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A Positive Outcome of COVID-19? The Effects of Work from Home on Gender Attitudes and Household Production

Hiromi Hara*
harahiromi@fc.jwu.ac.jp

Daiji Kawaguchi**
kawaguchi@e.u-tokyo.ac.jp

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Bank of Japan
2-1-1 Nihonbashi-Hongokucho, Chuo-ku, Tokyo 103-0021, Japan

* Japan Women's University
** University of Tokyo

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Hiromi Hara† Daiji Kawaguchi‡

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Abstract

One of the more substantial changes brought by the COVID-19 pandemic has been the work from home (WfH) movement. However, as countries now prepare to move beyond the pandemic, the longevity of WfH remains unclear, as it involves not only the operations of businesses but of households as well. A further question is whether this pandemic-induced behavioral change might lead to more long-lasting societal effects such as a shift in gender norms. This study draws on an original panel survey dataset in Japan covering the periods before and after the onset of the pandemic to explore how engagement in WfH affects a couple's allocation of household production, work hours, and attitudes toward traditional gender norms. We find that husbands who adopt WfH increase their share of household production and also form more gender-neutral views of traditional gender roles. We also discuss the potential impact of this shift in gender attitudes on the future of WfH and the labor market.

Keywords: *Work from Home, Household Production, Gender Attitudes, COVID-19, Japan*

JEL Classification: *J12, J16, J22, J81*

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†Japan Women's University, 2-8-1 Mejirodai, Bunkyo-ku, Tokyo 112-8681, Japan. E-mail: harahiromi@fc.jwu.ac.jp.

‡University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8654, Japan. E-mail: kawaguchi@e.u-tokyo.ac.jp.

1 Introduction

Amidst all the devastation brought about by COVID-19, one of the most substantial changes has been the rise in Work from Home (WfH), with as many as 16.6 percent of workers in the US and 30 percent in Japan working from home as of May 2021.[1] Some studies predict that WfH will persist in a wide range of occupations even after the pandemic because of the substantial investment made by firms to accommodate WfH that now make WfH "irreversible" [Barrero et al., 2021]. However, equally important is the adaptation of the household to WfH. For many, the decrease in commuting time has led to a substantial relaxation of household time constraints. How have households reacted to this enhancement of their choice set, and how persistent are their choices? To answer these questions, we examine how the adoption of WfH has changed the spousal allocation of household production, which here includes housework and childcare, by drawing on a unique Japanese panel dataset that covers the periods before and after the onset of the pandemic. We also examine how the adoption of WfH changes gender attitudes in order to foresee the potential long-term impact of WfH on household behavior.

A few months after the onset of the pandemic, Alon et al. [2020] predicted that the spread of WfH would fundamentally change the roles of husbands and wives within a household as it would enable fathers to take primary responsibility for child care and thus erode gender norms that have led to an unequal division of labor in housework and child care. However, despite the fundamental societal change implied by this prediction, few studies to date have empirically tested it. Among those that have, Del Boca et al. [2020] report that in Italy, husbands working from home increase their time doing housework if their wife works at the office, and in Japan, Inoue et al. [2021] find that WfH causes husbands to increase their involvement in household production as their priorities shift more towards life and away from work. However, while WfH appears to have had at least a temporary effect on household production, how long will this rearrangement of the division

[1] US Bureau of Labor Statistics, Supplemental data measuring the effects of the coronavirus (COVID-19) pandemic on the labor market, accessed at https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm on February 12, 2022, and Japan Cabinet Office (2021), the 3rd Survey on Change in Lifestyle Awareness and Behavior under the COVID-19 pandemic.

of housework persist? Given the substantial investment made by firms to adopt WfH, it is unlikely that they will completely roll back this option for their employees [Barrero et al., 2021], so at least some WfH households are likely to maintain that arrangement after the pandemic subsides. However, the longevity and growth of WfH will depend on how household adapts to this arrangement. The literature has demonstrated that a couple's allocation of housework is critically affected by gender norms [Akerlof and Kranton, 2000; Bertrand et al., 2015], so if a possible rearrangement of household duties is in conflict with these gender norms, the couple may eventually feel discomfort with the WfH arrangement and return to working at the office. Thus the extent to which gender norms change in response to the penetration of WfH will crucially determine the take-up of WfH by households and the extent to which WfH will persist. With this in mind, this study analyzes the impact of WfH on the allocation of housework within a household as well as any shifts in attitudes towards traditional gender norms.

To do this, we utilize an online panel survey in July 2019 and in February 2020, covering the period immediately before the onset of COVID-19 through the middle of the pandemic. Both the July 2019 and February 2020 surveys collect information about attitudes toward gender norms and the allocation of housework within the household, and the February 2020 survey also includes involvement in WfH. Notably, the data on attitudes about gender norms was collected *before* the pandemic, which prevents any possibility of recall bias, which occurs when survey responses conform to recent experiences and events.

Drawing on this panel data, we regress the allocation of household production and attitudes toward traditional gender norms during the pandemic on the frequency of WfH, conditional on past gender attitudes and WfH experience. We use an instrumental variable (IV) approach to address potential endogeneity in the adoption of WfH. Specifically, an increase in the need for household production may change the allocation among couples and increase the adoption of WfH. This was commonly seen in households during the pandemic when school closures increased the need for child care, which increased the husband's involvement in child care as well as his adoption of WfH. We use the WfH penetration rate predicted from occupation, firm size, and location as the instrumental

variable because it captures the feasibility of WfH by occupation and firm size and the need for WfH according to the COVID-19 infection rate across prefectures. This IV satisfies the exclusion restriction because the WfH penetration rate does not directly affect the division of labor in the household, gender attitudes conditional on the division of labor, or gender attitudes before the pandemic.

Our results show that a husband's engagement in WfH increases his share of household production and reduces his wife's share. We first examine the impact on the *perceived* change in the allocation of household production among couples and find that both husbands and wives perceive that an increase in the frequency of WfH increases the husband's involvement in home production. These results are supported by survey questions about the actual share of housework performed by husbands and wives. When a husband moves from no WfH to full WfH, the husband's share of household production increases by 9.7 percentage points and the wife's decreases by 5.3 percentage points, where the mean shares were 30 and 75 percent before the pandemic. Both effects are statistically significant. As the instrumental variable estimation using the WfH penetration rate predicted by occupation, firm size, and prefecture renders largely similar results, this eliminates any concern about endogeneity. While our main finding is that the uptake of WfH by husbands substantially shifts the allocation of household production from wives to husbands, we also investigate how the adoption of WfH affects the views of home production through a survey question asking both husbands and wives how much they wish to change their share of housework. We find that the husband's adoption of WfH leads both spouses to want the husband to increase his involvement in housework duties, a remarkably symmetrical impact on the preferences of husbands and wives.

We further demonstrate that engagement in WfH affects attitudes toward traditional gender roles. We construct an index summarizing the gender attitudes based on three survey statements about gender norms and find that intensive involvement in WfH by husbands leads them to have more neutral attitudes toward traditional gender roles. Overall, our analysis shows that a husband's engagement in WfH substantially changes the gender attitudes of the couple, particularly that of the husband, which suggests that

WfH penetration might lead to a persistent long-term change in the way housework is shared between husbands and wives.

