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RESEARCH PAPER

The Impact of Intra-household Bargaining Power on Happiness of Married Women: Evidence from Japan

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Abstract
This paper evaluates the correlation between intra-household bargaining power and the happiness of married women using Japanese longitudinal survey data (Japanese Panel Survey of Consumers: JPSC) from 1995 to 2013. The results suggest that when absolute income, relative household income, and other factors are constant, the income gap, wage gap and education gap between wife and husband negatively affect married Japanese women's happiness. The proportion of the total household income or husband's income controlled by the wife can positively affect married Japanese women's happiness. The effects of intra-household bargaining power on happiness are greater for the working married women group than the housewife group.

Keywords Intra-household bargaining power · Happiness · Married working women · Housewife · Gender roles

1 Introduction

According to conventional neoclassical economics, the well-being of a people is measured by the total value of individual utility: for the economist this has posed a problem. Utility cannot be measured because individual utility is an ordinal number not a cardinal number, therefore it is difficult to compare utility between individuals. In the 1980s, Happiness Economics overturned this argument. In Happiness Economics, subjective well-being (SWB) is one of the indicators reflecting the theoretical concept of individual utility. Measurement of individual utility (happiness, life satisfaction) is necessary when evaluating a social policy and the empirical study of happiness has become an important concern.

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Two hypotheses, the absolute income hypothesis and the relative income hypothesis, have been advocated by economists to explore the impact of income on happiness, (Duesenberry 1949; Leibenstein 1950). The absolute income hypothesis holds that subjective happiness is greater for the high-income group than for the low-income group. The relative income hypothesis emphasizes how the size of the gap to the reference group may negatively affect happiness: the probability of unhappiness is greater for those whose income level is lower than the income of the reference group. In previous studies, the reference group is usually defined as having characteristics similar to the analyzed unit (individual or household), and the gaps between individual (or household) income and the average income of the reference group is usually used as the index of relative income.[1]

Empirical studies for Japan have tested the two hypotheses, and they indicate that both the absolute income hypothesis and relative income hypothesis are supported for Japan, but important issues remain to be analyzed. For example, studies based on the Collective Model proposed by Chiappori (1992), such as Browning et al. (1994), Chiappori et al. (2002), Couprie (2007), Lise and Seitz (2011), Cherchye et al. (2012, 2015), Browning et al. (2013), and Lise and Yamada (2014) all point out that intra-household bargaining power differs between husband and wife, and the intra-household bargaining power gap may influence household resource allocation. It is thought that the intra-household bargaining power gap may affect married women's well-being, however published empirical studies on the issue are scarce. Most published studies analyze the determinants of happiness based on the Ordinary Least Squares (OLS) or ordered logit regression model using one period or repeated cross section survey data, and there may be an heterogeneity problem in these results.

This study uses empirical tests for the impact of intra-household bargaining power on happiness using data from the Japanese longitudinal survey (Japanese Panel Survey of Consumers: JPSC) conducted from 1994 to 2014. Dynamic panel data analysis methods address the heterogeneity problem. The results contribute new evidence for the study of happiness, and enable a deeper understanding of the work-family conflict as it affects married Japanese women.

This study is structured as follows. Firstly, we summarize the previous empirical study results on the absolute income hypothesis and relative income hypothesis, then survey the literature from economics, sociological and psychological perspectives, and introduce approaches to explain how intra-household bargaining power influences wives' happiness. Secondly, we describe the methods of analysis, including introduction to models and data. Then, we give the calculated results, and interpret the econometric results. Lastly, we present the main conclusions and policy implications.

[1] Two hypotheses are concerned with the influence of relative income on happiness. The interdependence preference hypothesis for which Leibenstein (1950), Kapteyn et al. (1978), and Frank (1985) point out that because the satisfaction of the consumer is not only related to the good function itself, but also with non-good function need (e.g. the rise of social position through holding a high quality or high-price good), the owned good gap between the individual and his (her) reference group with similar characteristics (e.g. age, education) could influence subjective happiness. The second is the relative deprivation hypothesis. Easterlin (1974), Boskin and Sheshinski (1978), Layard (1980), Frank (1985) and Akerlof and Yellen (1990) emphasize that when the gap between the individual and his (her) reference group is greater, for example, the income of the individual is lower than his (her) reference group, the individual might feel inferior, which might cause unhappiness.

2 Literature Review

2.1 Empirical Studies on Happiness

The absolute income hypothesis and relative income hypothesis have been the subject of extensive published research. The absolute hypothesis is supported in most previous studies for both developed countries including Japan (Hamermesh 1977; Easterlin 2001; Ferrer-i-Carbonell 2005; Vendrik and Woltjer 2007; Sano and Otake 2007; Otake et al. 2010; Tsutsui 2010) and developing countries (Appleton and Song 2008; Smyth et al. 2010; Jiang et al. 2011; Wang and VanderWeele 2011; Ma 2016). However, it is rejected for some developing countries including China (Luo 2006, 2009). The relative income hypothesis is supported for both developed countries (Hamermesh 1977; Ferrer-i-Carbonell 2005; Vendrik and Woltjer 2007; Tsutsui 2010) and developing countries (Luo 2006, 2009; Brockmann et al. 2009; Wang and VanderWeele 2011; Ma 2016). Particularly, for Japan, Irokawa (1999) undertook an empirical study using data from the Japanese Panel Survey of Consumers (JPSC) from 1995 to 1997, and finds the total income of wife and husband positively affects life satisfaction, therefore the absolute income hypothesis is supported. Urakawa and Matsuura (2007) analyze the influence of relative income on happiness using data from the JPSC for 1994–2001, and indicate that the relative income hypothesis is supported. Sakamoto (2008) analyzes the effect of the wife's work status and intra-household resource allocation (time and consumption) on happiness using data from the JPSC for 1994–2004, and finds that greater household income positively affects happiness, which means the absolute income hypothesis is supported. He finds that other factors, such as education, age, children, or return to work also influence happiness. Higuchi and He (2011) test the relative income hypothesis using data from the JPSC for 1993–2009, and indicate that in Japan the relative income hypothesis is supported. Higuchi and Hagiwara (2011) employ an empirical study using JPSC data. They find the wife's income and the husband's income affect happiness.

For the empirical studies on the marital happiness, Dakin and Wampler (2008), Kerkmann et al. (2000), and Wong and Goodwin (2009) found that the higher the couple's income the higher their marital satisfaction, these results support the absolute income hypothesis using cross section survey data. The results utilized the British Household Panel Survey (BHPS) and German Socio Economic Panel also showed that the absolute income hypothesis is supported (Boes and Winkelmann 2010; VanLaningham et al. 2001). Blanchflower and Oswald (2004) found a positive relation between relative income and life satisfaction using the General Social Surveys of the United States and the Eurobarometer of Great Britain. On the contrary, in an empirical study of the determinants of divorce caused by marital unhappiness, Rogers (2004) found a positive relation between the wife's income attainment and divorce probability. Bertrand et al. (2015) found the probability of divorce is higher for the wife with a greater income share of the couple's income. Heckert et al. (1998) and Rogers (2004) indicated that the probability of divorce is highest for the wife when her income share of the couple's income is around 50%. These results indicate that the wife's higher income may cause marital unhappiness.

Moreover, we found from sociological and psychological perspectives, a set of empirical studies also can give us the similarity ideas. For example, based on sociological and psychological empirical studies, Kahneman and Deaton (2010), Diener et al. (2010) and Yu and Chen (2016) found that higher absolute income cannot improve emotional well-being (such as happiness), it can only improve the life evaluation and weaken negative emotional well-being

(such as depression, anxiety); On the contrary, Boyce et al. (2010), Yu and Chen (2016) and Cheung and Lucas (2016) argued that higher relative income improves positive emotional well-being.

