlled for. Nevertheless, we prefer the baseline specification since weekend hours are plausibly influenced by husbands' weekday domestic work choices and may therefore absorb part of the causal effect; conditioning on them risks bias from controlling for a post-treatment variable.

5.6 Individual Fixed Effects

Finally, we re-estimate our main specifications using individual fixed effects. Figure A.15 reports the estimates from the fixed-effects specification alongside the baseline estimates based on the same sample, corresponding to Figures 3a and 5a. Caution is warranted when comparing the coefficients. Since we control for individual fixed effects and survey-year dummies, identification relies on within-individual changes in husbands' domestic-work hours. Such variation reflects time-varying shocks or constraints within the household, such as changes in work schedules or hours, which affect the scope for reallocating time within couples. For this analysis, we restrict the sample to couples observed for at least two periods. The baseline estimates indicate that our results are insensitive to this additional sample restriction.

In the uncorrected panel of Figure A.15a, controlling for the individual fixed effects reveals a statistically significant positive association between husbands' domestic work and wives' labor supply. In the corrected panel, the positive association becomes statistically insignificant after correcting for selection using the control function, although the control function itself is statistically insignificant. Figure A.15b shows that the individual fixed-effects specification indicates a modest positive correlation between husbands' and wives' domestic work in the uncorrected panel. After correcting for selection, the estimated effect increases in magnitude. This is because the control function captures significant negative selection in wives' domestic work. These patterns suggest that individual fixed effects mitigate selection on unobservables but do not eliminate it. Therefore, even in the fixed-effects specification, including the control function remains essential to account for time-varying unobservables.

6 Conclusion

This study examines the effects of increases in husbands' weekday domestic work hours on wives' labor supply and time use in households with at least one child aged 9 or younger. Using Japanese panel data, we address endogeneity in intrahousehold time allocation using a control-function approach that exploits bunching at zero weekday hours of husbands' domestic work. We observe a positive association between husbands' domestic work hours and wives' labor supply. However, once we account for selection on unobservables, the estimated effects are small and statistically insignificant. These results suggest that the observed positive association is largely driven by selection rather than by a causal effect on wives' labor supply.

After accounting for selection, we find that an increase in husbands' domestic work hours increases wives' weekday domestic work hours. This pattern in couples' domestic work time is consistent with complementarities rather than substitution in household production. One possible interpretation is that husbands' participation requires coordination, supervision, or joint engagement in home production, and that couples may also derive utility from spending time together. The results further suggest that couples reduce time spent on basic activities of daily living, such as sleep and meals, while there is no clear evidence that husbands' overtime work declines.

Our estimates are informative about policies that primarily reallocate husbands' weekday time within the household while holding the labor-market environment fixed. Once selection arising from unobserved heterogeneity related to wives' labor-market attachment is taken into account, increasing husbands' weekday domestic work is unlikely to generate large gains in maternal employment. Along this margin, policies aimed at increasing husbands' time spent on domestic work, including the expansion of paternity leave, may not be sufficient on their own to raise wives' labor supply; complementary measures addressing labor-market barriers, such as inflexible work arrangements and wage disparities, may also be needed. At the same time, our findings do not rule out the possibility that such policies may affect child outcomes, family well-being, or longer-run gender norms, which are outside the scope of our analysis.

This study has three main limitations. First, we do not observe the specific domestic tasks performed by each spouse. More detailed time-use data would help identify the channels through which time allocation affects outcomes.

Second, our treatment variable is reported by wives, so we cannot fully disentangle wives'

perceptions of their husbands' contribution from their husbands' true domestic-work time inputs. This limitation is common to survey-based time-use measures. Nevertheless, because wives' labor-supply decisions are based on their perceptions and evaluations of their husbands' domestic contribution, we can also interpret our estimates as capturing the effect of perceived husbands' domestic contribution. This margin is plausibly directly relevant to wives' labor-supply decisions.

Third, following Caetano et al. (2024b), our identification relies on a one-dimensional control function constructed from bunching. The analysis therefore applies to settings in which endogeneity can be fully absorbed by such a control function, and it does not address more general forms of simultaneity (see Blundell and Matzkin, 2014; Matzkin, 2013). In particular, simultaneity may arise if wives' reporting of their husbands' contribution is itself affected by their employment status. Such state-dependent reporting falls outside the scope of our control-function correction. Because a credible instrumental variable that shifts husbands' domestic work time without directly affecting wives' time use is difficult to justify in our context, we employ a bunching-based control-function approach. An important direction for future research is to examine these effects in frameworks that allow more general simultaneity, ideally by leveraging long-run, fine-grained time-use data to validate exclusion restrictions.

