IZA Institute of Labor Economics
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DISCUSSION PAPER SERIES

IZA DP No. 14549

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ISSN: 2365-9793

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ABSTRACT

Gender Norms and Women's Decision to Work: Evidence from Japan*

Using individual-level data from the *National Family Research of Japan Survey* (1999, 2004 and 2009) and exploiting variation in the share of individuals with non-traditional gender norms across birth-cohorts, survey year, education, and prefecture, we find that an increase in the share of individuals with non-traditional beliefs by one standard deviation is associated with an increase in Japanese women's decision to work by 0.016 percentage points, the equivalent of an increase of 3.4% standard deviation. Our measure of non-traditional gender norms is the share of women who disagree with the statement "*men should work outside and women should look after the family*". As we conduct a battery of sensitivity analyses and placebo tests, our findings suggest an impact of non- traditional norms on Japanese women's decision to work full-time.

JEL Classification: J16, J22, Z13

Keywords: gender norms, women's decision to work, culture

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* This study has benefitted from excellent suggestions and feedback from co-editor Sonia Oreffice and two anonymous referees. The authors would like to thank Yukiko Abe, Hideo Owan, Daiji Kawaguchi, Ayako Kondo, Shintaro Yamaguchi, and Kazufumi Yugami for comments that helped us improve the paper, as well as comments from participants at the 2nd Society of Economics of Household in Paris, and seminar participants Osaka University and Hokkaido University. Ryuichi Tanaka acknowledges financial support from Japan Society for the Promotion of Science through the Grant-in-Aid for Scientific Research (JSPS KAKENHI Grant Numbers JP24330077).

1. Introduction

While the convergence of adult women and men's labor force participation rate in many OECD countries is considered "among the grandest advances in society and the economy in the last century" (Goldin 2014), the plateau or even decline in female participation rates in many countries since the 1990s has brought renewed attention on better understanding the factors driving women's participation in the labor market (Fortin 2005 and 2015; Blau and Kahn 2013). This paper aims at analyzing the association between gender norms and women's decision to participate in the labor market and the extent to which this association is causal.

As societies go through the process of industrialization, women's identity focuses on their role as wives and mothers, and they are relegated to working inside the household. If they worked prior to getting married, they usually exit the labor market at marriage as there is substantial social stigma regarding the work of wives outside the home (Goldin 1995). In such context, gender norms — defined as "acceptable behavioral boundaries for men and women, congruent with the gender division of labor and male power" (Seguino 2007) — increase women's costs of deviating from traditionally feminine activities. At the same time, putting women in a position of economic dependency on their husbands may make it more difficult for them to deal with the social sanctions that may come with their potential deviation from their assigned gender roles, such as pursuing career goals. As gender norms are relaxed, women move from the private to the public sphere and engage in traditionally male activities including formal education and paid employment in the labor market. To the extent that gender norms affect women's decision to work outside of the household, policies aiming at transforming gender imbalance in power and resources should be an important policy measure seeking to promote female labor force participation both in developed and developing countries.

In the current paper, we follow Fortin (2005) by directly measuring gender norms with gender role attitudes from individual survey data, in our case from the *National Family Research of Japan Survey* (1999, 2004 and 2009). Our measure of non-traditional gender norms is the share of individuals who disagree with the statement "*men should work outside and women should look after the family*". To address the reverse causality problem, we exploit idiosyncratic variation in the share of individuals with non-traditional gender norms across adjacent birth cohorts within demographic groups (defined by education level and prefecture in each survey year). We use controls for years of the highest educational attainment, and birth-cohort, survey-year and prefecture-fixed effects, as well as cohort/prefecture time trends to control for unobserved factors that might influence variation in both cohort composition and a woman's decision to work within prefecture.

We find that an increase in the share of individuals with non-traditional beliefs by one standard deviation increases Japanese women's probability of participating in the labor force by 0.016 percentage points, the equivalent of an increase of 3.4% standard deviation, which is smaller but in the range of other estimates of social norms on female labor supply in the US (Olivetti, Patacchini and Zenou 2020; Fernández 2007). Our findings are robust to controlling for individual characteristics as well as many aggregate-level controls at the prefecture/cohort/ survey-year level, including labor-demand shifters à la Bartik (1991). In addition, our findings hold to a battery of sensitivity tests, including placebo tests suggesting that it is unlikely that they are confounded by unobserved factors that influence variation in both cohort composition and a woman's decision to work within prefecture.

Analyzing whether gender norms affect women's decision to work is a highly policy relevant question[1] in light of Japan's impending labor shortage and continued (although weakening) M-shaped curve of female labor force participation. While the proportion of Japanese women aged 25 to 54 employed (as paid employees) soared by 32% during the 1975-2010 period (from 51% to 67.5%), Japan's 2010 female employment rate is dwarfed by those of other high-income countries — 81% in Sweden, 77% in France, 76% in Germany, 75% in the USA or 74% in the UK.[2] Interestingly, behind Japan's modest average hides wide geographical dispersion ranging from as much as 78% of women working in the seven prefectures in the Northern Coastal region to as little as 62% in the prefecture of Nara.[3] In contrast with the trends and variance observed among Japanese female workers, the Japanese male employment rate has remained substantially high over time (over 90%) and with minimal geographical dispersion (Abe 2016). Findings from Japan may well be informative of what one ought to expect in

[1] For instance, the Prime-Minister's office announced in 2016 several measures to promote female labor force participation.

[2] Source OECD 2017— https://stats.oecd.org/Index.aspx?DataSetCode=LFS_SEXAGE_I_R, and Japanese Population Census.

[3] Data from Census tabulations by Abe (2016) shown in Tables 1A and 1B.

countries going through the industrialization process and, hence, with relatively low female labor force participation.

Our main contribution to the gender-norms literature described in the next section follows. We borrow an identification strategy widely used in the field of education, which exploits variation in the student composition across cohorts within schools[4], and apply it to the literature on the effects of gender-related cultural dimension on women's labor-market decisions. While one may be concerned that our estimates are biased by the existence of other confounding factors as our analysis is at the education/survey-year/prefecture level (instead of the school level), our empirical analysis shows convincing evidence that variation of our gender norms variable is as good as random. Our contribution in terms of identification of the effects of gender norms has high relevance for the countries with small share of immigrants such as Japan where epidemiologic approach (Fernández 2007, Fernández and Fogli 2009) is hardly applicable as an identification strategy.

The remainder of this paper is organized as follows. Section 2 discusses the literature review and data. Section 3 presents the identification strategy and its validity. Section 4 present our findings, robustness checks and placebo test before concluding in Section 5.