Although the absolute income and relative income hypotheses are examined in previous studies, important issues remain to be discussed. The gap between individual (or household) income and the reference group is usually used in previous studies and can be defined as "inter-household relative income" (e.g. Higuchi and He 2011), whereas another kind of relative income, for example, the income gap between wife and husband which is relation with intra-household bargaining power is not considered. In this study new findings about the impact of intra-household bargaining power on wife' happiness based on econometric analyses develop the previous studies.

2.2 The Impact of Intra-household Bargaining Power on Wives' Happiness

How does intra-household bargaining power affect the wife's happiness? Four reasons can explain it.

First, based on the individual utility maximum rule in Neoclassical economics theory, when the wife feels very happy with the increase of her intra-household bargaining power, her happiness may increase when her income (wage) is higher than her husband's, or her educational attainment level is higher than her husband's (positive effect).

Second, according to household production theory in family economics (Becker 1965; Gronau 1977), in order to maximize total household utility, family members (e.g. wife and husband) attempt to efficiently allocate time, income, and the collection of goods and services which they both use and produce. Because the market wage is usually higher for men than for women, and the housework skill is usually higher for women than for men, usually the husband should work for a longer time and obtain more income than the wife. Therefore in the unusual circumstance when the wife's income is higher than her husband, the wife's higher income may cause unhappiness for the husband that might in its turn cause unhappiness for the wife (negative effect).

Third, from the mental health perspective, it is thought that working hours might be longer for the group with a high income (wage) or higher educational attainment group. When the high income (wage) wife group works longer hours, it might cause mental health problems that decrease the wife's happiness (negative effect).

Finally, based on Confucianism and traditional gender role consciousness, the patriarchal consciousness crystallized as "men for work, women for family" persists as an influence on Japanese women's housework and labor participation behaviors. For the group with stronger gender role consciousness, when the income (wage) or educational attainment level is higher for the wife than for her husband, the wife may feel unhappiness (negative effect).

There is evidence of both positive and negative effects for intra-household bargaining power and it is not clear how in Japan the intra-household bargaining power gap affects the wife's happiness. This study employs an appropriate empirical study to investigate the question.

3 Method

3.1 Data

This study uses the Japanese Panel Survey of Consumers (JPSC) data. The JPSC was first conducted in 1993 by randomly selecting young women aged 24–34 years old as Cohort A. Cohort B was added in 1997 for women aged 24–27. In 2003 Cohort C was added for women aged 24–29. In 2008 Cohort D was added for women aged 24–28. The JPSC was conducted every year from 1993 to 2017. The attrition samples for the panel survey provide long-term balance panel datasets for this study because the survey objects are effectively controlled and managed. The JPSC questionnaire includes information about the subjective happiness of the wife, the household member's (wife and husband) demographics (age and education) and household characteristics (number of children, children's age, and hours of husband participation in child care or housework). Detailed information on income (wife and husband's yearly income and wage, household yearly income, work status, intra-household income transfer and household income management pattern) can be obtained. Using this information, we can investigate the influence of intra-household bargaining power on the happiness of married women. The samples utilized in the study are married couples (wife and husband) for 19 waves from 1995 to 2013.[2] The observations with missing values are deleted.

3.2 Models

Fixed-effect and random-effect models are used in this study to investigate the correlation between income, intra-household bargaining power and married Japanese women's happiness. In previous studies, the dependent variable can be constructed as an ordered category dummy variable, binary dummy variable and scale variable. The estimated results based on these methods are usually consistent. When the dependent variable is a scale variable, the results are more easily understood, therefore a scale variable of the wife's subjective happiness score (very happy = 5, happy = 4, normal = 3, unhappy = 2, very unhappy = 1) is used as the dependent variable in this study. When the dependent variable is a scale variable limited by 1 as the minimum value and 5 as the maximum value, the OLS and the panel data analysis methods can be used. The models are expressed as Eqs. (1) and (2).

$$H_i = a + \beta_1 \ln y_i + \beta_2 \ln \left(y_i / y_i^*\right) + \beta_X X_i + u_i \tag{1}$$

$$H_{it} = a + \beta_1 \ln y_{it} + \beta_2 \ln \left(y_{it} / y_{it}^*\right) + \beta_X X_{it} + v_i + \varepsilon_{it}. \tag{2}$$

Equation (1) represents the pooling OLS model. Equation (2) represents the fixed-effect model or random-effect model. In the Eqs. (1) and (2), i denotes wife individual, t denotes survey year (from 1995 to 2013), H is the wife happiness score from 1 to 5, $\ln y$ is the logarithmic value of household (or wife) income variable, $\ln y/y^*$ are a set of logarithmic value of relative income including inter-household relative income (e.g. household income gap) and intra-household relative income (e.g. wage gap between wife and husband, income gap

[2] The JPSC was conducted from 1993 to 2013, but information about married women's happiness can be obtained only for 19 waves, which is from 1995 to 2013, therefore the panel dataset from 1995 to 2013 is utilized in this study.

between wife and husband). a is a constant, β are the estimated coefficients. u is a true error. v is an item related with individual specific and time invariant factors. In the Eq. (1), because v_i is not considered, heterogeneity problems may occur in the estimated results. In the Eq. (2), because the fixed-effect model and random-effect model is based on first difference (FD) estimation, v_i will drop out by first difference (FD) estimation, thus the heterogeneity problem can be addressed by the fixed-effect and random-effect models.

When $\ln y/y^*$ is intra-household bargaining power index, β_2 is statistically significant, it is shown that the impact of intra-household bargaining power on the wife's happiness is statistically significant.

As pointed out in Wooldridge (2002, 2005) and Contoyannis et al. (2004), there may be an initial dependent problem in Eq. (2). The happiness in t_1 period might affect happiness in t period. To address the problem, the dynamic fixed-effect (or random-effect) model is used in this study. It is expressed by Eq. (3).

$$H_{it} = a + \beta_{Ht\_1} H_{i(t\_1)} + \beta_1 \ln y_{it} + \beta_2 \ln(y_{it}/y_{it}^*) + \beta_X X_{it} + v_i + \varepsilon_{it}. \tag{3}$$

In Eq. (3), H_{t_1} denotes happiness in the t_1 period. The definitions of the others are similar for Eq. (2).

The pooling OLS model, the fixed-effect model and the random-effect model, the F test, the Breusch and Pagan Largangian multiplier test, and the Hausman specification test are employed in order to compare the fitness of the three models.

3.3 Variable Setting

The wife' subjective happiness score (SHS) is utilized as the dependent variable. It is a scale variable calculated as "very happy = 5, happy = 4, normal = 3, unhappy = 2 and very unhappy = 1".[3]

The independent variables are conducted as follows. First, the important independent variable is the index for intra-household bargaining power. In previous studies based on the collective model the income index of intra-household bargaining power is utilized as follows: (1) the wage gap, which is the ratio of the wife's hourly wage to the husband's hourly wage (or to the total hourly wage of wife and husband) (Chiappori et al. 2002; Couprie 2007; Cherchye et al. 2012, 2015). (2) The income gap, which is the ratio of the wife's income to the husband's income (or to the total income of wife and husband (Browning et al. 1994, 2013). (3) The non-earned income gap which is the ratio of the wife's non-earned income to the husband's non-earned income (or to the total non-earned income of wife and husband) (Chiappori et al. 2002; Couprie 2007; Cherchye et al. 2012, 2015). (4) The saving gap which is the ratio of the wife's saving to the husband's saving (or to the total saving of wife and husband) (Lise and Yamada 2014).[4]

When the focus is only on the working wife and working husband, this utilizes the wage gap as an intra-household bargaining power index. When considering both the working wife and housewife who are not in work and her wage is zero, the income gap between wife and husband is utilized. According to labor market theory, the higher wage gap may be due to the working wife having higher human capital (a higher educational level), a senior

[3] Value is transformed into opposite order based on the questionnaire item. Although the value for very happy is "1" in the survey questionnaire, it is transformed to "5" in this analysis.

