Women's Employment, Childcare Leaves and Earnings Mobility among Married Couples in Japan

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Paper prepared for the 35th IARIW General Conference

Copenhagen, Denmark, August 20-25, 2018

PS13: Mobility, Opportunity and Longitudinal Data

WEDNESDAY, AUGUST 22, LATE AFTERNOON

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July 2, 2018

Abstract

This study analyzes the impact of married women's employment sequences on married couples' income mobility, using wave 11-24 (2003−2016) of the Japanese Panel Survey of Consumers.

The findings are, first, wives' continuous employment after the first birth or taking childcare leave makes the couples' income level transitioned to upward. Second, however, taking the endogeneity of women's income level and continuous employment and taking childcare leave into account, the upward effect is observed only in high husband's income households. Third, the upward effect expired within ten years after the first birth.

These findings suggest that work life balance policies, aiming at married women's continuous work, will increase income inequality among married couples' income.

JEL Classification: D31, J21

Keywords: Women's employment, Employment sequences, Upward Mobility, Childcare leaves

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[1] This research has received support from the Japan Society for the Promotion of Science (JSPS) Grants-in-Aid for Scientific Research C "Experimental study concerning resource allocation and inequality in households" (15K03502) and "Analysis of the effects of childcare and employment compatibility support measures on married couple's income divide" (15K03517), and the Joint Usage and Research Center Programs (chosen project for 2017) by Hitotsubashi University's Institute of Economic Research, "Tax reform, the social security system, and income division: an experimental study in Japan" (Principal Investigator: Yoko Morita). Data from the "Japanese Panel Survey of Consumers" is used with permission of the Institute for Research on Household Economics. Moreover, the preparation of this paper benefitted from many comments from Akiko Sato Oishi (Chiba University), Masaaki Mizuochi (Nanzan University), Tomoki Kitamura (NLI Research Institute), Masaharu Usuki (Nagoya City University), Kunio Nakashima (NLI Research Institute), Toshiyuki Uemura (Kwansei Gakuin University), Yoshimi Adachi (Konan University), Hiroki Tanaka (Doshisha University), and participants in the 2017 Hitotsubashi University Research Symposium "Visualizing Japanese society and economics from microdata." We would like to note our thanks.

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1. INTRODUCTION

This study analyzes the impact of married women's employment sequences on income mobility among married couples in Japan. In recent years, the number of dual income households has increased, and women's incomes have become more important to married couples. Not simply whether women work, but women's employment sequences may impact the income distribution of married couples. Focusing on women's career changes, we examines whether married women's employment affects probability of upward mobility of married couples' income levels.

In these last 20 years, the work styles of married couples in Japan have changed a great deal. Figure 1 shows changes to single income households (the husband is employed and the wife is not) and dual income households (the husband and wife are both employed). In 1980, "single income households" greatly outnumbered "dual income households," but since 1997, the number of "dual income households" has steadily outstripped "single income households," and in 2013, this had increased to where there were 1.4 times as many dual income households as single income households, with 10,650,000 "dual income households" and 7,450,000 "single income households."

There are various opinions on what might be behind this increase to the number of women in employment, but plausible explanations include women no longer leaving their jobs after life events, such as marriage and childbirth, due to the spread of work life balance policies, and the destabilization of men' incomes ascribed to the collapse of the lifetime employment system, due to increases to women's levels of academic achievement.

Women's work styles may also greatly influence income levels. The number of years of working and working as a regular employee are major determinants of

wage levels. And to keep one's job is also important to one's earning level form the view point of recruitment system in Japan. Young people are employed simultaneously after graduating from high school or university as permanent and regular employees, and once if they quit the job, it is difficult to find another employment offering high income, such as, employment in large firms as a permanent or a regular employee. For women especially, if she is going to retire due to marriage, childbirth, or childcare, reemployment opportunities are limited and it will be difficult to find work as a regular employee.[4] For those reasons, being able to continue working without losing one's job through childbirth and childcare also influences income levels of households.

We empirically analyze whether married women's employment sequences have impacts on upward mobility of married couples. Here, we define upward mobility as transition to a higher income level of the couple's total income form a lower income level of the husband's income. We estimate the impacts, for husbands of each income level, in order to determine whether the effect differs according to the husband's income level. Additionally, we inspect the long-term effects for ten years after the first birth.

The data we use are wave 11-24 (2003–2016) of The Institute for Research on Household Economics "Japanese Panel Survey of Consumers", which carried out longitudinal follow-up surveys with individuals understand how career changes subsequently affected people's lives.