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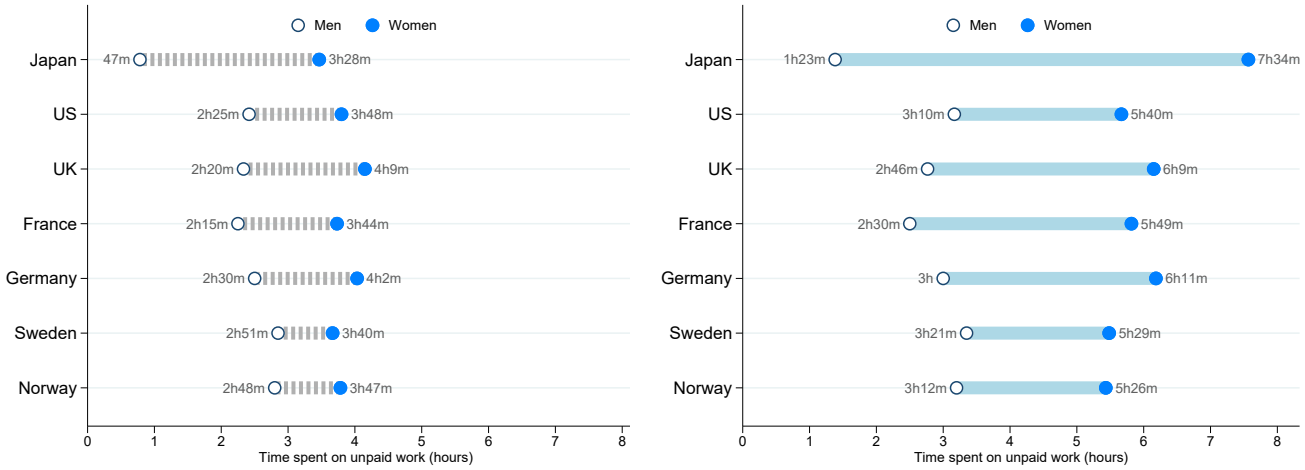
A Appendix

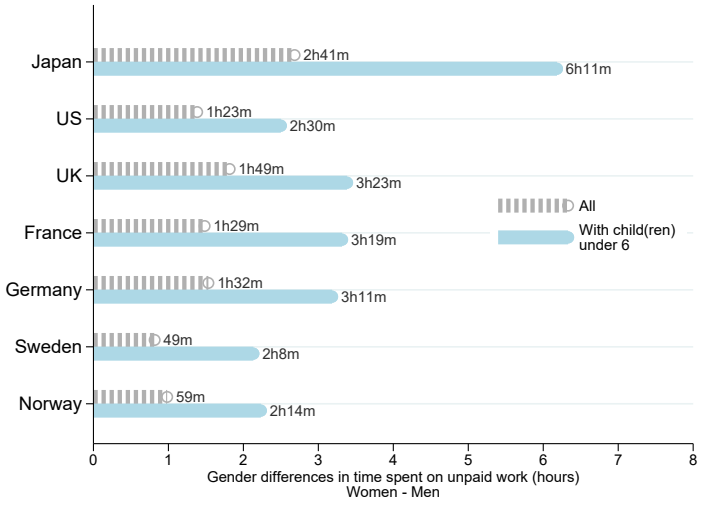
Figure A.1: International comparison of couples' time spent on unpaid work