[4] The age gap and the education gap between wife and husband are also utilized for the indices of intra-household bargaining power in previous studies (e.g. Browning et al. 1994; Lise and Yamada 2014).

Table 1 Intra-household bargaining power index in the study. *Data Sources*: By the authors

Index	Contents
(1) Income gap	Ratio of wife income to couple's income
(2) Wage gap	Ratio of wife wage to couple's wage
(3) Education gap	Gap of wife education level to husband education level
(4) Controlled income (1)	Proportion of husband income controlled by wife to total husband income
(5) Controlled income (2)	Proportion of husband income controlled by wife to couple income

job (manager or executive), or a better job (in regular or full-time work) than her working husband. Because income includes the wage (earned income) and no-earned income (e.g. inheritance or interest from savings), the higher income gap may be caused by the wife having a better employment status or more wealth than her husband.

To refer to previous studies and to utilize the JPSC questionnaires, the five types of variables are utilized as the indices of the intra-household bargaining power (see Table 1). The five are as follows: (1) the intra-household income gap, which is the ratio of the wife's income to the couple's income.[5] (2) The intra-household wage gap, which is the ratio of the wife's wage to the couple's wage.[6] (3) The intra-household education gap,[7] which is the education gap between wife and husband, to be calculated as the wife's educational level minus the husband's educational level. (4) The ratio of the husband's income controlled by the wife, which is the proportion of household income controlled by the wife compared to the total of the husband's disposable income. (5) The ratio of the husband's income controlled by the wife, which is the proportion of the household income controlled by the wife compared to the couple's total disposable income. The controlled income rates in (4) and (5) are the original indices utilized for the issue. It is conducted as follows: the questionnaire asks the wife whether her husband transferred all of his disposable income to her (yes or no) and how much is the transferred income. The transferred husband income account is used as the husband's income account controlled by the wife. It is thought when the intra-household bargaining power is large for the wife, the proportion of the husband's income controlled by the wife to the total husband's income or couple's income will be large.

Second, household income is used as the index of absolute income. The household equivalent income utilized in the study is calculated based on an equivalent coefficient.[8] The income (household, wife, and husband) from 1995 to 2013 is adjusted by the Japanese consumption price index (CPI) from 1995 to 2013 published by the Ministry of Internal Affairs and Communications, Japan. The CPI in 1995 provides the standard. To compare the influences of household income on wives' happiness by low, middle and high-income groups, a set of household income dummy variables from income first quintile to fifth quintile is constructed.

[5] Income includes wage and non-labor income (e.g. saving, capital gain).

[6] It is equal to "0" when the individual is non-work.

[7] The education attainment level is evaluated as follows: junior high school graduation is equal to 1; vocational school graduation (entrance requirement junior high school graduation) is equal to 2; senior high school graduation is equal to 3; vocational school graduation is (entrance requirement senior high school graduation) is equal to 4; college school graduation is equal to 5; university graduation is equal to 6, and graduate school graduation is equal to 7.

[8] In the study, the square root of family numbers is utilized as the equivalent coefficient.

Third, the household income gap (the ratio of the wife's household income to the reference group household income) is used as the inter-household relative income index which is commonly utilized in previous studies to test the relative income hypothesis. The household income of the reference group is an imputed value calculated from the income functions.[9] Here, it should be noticed that the household income gap is different to the income gap between wife and husband which is an index of intra-household relative income. It is expected that the correlation between these two kinds of variables is small because the reference group for the household income gap is the outside-household group with a set of similar characteristics (e.g. husband with a similar education, work experience, and work status) and the imputed values are used. Then the correlation coefficient of mean values of these two kinds of variables is constructed: it is 0.203 and the coefficient is not statistically significant, which confirms that there is no multicollinearity problem between these two kinds of variables.

Fourth, the other variables (controlled variables) are also constructed. (1) The prior period of the wife's happiness is constructed and utilized in the dynamic panel analysis models to address the initial dependence problem. A set of dummy variables are constructed to compare the differences between groups with different happiness status in the prior period. (2) The wife's age dummy variables consist of the group aged 24–29, 30–39 and older than 40 years.[10] (3) The wife and husband education dummy variables are constructed using the highest educational level attained. They are junior high school, senior high school, vocational school, college, and university or the graduate school of the university. (4) The wife and husband work status dummy variables, which include the non-work, irregular worker, regular worker, the self-employed and others. (5) The youngest child's age and number of children. (6) The weekly husband child care or housework hours.[11] (7) The living with parents (either wife's parents or husband's parents) dummy variable. (8) The home status (rent room or my home) dummy variable. (9) The number of years married. (10) The city and country scale dummy variables, which is divided into the household lives in a large city, other city, or the countryside. (11) The survey year dummy variables, and the 2008 dummy variable are used to control the effect of the world financial crisis. Even though it is thought the husband's happiness status can influence the wife's happiness, the JPSC data does not include this information. A new survey needs to be made to explore the husband's happiness status.

The statistical description of the dependent and independent variables is summarized in Table 2.

4 Results

4.1 Basic Results

The results for five types of intra-household bargaining power indices are analyzed. The results for the income gap between wife and husband are shown in Table 3, and the results

[9] For household income function, the dependent variable is household equivalent income, independent variables are husband's experience year, educational attainment, work status, cities and countries scale.

[10] In this dataset, youngest age for the wife is 24 years old.

[11] It is calculated by assuming 5 ordinary days and 2 days holiday per week.

Table 2 Descriptive statistics. *Data Sources*: Calculated based on JHPS 1995–2013

Variable type		Total	Happy	Normal	Unhappy
Estimated variables (total)	(1) Income gap (wife/couple income)	0.151	0.146	0.168	0.181
	(2) Wage gap (wife/couple income)	0.150	0.144	0.167	0.181
	(3) Education gap (wife-husband)	−0.167	−0.228	0.016	0.104
	(4) Proportion of controlled husband income by wife to total husband income	0.853	0.854	0.852	0.841
	(5) Proportion of controlled husband income by wife to couple income	0.695	0.700	0.681	0.664
Estimated variables (working wife)	(1) Income gap (wife/couple income)	0.249	0.248	0.249	0.260
	(3) Education gap (wife-husband)	−0.068	−0.145	0.107	0.270
	(4) Proportion of controlled husband income by wife to total husband income	0.839	0.842	0.835	0.821
	(5) Proportion of controlled husband income by wife to couple income	0.610	0.613	0.605	0.581
Estimated variables (housewife)	(1) Income gap (wife/couple income)	0.029	0.029	0.030	0.035
	(3) Education gap (wife-husband)	−0.292	−0.323	−0.140	−0.204
	(4) Proportion of controlled husband income by wife to total husband income	0.871	0.869	0.883	0.878
	(5) Proportion of controlled husband income by wife to couple income	0.854	0.851	0.865	0.865
Control variables	Inter-household income (10 thousand yen)	369	375	358	324
	Inter-household income gap	0.986	0.996	0.971	0.893
	Wife's Education				
	Junior high school	0.041	0.035	0.055	0.090
	Senior high school	0.407	0.390	0.468	0.462
	Vocational school	0.184	0.183	0.193	0.169
	College	0.227	0.234	0.198	0.218
	University	0.140	0.158	0.086	0.061
	Wife's Age				