The analysis in this paper is significant for three reasons. The first is that it is possible to explicitly capture the effect of long-term career paths, such as changing work styles on the incomes of married couples using parametric analysis. Many different opinions can be entertained regarding the effect of women's employment

[4] In Japan, there are a very large number of cases of women ceasing work following life events such as marriage or giving birth. This is known as kotobuki taisha (resignation from a company on marriage) or shussan taisha (resignation from a company on giving birth). This has been decreasing in recent years, but it remains common to take the opportunity of a life event as a chance to resign from a company. According to the Ministry of Health, Labor and Welfare's "Longitudinal survey of adults in the 21st Century", in the 2000s around 40% of women who were working in the years before they married left their jobs or changed jobs, and more than half, or around 55%, of women who had been working in the years before they had their first child left their jobs or changed jobs. This confirms that one in every 3, who were working before marriage, did not continue working. A great deal of research results exist regarding what factors obstruct women from continuing employment before and after marriage and first birth (such as Higuchi, Sakamoto and Hagiwara (2016)).

on married couples' incomes, but in this study by focusing on employment sequences rather than whether someone is employed, we ascertain how married couples' incomes are affected by the kind of work style in which someone is employed.

Second, this may enable evaluations of how married couples' incomes are affected by the work-life balance policies such as childcare leave. Since the year 2000, the government has put effort into popularizing work-life balance policies with countermeasures to the falling birthrate, and countermeasures have been taken to reduce the opportunity cost of childbirth by facilitating employment after giving birth. Here we ascertain the effects of using work-life balance policies on married couples' income distribution, focusing on whether they benefitted from a childcare leave system.

Third, using panel data, we can ascertain how married couples' long-term income distribution is affected by women's work styles after having their first child. We ascertain whether the short-term effects of a woman's work style, after having her first child, is reflected in the long-term effects.

In the following, in Section 2 we introduce previous studies, in Section 3 we introduce our data and empirical model, in Section 4 we analyze the effect of women's employment sequences on married couples' transitions of income level, in Section 5 we present a robustness check, in Section 6 we analyze the long-term effect and in Section 7 we present our conclusions.

The findings from our empirical analysis are as follows. First, for the household with the wife who was continuously employed after the first birth or took childcare leave, the couple's income level transitioned to upward from the husband's income level. Second, however, taking into account the endogeneity of women's earning level and being continuously employed and taking childcare leave, the upward effect is observed only in high husband's income households. Third, regarding the long-term effects of women's employment sequences on married couple's income, the upward transition effect expired within ten years after the first birth.

These findings suggest that work life balance policies will make married couples' income of high husbands' income even higher, hence may enlarge income inequality among married couples in the future. Moreover, if the work life balance policies become more effective for among married women's employment, the upward

transition effect will last long among married couples' income level. Thus, it is essential for the Gov't to design work-life balance policies to be neutral ones which are not biased towards high husbands' income household.

2. PREVIOUS STUDIES

There has been a large amount of research on the effects of women's employment and incomes on family income distribution from the point of view of difference analysis. Analyses using Current Population Surveys have been carried out in Lehrer and Nerlove (1984), Karoly and Burtless (1995), Cacian and Reed (1998), Lehrer (2000), Reed and Cacian (2001), Pencavel (2006). Although Karoly and Burtless (1995) state that women's incomes increase the difference in family incomes, the other research found that generally, women's incomes have a greater reduction effect on family income differentials.

In Japan, research has been carried out by Tachibanaki and Yagi (1994), Abe and Oishi (2007), Urakawa (2007) and Ojima (2011). The analysis period covers the 1960s to 2005, and there has been also a variety of data used in analysis, household types, ages, and incomes that have been the target of analysis, and analytical methods, and although it is difficult to simply compare them, the following results seem to have been obtained.

Tachibanaki and Yagi (1994), Urakawa (2007), and Ojima (2011) found that women's incomes increased the income differentials for married couples, Abe and Oishi (2006, 2007) found that women's incomes had no magnification effect on the income differentials for married couples. Additionally, if the age of the head of the family was 20-30, there was a magnification effect on the income differential, but if they were 40 or older, magnification and reduction effects on income disparity have both been observed (Urakawa 2007, Ojima 2011).