This study contributes to the literature in several ways. First, it informs a small but growing literature examining the impact of WfH during COVID-19 on the time allocation among couples within a household. To date, the results have been ambiguous, with Del Boca et al. [2020], Inoue et al. [2021], and Sevilla and Smith [2020] showing that the husband's adoption of WfH increases his contribution to housework, but Adams-Prassl et al. [2020], Andrew et al. [2021], and Farré et al. [2020] finding that the wives' share of household duties increased during the pandemic. This increase in the role of wives in home production despite a relaxation of the time constraint faced by husbands due to the adoption of WfH poses a puzzle, and Andrew et al. [2021] and Sevilla and Smith [2020] conjecture that this result may be due to traditional attitudes about gender roles. In our context, we find that a husband's adoption of WfH both increases his contribution to housework and child care and also causes his attitudes towards gender roles to become more gender neutral.

Second, this study sheds light on possible determinants of long-term societal gender norms. Previous studies such as Akerlof and Kranton [2000] and Akerlof and Kranton [2010] theoretically argue for the significance of self-identity as a determinant of peoples' behavior, and Bertrand et al. [2015] and Rodríguez-Planas and Tanaka [2021] demonstrate the importance of gender norms in explaining observed gender differences in housework and labor supply behaviors. Regarding the formation of gender norms, Alesina et al. [2013] provide a historical argument that traditional farming practices in ancient times have shaped the evolution of norms and beliefs about appropriate gender roles in society. In the medium term, Fernández et al. [2004] provide evidence that maternal employment affects sons' preferences about gender roles, and Hara and Rodríguez-Planas [2021] show that gender equality in home economics and industrial arts education in childhood helps to equalize attitudes toward traditional gender roles as adults. Looking at more contemporaneous determinants of gender norms, Dhar et al. [2018] show that classroom discussions about gender equality have a positive impact on gender attitudes and Dahl et al. [2021]

find that men forced to work side-by-side with women in the Norwegian military changed their attitudes about gender roles. Our study contributes to this strand of literature by demonstrating that a sudden rearrangement of work style also affects gender attitudes and, if persistent, may also contribute to a shift in gender norms.

Third, our study contributes to the literature on the effect of a significant shock on preferences. While economists generally assume that preferences are stable, Schildberg-Hörisch [2018] reviews numerous studies investigating the stability of risk preferences and finds that a substantial exogenous shock such as an economic crisis or natural disaster can change risk preferences. More recently, Alsharawy et al. [2021] find that COVID-19 altered risk, time, and social preferences, and our study adds to this literature by examining the impact of WfH induced by an exogenous pandemic shock on preferences about gender roles in home production.

Fourth, this study contributes to the extensive literature on the impact of technology on resource allocation within a household. As Barrero et al. [2021] articulates, WfH represents a drastic population-wide adoption of new technology, not unlike past examples such as the adoption of electric appliances induced by electrification that mobilized women from home production to market production [Greenwood et al., 2005; Dinkelman, 2011], or technological advancements in birth control and maternal health that contributed to women's career advancement [Goldin and Katz, 2002; Bailey, 2006; Albanesi and Olivetti, 2016]. Our results suggest that the adoption of WfH could have a similar impact on women's career advancement by freeing up women from home production through the additional time created by WfH.

2 Data

The data for this study was obtained from the *Lifestyle Survey*, a panel dataset with two waves conducted in July 2019 and February 2021 by the survey company Rakuten Insight which regularly surveys its registered respondents on specific topics. The first wave, conducted in 2019 between July 22 and 27, targeted married men and women born between April 1973 and March 1982 (between 37 and 46 years old) to focus on

the generation that is currently in the midst of working and raising children.[2] The target number of respondents was 1,750 individuals for each birth year cohort and gender, and the survey continued until the target number was recovered, leading to responses from 31,500 people (=1,750 × 9 annual cohorts × 2 genders). This survey method was implemented to maximize precision by guaranteeing sufficiently large gender-cohort sample sizes, and the survey asked respondents about their socio-demographic characteristics and attitudes toward traditional gender roles.

The second wave survey, which occurred in 2021 between February 19 and 28, again asked about attitudes toward traditional gender roles but also the frequency of WfH, hours worked per week, and share of household production of respondents and their spouses as of July 2019 and February 2021. In addition, the survey inquired about *changes* in the respondent's share of housework and childcare within a couple and whether there had been any change in their attitudes about the allocation between husband and wife after the spread of COVID-19. Both the *levels* and the *changes* in housework share were surveyed in order to measure changes in housework before and after the onset of COVID-19 in multiple ways.

Of the 31,500 people who replied to the first wave of the survey, 19,575 people (62.1%) responded to the second wave, consisting of 10,459 men and 9,116 women. Dropping observations with missing values reduces the analysis sample to 10,442 men and 9,087 women. As explained in detail in Table A1 in the Appendix, we further restricted our analysis sample to couples in which both spouses lived together and worked as employees[3] or corporate executives, but excluding the self-employed, in both 2019 and 2021. This restriction reduces the analysis sample to 5,080 men and 3,960 women. Table A1 shows that the sample restriction does not substantially change the means of the variables.

Table 1 shows the summary statistics of our analysis sample.[4] Both males and females

[2]In Japan, the fiscal and school year begins in April and ends in March the following year, so the respondents were those who were born between FY1973 and FY1981.

[3]Employees here include both *regular* employees who work full-time on permanent time-indefinite contracts and *non-regular* employees who work part-time or with fix-term contracts, including part-time workers, temporary staff, contract workers, commissioned workers, and others.

[4]Descriptive statistics of the original categorical variables used to construct the WfH frequency and the Gender Neutral Index explained below are reported in Table A2 in the Appendix.

are around 43 years old on average, and 53% of men and 43% of women had elementary school-age children in 2020.[5] As for the respondents' occupations, the proportion of women who are clerical workers or professional and engineering workers is high at 36% and 20%, respectively, followed by service workers at 19%. The proportion of men in professional and engineering, administrative and managerial, clerical, and sales positions is high but the proportion of service workers is only 7%, much lower than that of women. Regarding employment format, 98% of men are regular employees who work full-time under permanent contracts compared to only about one-third of women.

The survey asks about engagement in WfH both at the extensive and intensive margins by first asking whether the respondent and his/her spouse engaged in WfH and, if the response was yes, how frequently both the respondent and their spouse engaged in WfH in July 2019 and in February 2021, choosing from among the following options: 1) more than 80%, 2) 50–79%, 3) 20–49%, and 4) 19% or less. A WfH dummy variable taking one if the respondent chose one of the above four WfH frequency options, and zero otherwise, indicates that 30% of men and 14% of women engaged in WfH in 2021 based on self responses (Table A2 in the Appendix) and about 21% of men and 15% of women based on their spouse's responses. Despite the observed difference in male WfH frequency between self and spousal responses, it is clear that men are more likely to engage in WfH than women at the extensive margin.

Next, to capture the intensity of engagement in WfH, we converted the categorical variable of WfH frequency to a continuous measure by using the mid-point of each category.[6] Including those who did not engage in WfH, WfH amounted to 4% of total hours worked in 2019 and 15% in 2021 for men, a substantial increase of 11 percentage points. Also reassuring is that the figures for men reported by their wives are broadly consistent, with WfH increasing from 3% to 11%, or an 8 percentage point increase. As for women, the self-reported and spouse-reported figures are identical, at 3% in 2019 and 8% in 2021,

[5]The children were between 5 and 11 years old in 2019 and between 7 and 13 years old in 2021. As the age range for elementary school students in Japan is between 6 and 12 years old, they were of elementary school age in 2020.