(a) All couples

(b) Couples with a child aged 6 or younger

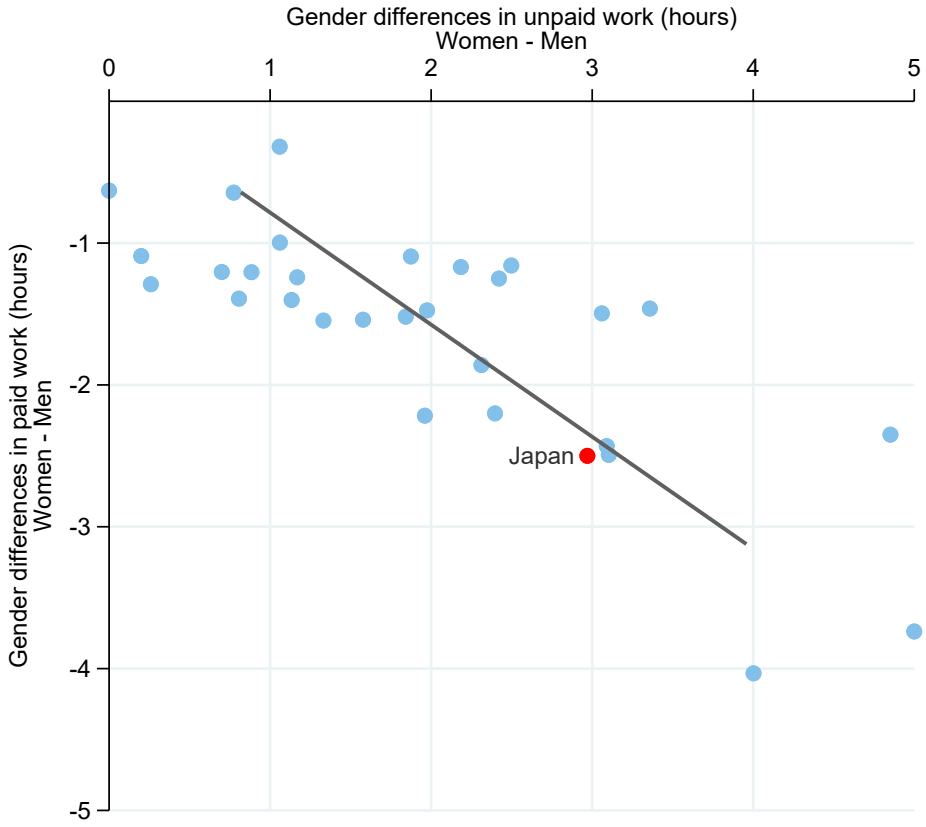


(c) Gender difference between women and men



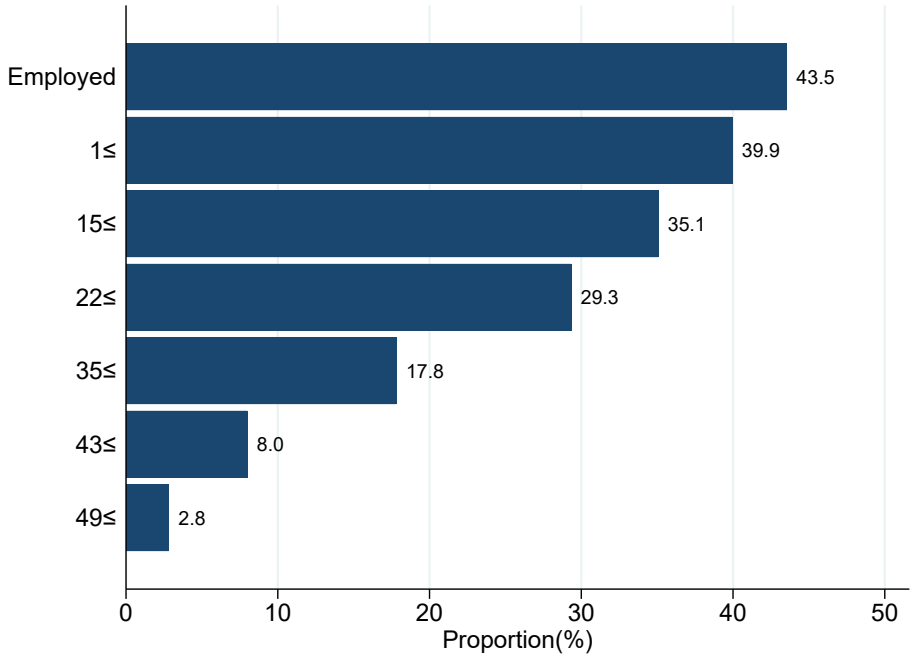
Notes: This figure illustrates the average amount of time that men and women in several developed countries spend on unpaid domestic work. Panel (a) shows data for all couples. Panel (b) shows data for couples with a child aged 6 or younger. Panel (c) shows the difference in hours between women and men.
Source: OECD (2025), Time-use Database and Gender Equality Bureau (2020).

Figure A.2: Scatter plots of the gender differences in paid and unpaid work



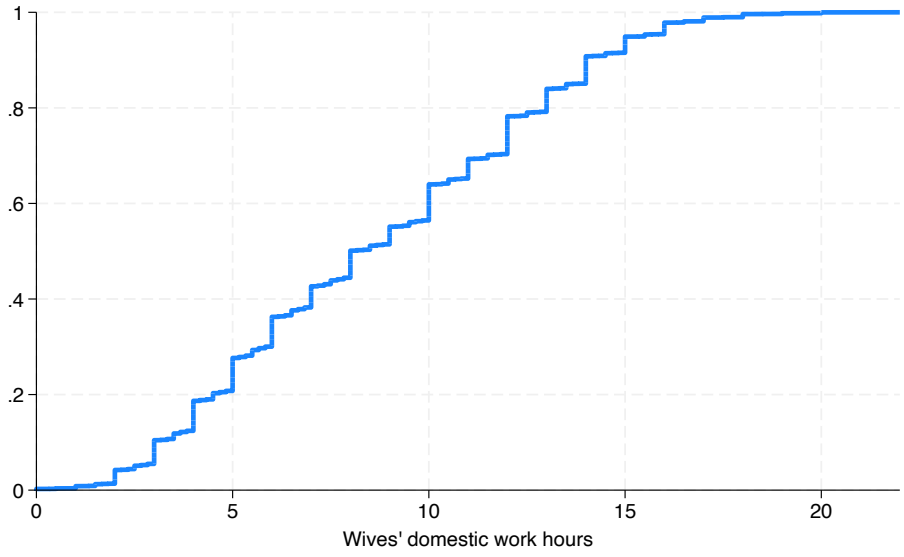
Notes: This figure illustrates the differences in time spent on paid and unpaid work between women and men. The vertical axis shows the differences in paid labor market work time. The horizontal axis shows the difference in unpaid domestic work time. The solid line is the linear regression line.
Source: OECD (2025), Time-use Database.

Figure A.3: Cumulative proportion of wives by weekly working hours



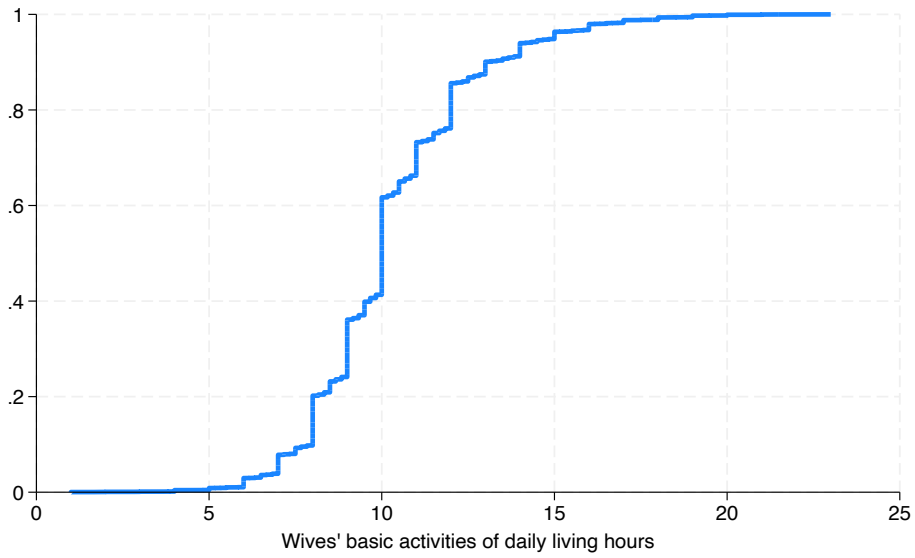
Note: This figure illustrates the cumulative proportion of wives who work at least h hours per week for $1, \ldots, 49$, as well as the overall employment rate, counting those on leave as employed.