The research above uses methods such as comparison or decomposition of inequality indices, such as the Gini coefficient or CV, and understands average trends, but employment sequence or effects of individual attributes on difference indices are, for the most part, not clearly understood. Lehrer and Nerlove (1984), Lehrer (2000), and Pencavel (2006) have analyzed chronological changes by cohort, but did not focus on household attributes apart from whether the woman was in

employment. Moreover, although Abe and Oishi (2007) have analyzed disparities in the incomes of married couples according to women's employment sequences, they have not analyzed the effect on the distribution of incomes between households. Here, we explicitly address women's employment sequences and usage of childcare leave, and carry out parametric analysis on the effect of women's changing work styles on the distribution of married couples' incomes, specifically on households' upward transition in income level.[5]

3. EMPIRICAL MODEL

The data used here is the longitudinal survey called "Japanese Panel Survey of Consumers" conducted by The Institute for Research on Household Economics.[6] The advantages of using the "Japanese Panel Survey of Consumers" are: it is possible to obtain the newest information concerning women's married couples' income distribution, by using the latest data; and it is possible to correlate status of employment after giving birth to information about the married couple's subsequent income level.

The definition of income is employment income [income from place of work,[7] and business income[8]], adjusted for inflation by the Consumer Price Index.[9] Here, because of our focus on married women's employment and couple's incomes, we only consider couple's income but do not consider incomes of other members of the household. In order to exclude outliers, samples with an average value of ±3σ were dropped from the analysis.

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[5] As for analyses of political variables and income mobility, there is Thompson (2016). Thompson (2016) carries out a parametric analysis of the effect of a conviction for drug possession on intergenerational income mobility and uses methods similar to those in this paper.

[6] The survey comprises women who were aged 24-34 in 1993 when the survey began (Cohort A), and added after that, aged 24-27 (1997 onwards, Cohort B), aged 24-28 (2003 onwards, Cohort C), aged 24-28 (2008 onwards, Cohort D), and aged 24-28 (2013 onwards, Cohort E), and their spouses (men). We use samples of households with couples and children of wave 11-24 (2003–2016).

[7] Employees' income before tax (ten thousand yen)

[8] Self-employed persons' income before tax (ten thousand yen)

[9] The previous years' income was asked for; and therefore, for example, the information in the 2003 study concerns income from 2002.

Cases where the married couple's income decile Q_c is higher than the husband's income decile Q_h are defined as "upward transition" ($Q_h < Q_c$), cases where the married couple's income decile Q_c is the same as the husband's income decile Q_h are defined as "equal transition" ($Q_h = Q_c$), and cases where the married couple's income decile Q_c is lower than the husband's income decile Q_h are defined as "downward transition" ($Q_h > Q_c$) (Abe and Oishi 2006, Ojima 2011).

Women's career change classification is based on Table 1. They were classified into four groups: first, cases in which the woman was continuously employed before and after the first birth (continuous employment: emp_fb); second, cases in which the woman was continuously unemployed before and after the first birth (continuous unemployment: unemp_fb); third, cases in which the woman ceased employment after the first birth (exit after birth: reference group); and fourthly, cases in which the woman reentered into work after giving birth (reentry into work after birth: drop2_fb). We estimated how these employment sequences had affected the upward transition in the married couple's income level for each husbands' income decile.

Our estimates used the Panel Logit Model below

$$\Pr(y_{1i}{}^{*} > 0) = \Pr(y_{2i}'\beta_1 + X_i'\beta_2 + \alpha_i + \varepsilon_{it}) \qquad (1)$$

$i = 1, .. n, t = 1, ... n_i, P(z) = \{1 + \exp(-z)\}^{-1}$ The potential result variable $y_{1i}{}^{*}$ is a dummy variable for upward transition, y_{2i} is employment sequences or taking childcare leave, X_i is the other explanatory variable, α_i is the unobservable individually identified result $(\mathrm{E}(\alpha_i) = 0,\ \mathrm{Var}(\alpha_i) = \sigma_\alpha{}^2)$, ε_{it} shows the error term. $y_{1i}{}^{*}$ sets "upward transition" ($Q_h < Q_c$) to 1 in cases where the married couple's income decile Q_c is higher than the husband's income decile Q_h.

y_{2i} represents employment sequences or taking childcare leave. In order to examine the effect of continuous employment using work-life balance policies on married couples' income distribution, we estimate the same model by using a

dummy variable (leave), setting as 1 f a married woman had an experience of taking childcare leaves.[10]

The following variables are used as the explanatory variable X_i: birth decade cohorts (both in the 1960s, born in the 1970s, [born in the 1980s]), husband's age ([20s, 20s, 40s, 50s and older]), woman's number of years of education, husband's number of years of education, age of youngest child (younger than 6 years old, 6-11 years old, 12 years old and above), structure of town or city of residence (ordinance-designated city, other city, [town and villages]), living with parents, living close to parents, husband and wife's occupation (self-employed or employed in a family business, self-employed profession (e.g., actor, artist), management, profession, engineering, teaching, [clerical work], technical or manufacturing, sales and service industries, home industry, others), year dummy.