2. Literature Review and Data

Literature Review

Estimating the causal impact of gender norms is difficult both in terms of the identification strategy and the measurement of gender norms. Fortin (2005) was among the first to explore the effect of gender norms on female labor force participation by directly measuring gender norms with gender role attitudes such as "*being a housewife is just as fulfilling as working for pay*" or "*when jobs are scarce, men should have more right to a job than women*" reported in individual surveys. She exploited cross-country variation in gender role attitudes across 26 OECD countries, finding that female labor force participation is lower in countries with more traditional

[4] See Angrist and Lang (2004); Friesen and Krauth (2007); Hanushek et al. (2002); Hoxby (2000); Lavy and Schlosser (2011); Lavy, Paserman and Schlosser (2012); Bifulco, Fletcher and Ross (2011); and Olivetti, Patacchini, and Zenou (2020).

gender roles. Despite using lagged attitudes in some specifications, Fortin acknowledges the reverse causality problem and recognizes that many of her estimates capture "partial correlations" rather than "causal factors".[5]

Several authors have addressed the reverse causality problem using different empirical strategies. Fernández (2007), Fernández and Fogli (2009), and Blau et al. (2013) have exploited the fact that second-generation immigrants are born in the country their parents immigrated to and, hence, share their own birth country's laws, labor market regulations and institutions, but differ in their parents' cultural background, including their parent's country-of-ancestry gender norms. To approximate gender norms, these authors have used country-level female labor force participation rates. They find a positive relationship between country-of-ancestry female labor force participation and the decision to work of second-generation immigrant women in the US, suggesting that gender norms from the country of ancestry (transmitted through the parents or the parental social network) determine adult women's labor force participation in the US.[6]

Another strategy has been that of Bertrand, Kamenica and Pan (2015), which approximate the traditional gender norm "*a man should earn more than his wife*" by estimating the likelihood that a married woman would earn more than her husband if her income were a random draw from the population of working women in her demographic group (defined by race, age group, education level and state of residence) using US data from 1970 to 2011.[7] They find that the likelihood that a wife participates in the labor force decreases with the probability that she would earn more than her husband.

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[5] Fortin's 2005 analysis uses both individual- and aggregate-level data to measure the outcome variable, namely women's decision to work and female labor force participation, respectively. In another paper, Fortin (2015) exploits 30 years of time variation and focuses only on one country, the US, to study how individuals' *own* beliefs about gender roles affects women's decision to work. She addresses the endogeneity concerns using an instrumental variable approach.

[6] Antecol (2000) conducts a similar analysis using first-generation immigrants instead of second-generation immigrants.

[7] To do so, the authors, first, estimate for each married women a distribution of the wife's potential earnings by assigning her a random draw of the population of working women in her demographic group. The distribution is based on 19 percentiles as the authors estimate it based on every 5th percentile from the 5th to the 95th. Thereafter, using this distribution of potential earnings, they define the likelihood that each married women earns more than her husband with the following formula: $\frac{1}{19}\sum_p 1_{\{w_i^p > husbandIncome_i\}}$.

Most recently, several authors have estimated non-traditional gender norms with the share of high-school peers' mother who work (Olivetti, Patacchini and Zenou 2020) or who think that important skills for both boys and girls to possess are traditionally masculine ones, such as to think for him or herself or work hard, as opposed to traditionally feminine ones, namely to be well-behaved, popular or help others (Rodríguez-Planas, Sanz-de-Galdeano and Terskaya 2018). As identification strategy, these authors exploit idiosyncratic variation in gender norms across adjacent grades within schools. They find that socializing in a cohort with a higher share of working mothers or non-traditional mothers during high-school in the mid-1990s in the US increases women's labor supply (Olivetti, Patacchini and Zenou 2020) and reduces the gender wage gap and women's welfare dependency when they become adults (Rodríguez-Planas, Sanz-de-Galdeano and Terskaya 2018).[8]

Most Japanese studies analyzing female employment focus on labor supply factors including the availability of childcare (Hashimoto and Miyagawa 2008; Unayama 2009 and 2012), the presence of wife's parents or parents-in-law in the household (Ogawa and Ermish 1996; Sasaki 2002; Nawata and Li 2004; Asai, Kambayashi, and Yamaguchi 2015), and the presence of small children and the husband's income (Ogawa and Ermish 1996).

Recently, several authors have suggested that changes in gender norms regarding female employment may explain the 1990s increase in Japanese FLFP (Mitani 2003; and Kawaguchi and Miyazaki 2009). More specifically, using repeated cross-section from 2000, 2001, 2002 and 2003 *Japanese General Social Survey* (JGSS), Kawaguchi and Miyazaki (2009) find evidence that Japanese men raised by full-time working mothers when they were 15 tend to disagree with statements expressing traditional gender stereotypes such that wife should not work or wife should keep the household.[9] Their findings suggest that mothers' full-time work experience in adolescence affects their sons' preferences regarding their wife's labor force status.[10] However,

[8] Rodríguez-Planas, Sanz-de-Galdeano and Terskaya (2018) do not find an effect on female labor force participation.[9] In the same spirit, Fernández *et al.* (2004) find that US husbands raised by working mothers were more likely to be married to full-time working wives suggesting that husbands' gender stereotypes affect their wives' labor force participation.

[9] In the same spirit, Fernández *et al.* (2004) find that US husbands raised by working mothers were more likely to be married to full-time working wives suggesting that husbands' gender stereotypes affect their wives' labor force participation.

[10] However, using the *Social Stratification and Social Mobility Survey*, Shirahase (2005) finds that a mother's labor force participation affects neither her sons' nor her daughters' opinion regarding gender roles.

their findings on the effect of husband's mothers' full-time work experience on the likelihood that the wife works full time is inconclusive.[11] Most recently, Hara and Rodríguez-Planas (2020) evaluate the impact of a 1990 Japanese educational reform that eliminated over 30 years of gender-segregated and gender-stereotyped industrial arts and home economics classes in junior high schools. The authors find that the reform led to long-term behavioral gender convergence inside and outside the household that may well have been driven by changes in gender norms. Consistent with this, Abe (2013) concludes that future research may consider exploring the role of "cultural factors" or norms towards women's labor market participation after finding that supply and demand factors do not eliminate regional difference in female labor force participation in Japan. This is the main objective of the current paper.

Data

Our main data set uses individual-level data from the repeated cross-sectional *National Family Research of Japan Survey* (1999, 2004 and 2009). Conducted every 5 years since 1999 by the *Japanese Society of Family Sociology*, this survey aims at making available secondary-use data to conduct research on family sociology in Japan. The survey uses probability sampling to obtain a nationally-representative micro-data set of individuals. The survey collects information on respondents' socio-demographics, household structure, marital status, and gender role attitudes. Because 2009 was the last year the *National Family Research of Japan Survey* collected data on gender role attitudes, we restrict our analysis to the 1999, 2004 and 2009 waves.