Figure A.4: Cumulative distribution function of wives' domestic work hours



Note: This figure shows the cumulative distribution function of wives' domestic work hours.

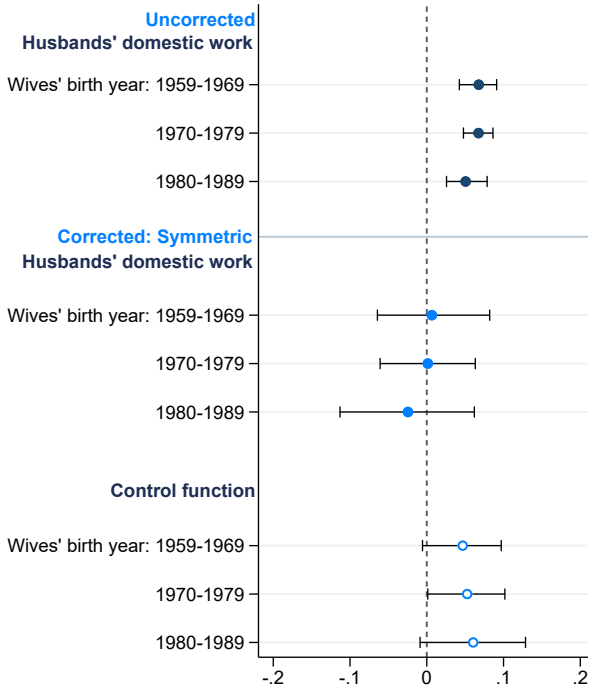
Figure A.5: Cumulative distribution function of wives' basic activities of daily living hours



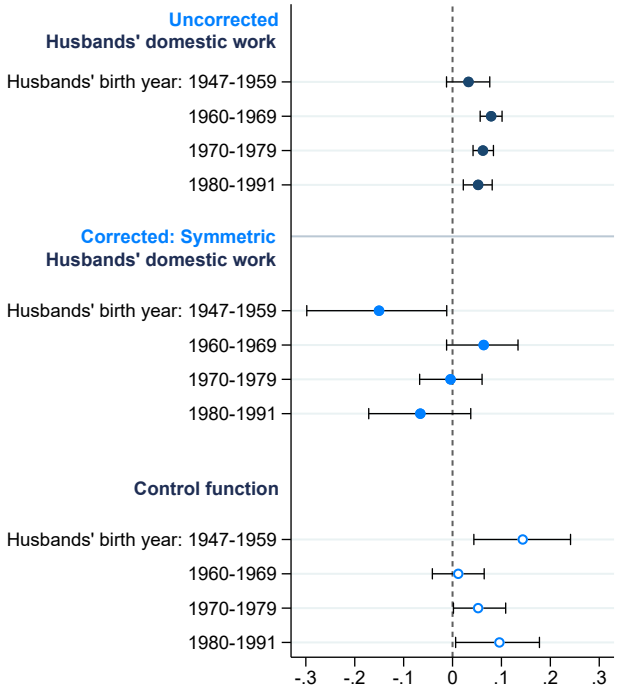
Note: This figure shows the cumulative distribution function of wives' basic activities of daily living hours.