[6]We use 0.9 if 1) more than 80%, 0.65 if 2) 50–79%, 0.35 if 3) 20–49%, 0.10 if 4) 19% or less, and 0 if the respondent did not engage in WfH.

representing a 5 percentage point increase. To summarize, both men and women were more likely to engage in WfH in 2021 than in 2019, with an 11 percentage point increase among men and a 5 percentage point increase among women, and the consistency of the self-reported and spouse-reported data provide further reassurance that the survey has accurately captured WfH engagement.

We next focus on hours worked, which only slightly decreased for both men and women from 2019 to 2021: from 43.08 to 42.05 hours for men and from 27.96 to 27.90 hours for women, with similar numbers reported by spouses. These raw figures suggest a slight decrease in working hours from 2019 to 2021.

Turning to household production, the survey asks three questions, the first one being the share of housework and childcare between the respondent and his/her spouse in both 2019 and 2021, with the respondent required to answer with a number between 0 and 100. We find that the men's share increased slightly from 29.6% in 2019 to 31.6% in 2021 and the women's share decreased accordingly from 77% to 74.7%.

The second question asks how the roles of each spouse in household production have changed in the wake of the spread of COVID-19, with the respondent required to answer among five options.[7] Although the most common response was that neither the husband's nor the wife's role changed, both husbands and wives responded more frequently that the husband's role increased than the wife's.

The third survey question is whether the spread of COVID-19 changed the respondent's attitudes about the division of housework and childcare between the spouses. Among men, 19% have come to think that men should increase their share of home production while only 4% think that their wives should increase their share. Similarly, among women, 18% have come to think that their husbands should increase their share of home production while only 3% of women think that they should increase their own share. Thus, after the onset of COVID-19, husbands and wives are aligned in thinking that husbands should increase their share of household production.

[7]They are 1) the husband's role increased, 2) the husband's role increased somewhat, 3) neither the husband's nor the wife's role changed, 4) the wife's role increased somewhat, and 5) the wife's role increased.

Lastly, the survey also inquires about attitudes toward traditional gender roles by asking respondents whether they agree or disagree with the following three statements:

1. The husband should be the breadwinner and the wife should be responsible for housework.

2. If the husband makes enough money, the wife should not work.

3. Men should also be involved in household chores and child-rearing.

For each of the three statements, respondents choose one of five options: strongly agree, agree, neither agree nor disagree, disagree and strongly disagree, and from these responses, we constructed a single *Gender Neutral Index* to summarize the attitude toward traditional gender roles reflected in the responses.[8] The Index has a minimum of 0 and a maximum of 12, with larger values indicating more gender neutral attitudes. As the index means were 7.24 in 2019 and 7.48 in 2021 for men and 8.06 in 2019 and 8.28 in 2021 for women, this indicates that women's attitudes are generally more gender neutral than men's but the attitudes of both men and women became more gender neutral after the onset of COVID-19.

3 Econometric Framework

To capture the changes in the sharing of household production and the attitudes about traditional gender norms caused by the adoption of WfH, we estimate the following equation:

$$Y_{i1} = \alpha \mathrm{WfH}_{i1} + \beta \mathrm{WfH}^{s}_{i1} + \gamma Y_{i0} + \delta \mathrm{WfH}_{i0} + \zeta \mathrm{WfH}^{s}_{i0} + X_{i0}\eta + u_{i1}, \tag{1}$$

where i is an individual and $t = \{0, 1\}$ is a time index taking 0 for 2019 and 1 for 2021. The dependent variable Y_{i1} is the outcome of interest for individual i in 2021, and our estimation procedure includes three dependent variables: household production, hours

[8] To construct the Gender Neutral Index, we assigned 0 for strongly agree, 1 for agree, 2 for neither agree nor disagree, 3 for disagree, and 4 for strongly disagree to responses for the first two statements but 4 for strongly agree, 3 for agree, 2 for neither agree nor disagree, 1 for disagree, and 0 for strongly disagree for the third statement because of its reverse polarity. The scores of the three statements were then added together to create the Gender Neutral Index.

worked, and the Gender Neutral Index. The independent variables include WfH_{i1} and WfH^s_{i1}, the WfH time share among total hours worked by individual i and i's spouse, respectively, in 2021. To capture any pre-existing heterogeneity in the sharing of housework or in gender attitudes, both of which can be correlated with the adoption of the WfH, we control for the outcome variable before the onset of COVID-19, Y_{i0}, and the adoption of WfH before the onset of COVID-19, WfH_{i0} and WfH^s_{i0}. X_{i0} is a vector of control variables that include a continuous age variable, a dummy variable for having children aged 7–13, a continuous variable for the number of children aged 7–13, and a constant term.

As we are concerned about possible endogeneity in the adoption of WfH after the onset of COVID-19, we address this concern through an instrumental variable estimation. The concern about endogeneity arises because a shock for household production affects both the share performed by husbands and wives and the adoption of WfH. For example, a school closure can cause a rearrangement in the share of childcare among couples while also encouraging the adoption of WfH to accommodate the increased need for child care. To address this endogeneity, we chose an instrumental variable that exploits the heterogeneity in the adoption of WfH during the pandemic. Focusing on the adoption of WfH in 2020, Kawaguchi and Motegi [2021] report that workers who were intensively involved in communication tasks before the pandemic were more likely to adopt WfH, presumably because adopting technologies such as online meeting or business chat applications substantially lowered the cost of remote communication. Furthermore, larger firms expanded these WfH opportunities more rapidly than smaller firms, presumably because larger firms have a higher capacity for the adoption of new technology. In addition to these technological factors, the adoption of WfH was also more prevalent in urban areas than rural areas, reflecting the degree of the spread of COVID-19.

Our instrumental variable for WfH frequency that captures these technological and location-specific determinants of WfH adoption is *predicted* WfH frequency based on occupation, firm size, place of residence, and individual characteristics (sex, age, whether the person has children aged 7–13, and the number of children aged 7–13) in 2019. Note that the sharing of household production and gender attitudes are likely to be heterogeneous

across occupations, firm size, and the location of the respondents, but this pre-existing heterogeneity is captured by the lagged dependent variable Y_{i0}. Thus, we may assume that any occupation, firm size, or regional heterogeneity in the adoption of WfH is as good as random, conditional on the gender attitudes and WfH arrangement before COVID-19 (i.e., Y_{i0} and WfH_{i0}), thus satisfying the IV exclusion restrictions.

4 Impact of WfH on Household Production

4.1 Subjective Change in the Share of Household Production

First, we examine the effects of an increase in WfH on the subjective change in the division of household production between husbands and wives. The survey asks how the relative share changed during the COVID-19 pandemic, with the respondent choosing one item from the following categories: 1) husband's role increased; 2) husband's role increased somewhat; 3) neither husband's nor wife's roles changed; 4) wife's role increased somewhat; 5) wife's role increased.

To estimate the subjective changes in household production, we constructed a linear probability model using each response category as the dependent variable against a set of mutually exclusive and exhaustive dummy variables we generated that correspond to the response choices. As the sum of the dummy variables is one, the sum of the estimated coefficients will be zero. Thus, if the adoption of WfH increases the probability of one choice, it will necessarily decrease the probabilities of the other choices. Panel A of Table 2 shows the results of the OLS regression for husbands, and we see that an increase in WfH by men causes an increase in their likelihood to perceive that they have increased their share of home production while they are also less likely to perceive that their wives increased their share. In addition, husbands also perceive that if their wives increase WfH, their wives will become more involved in home production. The IV results reported in Panel B are broadly similar to the OLS results.