Before the estimation of the model, we ascertain the effect of women's incomes on married couples' income disparity by decomposing the Gini coefficient for men, women, and married couples' incomes in each analysis period. We used the methods of Lerman and Yitzhaki (1985), Lopez-Feldman (2006), and Urakawa (2007).[11]

Table 2 shows the results of Gini coefficient changes and analysis from 2013 to 2014 every five years. The sample is limited to households in which the age of the husband is between 25 and 44 years old and shows the situation every five years from 2003. The wife's share of income (S_k) increases year by year, and the correlation with the Gini coefficient (R_k) increases year by year. The influence on the wife's income Gini coefficient (I_k) increases year by year. The Gini coefficient of

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[10] Between employment sequences variables and experiences of taking childcare leave, there is a multicollinearity, so to estimate the effect of experiences of childcare leave, the employment sequences variable is excluded from X_i.

[11] The decomposition of the Gini coefficient is as follows:

$$G = \sum_{k=1}^{K} S_k G_k R_k$$

G : the Gini coefficient for total income

S_k=share of source k in total income

G_k=the source Gini corresponding to the distribution of income from source k

R_k=Gini correlation of income from source k with the distribution of total income

I_k= the share of each income source in total inequality $I_k = S_k R_k G_k / G$

husband's income, wife's income, and married couple's income (G_k) decreased year on year on three occasions. When comparing the Gini coefficient of husband's income with the Gini coefficient of wife's income, the wife's income had a lower Gini coefficient, so we know that between 2003 and 2014, the wife's income had the effect of reducing the income differential.

From the point of view of disparity, married women's income becomes more important to married couples' incomes and it is working to reduce the income disparity of married couples. In the next section, we focus on women's employment sequences and childcare leaves and examined their impacts on upward mobility in married couples' income level.

4. WOMEN'S EMPLOYMENT SEQUENCES AND UPWARD MOBILITY

We will ascertain income distribution and the proportion of upward and downward transition for each of the ten deciles of woman's income and married couple's income. (Table 3).

The lower the husband's income decile, the higher the proportion of upward transition, and in the lower bands of husband's income, the wife's income played a greater role in supporting the household income. The extent of the married couple's transition to a higher income level, due to the woman's income, was most often a transition to the next level, above the level in which the husband's income was positioned. This trend existed generally regardless of the income level of the husband.

Table 3 shows that both in the years 2003-2009 and the years 2010-2016, the degree of downward transition in the married couple's income level after adding the wife's income is two deciles (e.g.: transition from the fourth decile to the second). Upward transition can be described the same way. Although the married couple's income level changes depending on whether the wife has an income, around 80% of the extent of transition between levels is within two deciles above or below the husband's income level. Accordingly, although the wife's income affects the married couple's income, the majority of the married couple's income is defined as the

husband's income, and the wife's income may have a strong supplemental role on household income.

When comparing 2003-2009 to 2010-2016, although for husband's income in 1st, 2nd, 3rd, 5th, and 8th deciles the proportion of households with upward transition has increased, it has decreased for 4th, 6th, 7th, and 9th deciles. Regarding downward transition, for husband's income 1-8th deciles, the proportion of households with downward transition has decreased. Regarding husband's income deciles 9-10th, the proportion of households with downward transition has increased. On two occasions, the upward transition effect of women's income was large at some levels of husband's income and small at other levels. For both, the wife's income may have strongly limited decreases to the married couple's income level.

Table 3 suggests that the wife's income level has upward or downward effect on couples' income level. However, the magnitude of the effect will differ depending on whether the wife was employed continuously or not. Below, the effects of women's employment sequences are ascertained through estimations of Equation 1.

The estimation results are shown in Table 5 and Table 6 reporting the marginal effects of the employment sequences and experiences of taking childcare leaves, respectively. The 1st column in Table 5 shows the result estimated using wave 11-24. Continuous employment has a positive and significant effect on upward transition, and continuous non-employment has a negative and significant effect. Reentry did not influence upward transition.

Columns 2-5 are estimated for every quintile of husband's income. At all quintiles, continuous employment had a positive and significant effect, continuous unemployment had a negative and significant effect, and reentry had a positive effect. The upward effect of continuous employment was particularly large for husband's incomes in the 3rd and 4th quintiles.