Figure A.6: Wives working 22 hours or more per week

(a) by wives' birth cohort



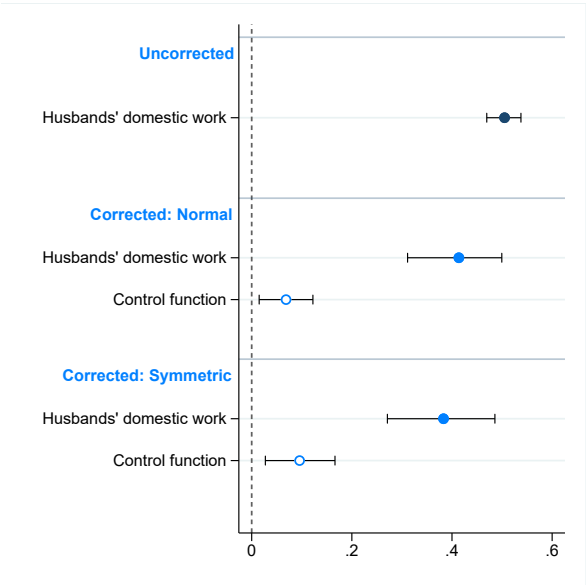
(b) by husbands' birth cohort



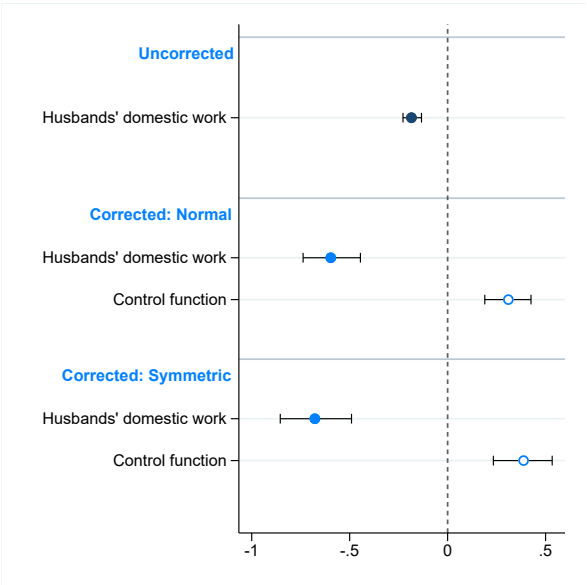
Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.7: Husbands' time use on a weekday

(a) Domestic work in the following year



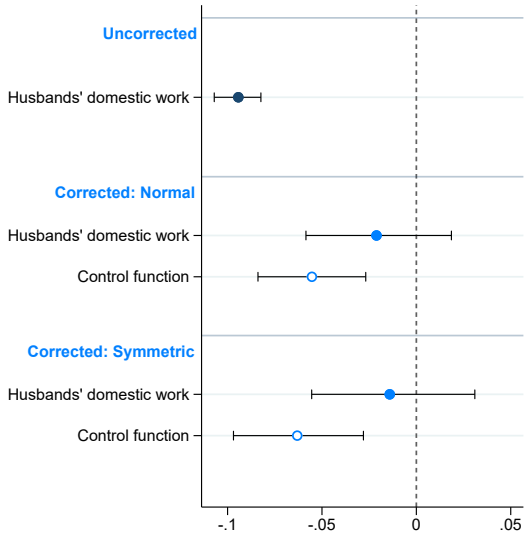
(b) Basic activities of daily living in the current year



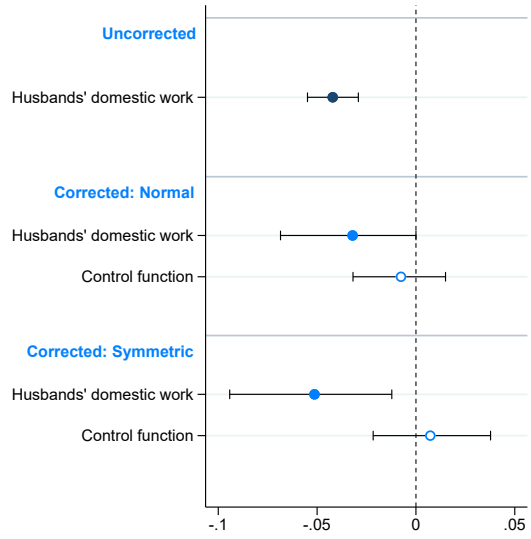
Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.8: Husbands' working hours and earnings