Panels C and D report the results for wives. The OLS results reported in Panel C show that an increase in WfH engagement by husbands causes their wives to perceive an increase

in their husbands' share of home production, while an increase in the wives' engagement in WfH enhances their perception that their share of home production has increased. The IV estimates reported in Panel D are relatively close to the OLS estimates, which provides reassurance that engagement in WfH is orthogonal to the allocation of housework.

To summarize, engagement in WfH makes people feel that they have increased their share of home production, and an increase in their spouses' engagement in WfH makes people feel that their spouses increased their share of home production. In particular, engagement in WfH by husbands substantially increases both the husbands' and wives' perceptions of the husband's share of household production.

4.2 Actual Change in the Share of Household Production

We next examine how engagement in WfH in 2021 affected the sharing of housework within a couple in 2021, conditional on the sharing in 2019 and other baseline characteristics. Table 3 shows the effects of each spouse's 2021 WfH frequency on their share (%) of household production in 2021, where household production includes both housework and child care. Column (1) shows the results of the OLS estimation for men, and indicates that moving from no WfH to full adoption of WfH increases the husband's share of household production by 9.7 percentage points, which is substantial given that the share in 2019 was 30%. However, an increase in their wife's engagement in WfH does not affect the husband's share of household production. The coefficient for the share in 2019 (past household production) is about 0.9, suggesting that the sharing of housework is persistent. Column (2) reports the IV estimates in which the husband's WfH frequency is instrumented with a set of dummy variables including occupation, firm size and prefecture in 2019. The first-stage F statistic is large enough to strongly negate any issue about a weak instrument, but as the IV and OLS estimates are remarkably similar, we can rely on the OLS estimate for our analysis.

Column (3) shows the OLS estimation results for women, and we see that wives' engagement in WfH does not affect their share of household production. However, if their husbands move from zero to full WfH, the wives' share decreases by 5.3%, which is not

negligible given that the wives' share of household production was 75% in 2019. As the IV estimate in Column (4) is quantitatively similar to the OLS estimate reported in Column (3), as with men, we can infer the causal impact of WfH on the share of housework by using the OLS estimates.

In sum, we find robust evidence that an increase in a husband's engagement in WfH increases his share of household production and decreases his wife's share. In other words, husbands engage more in household production if they engage more in WfH. This result for actual behavior supports the findings above based on the *perceived* change in the share of household production.

4.3 Change in Attitudes about Household Production

We have demonstrated that a husband's engagement in WfH increases his share of household production. In this section, we examine if this change caused by WfH has also affected the way men and women think about the proper allocation of housework. The survey inquires whether respondents' attitudes toward housework have changed in response to the COVID-19 pandemic by asking them to choose one of the following three statements: 1) I have come to think I should increase my own share of home production in response to the pandemic; 2) I have come to want my spouse to increase his/her share of home production in response to the pandemic; 3) there is no change in attitudes. We regressed dummy variables corresponding to each choice on the individual and spouse's engagement in WfH and other controls variables as in the previous analysis.

The estimation results are summarized in Table 5. As in the previous analysis, both OLS and IV estimations were conducted. Panel A shows that a husband who engages in WfH wishes to increase his own share of household production and if his wife engages in WfH, he wishes for his wife's share to increase. The IV estimates in Panel B are consistent with the OLS estimates. Similar to the results for husbands in Panel A, Panel C shows that a wife who engages in WfH wishes to increase her own share of household production and if her husband's engagement in WfH increases, she wants her husband's share to increase. The IV estimates in Panel D are similar to the OLS estimates in Panel C, with

the exception that the estimates become imprecise and lose statistical significance. We also see for the IV estimates that a wife's engagement in WfH causes her to want her husband's share of the housework to increase.

Overall, the results regarding changes in attitudes about the sharing of household production among couples are largely consistent with the actual changes in the allocation of household production. We have thus found an alignment for both spouses between perceived and actual housework reallocation and the extent of working from home.

4.4 Change in Working Hours

To shed light on the mechanism underlying why an increase in husbands' WfH increases their share of housework, we examine how the adoption of WfH affects hours worked. While the adoption of WfH increases the time available for housework by cutting commuting time, if WfH increases the hours worked, this could outweigh any reduction in commuting time.

The survey asks respondents about hours worked per week including overtime but excluding commuting time in 2019 and 2021. Table shows the effect of WfH frequency on working hours, and we see that both the OLS and IV estimates for men indicate that engagement in WfH *reduces* the hours worked, but the effects are imprecisely estimated and not statistically significant. Both the OLS and IV estimates for women indicate that an increase in WfH by husbands decreases the hours worked by their wives, but the estimates are again imprecise and not statistically significant. In sum, we find that increased engagement in WfH by husbands does not increase the hours worked by either husbands or wives, leading to an increase in the time available for husbands to engage in housework due to reduced commuting time.

5 Impact on Attitudes toward Gender Norms

We next examine how the adoption of WfH affects a couple's attitudes toward traditional gender norms, as shown in Table 6, which reports the regression results of the effect of

each spouse's WfH frequency on that spouse's attitudes toward traditional gender roles as captured by the Gender Neutral Index. As explained in Section 2, a larger value for the index corresponds to a more gender-neutral or liberal attitude.

Columns (1) and (2) show the OLS and IV estimates for men, and they both show that increased engagement in WfH causes men to become more gender-neutral in their attitudes. The OLS estimate indicates that a transition from no WfH to full WfH increases the Gender Neutral Index by 0.36, where the mean of the index was 7.4 before the pandemic. The IV estimate reported in Column (2) confirms the OLS estimate and is actually greater in magnitude, but due to its large standard error, the difference is not statistically significant.[9] Columns (3) and (4) show the OLS and IV estimates for women, and we see that wive's gender attitudes are not affected by either their own WfH or their husband's.

To provide some context, the estimated coefficient for the Gender Neutral Index in 2019 was around 0.65 for both men and women, suggesting that gender attitudes are persistent. Nonetheless, an increase in WfH appears capable of changing husbands' attitudes toward gender roles in the relatively short term. While gender norms are social concepts formed in the very long term, as noted in Alesina et al. [2013], actual gender roles play a part in shaping attitudes and social norms associated with gender roles. Similarly, we find that the husband's increased involvement in household production due to WfH leads to a reallocation of gender roles in the household which alters husbands' attitudes about traditional gender norms.

Importantly, we have shown that an increase in WfH has led men to both increase their share of household production and cause their views of traditional gender roles to become more neutral. Attitudes not accompanied by action, or vice versa, may lead to the allocation of home production reverting to a pre-COVID level. However, our finding that men are tolerating or even embracing their involvement in domestic work implies that the observed increase in their share of household production is likely to persist even after the COVID-19 pandemic has subsided, as long as WfH options remain available.

[9]The Hausman t-statistic (Wooldridge [2010], p. 132) is $(0.540 - 0.355)/(0.092^2 + 0.265^2)^{\frac{1}{2}} = 0.659$.

If this observed reallocation of household production does persist, with husbands increasingly involved in housework, this could have a substantial social impact, helping to resolve the well-known unequal distribution of housework among couples. Particularly in Japan, reducing the burden of household duties from the shoulders of wives will help to mitigate the double burden faced by working women who are expected to take care of both household and market work. A reduction in housework may well provide women with a greater opportunity to work more intensively in the labor market and, more importantly, mitigate the observed statistical discrimination against women of childbearing age. Since the traditional gender norm in Japan is that women will take care of a substantial portion of the duties related to child-rearing, employers expect women to quit their jobs or reduce work hours substantially after childbearing. These expectations induce firms to initiate a vicious cycle whereby women are less frequently placed on the management track and are promoted less frequently to important positions when they are. Our results indicate that one positive side effect of the COVID-19 pandemic is that the increased penetration of WfH has at least the potential to break this vicious cycle.