Table 2 (continued)

Variable type		Total	Happy	Normal	Unhappy
	Aged 24–29 years	0.122	0.137	0.069	0.087
	Aged 30–39 years	0.523	0.539	0.474	0.448
	Aged more than 40 years	0.355	0.325	0.458	0.465
Number of children					
	No child	0.099	0.103	0.091	0.067
	One	0.222	0.230	0.196	0.176
	Two	0.480	0.474	0.495	0.520
	More than three	0.199	0.192	0.218	0.238
Youngest child age					
	No child	0.099	0.103	0.091	0.067
	Aged 0–3 years	0.297	0.329	0.190	0.174
	Aged 4–6 years	0.160	0.159	0.158	0.167
	Aged 7–14 years	0.300	0.281	0.360	0.394
	Aged more than 15 years	0.144	0.127	0.202	0.197
	Hours of husband participation in child care or housework	8.555	9.104	6.903	6.058
Wife's work status					
	Non-work	0.444	0.468	0.369	0.351
	Regular worker	0.200	0.203	0.191	0.182
	Irregular worker	0.299	0.279	0.360	0.394
	Self-employed and other	0.057	0.050	0.080	0.073
Husband's work status					
	Non-work	0.003	0.001	0.007	0.016
	Regular worker	0.926	0.938	0.894	0.872
	Irregular worker	0.011	0.008	0.020	0.035
	Self-employed and other	0.059	0.053	0.078	0.077

Table 2 (continued)

Variable type		Total	Happy	Normal	Unhappy
	Number of years in marriage				
	1–4 years in marriage	0.125	0.141	0.075	0.060
	5–8 years in marriage	0.190	0.207	0.129	0.147
	9–13 years in marriage	0.204	0.207	0.194	0.195
	More than 13 years in marriage	0.481	0.445	0.602	0.598
	Husband's education				
	Junior high school	0.076	0.061	0.113	0.169
	Senior high school	0.398	0.379	0.464	0.470
	Vocational school	0.125	0.126	0.133	0.096
	College	0.042	0.043	0.039	0.037
	University	0.358	0.391	0.250	0.229
	Coresident with parents	0.282	0.275	0.307	0.312
	House status				
	Rent	0.300	0.302	0.289	0.309
	Home owner	0.700	0.698	0.711	0.691
	Cities and countries scale				
	Large city	0.255	0.254	0.244	0.300
	Other city	0.619	0.622	0.624	0.574
	Countryside	0.125	0.124	0.131	0.126
Observations		14,627	11,311	2177	866

Mean values are summarized in Table 2

The observations for wife's controlled income to couple income is 12,439 due to wife's September income is missing

Table 3 Results on the income gap between wife and husband and wives' happiness in Japan. *Data Sources*: Calculated based on JHPS 1995–2013

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E.	Coeff.	S.E
Income gap between wife and husband	−0.136**	0.056	−0.192**	0.075	−0.155***	0.060
Household income (ref. Income first quintile)						
Income second quintile	0.040**	0.019	0.013	0.022	0.032	0.020
Income third quintile	0.017	0.021	0.022	0.026	0.021	0.022
Income fourth quintile	0.073***	0.024	0.074**	0.032	0.083***	0.026
Income fifth quintile	0.105***	0.032	0.113***	0.042	0.115***	0.034
Household income gap (ref. I1<I0)						
I1>I0	−0.016	0.020	−0.008	0.026	−0.012	0.021
t − 1 Happiness (ref. Very unhappy)						
Very happy	0.025***	0.001	0.007***	0.001	0.020***	0.001
Happy	0.019***	0.001	0.006***	0.001	0.015***	0.001
Normal	0.012***	0.001	0.004***	0.001	0.009***	0.001
Unhappy	0.007***	0.001	0.002***	0.001	0.005***	0.001
Wife's education (ref. Junior)						
Senior high school	0.058*	0.031			0.091**	0.041
Vocational school	0.069**	0.033			0.108**	0.043
College	0.068**	0.033			0.109**	0.043
University or more	0.100***	0.036			0.139***	0.047
Husband's education (ref. Junior)						
Senior high school	0.061**	0.024			0.078**	0.032
Vocational school	0.086***	0.028			0.117***	0.036
College	0.037	0.036			0.068	0.048
University or more	0.108***	0.027			0.150***	0.035
Wife's age (ref. aged 24–29 years)						
Aged 30–39 years	−0.023	0.024	−0.078***	0.029	−0.043*	0.024

Table 3 (continued)

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E.	Coeff.	S.E
Aged more than 40 years	−0.056*	0.029	−0.075*	0.039	−0.078**	0.031
Number of children (ref. no child)						
One	−0.024	0.029	0.025	0.049	−0.015	0.032
Two	−0.031	0.028	0.000	0.056	−0.028	0.032
More than three	0.004	0.030	0.017	0.068	0.009	0.035
Youngest child age (ref/ aged 0–3 years and no-child)						
Aged 4–6 years	0.000	0.020	−0.016	0.021	−0.006	0.020
Aged 7–14 years	0.003	0.023	−0.010	0.029	−0.008	0.024
Aged more than 15 years	−0.001	0.029	0.019	0.042	−0.021	0.031
Hours of husband participation in child care or housework	0.002***	0.001	0.002***	0.001	0.002***	0.001
Wife's work status (ref. Non-work)						
Regular worker	0.010	0.025	−0.022	0.032	0.007	0.026
Irregular worker	−0.020	0.016	−0.009	0.020	−0.023	0.017
Self-employed and other	−0.043	0.028	−0.056*	0.034	−0.052*	0.030
Husband's work status (ref. Non-work)						
Regular worker	0.455***	0.105	0.400***	0.112	0.484***	0.105
Irregular worker	0.318***	0.120	0.137	0.134	0.303**	0.122
Self-employed and other	0.476***	0.108	0.429***	0.115	0.507***	0.108
Coresident with parents	−0.034**	0.015	−0.077**	0.034	−0.044**	0.018
House status (ref. Rent)						
Home owner	0.026*	0.014	0.033	0.026	0.028*	0.017
Number of years in marriage (ref. less than 4)						
5–8 years in marriage	−0.009	0.025	−0.082***	0.030	−0.029	0.025
9–13 years in marriage	−0.040	0.028	−0.100***	0.039	−0.065**	0.029

Table 3 (continued)

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E.	Coeff.	S.E
More than 13 years in marriage	−0.050	0.031	−0.133***	0.047	−0.092***	0.033
Cities and countries scale	Yes		Yes		Yes	
Survey year	Yes		Yes		Yes	
Number of observations	10,853		10,853		10,853	
Number of households	1684		1684		1684	
R-sq. within			0.08		0.06	
Between			0.49		0.72	
Overall			0.32		0.45	
F-test that all u_i = 0			3.01 ($p > F = 0.0000$)			
Breusch and Pagan Lagrangian multiplier test for random effects					147.41 ($p > chibar2 = 0.0000$)	
Hausman specification test			3199.66 ($p > chi2 = 0.0000$)			

*,**,***Statistical significant levels are 10%, 5%, 1%

Table 4 Summary of the results for five types of intra-household bargaining power indices. *Data Sources*: Calculated based on JHPS 1995–2013