(a) Works 49 hours or more per week

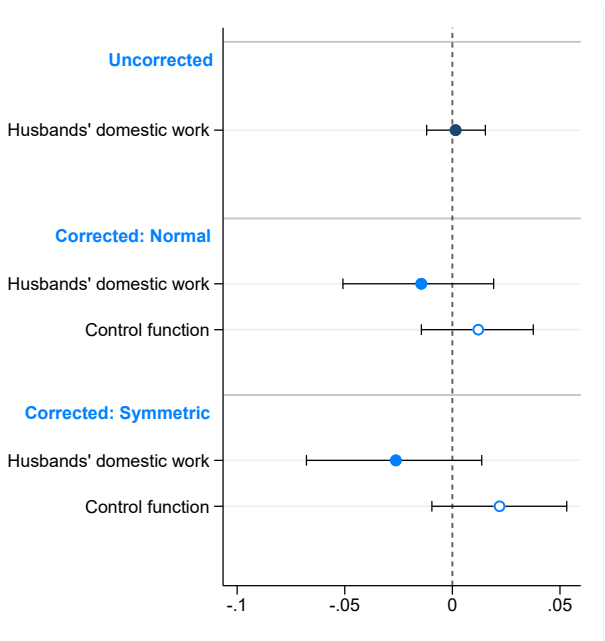


(b) Husbands' log annual earnings



Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.9: Couples' log earnings

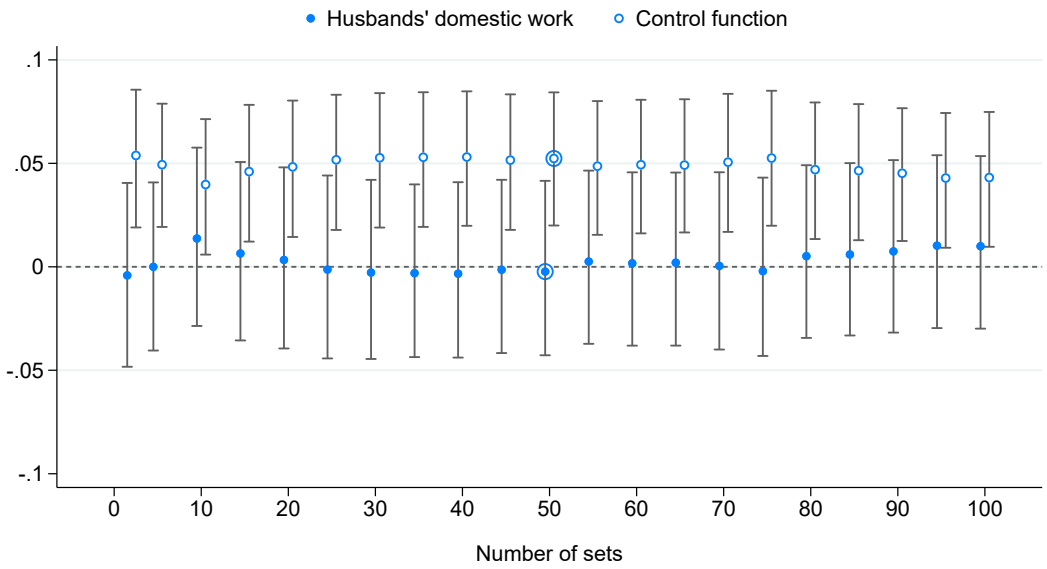


Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.10: Sensitivity to alternative upper bounds of the treatment variable

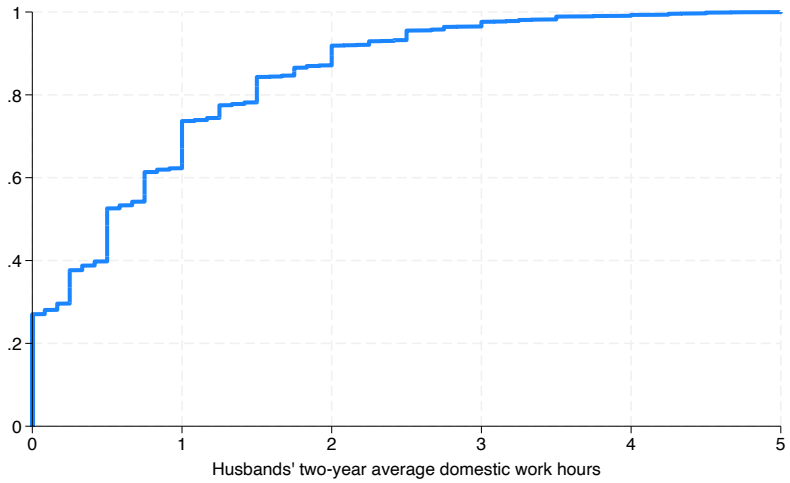
Notes: The outcome variable is the dummy for wives working 22 hours or more per week. The closed circles indicate the estimates of the coefficient of the treatment variable. The open circles indicate those of the control function. The bars indicate the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.11: Sensitivity to the number of covariate discretization sets



Notes: The outcome variable is the dummy for wives working 22 hours or more per week. The closed circles indicate the estimates of the coefficient of the treatment variable. The open circles indicate those of the control function. The baseline value of 50 sets is marked by a double-circled point. The bars indicate the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

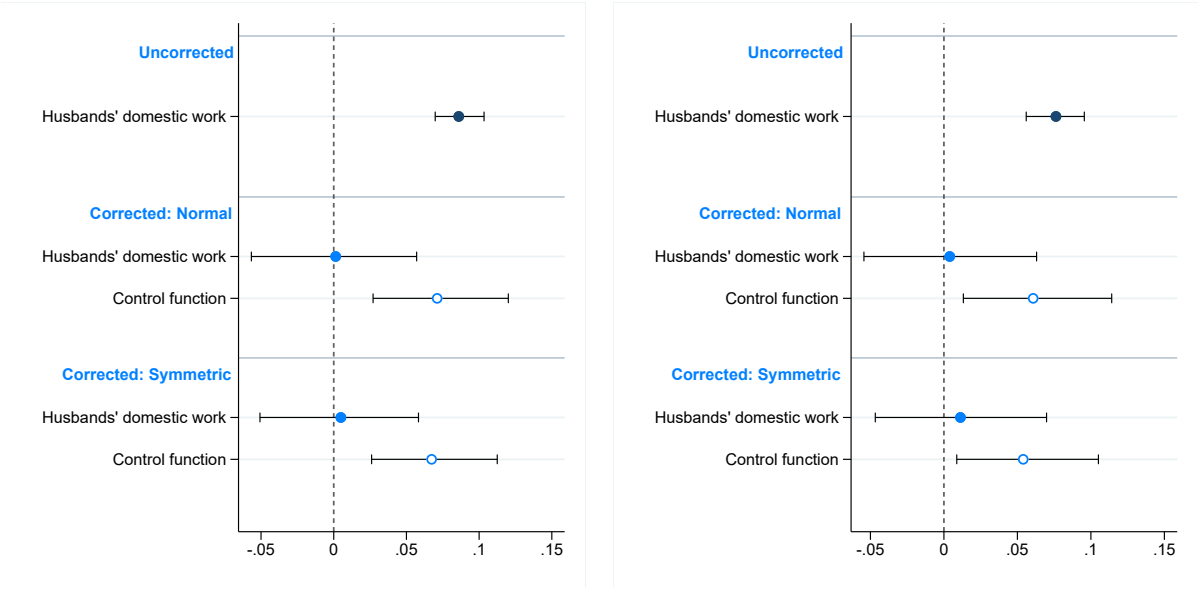
Figure A.12: Cumulative distribution function of husbands' two-year average domestic work hours



Note: This figure shows the cumulative distribution function of the domestic work hours of husbands averaged over t and $t-1$ years.