Column 6 and 7 shows the results using wave 11-17, and wave 18-24, respectively. The same results were observed for both points in time, but in wave 18-24 the positive effect of continuous employment was smaller, and the negative effect of continuous non-employment was greater. This suggests that between those two points in time, the effect of upward transition due to continuous employment

weakened, and the effect of downward transition due to continuous non-employment strengthened.

Table 6 shows the effect of experiences of taking childcare leave. Experiences of taking childcare leave had the same effect as continuous employment. If childcare leave was taken, the probability of a married couple's income level having upward transition was higher, and the upward effect of continuous employment was particularly great where the husband's income was in the 3rd and 4th quintile (column 4 and 5). It can be ascertained that the positive effect of continuous employment is smaller for wave 18-24 (column 6) than for wave 11-17 (column 7).

5. ROBUSTNESS CHECK

Although the preceding section indicated the positive correlation between continuous employment and taking childcare leaves, and married couples income level, as Abe (2005) clarified, there is a trend of women with higher earning power being able to be continuously employed and taking childcare leave, and so it is necessary to consider the endogeneity of income level and transition effects. In order to deal with the endogeneity, we estimate a Linear Probability Model using the Panel Instrumental Variable Model and Linear regression with endogenous treatment effects Model through the method of instrumental variables.

We use information on changes to the system of childcare leave law (Table 7) as an instrumental variable z_i that influences employment and childcare leave after birth, but does not influence upward transition in married couples' income level (Zhou 2016). Specifically, we used dummy variables showing experiences of birth for [before 1994,]1995-1998, 1999-2001, 2002-2006, 2007-2009, 2010-2013, and 2014 onwards, since it is expected that women who gave birth at later years were more likely to continue work or take childcare leaves on behalf of the reformations of childcare leave law in the later periods.

Panel Instrumental Variable Model (Panel IV) is defined as follows,

$$y_{it} = y_{2i}'\beta_1 + X_{it}'\beta_2 + \alpha_i + \varepsilon_{it} = Z_{it}'\gamma + \alpha_i + \varepsilon_{it}$$

α_i : effects of unobservable individual discrimination $(\mathrm{E}(\alpha_i) = 0, \mathrm{Var}(\alpha_i) = \sigma_\alpha{}^2)$, ε_{it}: calculation error, $\mathrm{Z}_{it} = [y_{2i}, X_{it}, z_{it}]$, z_{it}: instrumental variable, instrumental variable satisfies the following assumptions.$\mathrm{E}(\varepsilon_{it}|z_{it}) = 0$, $\mathrm{E}(\varepsilon_{it}|\alpha_i, z_{i1}, \ldots, z_{iT}) = 0$

Linear regression with endogenous treatment effects Model (Endogenous Treatment Effects) is defined as follows,

$y_{1i} = y_{2i}'\beta_1 + X_i{}'\beta_2 + \varepsilon_1,$

$y_{2i}{}^* = z_i'\delta_1 + X_i'\delta_2 + \varepsilon_2, \qquad y_2 = 1(y_2{}^* > 0)$

The measurement errors of $(\varepsilon_i, \varepsilon_2) \sim N(0, \Sigma)$ $\varepsilon_i, \varepsilon_2$ correlate, reflecting that$\mathrm{Var}(\varepsilon_1) = \sigma^2$, $\mathrm{Var}(\varepsilon_2) = 1$, $\mathrm{Cov}(\varepsilon_1, \varepsilon_2) = \rho\sigma^2$.

Regarding the assumption of the model described above, due to the difficulty of dealing with multiple endogenous variables at the same time, the employment sequences variable only uses continuous employment. The results of estimation are shown in Table 8 and Table 9.

Table 8 shows the effect of continuous employment (before and after the first birth) on upward transition; taking account of the endogeneity, continuous employment has the impacts on upward mobility only when the husband's income is in the 4th quintile for both Panel IV and Endogenous Treatment Effects estimations (Column 5).

Table 9 shows the estimation results of experiences of taking childcare leave on upward transition. The results are approximately the same as the effects of employment sequences. Considering the endogeneity, the upward effect comes out strong only at bands where the husband's income level is relatively high (Column 5).

The results indicate that the work life balance policies, which encourage women to continuously be employed or to take childcare leave, affect married women of high husbands' income households. This is because, in households where the husband's income is high, there is a high ability to pay the childcare service costs incurred when the wife choose continuous employment. So, even if the wife's income is low, she is able to choose continuous employment or to take childcare leave, which

leads to the higher income level of the couple. Hence, the work life balance measures will distort married couple's income distribution.