Model	Coeff.	S.E.
Model 1: income gap between wife and husband	−0.192**	0.075
Model 2: wage gap between wife and husband	−0.201***	0.074
Model 3: education gap between wife and husband	−0.028***	0.006
Model 4: proportion of controlled husband income by wife to total husband income	0.067**	0.033
Model 5: proportion of controlled husband income by wife to couple income	0.102**	0.040

*,**,***Statistical significant levels are 10%, 5%, 1%

Controlled variables are similar to those used in Table 3. They are household income inter-household income, age dummy, number of children, number of years in marriage, husband's education, husband's work status, youngest child age, hours of husband participation in child care or homework, work status, coresident with parents, housing status, number of marriage years and countries scale and survey year summary variables. Although controlled variable are estimated in each model, they are not expressed in Table 4

The random effect is utilized for the Model 3 due to the education gap is time invariant. Fixed effect model is utilized for other models

on the other four types of intra-household bargaining power indices are summarized in Table 4.[12]

(1) The Pooling OLS, (2) the fixed-effect model, and (3) the random-effect model are used in these analyses (see Table 1, and Appendix Tables 6, 7, 8, 9). The analyzed results are shown in Table 1. The results from Model 1, Model 3, Model 4, and Model 5 are shown in Table 4. The results from the F-test and the Breusch and Pagan Largangian multiplier test indicate that both the fixed-effect model and random-effect model show more propriety than the OLS. The results based on Hausman specification test indicate that the fixed-effect model shows more propriety than the random-effect model. The results from the fixed effect model are used to investigate the relation between intra-household bargaining power and the wife's happiness. The results from Model 2 shown in Table 4 cannot be analyzed by the fixed-effect model because the education gaps between wife and husband are the time invariant variables. The Breusch and Pagan Largangian multiplier test suggests that the random effect model shows more propriety than the OLS, thus the results for the education gaps between wife and husband are discussed using the random effect model in Table 4. The main findings are as follows.

First, for intra-household bargaining power, (1) the coefficient of the income gap between wife and husband is a negative value (−0.192), and it is statistically significant at 5% (see Table 3 and Model 1 in Table 4). It indicates that when the income gap between wife and husband increases, the wife's happiness may decrease. (2) The coefficient of the wage gap between wife and husband is a negative value (−0.201), and it is statistically significant at 1% (see Model 2 in Table 4). It suggests that when the wage gap between wife and husband increases, the wife's happiness may decrease. As previously described, the higher wage gap may be due to the working wife possessing higher human capital (e.g. attaining a higher educational level) and better job status. Because the wife' education

[12] For the detailed results, please see Tables 6, 7, 8 and 9 in the appendix. In these analyses, the controlled variables are the similar with those utilized in Table 1.

levels are controlled in these analyses, it is thought the higher wage gap shows the working wife to have a higher job position (e.g. manager), or better job (e.g. regular worker) than her working husband. (3) The coefficient of the education attainment gap between wife and husband is a negative value (−0.028), and it is statistically significant at 1% (see Model 3 in Table 4). It is clear that when the education attainment level is higher for the wife than her husband the wife's happiness may decrease. These results based on Model 1, Model 2 and Model 3 suggest that when the traditional intra-bargaining power increases for the wife, the wife's happiness may decrease. These results may be associated with the household production theory, the mental health problems associated with longer work hours, and Confucianism and gender role consciousness. For example, in Japan the traditional consciousness of the gender role expressed as "Men for work, women for family" persists. Thus the husband must gain more income in the job market, whereas the wife's responsibility is to do housework or care for children and other family members (e.g. patient parent care). When the wage in the job market is higher for the wife than for the husband, but the wife's housework or family care work responsibility is still greater than the husband's, the probability of work-family conflict will be higher for the married women with a high-wage (or high-income, high-educational attainment). Consequently the wife with household responsibilities and a high income is likely to be unhappy.[13] (4) According to the results of Model 4 and Model 5 displayed in Table 4, the coefficients of the proportion of the husband's income controlled by the wife are positive values (0.067 in Model 4, 0.102 in Model 5), and they are statistically significant at 5%. It indicates that when the proportion of the husband's income controlled by the wife increases, the wife may be happier. These results may be because the household consumption controlled by the wife may increase due to the proportion of her husband's income she controls increasing and the management power of the whole household including the individual wife, her children and her husband might increase, and with it the wife's utility

Second, other factors may affect a Japanese wife's happiness. For example, using the results from the fixed effect model in Table 3, (1) the results show that for the low-income group (income first quintile), the happiness score is higher than for high-income group (income fourth and fifth quintile). The coefficients of both fourth and fifth quintile income groups are positive values (0.074 and 0.113), and are statistically significant at 1% and the differences to wives' happiness are small for the low and middle-income groups. These results indicate happiness is greater for the higher income group and therefore the absolute income hypothesis is supported. The result is consistent with previous studies for other developed countries (Hamermesh 1977; Ferrer-i-Carbonell 2005; Vendrik and Woltjer 2007; Sano and Otake 2007; Otake et al. 2010; Tsutsui 2010) and for developing countries (Appleton and Song 2008; Smyth et al. 2010; Jiang et al. 2011; Wang and VanderWeele 2011, and Ma 2016). (2) For inter-household income, the coefficient of the $I_1 \geq I_0$ dummy variables is not statistically significant and the relative income hypothesis is not supported. Excepting the absolute income variable, the coefficient of the $I_1 \geq I_0$ dummy variable is a positive value, and it is statistically significant at the 10% level and the relative income

[13] Labor participation by married women has increased over recent decades, but the traditional pattern of division of housework persists and married women do almost all the housework in Japan. Ma (2007) indicated that housework and family care time for the non-work wife and working wife is almost the same in Japan. She points out that compared with husbands in other developed countries Japanese husbands do little housework in the home. Tsutsui (2013, 2016) argued that household gender role segregation may explain why the husband's housework time is short in Japan. In addition, to compare to the less housework gender gap group, the group with great housework gender gap is likely to experience greater family conflict, more time stress and less marital satisfaction (Baxter and Tai 2016).

hypothesis is supported.[14] It indicates that the influence of the inter-household relative income on happiness is smaller compared with the influence of absolute income.

The results can be explained as follows. (1) The first result is associated with the working poor who emerged as a significant group and with the problem of relative poverty that become serious with the increase of irregular workers and the economic recession since the 1990s. In this context the effect of absolute income on the happiness of married women might be greater. (2) The second result may be related to smaller inter-household income inequality in Japan. (3) The results show that prior period happiness status positively affects present happiness. Compared with the very unhappy group, the likelihood of feeling happiness in the survey year is higher for the groups who answered "very happy", "happy", "normal" and "unhappy" in the prior survey year. The results show there is an initial dependence problem, and it is appropriate to use the dynamic panel data analysis method. All these coefficients are statistically significant at 1%, however, the influence of the happiness status in the prior period on the well-being in the survey year is greater for the group who answered "very happy" in the prior survey year.

(4) The results based on the random effect model show that the higher educational level group (particularly for university and graduate school) is more likely to be happy than the low educational level group. (5) The probability of experiencing happiness is lower for the groups aged older than 30 than for the group aged 24–29. (6) The wife's happiness increases when the husband's housework hours become longer. It indicates that a husband doing more housework may increase the wife happiness. (7) Living with parents may decrease the wife's happiness.