Figure A.13: Wives working 22 hours or more per week (the treatment variable is averaged over t and $t-1$ years)

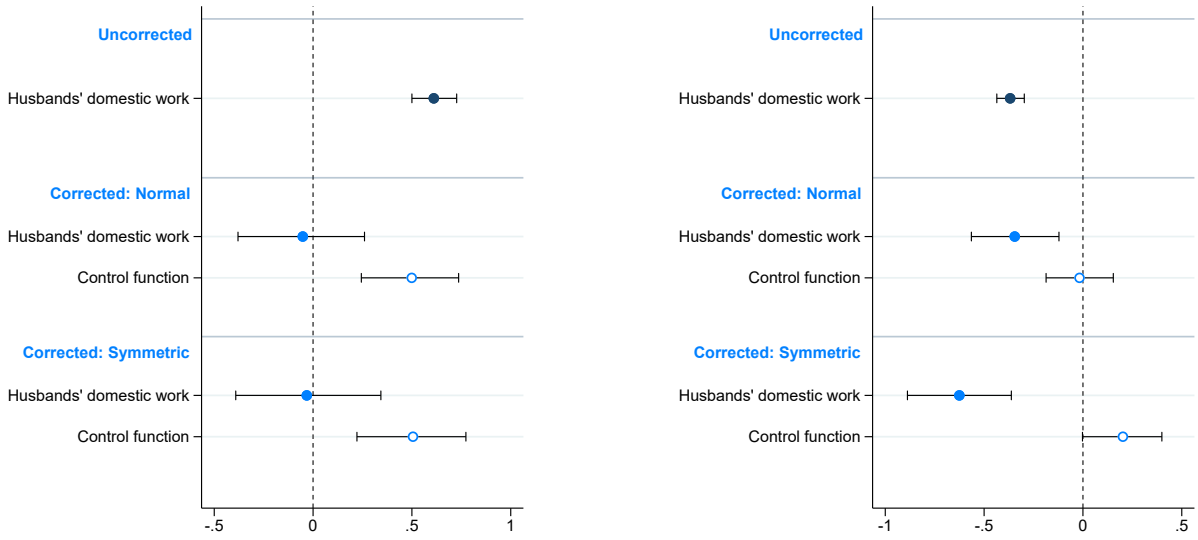
(a) in year t (b) in year $t+1$



Notes: The dot indicates the estimate of the coefficient of the two-year average treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.14: Wives' work time and leisure

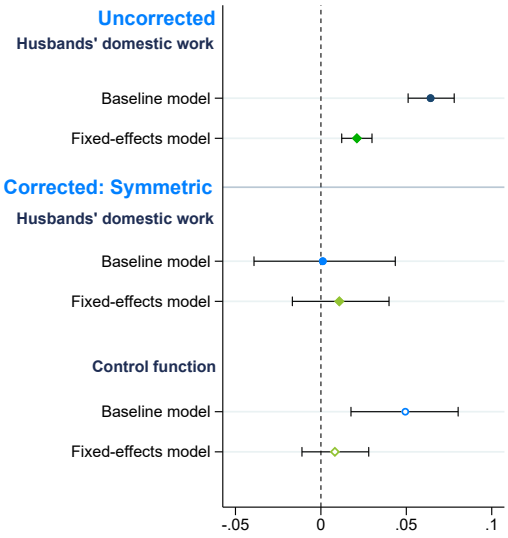
(a) Work time (b) Leisure



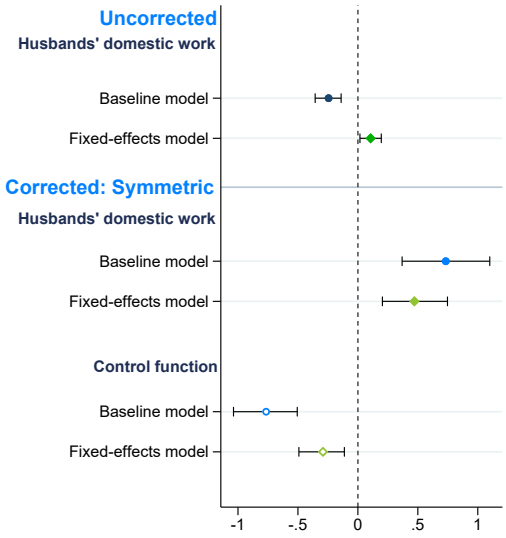
Notes: The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Figure A.15: Comparison of the base model and the model with fixed effects

(a) Working 22 hours or more per week



(b) Domestic work



Notes: Baseline: baseline specification re-estimated on the fixed-effects sample; Fixed-effects: specification with individual dummies and time-varying covariates. The dot indicates the estimate of the coefficient of the treatment variable and control function. The bar indicates the wild bootstrap 95% confidence intervals clustered at the individual level (1,000 bootstrap samples).