6 Conclusion

This paper examined the impact of work from home (WfH) on both the allocation of housework and attitudes about traditional gender norms about the division of labor among couples. Examining Japan's experience is important because Japan is known as a country where women have traditionally borne a much larger burden of household production than men because Japanese men have traditionally worked long hours outside of the home, leaving them unable to play a substantial role in household chores and child care.[10] The penetration of WfH caused by COVID-19 has changed this situation drastically by enabling men to spend more time at home, and so we examine the impact on the allocation of household production between spouses, their attitudes toward household production,

[10] According to the Japanese Time Use Survey, officially known as the *Survey on Time Use and Leisure Activities* and conducted every five years by the Japan Bureau of Statistics, men were involved in home production for 44 minutes per week and women for 3 hours and 28 minutes per week in 2016, the most recent year available.

and their attitudes about traditional gender norms.

We found that the penetration of WfH after the onset of COVID-19 changed the allocation of home production among spouses, with an increased engagement in WfH by husbands increasing their share of home production and reducing their wives' share, which is consistent with previous studies [Del Boca et al., 2020; Inoue et al., 2021]. Our new findings relative to the literature concern the impact on attitudes toward traditional gender norms, and our analysis shows that husbands' extra time at home due to increased engagement in WfH have changed men's attitudes toward gender roles. Being at home longer has caused husbands to recognize that they need to contribute more. Further, we found evidence that husbands' experience with increased home production caused their attitudes to become more gender neutral, which is consistent with Alesina et al. [2013] who demonstrated that the roles actually played in society help to form people's attitudes about appropriate gender roles. Our examination provides evidence that the change in the gender roles in the household induced by a temporary shock has modified attitudes about the social norms associated with traditional gender roles.

Further, our findings suggest that the WfH arrangement will persist even after the COVID-19 pandemic subsides. Barrero et al. [2021] argue that the adoption of WfH has a network externality because colleagues at work and business partners must all adopt the arrangement simultaneously. However, due to the exogenous shock of COVID-19, this simultaneous investment has occurred, which means that WfH will likely stick because the infrastructure, both physical and in terms of human resource development, is already in place. Further, our finding that WfH has changed not only the allocation of housework but also the attitudes about gender roles within the household strengthens the argument that this adjustment caused by WfH will stick because the household allocation has adapted to the change in the share of market work within a couple. The implication of these findings is that since WfH contributes to more equitable gender roles within the household, policymakers should encourage at least the maintenance if not the expansion of WfH opportunities in Japan.

References

Adams-Prassl, Abi, Teodora Boneva, Marta Golin, and Christopher Rauh, "Inequality in the Impact of the Coronavirus Shock: Evidence from Real Time Surveys," *Journal of Public Economics*, 2020, *189*, 104245.

Akerlof, George A. and Rachel E. Kranton, "Economics and Identity," *Quarterly Journal of Economics*, 2000, *115* (3), 715–753.

_ and _ , *Identity Economics: How Our Identities Affect Our Work, Wages, and Well-Being*, Princeton, NJ: Princeton University Press, 2010.

Albanesi, Stefania and Claudia Olivetti, "Gender Roles and Medical Progress," *Journal of Political Economy*, 2016, *124* (3), 650–695.

Alesina, Alberto, Paola Giuliano, and Nathan Nunn, "On the Origins of Gender Roles: Women and the Plough," *Quarterly Journal of Economics*, 2013, *128* (2), 469–530.

Alon, Titan, Matthias Doepke, Jane Olmstead-Rumsey, and Michèle Tertilt, "The Impact of COVID-19 on Gender Equality," *NBER Working Paper 26947*, 2020.

Alsharawy, Abdelaziz, Sheryl Ball, Alec Smith, and Ross Spoon, "Fear of COVID-19 Changes Economic Preferences: Evidence from a Repeated Cross-sectional Mturk Survey," *Journal of the Economic Science Association*, 2021, pp. 1–17.

Andrew, Alison, Sarah Cattan, Monica Costa Dias, Christine Farquharson, Lucy Kraftman, Sonya Krutikova, Angus Phimister, and Almudena Sevilla, "The Gendered Division of Paid and Domestic Work under Lockdown," *IFS Working Paper W21/17*, June 2021. https://ifs.org.uk/uploads/WP2117-The-gendered-division-of-paid-and-domestic-work-under-lockdown.pdf.

Bailey, Martha J., "More Power to the Pill: The Impact of Contraceptive Freedom on Women's Life Cycle Labor Supply," *Quarterly Journal of Economics*, 2006, *121* (1), 289–320.

Barrero, Jose Maria, Nicholas Bloom, and Steven J Davis, "Why Working from Home Will Stick," *NBER Working Paper 28731*, 2021.

Bertrand, Marianne, Emir Kamenica, and Jessica Pan, "Gender Identity and Relative Income within Households," *Quarterly Journal of Economics*, 2015, *130* (2), 571–614.

Dahl, Gordon B, Andreas Kotsadam, and Dan-Olof Rooth, "Does Integration Change Gender Attitudes? The Effect of Randomly Assigning Women to Traditionally Male Teams," *Quarterly Journal of Economics*, 2021, *136* (2), 987–1030.

Del Boca, Daniela, Noemi Oggero, Paola Profeta, and Mariacristina Rossi, "Women's and Men's Work, Housework and Childcare, before and during Covid-19," *Review of Economics of the Household*, 2020, *18* (4), 1001–1017.

Dhar, Diva, Tarun Jain, and Seema Jayachandran, "Reshaping Adolescents' Gender Attitudes: Evidence from a School-Based Experiment in India," *NBER Working Paper 25331*, 2018.

Dinkelman, Taryn, "The Effects of Rural Electrification on Employment: New Evidence from South Africa," *American Economic Review*, 2011, *101* (7), 3078–3108.

Farré, Lídia, Yarine Fawaz, Libertad González, and Jennifer Graves, "How the COVID-19 Lockdown Affected Gender Inequality in Paid and Unpaid Work in Spain," *IZA DP No. 13434*, 2020. https://ftp.iza.org/dp13434.pdf.

Fernández, Raquel, Alessandra Fogli, and Claudia Olivetti, "Mothers and Sons: Preference Formation and Female Labor Force Dynamics," *Quarterly Journal of Economics*, 2004, *119* (4), 1249–1299.

Goldin, Claudia and Lawrence F. Katz, "The Power of the Pill: Oral Contraceptives and Women ' s Career and Marriage Decisions," *Journal of Political Economy*, 2002, *110* (4), 730–770.

Greenwood, Jeremy, Ananth Seshadri, and Mehmet Yorukoglu, "Engines of Liberation," *Review of Economic Studies*, 2005, *72* (1), 109–133.

Hara, Hiromi and Núria Rodríguez-Planas, "Long-Term Consequences of Teaching Gender Roles: Evidence from Desegregating Industrial Arts and Home Economics in Japan," *RIETI Discussion Paper 21-E-072*, 2021.

Inoue, Chihiro, Yusuke Ishihata, and Shintaro Yamaguchi, "Working From Home Leads to More Family-Oriented Men," *CREPEDP-109*, 2021.

Kawaguchi, Daiji and Hiroyuki Motegi, "Who can Work from Home? The Roles of Job Tasks and HRM Practices," *Journal of the Japanese and International Economies*, 2021, *62*, 101162.