(8) The husband's characteristics affect the wife's level of happiness. For example, the probability of experiencing happiness is higher for a wife with a husband who attained the middle or high educational level than for a wife with a husband who has a low level of educational attainment (junior high school). The husband's employment status if it is non-worker, regular worker, or irregular worker, does not affect the level of the wife's happiness to a degree that is statistically significant, but the wife with a self-employed husband is more likely to be unhappy than the other groups. (9) The number of years in the marriage also affects the Japanese wife's level of happiness. It is shown that the wife's happiness decreases with the length of the marriage. This is consistent with the findings of Johnson et al. (1992), Karney and Bradbury (1995), Kurdek (1998), and Lindahl et al. (1998) which utilize the European countries panel survey data: they found that marital happiness decreases with the length of the marriage. On the contrary, VanLaningham et al. (2001) indicate a U-shaped curve for the relation between marital happiness and marital duration. The U-shaped curve was not found for married Japanese women in this study. It is shown that in the long-term the well-being of married Japanese women decreases. It indicates that for married Japanese women the work-family conflict problem becomes more severe over the length of the marriage.

4.2 Estimates for the Married Working Women and Housewife Groups

Household responsibility determined by gender, work and family consciousness, and time and budget constraints all differ for the married working women and housewife groups. It is thought that the effect of intra-household bargaining power on happiness may also differ

[14] These results, excepting the absolute income variable, are not shown in this paper due to the paper scale limit, the reader can contact the authors for these results.

Table 5 Summaries of the results by married working women and housewife groups. *Data Sources*: Calculated based on JHPS 1995–2013

Model	Coeff.	S.E.
Model 1: income gap between wife and husband		
a: married working women	−0.307***	0.102
b: housewife	0.157	0.149
Model 2: education gap between wife and husband		
a: married working women	−0.029***	0.008
b: housewife	−0.025***	0.010
Model 3: proportion of controlled husband income by wife to total husband income		
a: married working women	0.098**	0.046
b: housewife	0.052	0.056
Model 4: proportion of controlled husband income by wife to couple income		
a: married working women	0.154***	0.058
b: housewife	0.055	0.065

*,**,***Statistical significant levels are 10%, 5%, 1%

Controlled variables are the similar to those used in Table 3. They are household income inter-household income, age dummy, number of children, number of years in marriage, husband's education, husband's work status, youngest child age, hours of husband participation in child care or homework, work status, coresident with parents, housing status, number of marriage years and countries scale and survey year summary variables. Although controlled variable are estimated in each model, they are not expressed in Table 4

The random effect is utilized for the Model 3 due to the education gap is time invariant. Fixed effect model is utilized for other models

between these two groups. Two subsamples (a and b) are employed. The results are summarized in Table 5.

It is shown that the effect of intra-household bargaining power on happiness is greater for the married working women group than for the housewife group. The results based on the Model 1, Model 3, and Model 4 suggest that the coefficients of income gap, and proportion of the husband's income controlled by the wife are statistically significant, whereas these coefficients are not statistically significant for the housewife group. The results based on model 2 show that the coefficients of the education gap are statistically significant for the married working women and the housewife groups, but the coefficients absolute value is greater for the married working women group. It indicates that the work-family conflict problem is more severe for the married working women group, and may decrease their well-being.

5 Conclusions

How does the intra-household bargaining power gap between wife and husband affect the happiness of married women in Japan? The absolute income hypothesis and relative income happiness are generally proven in the previous literature. This study develops the relative income hypothesis and makes an empirical study to investigate the impact of the intra-household bargaining power gap on happiness using the Japanese Household Panel Survey (JHPS) data conducted from 1995 and 2013 based on the pooling OLS, dynamic fix-effect and random effect models.

The major conclusions are as follows. First, when absolute income, relative household income, and other factors are constant, the income gap, wage gap and education gap between wife and husband negatively affects the level of happiness of married Japanese women. If a higher proportion of the husband's income is controlled by the wife or the total household income increases, this can positively affect the level of happiness of married Japanese women. Second, the effects of the intra-household bargaining power gap between wife and husband on happiness are greater for the married working women group than for the housewife group. It indicates that in Japan the traditional gender role consciousness "men for work, women for family" may influence married women's happiness and as a result, the work-family conflict for working married women may be severe. For example, though wives labor participation is increasing, the traditional pattern of division of housework is unchanged and wives do most of the housework in Japan. The intra-household gender segregation of housework may explain this phenomenon (Ma 2007; Tsutsui 2013, 2016). Moreover, Baxter and Tai (2016) found that compared to the less housework gender gap group, the gender gap group with more housework is likely to experience greater family conflict, more time stress and less marital satisfaction. In addition, Inglehart and Baker (2000), Constantin, and Voicu (2015), and Inglehart and Norris (2003) indicate that not only is there a difference in the time use of labor supply and housework, but gender role attitudes also differ by country according to the World Value Survey data.

The policy implications of these empirical results are as follows. It is shown that the income/wage gap and education gap between wife and husband negatively affects the wife's happiness, but if a higher proportion of the husband's income is controlled by the wife it positively affects the wife's happiness, and this influence differs for the housewife and working wife groups. It indicates that the traditional gender role consciousness may decrease married women's happiness and the work-family conflict for working married women may be severe in Japan. The Japanese government has promoted female labor participation since the 1980s and a progressively ageing population needs to be cared for by someone, and that may well be a working married woman. The government promotes policies to keep married women working but the proportion of female regular workers is still small, and the female labor participation rate is smaller for Japan than for other developed countries. The implementation of labor and family policies to mitigate work-family conflict presents an important challenge for the Japanese government. The husband's support with housework, elder care and child care affects the wife's well-being and change in gender roles may usefully be promoted by the Japanese government. Japan's economic progress may best be supported if there is a fundamental evolution of gender roles as they impact on control of household income, housework, and familial care. The implementation and enforcement of a work-life balance policy for both men and women is likely to increase national well-being in Japan.

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Appendix

See Tables 6, 7, 8 and 9.

Table 6 Results on the wage gap between wife and husband and wives' happiness in Japan. *Data Sources*: Calculated based on JHPS 1995–2013

	(1) Pooling		(2)Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
Wage gap between wife and husband	−0.124**	0.055	−0.201***	0.074	−0.147**	0.059
Household income (ref. Income first quintile)						
Income second quintile	0.040**	0.019	0.014	0.022	0.033	0.020
Income third quintile	0.017	0.021	0.023	0.026	0.021	0.022
Income fourth quintile	0.074***	0.024	0.075**	0.032	0.083***	0.026
Income fifth quintile	0.106***	0.032	0.115***	0.042	0.115***	0.034
Household income gap (ref. I1<I0)						
I1>I0	−0.017	0.020	−0.011	0.026	−0.014	0.021
t − 1 Happiness (ref. Very unhappy)						
Very happy	0.025***	0.001	0.007***	0.001	0.020***	0.001
Happy	0.019***	0.001	0.006***	0.001	0.015***	0.001
Normal	0.012***	0.001	0.004***	0.001	0.010***	0.001
Unhappy	0.007***	0.001	0.002***	0.001	0.005***	0.001
Wife's education (ref. Junior)						
Senior high school	0.058*	0.031			0.091**	0.041
Vocational school	0.068**	0.033			0.107**	0.043
College	0.067**	0.033			0.108**	0.043
University or more	0.099***	0.035			0.137***	0.047
Husband's education (ref. Junior)						
Senior high school	0.061**	0.024			0.078**	0.032
Vocational school	0.086***	0.028			0.116***	0.036
College	0.037	0.036			0.068	0.048
University or more	0.109***	0.027			0.150***	0.035
Wife's age (ref. aged 24–29 years)						
Aged 30–39 years	−0.023	0.024	−0.078***	0.029	−0.043*	0.024
Aged more than 40 years	−0.057*	0.029	−0.075*	0.039	−0.078**	0.031
Number of children (ref. no child)						
One	−0.024	0.029	0.024	0.049	−0.015	0.032
Two	−0.030	0.028	−0.001	0.056	−0.028	0.032
More than three	0.005	0.030	0.016	0.068	0.009	0.035
Youngest child age (ref/ aged 0–3 years and no-child)						
Aged 4–6 years	0.000	0.020	−0.016	0.021	−0.006	0.020
Aged 7–14 years	0.003	0.023	−0.009	0.029	−0.008	0.024
Aged more than 15 years	−0.001	0.029	0.020	0.042	−0.022	0.031
Hours of husband participation in child care or homework	0.002***	0.001	0.002***	0.001	0.002***	0.001
Wife's work status (ref. Non-work)						
Regular worker	0.006	0.025	−0.019	0.032	0.006	0.026
Irregular worker	−0.021	0.016	−0.008	0.020	−0.023	0.017
Self-employed and other	−0.045	0.028	−0.054	0.034	−0.053*	0.030