Table A.1: Summary statistics

	N=12,699
Wives working 22 hours or more per week	0.293 (0.455)
(in the following year)	0.328 (0.469)
Wives' domestic work hours	8.805 (4.228)
Wives' time for basic activities of daily living (hours)	10.182 (2.407)
Husbands' domestic work hours	0.809 (0.997)
Husbands' domestic work hours = 0	0.402 (0.490)
Wives completed 2- or 4-year college	0.402 (0.490)
Husbands completed 2- or 4-year college	0.426 (0.495)
Age of the youngest child	
0, 1	4,211 (33.2%)
2, 3	3,354 (26.4%)
4–6	2,964 (23.3%)
Elementary school: grades 1–3 (aged 6–9)	2,170 (17.1%)
Number of children	
1	4,201 (33.1%)
2	6,515 (51.3%)
3, 4	1,983 (15.6%)

Notes: The table reports sample means (standard deviations in parentheses) for continuous and indicator (dummy) variables, and counts (proportions in parentheses) for categorical variables (sets of dummies). A set of dummies for wives' and husbands' birth years, for the survey years, and for the eight regions × three types of city size is also controlled for in the regression model but not reported owing to space constraints.

Table A.2: Wives' working hours

	(1) Employed	(2) Working 1 hour+	(3) 15 hours+	(4) 22 hours+	(5) 35 hours+
Panel A: Uncorrected					
Husbands' domestic work	0.067	0.062	0.065	0.064	0.057
	(0.053 0.081)	(0.049 0.074)	(0.052 0.078)	(0.051 0.077)	(0.045 0.070)
Panel B: Corrected (Normal)					
Husbands' domestic work	-0.009	-0.004	-0.003	-0.001	0.023
	(-0.050 0.032)	(-0.044 0.032)	(-0.041 0.036)	(-0.039 0.038)	(-0.014 0.060)
Control function	0.057	0.050	0.051	0.049	0.025
	(0.024 0.087)	(0.020 0.078)	(0.021 0.079)	(0.019 0.075)	(-0.001 0.051)
Panel C: Corrected (Symmetric)					
Husbands' domestic work	-0.017	-0.006	0.003	-0.002	0.035
	(-0.063 0.030)	(-0.048 0.035)	(-0.039 0.046)	(-0.043 0.042)	(-0.004 0.074)
Control function	0.066	0.053	0.049	0.052	0.017
	(0.027 0.102)	(0.019 0.086)	(0.014 0.082)	(0.020 0.084)	(-0.012 0.047)

Notes: The table reports the effects of husbands' domestic work hours on a typical weekday on wives' employment outcomes. Each column within a panel reports estimates from a separate regression. Employed is an indicator equal to one if the wife is employed (including those on leave). Works h hours+ is an indicator equal to one if the wife works at least h hours per week, for $h \in \{1, 15, 22, 35\}$. Wild-bootstrap 95% confidence intervals, clustered at the individual level (1,000 bootstrap samples), are in parentheses.

Table A.3: Wives' main outcomes controlling for husbands' domestic work hours on weekends

	Working 22 hours+		Working 22 hours+ in t+1		Domestic work		Basic activities	
	Baseline	Control weekends	Baseline	Control weekends	Baseline	Control weekends	Baseline	Control weekends
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Uncorrected								
Husbands' domestic work	0.064	0.072	0.061	0.073	-0.244	-0.486	-0.223	-0.119
	(0.051 0.077)	(0.059 0.085)	(0.047 0.076)	(0.059 0.088)	(-0.349 -0.134)	(-0.592 -0.374)	(-0.275 -0.170)	(-0.176 -0.062)
Panel B: Corrected (Normal)								
Husbands' domestic work	-0.001	0.001	0.002	0.008	0.402	0.203	-0.178	-0.112
	(-0.039 0.038)	(-0.036 0.038)	(-0.043 0.042)	(-0.033 0.052)	(0.102 0.723)	(-0.089 0.482)	(-0.345 0.002)	(-0.307 0.071)
Control function	0.049	0.054	0.044	0.049	-0.486	-0.521	-0.033	-0.006
	(0.019 0.075)	(0.026 0.082)	(0.014 0.074)	(0.018 0.081)	(-0.699 -0.251)	(-0.737 -0.300)	(-0.165 0.103)	(-0.142 0.140)
Panel C: Corrected (Symmetric)								
Husbands' domestic work	-0.002	0.005	0.007	0.023	0.657	0.449	-0.350	-0.284
	(-0.043 0.042)	(-0.037 0.047)	(-0.040 0.052)	(-0.025 0.072)	(0.295 1.027)	(0.093 0.796)	(-0.545 -0.147)	(-0.502 -0.083)
Control function	0.052	0.053	0.043	0.040	-0.708	-0.739	0.100	0.130
	(0.020 0.084)	(0.021 0.086)	(0.009 0.076)	(0.004 0.078)	(-0.956 -0.429)	(-1.012 -0.463)	(-0.059 0.256)	(-0.032 0.310)

Notes: The table reports the effects of husbands' domestic work hours on a typical weekday on wives' outcomes. Each column within a panel reports estimates from a separate regression. Working 22 hours+ is an indicator equal to one if the wife works at least 22 hours per week. Working 22 hours+ in $t+1$ is defined analogously for the following year. Domestic work is the wives' domestic work hours on a typical weekday. Basic activities is the wives' hours spent on basic activities of daily living on a typical weekday. The baseline columns report the baseline specification. Control weekends additionally controls for husbands' weekend domestic work hours. Wild bootstrap 95% confidence intervals, clustered at the individual level (1,000 bootstrap samples), are in parentheses.