In households where the husband's income was not high, when taking endogeneity into account, promoting continuous employment does not affects wives' employment sequences. If childcare costs are brought down in the future, the work-life balance policies will enhance continuous employment in the low husbands' income households. In this case, the work life balance measures will be neutral to married couple's income distribution.

6. THE LONG-TERM EFFECT FOR UPWARD MOBILITY

In this section, we analyze the effect of women's employment sequences and experiences of taking childcare leave on the married couple's income over the long-term, after the first birth. This was estimated using a Panel Logit Model (1) for 2-4 years, 5-9 years, and 10-14 years after the first birth.

The results for employment sequences are reported in Table 10 and the effects of experiences of childcare leave are shown in Table 11. For both, although there was an upward transition effect on the married couple's income at 2-4 years and 5-9 years, there was no effect at 10-14 years.

The reason may be that married women followed a variety of life courses when more than ten years have passed since the first birth; even people who left work after birth (the reference) subsequently worked to supplement the household income, and conversely, even people, who chose to be continuously employed, left work when their child was in the first year of elementary school.[12]

If policies aimed at making childcare and employment compatible for women in the long term after birth are prevailed, the risk of leaving work when having a second child or while the children are at school will be reduced. In this case, the upward transition effect will last long among married couples' income level.

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[12] When children enter elementary school, they return home earlier, and have long holidays such as summer vacation, but childcare services for school-age children are in short supply, so mothers may be forced to leave their jobs when their children start elementary school even though they had been able to continue working while their children were pre-school age.

7. CONCLUSION

We analyzed the impact of women's employment sequences and experiences of childcare leave on married couples' income mobility. The main results of this analysis are as follows.

For the household with the wife who was continuously employed after the first birth or took childcare leave, the couple's income will transition to upward from the husband's income level. The correlation between wives' continuous employment and taking childcare leave is larger for couples with high husbands' income than for those with low husbands' income, which suggests there exists assortative mating in marriage market.

However, taking into account the endogeneity of women's earning level and being continuously employed and taking childcare leave, the upward effect is observed only in high husband's income households. These findings suggests that promoting work life balance policies, aiming at married women's continuous work, will make married couples' income of high husbands' income even higher, hence may enlarge income inequality among married couples in the future.

Regarding the long-term effects of women's employment sequences on married couple's income, we clarified that the upward transition effect expired ten years after the first birth. The reasons may be that employment sequencess at the first birth were not retained within ten year. Those who left work after birth subsequently worked to supplement the household income, and conversely, those who chose to be continuously employed left work at some point in time.

If the work life balance policies become more effective for among married women's employment, those who chose continuously employed at the first birth come to enable to keep their job in the long term after birth and the upward transition effect will last long among married couples' income level. However, if the policies are more advantageous for wives with the high husbands' income, they will distort the married couples' income distribution in the long run. Thus, it is essential for the

Gov't to design work-life balance policies to be neutral ones which are not biased towards high husbands' income household.[13]

The following may be topics for future study. It is necessary to clarify what is behind the different-sized effects of upward transition from women's employment sequences based on husband's income level. It may be because women coming under each level have a different average income level. This may be deeply connected to assortative mating in marriage, but it is necessary to clarify empirically the characteristics of assortative mating in recent years, and whether so-called high-income couples have been increasing in recent years.

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[13] For example, depending on factors such as the size of the company, the industry, the type of job, there may be a known bias against the person taking childcare leave.