Starting from a census of all Japanese-nationality individuals between 28 to 77 years old living in Japan, the *Japanese Society of Family Sociology* uses a two-stage random sampling design to select areas across 47 prefectures and four levels of city sizes, age and gender (in the first stage), and random sampling from registry of the selected areas (in the second stage). The original sample sizes are 6,985 in 1999, 6,302 in 2004 and 5,203 in 2009. Over the 1999-2009 period, the sample has a total of 9,752 females.

[11] The signs are consistent with Fernández *et al.* (2004) but not statistically significant.

We restrict our analysis to women between 28 and 59 years old to focus on prime-aged females who are young enough not to be thinking about retirement. As we want to focus on women old enough to be out of college and since, in Japan, young adults remain in college well into their mid-twenties, the restriction imposed by the dataset of being older than 28 years old is not too binding. The age restrictions reduce the sample size from 9,752 to 6,794 observations.

The questionnaire asks individuals whether they strongly agree, agree, disagree or strongly disagree with the statement: "*men should work outside and women should look after the family*". We convert the original 4-point-scale measure to a binary variable to create the key explanatory variable that measures non-traditional gender norms. Namely, the share of women in the woman's demographic group who disagree or strongly disagree with the above statement. We assign the demographic group based on age group, highest educational attainment, survey-year and prefecture. By ''age group'' we mean 7 five-year birth cohorts, and by ''highest education level'' we mean the following 5 categories: junior high school, high school, vocational school (after high school), junior college, and college. To the extent that, in Japan, the norms that are more relevant to oneself are those of individuals within the same social stratus (Kariya 2012; Kikkawa 2011) and that education is one of the most important proxies of social stratus (Kikkawa 2011), measuring gender norms at this demographic level is most appropriate. For each woman, the variable measuring non-traditional gender norms is constructed using *only* information on other women in that particular demographic group, that is, we exclude the respondent herself to avoid reverse causality from labor force participation to gender norms. To eliminate cells in which gender norms would be imprecisely estimated, we drop those demographic groups with less than 5 individuals. This restriction is common practice in the literature (see, for example, Fernández and Fogli 2009; Bifulco, Fletcher and Ross 2011; Olivetti, Patacchini and Zenou 2020). With this restriction, the sample size is further reduced to 2,768 observations. Finally, limiting the sample to those women for whom we observe number of children leaves us with a final sample size is 2,758 observations.

We merge individual-level data with aggregate variables at the survey-year/birth-cohort/prefecture level from different data sources. From the *Japanese Population Census*, we obtain the unemployment rate, the log income per capita, the natural log of the population of women, and the share of three-generation families co-residing in the same household. From the

Japanese Wage Census, we estimate wages at the survey-year/birth-cohort/industry-level/prefecture level as explained in the results section below. From the *Survey of Social Welfare Institutions* collected by the Ministry of Health, Labor and Welfare, we estimate the ratio of the maximum number of preschool children who can be taken care of by childcare centers to the population of females from 25 to 59 years old by prefecture and year.

Table 1 presents descriptive statistics for our sample. Close to two thirds of our sample is employed. Among those working, about half work full-time and the other half work part-time. On average, women in our sample are 45 years old and have over 12 years of education, 83% are married and 13% live in a three-generation household. Women in our sample have an average of 1.781 children and 17% have a child under 6 years old. The average spousal income is 5,780,000 JPY, which is equivalent to 52,072 USD. Close to 60% of women in our sample have non-traditional gender-role beliefs with a standard deviation of 20%. Moving to aggregate-level data, we observe that the gender wage ratio averages 61%, ranging between 40% and 85%, the unemployment rate averages 4.9%, ranging between 3% and 7%, and the logarithm of female population and logarithm of income per capita are 12 and 8, respectively.

3. Identification Strategy and Validity

Identification Strategy

We exploit variation across birth-cohorts, survey year, and highest education attainment levels within prefecture to obtain a causal estimate of non-traditional gender norms on Japanese women's decision to work. To do so, we estimate the linear probability model (1) below:

$$Y_{icepy} = \alpha_0 + \alpha_1 NonTraditionalBeliefs_{-icepy} + X'_{icepy}\gamma$$

$$+Z'_{cpy}\delta + \pi EDUCATION_e + COHORT_c + YEAR_y + PREFECTURE_p + LinearTrend_{cp} + \varepsilon_{icepy} \quad (1)$$

where Y_{icepy} is equal 1 if woman *i* living in prefecture *p*, from birth cohort *c*, with highest educational attainment level *e* is working in survey year *y*, zero otherwise.

$NonTraditionalBeliefs_{-icepy}$ is the share of women with non-traditional beliefs in the same demographic group (defined by age group, education level, survey year, and prefecture) as woman i (excluding the respondent i herself). X'_{icepy} is a vector of individual-specific covariates measured at survey year *y*, namely age, age squared[12], marital status, the number of children in the household, whether there are children under 6 years old in the household, presence of grandparents in the household and husband's income.[13] Z'_{cpy} is a set of prefecture/year covariates measured contemporaneously such as the annual unemployment rate, the annual natural log of income per capita or the log of the female population , as well as the ratio of female-to-male wages constructed à la Bartik.[14] We also include controls for years of the highest educational attainment, and birth-cohort, survey-year and prefecture-fixed effects, as well as birth-cohort/prefecture trends. Standard errors are clustered at the highest educational level, birth-cohort and prefecture level. Our results are robust to estimating a probit model instead of a linear probability model as discussed in the results section.

Our estimate of interest, α_1 , captures the association between the share of non-traditional individuals in one's own demographic group on women's decision to work. Identification in this case comes from variation in the share of individuals with non-traditional beliefs across birth-cohorts, education category, and survey year in that same prefecture cell. Including highest educational attainment dummies and prefecture fixed effects controls for endogenous sorting of individuals across educational groups and prefectures, respectively. To control for time-varying unobserved factors that are also correlated with the share of individuals with non-traditional beliefs and the likelihood that a woman works, we add a full set of prefecture-specific cohort trends, ($LinearTrend_{cp}$). In this case, identification is achieved from the deviation in the share of individuals with non-traditional beliefs from its cohort/prefecture long-term trend.

The variation of the non-traditional gender norms variable within prefecture can be considered as quasi-random if the following two conditions are met. First, being in one cohort or

[12] As we have 5-year cohort dummies, the age variable controls for age variation within cohorts.

[13] Specifications that control for presence of small children and grandparents in the household, as well as household income are restricted to married women.