Table 6 (continued)

	(1) Pooling		(2)Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
Husband's work status (ref. Non-work)						
Regular worker	0.448***	0.105	0.400***	0.112	0.477***	0.105
Irregular worker	0.309**	0.120	0.137	0.134	0.295**	0.122
Self-employed and other	0.470***	0.108	0.431***	0.115	0.501***	0.108
Coresident with parents	−0.035**	0.015	−0.075**	0.034	−0.044**	0.018
House status (ref. Rent)						
Home owner	0.026*	0.014	0.033	0.026	0.029*	0.017
Number of years in marriage (ref. less than 4)						
5–8 years in marriage	−0.008	0.025	−0.081***	0.030	−0.028	0.025
9–13 years in marriage	−0.039	0.028	−0.099**	0.039	−0.064**	0.029
More than 13 years in marriage	−0.048	0.031	−0.133***	0.047	−0.091***	0.033
Cities and countries scale	Yes		Yes		Yes	
Survey year	Yes		Yes		Yes	
Number of observations	10,853		10,853		10,853	
Number of households	1684		1684		1684	
R-sq. within			0.08		0.06	
Between			0.49		0.72	
Overall			0.32		0.45	
F-test that all u_i = 0			3.01 ($p > F = 0.0000$)			
Breusch and Pagan Lagrangian multiplier test for random effects					147.64 ($p > chibar2 = 0.0000$)	
Hausman specification test			3194.92 ($p > chibar2 = 0.0000$)			

*,**,***Statistical significant levels are 10%, 5%, 1%

Table 7 Results on the education gap between wife and husband income and wives' happiness in Japan. *Data Sources*: Calculated based on JHPS 1995–2013

	(1) Pooling		(2) Random effect	
	Coeff.	S.E	Coeff.	S.E
Education gap between wife and husband	−0.019***	0.004	−0.028***	0.006
Household income (ref. Income first quintile)				
Income second quintile	0.041**	0.019	0.032	0.020
Income third quintile	0.018	0.021	0.019	0.022
Income fourth quintile	0.075***	0.023	0.080***	0.026
Income fifth quintile	0.104***	0.032	0.109***	0.034
Household income gap (ref. I1<I0)				
I1>I0	−0.018	0.020	−0.013	0.021
t − 1 Happiness (ref. Very unhappy)				
Very happy	0.025***	0.001	0.020***	0.001
Happy	0.019***	0.001	0.015***	0.001
Normal	0.012***	0.001	0.010***	0.001
Unhappy	0.007***	0.001	0.005***	0.001
Wife's education (ref. Junior)				
Senior high school	0.097***	0.031	0.145***	0.040
Vocational school	0.121***	0.033	0.183***	0.043
College	0.139***	0.033	0.212***	0.043
University or more	0.189***	0.036	0.268***	0.046
Wife's Age (ref. aged 24–29 years)				
Aged 30–39 years	−0.021	0.024	−0.042*	0.024
Aged more than 40 years	−0.053*	0.029	−0.075**	0.031
Number of children (ref. no child)				
One	−0.016	0.028	−0.006	0.032
Two	−0.024	0.028	−0.019	0.031
More than three	0.014	0.029	0.021	0.035
Youngest child age (ref/ aged 0–3 years and no-child)				
Aged 4–6 years	−0.002	0.020	−0.009	0.020
Aged 7–14 years	0.001	0.023	−0.011	0.024
Aged more than 15 years	−0.005	0.029	−0.026	0.031

Table 7 (continued)

	(1) Pooling		(2) Random effect	
	Coeff.	S.E	Coeff.	S.E
Hours of husband participation in child care or home-work	0.002***	0.001	0.002***	0.001
Wife's work status (ref. Non-work)				
Regular worker	−0.036**	0.017	−0.038*	0.020
Irregular worker	−0.037***	0.014	−0.041***	0.016
Self-employed and other	−0.069***	0.026	−0.078***	0.028
Husband's work status (ref. Non-work)				
Regular worker	0.464***	0.105	0.493***	0.105
Irregular worker	0.315***	0.120	0.297**	0.122
Self-employed and other	0.481***	0.108	0.510***	0.108
Coresident with parents	−0.034**	0.015	−0.044**	0.018
House status (ref. Rent)				
Home owner	0.028*	0.014	0.031*	0.017
Number of years in marriage (ref. less than 4)				
5–8 years in marriage	−0.005	0.025	−0.024	0.025
9–13 years in marriage	−0.036	0.028	−0.060**	0.029
More than 13 years in marriage	−0.047	0.031	−0.087***	0.033
Cities and countries scale	Yes		Yes	
Survey year	Yes		Yes	
Number of observations	10,853		10,853	
Number of households	1684		1684	
R-sq. within			0.06	
Between			0.73	
Overall			0.45	
Breusch and Pagan Lagrangian multiplier test for random effects			149.2 ($p > \text{chibar2} = 0.0000$)	

*,**,***Statistical significant levels are 10%, 5%, 1%

Table 8 Results on the proportions of controlled husband's income by wife to total husband income and wives' happiness in Japan. *Data Sources*: Calculated based on JHPS 1995–2013

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
Proportions of controlled husband's income by wife to total husband income	0.040*	0.020	0.067**	0.033	0.053**	0.024
Household income (ref. Income first quintile)						
Income second quintile	0.039**	0.019	0.010	0.022	0.031	0.020
Income third quintile	0.018	0.021	0.016	0.026	0.020	0.022
Income fourth quintile	0.075***	0.024	0.065**	0.032	0.082***	0.026
Income fifth quintile	0.109***	0.032	0.103**	0.042	0.115***	0.034
Household income gap (ref. I1<I0)						
I1>I0	−0.017	0.020	−0.012	0.026	−0.013	0.021
t − 1 Happiness (ref. Very unhappy)						
Very happy	0.025***	0.001	0.007***	0.001	0.020***	0.001
Happy	0.019***	0.001	0.006***	0.001	0.015***	0.001
Normal	0.012***	0.001	0.004***	0.001	0.010***	0.001
Unhappy	0.007***	0.001	0.002***	0.001	0.005***	0.001
Wife's education (ref. Junior)						
Senior high school	0.054*	0.031			0.086**	0.041
Vocational school	0.064*	0.033			0.102**	0.043
College	0.063*	0.033			0.102**	0.043
University or more	0.094***	0.035			0.131***	0.046
Husband's education (ref. Junior)						
Senior high school	0.063***	0.024			0.082***	0.032
Vocational school	0.091***	0.028			0.123***	0.036
College	0.038	0.036			0.071	0.048
University or more	0.115***	0.027			0.160***	0.035
Wife's age (ref. aged 24–29 years)						
Aged 30–39 years	−0.021	0.024	−0.076***	0.029	−0.041*	0.024