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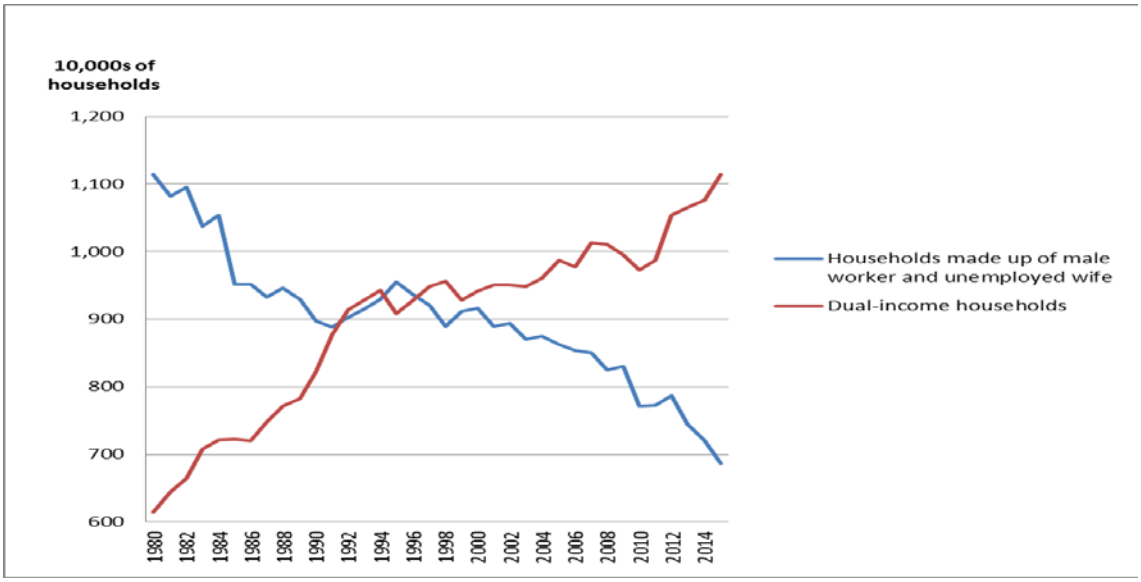
Figure 1: Increase in number of dual income households



Source: created by the authors from Ministry of Internal Affairs and Communications "Special Survey of the Labor Force Survey," "Labor Force Survey"

Table 1: Classification of employment sequences

	Continuous employment	Continuous unemployment	Reentry into work after birth		Exit after birth	
Year before giving the first birth	○	×	○	×	○	×
Year of giving the first birth	○	×	×	×	○/×	○
Year after giving the first birth	○	×	○	○	×	×

○ Employed × Not employed

Table 2: Decomposition of Gini Coefficient

2003-2004

Husband aged 25-44 n=1849

Source	Sk	Gk	Rk	Share	% Change
Husband's income	0.8473	0.2388	0.8705	0.7508	-0.0965
Wife's income	0.1527	0.7045	0.5434	0.2492	0.0965
Married couple's income		0.2346			

2008-2009

Husband aged 25-44 n=1670

Source	Sk	Gk	Rk	Share	% Change
Husband's income	0.8264	0.2264	0.8352	0.7095	-0.1168
Wife's income	0.1736	0.6708	0.5493	0.2905	0.1168
Married couple's income		0.2203			

2013-2014

Husband aged 25-44 n=1578

Source	Sk	Gk	Rk	Share	% Change
Husband's income	0.7968	0.2203	0.8171	0.661	-0.1358
Wife's income	0.2032	0.6205	0.5833	0.339	0.1358
Married couple's income		0.2169			

Table 3: Income mobility of married couple's income

wave11-17 (2003~2009),

Husband's income level	Married couple's income level											Upward transition (%)	Downward transition (%)
	1st decile	2nd decile	3rd decile	4th decile	5th decile	6th decile	7th decile	8th decile	9th decile	10th decile	Total		
1st decile	464	114	36	17	20	7	10	5	1	0	674		
	68.84	16.91	5.34	2.52	2.97	1.04	1.48	0.74	0.15	0	100	31.15	
2nd decile	221	163	129	48	34	16	9	6	3	1	630		
	35.08	25.87	20.48	7.62	5.4	2.54	1.43	0.95	0.48	0.16	100	39.06	35.08
3rd decile	14	305	169	109	61	44	18	9	8	0	737		
	1.9	41.38	22.93	14.79	8.28	5.97	2.44	1.22	1.09	0	100	33.79	43.28
4th decile	0	99	187	110	93	49	37	26	10	1	612		
	0	16.18	30.56	17.97	15.2	8.01	6.05	4.25	1.63	0.16	100	35.3	46.74
5th decile	0	0	173	220	134	75	55	32	19	3	711		
	0	0	24.33	30.94	18.85	10.55	7.74	4.5	2.67	0.42	100	25.88	55.27
6th decile	0	0	0	175	153	113	46	48	28	11	574		
	0	0	0	30.49	26.66	19.69	8.01	8.36	4.88	1.92	100	23.17	57.15
7th decile	0	0	0	0	229	200	130	79	42	57	737		
	0	0	0	0	31.07	27.14	17.64	10.72	5.7	7.73	100	24.15	58.21
8th decile	0	0	0	0	0	116	272	123	66	70	647		
	0	0	0	0	0	17.93	42.04	19.01	10.2	10.82	100	21.02	59.97
9th decile	0	0	0	0	0	0	90	322	186	100	698		
	0	0	0	0	0	0	12.89	46.13	26.65	14.33	100	14.33	59.02
10th decile	0	0	0	0	0	0	0	4	261	430	695		
	0	0	0	0	0	0	0	0.58	37.55	61.87	100		38.13
Total	699	681	694	679	724	620	667	654	624	673	6,715		
	10.41	10.14	10.34	10.11	10.78	9.23	9.93	9.74	9.29	10.02	100		