[14] The wage ratios are estimated at the industry/cohort/survey year/prefecture level. Their construction is explained with detail in the next section.

another is beyond one's control. Clearly one does not choose the year (cohort) one is born into. Second, the difference in unobserved heterogeneity across cohorts within a prefecture cell for a given survey year is not driven by unobserved factors that may also influence a woman's decision to work in a wage and salary job. Our conjecture is that after controlling for educational attainment, and birth-cohort, survey-year and prefecture fixed effects, as well as cohort-specific/prefecture trends, these two conditions are met. In the next sub-section, we provide evidence supporting this.

Validity of the Identification Strategy

To investigate the validity of our identification strategy, Table 2 shows the amount of variation that is left in our main variable of interest after controlling for highest educational attainment, and birth-cohort, survey-year and prefecture fixed effects, as well as cohort-specific/prefecture trends. Insufficient variation on our variable of interest would lead us to fail to reject the null hypothesis of no effect because of poor precision of our estimates.

Panel A in Table 2 shows descriptive statistics of our main explanatory variable. As discussed earlier, close to 60% of our sample reports to disagree or strongly disagree with the statement "*men should work outside and women should look after the family*". The standard deviation of this gender norms variable is 20%. Panel B shows residuals after removing education, birth cohort, year and prefecture fixed effects. Doing so reduces by 7% the standard deviation of the gender norms variable. Removing the cohort/prefecture trends further reduces the standard deviation of the gender norms variable by an additional 3% (shown in Panel C). Thus, our estimates are based on far from negligible changes in the data, which should give us reasonable precision.

In Table 3, we present balancing tests for our non-traditional gender norms variable. These tests involve estimating a modified version of model (1) that excludes both vectors X'_{icepy} and Z'_{cpy}, and where the left-hand-side variable is a socio-demographic variable. We conduct nine baseline tests using nine different left-hand-side variables. Each column in Table 3 displays the coefficient α_1 from each of these nine separate regressions, where α_1 captures the association between the share of non-traditional individuals in one's own demographic group and women's socio-demographic characteristics. Finding that variation in the share of individuals with non-traditional beliefs across birth-cohorts is unrelated to variation in a number of socio-demographic characteristics (net of cohort, highest-attainment level, year and prefecture fixed effects) enables us to rule out sorting across prefectures. To put it differently, being unable to reject the null hypothesis, $H_0 : \alpha_1 = 0$, would be supportive evidence that our measure of non-traditional norms is not associated with these observed factors known to affect women's decision to work in a wage or salary job, once the different fixed effects are controlled for.

Panel A in Table 3 shows balancing tests with years of education and cohort, year, and prefecture fixed effects. It reveals that two of our thirteen coefficients are statistically significantly different from zero at the 10% level, which is more than what we would expect by chance, and none are statistically significantly different at the 5% level, which is less than what we would expect by chance. Panel B shows balancing tests with fixed effects as well as cohort/prefecture linear trend. It reveals that three of our thirteen coefficients are statistically significantly different from zero at the 10% level, which again is more than what we would expect by chance; but none are significant at the 5% level, which is again less than what we would expect by chance. These tests reveal that controlling for education, birth-cohort, prefecture and year fixed effects as well as cohort/prefecture linear trend is likely to be sufficient to isolate variation in education/cohort composition that is not systematically related to women's socio-demographic composition within prefectures.

Our key identifying assumption postulates that changes in the proportion female with non-traditional belief (excluding herself) as a measurement of social gender norm within a prefecture-education cell are uncorrelated with changes in unobserved factors that could affect her individual labor force participation decision. To assess the feasibility of this assumption, we follow the Monte Carlo Simulations approach proposed by Lavy and Schlosser (2011) in the context of gender peer effects on students' outcomes within school. In their paper, they validate that the cohort-to-cohort variation of gender composition within school is as good as random by comparing the distributions of actual and simulated standard deviations of gender composition within school and finding these two distributions are close enough to each other. In our context, we do so by comparing the distributions of actual and simulated standard deviations of composition of females with non-traditional belief within prefecture-education cell.

For each prefecture-education cell, we randomly generate the dummy variable indicating non-traditional belief of the females in each birth cohort using a binomial distribution function with *p* equal to the average proportion of females with non-traditional belief in the prefecture-education cell across all survey years. We then compute the within prefecture-education cell standard deviation of the proportion female with non-traditional belief and repeat this process 1,000 times to obtain an empirical 90 percent confidence interval for the standard deviation for each prefecture-education cell. The result of one such simulation, plotted in Figure 1, clearly shows that the actual within prefecture-education cell variation in the proportion female with non-traditional beliefs is quite similar to the simulated variation. Based on these simulations, we also computed an empirical confidence interval for the standard deviation in the proportion of female with non-traditional belief, finding that 95 percent of the prefecture-education cells in our sample had a standard deviation that fell within the empirical 90 percent confidence interval, which is close to our expectations.

4. Results

Main Findings

Table 4 presents the main findings from estimating different specifications of equation (1). Column 1 presents a specification that only includes the share of individuals with non-traditional beliefs in the same demographic group as the respondent, years of education dummies, and survey-year, cohort, and prefecture fixed effects. The coefficient of interest, α_1, is positive and statistically significant at the 5% level, indicating that a higher share of individuals with non-traditional beliefs increases the likelihood that a woman is employed in a wage and salary job. Column 2 adds cohort-specific/prefecture trends, which increases α_1 to 0.1091 (also statistically significant at the 5% level). Adding additional individual-level controls decreases slightly α_1 to 0.0940 (shown in columns 3 and 4). The small change in our coefficient of interest α_1 between columns 2 and 4 suggests that omitted individual-level variable bias is less likely to be a problem. Interestingly, while we find that marital status affects negatively Japanese women's likelihood of employment, the number of children, conditional on marital status, has a non-statistically significant effect on the likelihood of working—estimates shown in Appendix Table A.1.

Estimates in column 4 may be biased if there are other confounding factors that are related with both gender norms and women's decision to work. More specifically, it is plausible that our variable is capturing structural changes in industry or sector composition across prefectures that may be correlated with changes in female employment. For instance, Abe (2016) analyzes the variance in the employment rate across genders, sectors and prefectures, and finds that changes in the sectoral composition of employment across genders and prefectures are directly related with the convergence of the female employment rates across prefectures. Given Japanese sex segregation by industry (Abe 2013 and 2016)[15], we follow Bartik (1991) and Aizer (2010) and use wage variation in industries dominated by women (or men) to construct measures of exogenous local labor demand for women (or men) as follows.