Rodríguez-Planas, Núria and Ryuichi Tanaka, "Gender Norms and Women's Decision to Work: Evidence from Japan," *Review of Economics of the Household*, 2021, pp. 1–22.

Schildberg-Hörisch, Hannah, "Are Risk Preferences Stable?," *Journal of Economic Perspectives*, May 2018, *32* (2), 135–54.

Sevilla, Almudena and Sarah Smith, "Baby Steps: The Gender Division of Childcare During the COVID-19 Pandemic," *Oxford Review of Economic Policy*, 2020, *36* (Supplement 1), S169–S186.

Wooldridge, Jeffrey M, *Econometric Analysis of Cross Section and Panel Data*, MIT press, 2010.

Table 1: Summary statistics

	(1) Male			(2) Female		
	Count	Mean	SD	Count	Mean	SD
Panel A: Demographic variables (2021)						
Age	5080	43.29	(2.53)	3960	43.21	(2.54)
Have children ages 7–13	5080	0.53	(0.50)	3960	0.43	(0.50)
Number of children ages 7–13	5080	0.76	(0.83)	3960	0.59	(0.77)
Panel B: Occupation (2021)						
Service worker	5080	0.07	(0.26)	3960	0.19	(0.39)
Security worker	5080	0.02	(0.16)	3960	0.00	(0.04)
Agriculture, forestry and fishery worker	5080	0.00	(0.06)	3960	0.00	(0.06)
Transport operation worker	5080	0.05	(0.21)	3960	0.01	(0.11)
Manufacturing process worker	5080	0.08	(0.27)	3960	0.04	(0.21)
Administrative and managerial worker	5080	0.15	(0.36)	3960	0.01	(0.11)
Clerical worker	5080	0.15	(0.35)	3960	0.36	(0.48)
Sales worker	5080	0.14	(0.35)	3960	0.09	(0.28)
Professional and engineering worker	5080	0.29	(0.46)	3960	0.20	(0.40)
Worker not classified by occupation	5080	0.04	(0.19)	3960	0.08	(0.28)
Panel C: Firm size (2021)						
1-29 workers	5080	0.16	(0.37)	3960	0.31	(0.46)
30-99 workers	5080	0.14	(0.35)	3960	0.18	(0.38)
100-999 workers	5080	0.31	(0.46)	3960	0.26	(0.44)
$\geq$1000 workers	5080	0.32	(0.47)	3960	0.23	(0.42)
Government	5080	0.07	(0.25)	3960	0.03	(0.17)
Panel D: Employment type (2021)						
Regular worker (2019)	5080	0.98	(0.15)	3960	0.34	(0.47)
Regular worker (2021)	5080	0.98	(0.15)	3960	0.35	(0.48)
Spouse is regular worker (2019)	5080	0.40	(0.49)	3960	0.95	(0.22)
Spouse is regular worker (2021)	5080	0.41	(0.49)	3960	0.95	(0.22)
Panel E: WfH						
Past WfH frequency (2019)	5080	0.04	(0.16)	3960	0.03	(0.14)
WfH frequency (2021)	5080	0.15	(0.29)	3960	0.08	(0.23)
Spouse's past WfH frequency (2019)	5080	0.03	(0.15)	3960	0.03	(0.13)
Spouse's WfH frequency (2021)	5080	0.08	(0.23)	3960	0.11	(0.25)
Panel F: Home production						
Share of home production						
Past home production (2019)	5080	29.59	(21.83)	3960	76.95	(26.33)
Home production (2021)	5080	31.60	(22.11)	3960	74.73	(26.92)
Change in home production post-COVID						
Husband's increase	5080	0.06	(0.23)	3960	0.04	(0.19)
Husband's somewhat increase	5080	0.15	(0.36)	3960	0.13	(0.34)
Unchanged	5080	0.75	(0.43)	3960	0.73	(0.44)
Wife's somewhat increase	5080	0.03	(0.18)	3960	0.05	(0.22)
Wife's increase	5080	0.01	(0.10)	3960	0.05	(0.22)
Attitude toward home production share						
Wish to increase own duty	5080	0.19	(0.39)	3960	0.03	(0.16)
Wish to increase spouse's duty	5080	0.04	(0.20)	3960	0.18	(0.39)
Do not wish for change	5080	0.77	(0.42)	3960	0.79	(0.41)
Panel G: Gender Neutral Index						
Past Gender Neutral Index (2019)	5080	7.24	(2.17)	3960	8.06	(2.17)
Gender Neutral Index (2021)	5080	7.48	(2.17)	3960	8.28	(2.20)
Panel H: Hours worked						
Past hours worked (2019)	5080	43.08	(16.57)	3960	27.96	(15.15)
Hours worked (2021)	5080	42.05	(16.97)	3960	27.90	(15.10)
Spouse's past hours worked (2019)	5080	26.87	(17.02)	3960	39.59	(21.11)
Spouse's hours worked (2021)	5080	26.67	(17.14)	3960	39.07	(20.76)

Notes: This table shows the summary statistics by gender. Individuals are classified as regular workers if they are employed on an indefinite (permanent) contract or are board members of the company.

Table 2: Impact of own and spouse's WfH frequency on subjective change in home production

	(1)	(2)	(3)	(4)	(5)
	Change in subjective home production				
	Husband's increase	Husband's somewhat increase	Unchanged	Wife's somewhat increase	Wife's increase
Panel A: Male, OLS					
WfH frequency	0.224***	0.268***	-0.442***	-0.038***	-0.012**
	(0.022)	(0.025)	(0.028)	(0.010)	(0.005)
Spouse's WfH frequency	0.014	-0.023	-0.098**	0.080***	0.027**
	(0.026)	(0.033)	(0.041)	(0.022)	(0.013)
Past home production	0.000*	-0.000*	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes	Yes	Yes
Control mean	0.029	0.106	0.818	0.037	0.010
Observations	5,080	5,080	5,080	5,080	5,080
R-squared	0.071	0.043	0.091	0.007	0.006
Panel B: Male, IV					
WfH frequency	0.240***	0.348***	-0.650***	0.038	0.024
	(0.042)	(0.057)	(0.067)	(0.030)	(0.015)
Spouse's WfH frequency	0.007	-0.059	-0.005	0.046*	0.010
	(0.032)	(0.041)	(0.051)	(0.025)	(0.014)
Past home production	0.000*	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes	Yes	Yes
Control mean	0.029	0.106	0.818	0.037	0.010
Observations	5,080	5,080	5,080	5,080	5,080
First stage F statistic	536.076	536.076	536.076	536.076	536.076
Panel C: Female, OLS					
WfH frequency	-0.008	-0.012	-0.090**	0.060**	0.051**
	(0.019)	(0.031)	(0.042)	(0.025)	(0.026)
Spouse's WfH frequency	0.144***	0.284***	-0.422***	0.006	-0.013
	(0.023)	(0.031)	(0.034)	(0.018)	(0.017)
Past home production	-0.000***	-0.000	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes	Yes	Yes
Control mean	0.031	0.121	0.753	0.048	0.047
Observations	3,960	3,960	3,960	3,960	3,960
R-squared	0.040	0.042	0.067	0.006	0.007
Panel D: Female, IV					
WfH frequency	0.078	0.041	-0.333**	0.027	0.186**
	(0.062)	(0.108)	(0.143)	(0.078)	(0.073)
Spouse's WfH frequency	0.123***	0.271***	-0.362***	0.014	-0.046*
	(0.027)	(0.041)	(0.049)	(0.026)	(0.024)
Past home production	-0.000***	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes	Yes	Yes
Control mean	0.031	0.121	0.753	0.048	0.047
Observations	3,960	3,960	3,960	3,960	3,960
First stage F statistic	161.126	161.126	161.126	161.126	161.126