Table 8 (continued)

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
Aged more than 40 years	−0.055*	0.029	−0.073*	0.039	−0.075**	0.031
Number of children (ref. no child)						
One	−0.019	0.028	0.037	0.049	−0.008	0.032
Two	−0.025	0.028	0.014	0.056	−0.021	0.032
More than three	0.011	0.030	0.031	0.068	0.018	0.035
Youngest child age (ref/aged 0–3 years and no-child)						
Aged 4–6 years	−0.002	0.020	−0.020	0.021	−0.009	0.020
Aged 7–14 years	0.000	0.023	−0.015	0.029	−0.011	0.024
Aged more than 15 years	−0.007	0.029	0.011	0.042	−0.028	0.031
Hours of husband participation in child care or homework	0.002***	0.001	0.002***	0.001	0.002***	0.001
Wife's work status (ref. Non-work)						
Regular worker	−0.033*	0.017	−0.048	0.029	−0.034*	0.020
Irregular worker	−0.038***	0.014	−0.022	0.019	−0.041***	0.016
Self-employed and other	−0.069***	0.026	−0.075**	0.033	−0.078***	0.028
Husband's work status (ref. Non-work)						
Regular worker	0.461***	0.105	0.402***	0.112	0.490***	0.105
Irregular worker	0.309**	0.120	0.125	0.133	0.294**	0.122
Self-employed and other	0.481***	0.108	0.426***	0.115	0.510***	0.108
Coresident with parents	−0.035**	0.015	−0.076**	0.034	−0.045**	0.018
House status (ref. Rent)						
Home owner	0.027*	0.014	0.035	0.026	0.030*	0.017
Number of years in marriage (ref. less than 4)						
5–8 years in marriage	−0.005	0.025	−0.078***	0.030	−0.025	0.025
9–13 years in marriage	−0.037	0.028	−0.096**	0.039	−0.062**	0.029

Table 8 (continued)

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
More than 13 years in marriage	−0.047	0.031	−0.130***	0.047	−0.089***	0.033
Cities and countries scale	Yes		Yes		Yes	
Survey year	Yes		Yes		Yes	
Number of observations	10,853		10,853		10,853	
Number of households	1684		1684		1684	
R-sq. within			0.08		0.06	
Between			0.51		0.72	
Overall			0.32		0.45	
F-test that all u_i = 0			3.01 ($p > F = 0.0000$)			
Breusch and Pagan Lagrangian multiplier test for random effects					147.83 ($p > chibar2 = 0.0000$)	
Hausman specification test			3194.92 ($p > chi2 = 0.0000$)			

*,**,***Statistical significant levels are 10%, 5%, 1%

Table 9 Results on the proportions of controlled husband's income by wife to total couple income and wives' happiness in Japan. *Data Sources*: Calculated based on JHPS 1995–2013

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
Proportions of controlled husband's income by wife to total couple income	0.074***	0.025	0.102**	0.040	0.093***	0.029
Household income (ref. Income first quintile)						
Income second quintile	0.031	0.021	−0.005	0.024	0.023	0.022
Income third quintile	0.019	0.023	0.009	0.029	0.020	0.024
Income fourth quintile	0.070***	0.025	0.046	0.035	0.075***	0.028
Income fifth quintile	0.110***	0.034	0.086*	0.046	0.113***	0.037
Household income gap (ref. I1<I0)						
I1>I0	−0.020	0.021	−0.005	0.027	−0.013	0.022
t − 1 Happiness (ref. Very unhappy)						
Very happy	0.026***	0.001	0.006***	0.001	0.020***	0.001
Happy	0.019***	0.001	0.005***	0.001	0.015***	0.001
Normal	0.013***	0.001	0.003***	0.001	0.010***	0.001
Unhappy	0.007***	0.001	0.002**	0.001	0.005***	0.001
Wife's education (ref. Junior)						
Senior high school	0.068**	0.034			0.106**	0.045
Vocational school	0.080**	0.036			0.124***	0.048
College	0.076**	0.036			0.123***	0.048
University or more	0.094**	0.039			0.140***	0.051
Husband's education (ref. Junior)						
Senior high school	0.073***	0.026			0.095***	0.034
Vocational school	0.099***	0.029			0.135***	0.039
College	0.050	0.039			0.086*	0.051
University or more	0.123***	0.029			0.169***	0.037
Wife's age (ref. aged 24–29 years)						
Aged 30–39 years	−0.019	0.027	−0.077**	0.034	−0.039	0.028

Table 9 (continued)

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
Aged more than 40 years	−0.050	0.032	−0.065	0.043	−0.069**	0.034
Number of children (ref. no child)						
One	−0.029	0.030	0.022	0.050	−0.017	0.033
Two	−0.031	0.029	0.003	0.058	−0.028	0.033
More than three	0.001	0.031	0.034	0.073	0.005	0.037
Youngest child age (ref/ aged 0–3 years and no-child)						
Aged 4–6 years	0.010	0.022	0.004	0.024	0.005	0.022
Aged 7–14 years	0.014	0.025	0.000	0.032	0.003	0.026
Aged more than 15 years	0.006	0.030	0.025	0.045	−0.013	0.033
Hours of husband participation in child care or homework	0.002**	0.001	0.003***	0.001	0.002***	0.001
Wife's work status (ref. Non-work)						
Regular worker	−0.009	0.020	−0.024	0.033	−0.007	0.023
Irregular worker	−0.024	0.016	−0.006	0.023	−0.027	0.018
Self-employed and other	−0.051*	0.027	−0.065*	0.036	−0.059**	0.030
Husband's work status (ref. Non-work)						
Regular worker	0.437***	0.109	0.291**	0.118	0.453***	0.109
Irregular worker	0.294**	0.124	0.022	0.140	0.272**	0.126
Self-employed and other	0.463***	0.112	0.298**	0.122	0.476***	0.112
Coresident with parents	−0.027*	0.016	−0.067*	0.038	−0.035*	0.020
House status (ref. Rent)						
Home owner	0.019	0.016	0.009	0.030	0.019	0.019
Number of years in marriage(ref. less than 4)						
5–8 years in marriage	−0.001	0.028	−0.072**	0.033	−0.020	0.028
9–13 years in marriage	−0.051*	0.030	−0.103**	0.044	−0.074**	0.032

Table 9 (continued)

	(1) Pooling		(2) Fixed effect		(3) Random effect	
	Coeff.	S.E	Coeff.	S.E	Coeff.	S.E
More than 13 years in marriage	−0.065*	0.033	−0.150***	0.053	−0.107***	0.036
Cities and countries scale	Yes		Yes		Yes	
Survey year	Yes		Yes		Yes	
Number of observations	9469		9469		9469	
Number of households	1610		1610		1610	
R-sq. within			0.05		0.03	
Between			0.48		0.73	
Overall			0.31		0.46	
F-test that all u_i=0			3.03($p>$F=0.0000)			
Breusch and Pagan Lagrangian multiplier test for random effects					80.46 (p> chibar2=0.0000)	
Hausman specification test			3927.95($p>$chi2=0.0000)			

*,**,***Statistical significant levels are 10%, 5%, 1%

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