First, we construct a weighted average wage by gender, prefecture, birth-cohort, and industry for census years 2000, 2005 and 2010 as follows:

$$\bar{w}_{gcpy} = \sum_j \gamma_{gcpj} w_{-pygj} \quad (2)$$

where g indexes gender, c birth cohort, p prefecture, y year, and j industry. γ_{gcpj} is the proportion of female (or male) workers of a given birth cohort c working in industry j in prefecture p from the 1995 Wage Census. Industries are defined on the basis of 5 one-digit industry cells (namely, construction, manufacturing, finance and insurance, retail, wholesale and restaurant, and service sectors). By measuring γ_{gcpj} in 1995, we exclude selective sorting across industry over time from our measure of $\bar{w}_{gcpy}$.[16] w_{-pygj} is the annual gender-specific wage in industry j in Japan excluding the prefecture p in year y. This exclusion prevents our $\bar{w}_{gcpy}$ measure to capture changes in that particular prefecture's industry wages caused by workers' compositional changes.

Provided that national industry gender-specific wage changes (excluding own prefecture industry wage changes) are uncorrelated with gender/cohort/prefecture-level local labor supply shocks, this variable will capture plausibly exogenous variation in prefecture local labor demand.

[15] While the Northern Coast of Japan and the prefecture of Chubu have a large share of female workers in manufacturing (25% and 24%, respectively, versus 25% and 34% of male workers); the prefecture of Kansai only has 19% of female workers in manufacturing (versus 26% of male workers) with female workers concentrating in the service sector (36% of female workers versus 21% of male workers). Not surprisingly, the service sector is also strong in Tokyo with a large share of both male (30%) and female (42%) workers employed in it.

[16] Our results are robust to using 1981 weights instead. Results are available from authors upon request.

This in turn will be true if gender-specific sectoral employment is not too concentrated in any prefecture-cohort-gender cell, a condition that appears satisfied in the data.[17] In addition, because we shall use the deviation of this variable from the cohort-prefecture long-term trend (as we have cohort/prefecture time trends in the equation), it is important that there is sufficient variation in the employment composition across prefecture-cohort-gender cells. This condition also appears to be satisfied in the data.[18]

Second, we calculate the ratio of female-to-male wages constructed according to equation (2) and add it to specification in column 4 in Table 4 as an additional control (shown in column 5). Column 6 is our preferred specification. It adds to the specification in column 5, the unemployment rate, the income per capita and the female population measures at the prefecture/cohort/year level. In our preferred specification, our coefficient of interest α_1 is 0.0827and statistically significant at the 10% level. Estimates shown in Appendix Table A.1 show that the local demand affects the likelihood that a woman is working (the coefficient on the wage ratio is 0.334 and statistically significant at the 5% level). When controlling for the gender wage ratio, the other aggregate variables are not statistically significantly different from zero.

Our estimates in all the specifications analyzed up until now show that non-traditional gender norms are directly related to Japanese women's decision to work. More specifically, we find that an increase in the share of individuals with non-traditional beliefs by one standard deviation is associated with an increase in women's probability of participating in the labor force by 0.016 percentage points[19], the equivalent of an increase of 3.4% standard deviation.[20] In comparison, a one standard deviation increase in the local gender wage ratio results in a 0.035 percentage points increase in the likelihood that a Japanese woman is employed, the equivalent of an increase of 7.4% standard deviation.[21]

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[17] For example, the maximum shares of workers in prefecture-cohort-gender cell in 1995 are 0.64 percent for 25-29 years old female working in service sector in Tokyo prefecture, and 0.53 percent for 25-29 years old male working in the same sector and prefecture.

[18] In 1995, the standard deviation of the share of workers in service sector across prefecture and cohort is 2.7 percent for male and 2.8 percent for female. The coefficients of variation are 14 percent for male and 18 percent for female.

[19] This is calculated as: $\alpha_2 * NonTraditionalBeliefs_{StDev} = 0.0827 * 0.1986 = 0.0164$

[20] This is calculated as $\frac{\alpha_2 * NonTraditionalBeliefs_{StDev}}{Y_{StDev}} = \frac{0.0827 * 0.1986}{0.4771} = \frac{0.0164}{0.4771} = 0.0344$

[21] This is calculated as $\frac{\alpha_2 * WAGERATIO_{StDev}}{Y_{StDev}} = \frac{0.3340 * 0.105}{0.4771} = \frac{0.0351}{0.4771} = 0.0736$

Comparing the size of our non-traditional gender norms coefficient to that of other estimates of gender norms on female labor supply in the US, we find that our effect is over one half of the one estimated by Olivetti, Patacchini and Zenou (2020) or about one-half of that estimated by Fernández (2007).[22] Similarly, comparing our coefficient to that estimated by Bertrand, Kamenica and Pan (2015) for married women in the US, we find that ours (0.0827) is a bit more than half the size of theirs (0.139).

Robustness Checks

Using a June 1990 national survey conducted by the Mainichi newspapers, Ogawa and Ermish (1996) examine the factors influencing Japanese married women's participation in the labor force. They find that co-residence with the wife's parents or parents-in-law is directly related to full-time employment as the elderly tend to reduce home time demands on Japanese women. Similarly, Hashimoto and Miyagawa (2008) and Unayama (2009 and 2012) have found childcare availability to affect maternal employment. The specification in column 7 addresses concerns of omitted variable bias because we fail to control for these two dimensions. Adding the share of three-generation families co-residing in the same household and a measure of childcare availability at the year and prefecture level[23] has little effect on our social-gender-norms estimate.

Concerns that it is male beliefs that matter, as opposed to female beliefs, are addressed in the specification in column 8. If indeed this were the case, the significance of our variable to interest would decrease when adding a variable constructed in the same way but capturing males' beliefs. This is not the case: when we include both variables in the equation, our key variable remains of similar size and significance. Finding that females' attitudes on gender roles matter is consistent with findings, also for Japan, in Hara and Rodríguez-Planas (2020).

[22] Olivetti, Patacchini and Zenou (2020) find that "one standard deviation increase in the average number of hours worked by mothers' of the students in the same school and same cohort translates into an additional 1/20th of a standard deviation in women's weekly hours worked in their late twenties." Fernández (2007) finds that an increase of one standard deviation in the FLFP of parents' source country was associated with an increase of 8% standard deviation in second-generation immigrant women's hours worked in the US.

[23] Unfortunately, information on whether they lived in a three-generation household or whether their child attends childcare is not available in the *National Family Research of Japan Survey.*

As an alternative robustness check, column 9 focuses only on married women and adds as controls whether there is a child under 6 years old in the household, whether the woman lives with grandparents in the household and her husband's income. The magnitude of the coefficient increases slightly when we add these additional individual-level controls and the coefficient remains statistically significant at the 10% level.