Notes: In the IV estimation in panels B and D, WfH frequency is instrumented by *predicted* WfH frequency based on occupation, firm size, place of residence, and individual characteristics (sex, age, whether the person has children aged 7–13, and the number of children aged 7–13) in 2019. Spouse's WfH frequency is treated as exogenous. All specifications control for age, whether the person has children aged 7–13, and the number of children aged 7–13. Past home production refers to the share of total home production (i.e. household chores and child rearing) the person performed in 2019. Past WfH refers to WfH frequency in 2019. Control mean refers to the mean of home production when one's own WfH frequency is equal to zero. First stage F statistic refers to the F statistic corresponding to the significance of the instrument to the WfH frequency. Robust standard errors are in parentheses. Significance levels are $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 3: Impact of own and spouse's WfH frequency on share of home production

	(1)	(2)	(3)	(4)
	Share of Home Production in 2021 (%)			
	Male		Female	
	OLS	IV	OLS	IV
WfH frequency	9.709***	9.812***	-0.089	-0.830
	(0.785)	(1.566)	(1.301)	(3.415)
Spouse's WfH frequency	-0.463	-0.509	-5.282***	-5.100***
	(1.058)	(1.263)	(1.032)	(1.342)
Past home production	0.908***	0.908***	0.938***	0.938***
	(0.009)	(0.009)	(0.006)	(0.006)
Past WfH	Yes	Yes	Yes	Yes
Control mean	30.244	30.244	75.271	75.271
Observations	5,080	5,080	3,960	3,960
R-squared	0.818		0.846	
First stage F statistic		536.076		161.126

Notes: Share of home production refers to the percent of household chores and child rearing the person is involved with relative to their spouse in 2021, and past home production refers to the same in 2019. Past WfH refers to the WfH frequency in 2019. In Columns 2 and 4, WfH frequency is instrumented by *predicted* WfH frequency based on occupation, firm size, place of residence, and individual characteristics (sex, age, whether the person has children aged 7–13, and the number of children aged 7–13) in 2019. Spouse's WfH frequency is treated as exogenous. All specifications control for age, whether the person has children aged 7–13, and the number of children aged 7–13. Control mean refers to the mean of the home production when one's own WfH frequency is equal to zero. First stage F statistic refers to the F statistic corresponding to the significance of the instrument to the WfH frequency. Robust standard errors are in parentheses. Significance levels are $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 4: Impact of own and spouse's WfH frequency on hours worked

	(1)	(2)	(3)	(4)
	Hours worked			
	Male		Female	
	OLS	IV	OLS	IV
WfH frequency	-0.625	-1.625	1.860***	2.319
	(0.491)	(1.352)	(0.651)	(2.664)
Spouse's WfH frequency	0.593	1.038	-0.354	-0.467
	(0.775)	(0.960)	(0.474)	(0.760)
Past hours worked	0.857***	0.857***	0.851***	0.851***
	(0.017)	(0.017)	(0.024)	(0.024)
Past WfH	Yes	Yes	Yes	Yes
Control mean	42.045	42.045	26.945	26.945
Observations	5,080	5,080	3,960	3,960
R-squared	0.699		0.735	
First stage F statistic		538.486		155.914

Notes: Hours worked refers to the total hours worked during the past week in 2021, and past hours worked refers to the same in 2019. Past WfH refers to the WfH frequency in 2019. In Columns 2 and 4, WfH frequency is instrumented by *predicted* WfH frequency based on occupation, firm size, place of residence, and individual characteristics (sex, age, whether the person has children aged 7–13, and the number of children aged 7–13) in 2019. Spouse's WfH frequency is treated as exogenous. All specifications control for age, whether the person has children aged 7–13, and the number of children aged 7–13. Control mean refers to the mean of the home production when one's own WfH frequency is equal to zero. First stage F statistic refers to the F statistic corresponding to the significance of the instrument to the WfH frequency. Robust standard errors are in parentheses. Significance levels are $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 5: Impact of own and spouse's WfH frequency on attitude on home production

	(1)	(2)	(3)
	Change in views on home production		
	Wish to increase own duty	Wish to increase spouse's duty	Do not wish for change
Panel A: Male, OLS			
WfH frequency	0.328***	-0.012	-0.316***
	(0.026)	(0.011)	(0.027)
Spouse's WfH frequency	-0.018	0.056***	-0.038
	(0.034)	(0.021)	(0.037)
Past home production	-0.001***	0.001***	0.000*
	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes
Control mean	0.135	0.034	0.831
Observations	5,080	5,080	5,080
R-squared	0.061	0.036	0.070
Panel B: Male, IV			
WfH frequency	0.378***	-0.033	-0.344***
	(0.061)	(0.033)	(0.065)
Spouse's WfH frequency	-0.040	0.065***	-0.026
	(0.043)	(0.024)	(0.046)
Past home production	-0.001***	0.001***	0.000
	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes
Control mean	0.135	0.034	0.831
Observations	5,080	5,080	5,080
1st stage F statistic	536.076	536.076	536.076
Panel C: Female, OLS			
WfH frequency	0.074***	0.048	-0.122***
	(0.024)	(0.038)	(0.041)
Spouse's WfH frequency	-0.001	0.271***	-0.269***
	(0.014)	(0.033)	(0.034)
Past home production	-0.000***	0.001***	-0.000
	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes
Control mean	0.020	0.171	0.809
Observations	3,960	3,960	3,960
R-squared	0.016	0.041	0.043
Panel D: Female, IV			
WfH frequency	0.094	0.275**	-0.369***
	(0.059)	(0.127)	(0.135)
Spouse's WfH frequency	-0.006	0.215***	-0.209***
	(0.021)	(0.045)	(0.048)
Past home production	-0.000***	0.001***	-0.000
	(0.000)	(0.000)	(0.000)
Past WfH	Yes	Yes	Yes
Control mean	0.020	0.171	0.809
Observations	3,960	3,960	3,960
First stage F statistic	161.126	161.126	161.126

Notes: In the IV estimation in panels B and D, WfH frequency is instrumented by *predicted* WfH frequency based on occupation, firm size, place of residence, and individual characteristics (sex, age, whether the person has children aged 7–13, and the number of children aged 7–13) in 2019. Spouse's WfH frequency is treated as exogenous. All specifications control for age, whether the person has children aged 7–13, and the number of children aged 7–13. Past home production refers to the share of total household chores and child rearing performed by the person in 2019. Past WfH refers to the WfH frequency in 2019. Control mean refers to the mean of the dependent variable when one's own WfH frequency is equal to zero. First stage F statistic refers to the F statistic corresponding to the significance of the instrument to the WfH frequency. Robust standard errors are in parentheses. Significance levels are $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 6: Impact of own and spouse's WfH frequency on the Gender Neutral Index

	(1)	(2)	(3)	(4)
	Gender Neutral Index			
	Male		Female	
	OLS	IV	OLS	IV
WfH frequency	0.355***	0.540**	0.246*	0.804
	(0.092)	(0.265)	(0.147)	(0.562)
Spouse's WfH frequency	0.226*	0.144	-0.119	-0.256
	(0.137)	(0.175)	(0.111)	(0.173)
Past Gender Neutral Index	0.631***	0.630***	0.656***	0.653***
	(0.012)	(0.012)	(0.013)	(0.013)
Past WfH	Yes	Yes	Yes	Yes
Control mean	7.389	7.389	8.229	8.229
Observations	5,080	5,080	3,960	3,960
R-squared	0.406		0.420	
First stage F statistic		534.815		160.967