Even though our left-hand-side is a binomial explanatory variable, we use a linear probability model. Column 10 re-estimates our preferred model using a probit instead. Results are consistent with our findings and we increase precision. Column 11 presents estimates clustered at the prefecture level so as to allow for correlation within prefecture even across cohort-education groups. Again our findings are robust to this change. Column 12 re-estimates our preferred specification (shown in column 6) using only cells with more than 10 observations (instead of 5) to construct our main explanatory variable: the share of women who disagree with the gender norm statement in the survey. By being more aggressive in dropping cells with low numerosity, we may reduce measurement error caused by the presence of cells with values equal to either 0 or 1 due to their small sample size. Indeed, column 12 reveals that by using cells with smaller number of observations we are introducing an attenuation bias suggesting that our estimates would be underestimating the true effect of gender norms. However, because the sample size is considerably reduced, we lose precision.

To further check the sensitivity of our results, we use prefecture/cohort panel data from 2000 to 2010 and estimate an aggregate data model using the following specification:

$$\begin{aligned} Y_{pcy} = \beta_0 + \beta_1 WAGERATIO_{pcy} + \beta_2 UNEMP_{py} + \beta_3 INCOME_{py} + \beta_4 NonTraditionalBeliefs_{pcy} \\ + \beta_5 POP_{pcy} + COHORT_c + YEAR_y + PREFECTURE_p + LinearCohortTrend_{cy} \\ + LinearPrefectureTrend_{py} + \varepsilon_{pcy} \end{aligned} \quad (3)$$

where each observation is a prefecture-cohort-year cell with *p* indexing prefecture, *c* birth cohort, and *y* year. Y_{pcy} is female labor force participation in prefecture *p*, birth cohort *c*, and year *y*. Our main explanatory variable, $NonTraditionalBeliefs_{pcy}$, is now measured at the cohort/survey-year/prefecture level. In addition to controlling for the other aggregate-level variables that we used in the micro-data model, we also control for cohort, year and prefecture fixed effects, as well as prefecture-year linear trend and cohort-year linear trend. Standard errors are clustered at the prefecture level.

Results from estimating equation (3) are displayed in column 1 in Table 5. Column 2 displays estimates from a similar specification as in column 1 but adding controls for the share of three-generation family and childcare availability. In both cases aggregate-data findings are consistent with those using individual-level data.

Estimates in column 1 in Table 5 reveal that the estimate on non-traditional gender norms variable, β_4, is positive and statistically significant at the 5% level, indicating that there is a positive association between non-traditional gender norms and female labor force participation within year, cohort, and prefecture. More specifically, the increase in non-traditional gender norms over the 2000-2010 period—an increase of 5.2 percentage points from 51.9% to 57.1%—is associated with 2.1% increase in the Japanese female labor force participation over that same period[24], which increased 3 percentage points from 63.7% to 66.7%.[25] As a comparison, in that same model, over two fifths of the increase in the Japanese female labor force participation over the period 2000-2010 is associated with an increase in the wage ratio of 2.59 percentage points, which is the increase in the actual wage ratio over that period.[26]

Placebo Tests

To investigate the validity of our identification strategy, Table 6 conducts four different placebo tests. In column 1, we replace the actual value of the non-traditional gender norms variable by a randomly selected value from the same prefecture for each cohort/education/prefecture/year cell. This random assignment is done by replacing actual values of these variables with bootstrapped samples with replacement. If our fixed-effects strategy controls for both unobserved characteristics at the year and education/cohort level, then the composition of other cohorts in the same prefecture should not have any significant effect on women's employment choice in

[24] This is calculated as $\frac{(0.0121*5.2)}{3} = 0.021$

[25] The female labor force participation estimates are calculated using our sample and hence differ slightly from those mentioned in the Introduction that use the Japanese Population Census.

[26] This is calculated as $\frac{(0.5022*2.59)}{3} = 0.4336$

column 1 in this placebo regression. Our placebo estimate, shown in column 1, is small in size and not statistically significantly different from zero, suggesting that it is unlikely that our estimates in Table 4 are confounded by unobserved factors that influence variation in both cohort, highest educational attainment and year composition and women's employment choice within prefecture. Column 2 presents a similar placebo exercise where the actual value of the non-traditional gender norms variable is replaced by that of the cohort right below (that is the younger cohort) than the actual one. Column 3 replicates the same exercise with the cohort right above (the older cohort). In both cases, placebo estimates are not statistically significantly different from zero, giving weight to the internal validity of our main findings. Column 4 uses the husband's decision to work as the left-hand-side variable and finds that non-traditional gender norms have no significant effect on the spouse's decision to work.

5. Conclusion

Using data from 1999 to 2009, we estimate the causal effect of non-traditional gender norms on Japanese women's decision to work. To identify local gender norms, we exploit idiosyncratic across-birth-cohort variation in the share of individuals with non-traditional beliefs within the same highest-educational-attainment-level/year/prefecture cell. We find that gender norms are relevant in explaining Japanese women's decision to work. This result is robust to a battery of sensitivity analysis and placebo tests.

Our findings are highly policy relevant in a country with serious medium- to long-term labor-shortages concerns. They suggest that gender-role beliefs matter for Japanese women's decision to work. Moreover, as we find no evidence that non-traditional gender norms affect the decision to work part-time, the effect is driven by full-time work.[27] Our findings suggest that policies aiming at changing gender roles in Japan would increase female full-time employment. An example of such policy would be an actual Japanese reform that eliminated gender-

[27] We replicated the analysis using the share of women in part-time work as the left-hand-side variable (results available from the authors upon request), and found that none of the coefficients on the non-traditional gender norms variable are statistically significantly different from zero. As reported in the white paper by the Ministry of Health, Labor and Welfare (1998), in Japan, female part-time work has been very much socially accepted since late 1990s. This would be consistent with our finding of no effect of our non-traditional gender norms variable on part-time. The lack of results on the decision to work part-time implies that earlier findings on the decision to work are driven by full-time work.

segregated and gender-stereotyped industrial arts and home economics classes in junior high schools in the early 1990s. Hara and Rodríguez-Planas (2020) find that such reform had long-term consequences as it increased non-traditional gender norms among Japanese women 20 years later, as well as female employment in regular jobs and wage and salary earnings.[28]

Comparison of the magnitude of the effects of non-traditional gender norms with the effect of the labor demand shifters reveal that policies aiming towards wage gender parity would also be quite effective in getting Japanese women into wage and salary jobs. Hence, measures aiming at improving not only quantity but also quality of jobs for females ought to help promote Japanese women's interest for their careers.

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[28] In contrast with non-regular employment, regular employment in Japan is full-time and allows workers to progress within the firm, have salary promotions, job benefits, and job security until retirement.

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Table 1. Descriptive Statistics

	Mean	Std. Dev.	Min	Max
Individual-level variables				
Employed	0.650	0.477	0.000	1.000
Part-time (conditional on working)	0.483	0.500	0.000	1.000
With non-traditional gender attitudes	0.587	0.199	0.000	1.000
Age	44.612	9.032	28.000	59.000
Years of education	12.553	1.248	9.000	15.000
Married	0.827	0.379	0.000	1.000
Number of children	1.781	1.039	0.000	6.000
Has a child under 6	0.167	0.373	0	1
Lives in a 3-generation family	0.130	0.337	0	1
Spouse's annual income (in 10,000 JPY)	578	286	0	1200
Aggregate-level variables				
Gender wage ratio	0.611	0.105	0.401	0.855
Log (female population)	12.299	0.612	10.214	13.252
Unemployment rate	4.913	0.993	3.000	7.000
Log(income per capita)	8.064	0.173	7.738	8.438
Share of 3-generation families	0.072	0.041	0.023	0.281
Childcare availability ratio	0.057	0.019	0.031	0.138

Notes: Number of individual-level observations: 2,758.

Table 2. Variation of Share of Women with Non-Traditional Beliefs across Demographic Groups Removing Fixed-Effects and Trends

	Observations	**Mean**	**Standard deviation**	**Minimum**	**Maximum**
Panel A: Raw data					
Share of women with non-traditional beliefs	2,758	0.5874	0.1986	0	1
Panel B: Residuals after removing education, cohort, prefecture and year fixed effects					
Share of women with non-traditional beliefs	2,758	0	0.1847	-0.6186	0.5200
Panel C: Residuals after removing education, cohort, prefecture and year fixed effects and cohort/prefecture trends					
Share of women with non-traditional beliefs	2,758	0	0.1789	-0.6175	0.5010

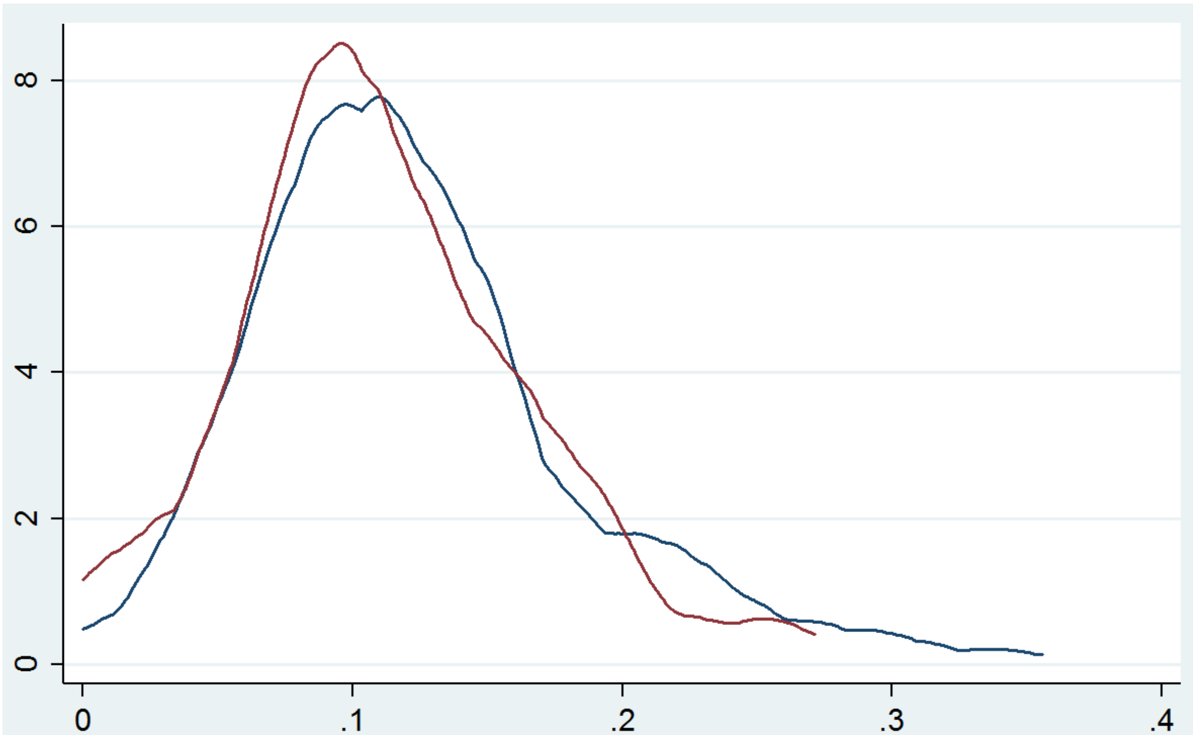
Table 3. Balancing Tests

	(1) Age	(2) Age-squared	(3) Marital Status	(4) Number of Children	(5) Log (fem pop)	(6) Unemp. Rate	(7) Log(income p.p.)	(8) Gender wage ratio	(9) Mother's educ_hs	(10) Mother's educ_col	(11) Mother's educ_col	(12) Husband's educ	(13) Own House
Panel A													
Share of Non-traditional Beliefs	-0.0133	-11.0606	-0.0326	0.0882	0.0148	0.1292	-0.0114*	0.0254*	0.0027	-0.0164	0.0015	0.0148	0.0097
	(0.1475)	(19.4186)	(0.0363)	(0.0915)	(0.0204)	(0.0916)	(0.0062)	(0.0148)	(0.0354)	(0.0154)	(0.0089)	(0.1200)	(0.0406)
Panel B													
Share of Non-traditional Beliefs with prefecture-cohort linear trend	-0.0133	-8.7006	-0.0360	0.0736	0.0018	0.1655*	-0.0103*	0.0290*	0.0181	-0.0145	0.0053	-0.0726	0.0136
	(0.1477)	(19.6846)	(0.0370)	(0.0915)	(0.0114)	(0.0913)	(0.0060)	(0.0158)	(0.0359)	(0.0152)	(0.0092)	(0.1244)	(0.0432)
N	2,758	2,758	2,758	2,758	2,217	2,280	2,758	2,758	2,758	2,758	2,758	2,217	2,758

Notes: Standard errors clustered at prefecture-cohort-education level are reported in parentheses.

* 10%, ** 5%, *** 1%.

Figure 1. Actual and Simulated within Cohort/Education/Year/Prefecture Cell in the Proportion of Individuals with Non-Traditional Beliefs



Notes: The figure shows the standard deviation in the share of individuals with non-traditional beliefs for each cohort/education/year/prefecture cell included in the analysis sample (blue line) and the simulated standard deviation in the share of individuals with non-traditional beliefs (red line).