Notes: Gender Neutral Index refers to the index constructed from opinions on the following statements: *The husband should be the breadwinner and the wife should be responsible for housework* (Strongly agree = 0, Agree = 1, Neither agree nor disagree = 2, Disagree = 3, Strongly disagree = 4), *Men should also be involved in household chores and child rearing* (Strongly agree = 4, Agree = 3, Neither agree nor disagree = 2, Disagree = 1, Strongly disagree = 0), and *If the husband makes enough money, the wife should not work* (Strongly agree = 0, Agree = 1, Neither agree nor disagree = 2, Disagree = 3, Strongly disagree = 4). Past Gender Neutral Index refers to the same in 2019, and past WfH refers to the WfH frequency in 2019. In Columns 2 and 4, WfH frequency is instrumented by *predicted* WfH frequency based on occupation, firm size, place of residence, and individual characteristics (sex, age, whether the person has children aged 7–13, and the number of children aged 7–13) in 2019. Spouse's WfH frequency is treated as exogenous. All specifications control for age, whether the person has children aged 7–13, and the number of children aged 7–13. Control mean refers to the mean of the Gender Neutral Index when one's own WfH frequency is equal to zero. First stage F statistic refers to the F statistic corresponding to the significance of the instrument to the WfH frequency. Robust standard errors are in parentheses. Significance levels are $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$.

Appendix

Table A1: Sample construction

	(1) Male			(2) Female		
	Count	Mean	SD	Count	Mean	SD
Panel A: Original sample						
Age	10442	43.15	(2.57)	9087	43.07	(2.60)
Have children ages 7–13	10442	0.51	(0.50)	9087	0.41	(0.49)
Number of children ages 7–13	10442	0.72	(0.81)	9087	0.55	(0.75)
Panel B: Keep only employed couples						
Age	6069	43.32	(2.54)	4900	43.26	(2.55)
Have children ages 7–13	6069	0.53	(0.50)	4900	0.42	(0.49)
Number of children ages 7–13	6069	0.75	(0.82)	4900	0.58	(0.77)
Panel C: Drop those with missing spouse's WfH frequency						
Age	5704	43.32	(2.54)	4652	43.25	(2.56)
Have children ages 7–13	5704	0.53	(0.50)	4652	0.42	(0.49)
Number of children ages 7–13	5704	0.75	(0.82)	4652	0.58	(0.77)
Panel D: Cohabiting couples						
Age	5557	43.32	(2.53)	4524	43.24	(2.56)
Have children ages 7–13	5557	0.53	(0.50)	4524	0.42	(0.49)
Number of children ages 7–13	5557	0.75	(0.82)	4524	0.58	(0.77)
Panel E: Drop the self-employed						
Age	5080	43.29	(2.53)	3960	43.21	(2.54)
Have children ages 7–13	5080	0.53	(0.50)	3960	0.43	(0.50)
Number of children ages 7–13	5080	0.76	(0.83)	3960	0.59	(0.77)

Notes: This table compares the characteristics of individuals in the original sample and final analysis sample. Individuals are classified as regular workers if they work on an indefinite (permanent) contract or if they are board members of the firm.

Table A2: Summary statistics #2

	(1) Male			(2) Female		
	Count	Mean	SD	Count	Mean	SD
Panel I: Present WfH (2021)						
Own WfH 80-100%	5080	0.09	(0.29)	3960	0.06	(0.23)
Own WfH 50-79%	5080	0.05	(0.22)	3960	0.02	(0.15)
Own WfH 20-49%	5080	0.07	(0.25)	3960	0.03	(0.17)
Own WfH 1-19%	5080	0.08	(0.28)	3960	0.03	(0.18)
Own WfH 0%	5080	0.70	(0.46)	3960	0.86	(0.35)
Spouse's WfH 80-100%	5080	0.06	(0.23)	3960	0.07	(0.26)
Spouse's WfH 50-79%	5080	0.03	(0.16)	3960	0.03	(0.17)
Spouse's WfH 20-49%	5080	0.03	(0.17)	3960	0.05	(0.21)
Spouse's WfH 1-19%	5080	0.04	(0.19)	3960	0.07	(0.25)
Spouse's WfH 0%	5080	0.85	(0.36)	3960	0.79	(0.41)
Panel J: Past WfH (2019)						
Own past WfH 80-100%	5080	0.02	(0.15)	3960	0.02	(0.14)
Own past WfH 50-79%	5080	0.01	(0.11)	3960	0.00	(0.07)
Own past WfH 20-49%	5080	0.02	(0.15)	3960	0.01	(0.10)
Own past WfH 1-19%	5080	0.05	(0.21)	3960	0.02	(0.14)
Own past WfH 0%	5080	0.90	(0.30)	3960	0.95	(0.22)
Spouse's past WfH 80-100%	5080	0.02	(0.15)	3960	0.02	(0.12)
Spouse's past WfH 50-79%	5080	0.01	(0.09)	3960	0.01	(0.09)
Spouse's past WfH 20-49%	5080	0.01	(0.11)	3960	0.02	(0.13)
Spouse's past WfH 1-19%	5080	0.02	(0.15)	3960	0.02	(0.15)
Spouse's past WfH 0%	5080	0.93	(0.25)	3960	0.93	(0.25)
Panel K: Views on gender roles						
The husband should be the breadwinner and the wife should be responsible for housework						
Strongly agree + Agree (2021)	5080	0.18	(0.38)	3960	0.14	(0.35)
Neither agree nor disagree (2021)	5080	0.50	(0.50)	3960	0.43	(0.50)
Disagree + strongly disagree (2021)	5080	0.32	(0.47)	3960	0.42	(0.49)
Strongly agree + Agree (2019)	5080	0.21	(0.41)	3960	0.17	(0.37)
Neither agree nor disagree (2019)	5080	0.49	(0.50)	3960	0.45	(0.50)
Disagree + strongly disagree (2019)	5080	0.30	(0.46)	3960	0.38	(0.49)
Men should also be involved in household chores and child rearing						
Strongly agree + Agree (2021)	5080	0.69	(0.46)	3960	0.84	(0.37)
Neither agree nor disagree (2021)	5080	0.27	(0.44)	3960	0.14	(0.35)
Disagree + strongly disagree (2021)	5080	0.04	(0.18)	3960	0.02	(0.15)
Strongly agree + Agree (2019)	5080	0.69	(0.46)	3960	0.85	(0.36)
Neither agree nor disagree (2019)	5080	0.27	(0.44)	3960	0.13	(0.34)
Disagree + strongly disagree (2019)	5080	0.04	(0.21)	3960	0.02	(0.15)
If the husband makes enough money, the wife should not work						
Strongly agree + Agree (2021)	5080	0.15	(0.36)	3960	0.12	(0.32)
Neither agree nor disagree (2021)	5080	0.52	(0.50)	3960	0.43	(0.49)
Disagree + strongly disagree (2021)	5080	0.33	(0.47)	3960	0.46	(0.50)
Strongly agree + Agree (2019)	5080	0.20	(0.40)	3960	0.14	(0.34)
Neither agree nor disagree (2019)	5080	0.51	(0.50)	3960	0.47	(0.50)
Disagree + strongly disagree (2019)	5080	0.30	(0.46)	3960	0.40	(0.49)