Table 4. Determinants of Women's Decision to Work

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Individual-level data												**Aggregate-level data**	
										Probit	Prefecture clusters	Different cell size		
Share of Non-traditional Beliefs	0.0998**	0.1091**	0.0925**	0.0940**	0.0853*	0.0827*	0.0781*	0.0823*	0.0952*	0.2504**	0.0827*	0.1550	0.0120**	0.0121**
	(0.0446)	(0.0484)	(0.0447)	(0.0448)	(0.0436)	(0.0436)	(0.0447)	(0.0434)	(0.0502)	(0.1277)	(0.0454)	(0.1374)	(0.0050)	(0.0050)
Years of Education	X	X	X	X	X	X	X	X	X	X	X	X		
Age, marital status			X	X	X	X	X	X	X	X	X	X		
Num. of children				X	X	X	X	X	X	X	X	X		
Gender wage ratio					X	X	X	X	X	X	X	X	X	X
UR, population and income per capita						X	X	X	X	X	X	X	X	X
Share of 3-generation families and childcare availability							X	X			X			X
Share of non-traditional male beliefs								X						
Has child <6, lives with grandparents, husband's income									X					
Prefecture-cohort linear trend	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,758	2,758	2,758	2,758	2,758	2,758	2,758	2,758	2,109	2,758	2,758	693	752	752
R-squared	0.0448	0.0558	0.1056	0.1065	0.1074	0.1076	0.1085	0.1085	0.1547	0.1079	0.1089	0.1175	0.9603	0.9559
Adjusted R-squared	0.0278	0.0301	0.0803	0.0808	0.0814	0.0806	0.0808	0.0808	0.1201	0.0809	0.0812	0.0705	0.9533	0.9533

Notes: Standard errors clustered at prefecture-cohort-education level are in parentheses. All equations (with the exception of the one estimated in column 10) are linear probability models containing prefecture fixed effects, cohort fixed effects, year fixed effects, prefecture-cohort linear trend. Column 10 present estimates using a probit model—marginal effects displayed. Column 11 replicates column 6 with standard errors clustered at the prefecture level in parenthesis. Column 12 restricts the analysis to those cells where there is at least 10 observations to estimate the main explanatory variable: non-traditional gender norms. Columns 13 and 14 present estimates using equation (3) in the paper. These two specifications are estimated by weighted least squares using female population as weight* 10%, ** 5%, *** 1%.

Table 5. Aggregate-Level Data Analysis

	(1)	(2)
Share of Non-traditional Beliefs	0.0120**	0.0121**
	(0.0050)	(0.0050)
Years of Education		
Age, marital status		
Num. of children		
Gender wage ratio	X	X
UR, population and income per capita	X	X
Share of 3-generation families and childcare availability		X
Prefecture-cohort fixed effects		
Prefecture-cohort linear trend	Yes	Yes
Number of Observations	752	752
R-squared	0.9603	0.9559
Adjusted R-squared	0.9533	0.9533

Notes: Standard errors clustered at prefecture-cohort-education level are in parentheses. All equations are linear probability models containing prefecture fixed effects, cohort fixed effects, year fixed effects, prefecture-year linear trend and cohort-year linear trend (not prefecture-cohort linear trend). * 10%, ** 5%, *** 1%.

Table 6. Placebo Tests

	(1)	(2)	(3)
Share of Non-traditional Beliefs	-0.006	-0.0646	-0.0462
	(0.0466)	(0.0659)	(0.0776)
Years of Education	X	X	X
Age, marital status	X	X	X
Num. of children	X	X	X
Gender wage ratio	X	X	X
UR, population and income per capita	X	X	X
Prefecture-cohort linear trend	Yes	Yes	Yes
Number of Observations	2,758	1,831	1,395
R-squared	n.a.	0.1101	0.1091
Adjusted R-squared	n.a.	0.0747	0.0787

Notes: Standard errors clustered at prefecture-cohort-education level are in parentheses. All equations contain prefecture fixe fixed effects, year fixed effects, prefecture-cohort linear trend. Column 1 reports the mean and standard deviation of the coeff non-traditional beliefs using the 1000 samples replacing the actual value of the non-traditional gender norms variable by a ran value from the same prefecture and gender but different demographic group (i.e., education, cohorts, and observation year). C instead the measures of the cohort right above (i.e. the younger cohort). Column 3 uses instead the measures of the cohort rig older cohort). Column 4 uses as outcome the husband's decision to work.

* 10%, ** 5%, *** 1%.

Appendix

Gender Norms and Women's Decision to Work: Evidence from Japan

Table A.1. Determinants of Women's Decision to Work in Details

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual-level data					
	Binomial explanatory variable					
Share of Non-traditional	0.0998**	0.1091**	0.0925**	0.0940**	0.0853*	0.0827*
Beliefs	(0.0446)	(0.0484)	(0.0447)	(0.0448)	(0.0436)	(0.0436)
Years of Education	-0.0148*	-0.0106	-0.0117	-0.0127	-0.0119	-0.0122
	(0.0076)	(0.0076)	(0.0077)	(0.0078)	(0.0079)	(0.0079)
Age			0.0722***	0.0751***	0.0589***	0.0598***
			(0.0174)	(0.0180)	(0.0181)	(0.0181)
Age squared			-0.0009***	-0.0009***	-0.0008***	-0.0008***
			(0.0002)	(0.0002)	(0.0002)	(0.0002)
Marital status			-0.2687***	-0.2542***	-0.2523***	-0.2531***
			(0.0237)	(0.0237)	(0.0240)	(0.0241)
Num. of children				-0.0154	-0.0145	-0.0143
				(0.0100)	(0.0099)	(0.0099)
Gender wage ratio					0.3438**	0.3340**
					(0.1638)	(0.1651)
UR, population and income per capita						-0.1077
						(0.1738)
UR, population and income per capita						0.0176
						(0.0322)
UR, population and income per capita						-0.0018
						(0.4213)
constant	0.4482***	0.6375*	0.3232	0.2474	0.4617	1.6333
	(0.1198)	(0.3590)	(0.3796)	(0.3930)	(0.3840)	(3.8882)
Prefecture-cohort linear trend	No	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,758	2,758	2,758	2,758	2,758	2,758
R-squared	0.0448	0.0558	0.1056	0.1065	0.1074	0.1076
Adjusted R-squared	0.0278	0.0301	0.0803	0.0808	0.0814	0.0806

Notes: Standard errors clustered at prefecture-cohort-education level are in parentheses. All equations contain prefecture fixed effects, cohort fixed effects, and year fixed effects.

* 10%, ** 5%, *** 1%.