Upper row: number of households. Lower row: household distribution ratio (%)

wave18-24 (2010~2016),

Husband's income level	Married couple's income level											Upward transition (%)	Downward transition (%)
	1st decile	2nd decile	3rd decile	4th decile	5th decile	6th decile	7th decile	8th decile	9th decile	10th decile	Total		
1st decile	330	71	31	24	15	7	3	4	3	0	488		
	67.62	14.55	6.35	4.92	3.07	1.43	0.61	0.82	0.61	0	100	32.36	
2nd decile	133	185	75	43	44	20	10	7	13	0	530		
	25.09	34.91	14.15	8.11	8.3	3.77	1.89	1.32	2.45	0	100	39.99	25.09
3rd decile	40	154	149	79	54	46	27	12	5	0	566		
	7.07	27.21	26.33	13.96	9.54	8.13	4.77	2.12	0.88	0	100	39.4	34.28
4th decile	0	102	103	106	48	31	29	21	9	1	450		
	0	22.67	22.89	23.56	10.67	6.89	6.44	4.67	2	0.22	100	30.89	45.56
5th decile	0	0	160	111	129	50	54	39	26	3	572		
	0	0	27.97	19.41	22.55	8.74	9.44	6.82	4.55	0.52	100	30.07	47.38
6th decile	0	0	2	140	121	108	28	35	26	14	474		
	0	0	0.42	29.54	25.53	22.78	5.91	7.38	5.49	2.95	100	21.73	55.49
7th decile	0	0	0	0	135	130	125	41	52	19	502		
	0	0	0	0	26.89	25.9	24.9	8.17	10.36	3.78	100	22.31	52.79
8th decile	0	0	0	0	0	106	159	98	47	86	496		
	0	0	0	0	0	21.37	32.06	19.76	9.48	17.34	100	26.82	53.43
9th decile	0	0	0	0	0	0	80	226	114	68	488		
	0	0	0	0	0	0	16.39	46.31	23.36	13.93	100	13.93	62.7
10th decile	0	0	0	0	0	0	0	8	207	302	517		
	0	0	0	0	0	0	0	1.55	40.04	58.41	100		41.59
Total	503	512	520	503	546	498	515	491	502	493	5,083		
	9.9	10.07	10.23	9.9	10.74	9.8	10.13	9.66	9.88	9.7	100		

Upper row: number of households. Lower row: household distribution ratio (%)

Table 4: Calculation of descriptive statistics

	Sample Size	Average	SD	Min.	Max.
Experience of taking childcare leave	3909	0.179	0.383	0	1
Continued employment after first birth	3909	0.248	0.432	0	1
Continued non-employment after first birth	3909	0.407	0.491	0	1
Ceased employment after first birth	3909	0.282	0.450	0	1
Reinstated employment after first birth	3909	0.062	0.242	0	1
Husband in 20s	3909	0.027	0.161	0	1
Husband in 30s	3909	0.508	0.500	0	1
Husband in 40s	3909	0.413	0.492	0	1
Husband in 50s or older	3909	0.053	0.223	0	1
Graduated junior high school (wife)	3909	0.010	0.098	0	1
Graduated high school (wife)	3909	0.286	0.452	0	1
Graduated vocational college (wife)	3909	0.488	0.500	0	1
Graduated university or higher (wife)	3909	0.216	0.412	0	1
Graduated junior high school (husband)	3909	0.047	0.211	0	1
Graduated high school (husband)	3909	0.337	0.473	0	1
Graduated vocational college (husband)	3909	0.390	0.488	0	1
Graduated university or higher (husband)	3909	0.424	0.494	0	1
Youngest child (under 6)	3909	0.608	0.488	0	1
Youngest child (6-12)	3909	0.287	0.452	0	1
Youngest child (12 or older)	3909	0.105	0.306	0	1
Large city	3909	0.274	0.446	0	1
Other city	3909	0.640	0.480	0	1
Town or village	3909	0.084	0.278	0	1
Lives with parents	3909	0.221	0.415	0	1
Lives close to parents	3909	0.443	0.497	0	1
Self-employed or family business (wife)	3909	0.042	0.202	0	1
Self-employed professional (wife)	3909	0.006	0.080	0	1
Management (wife)	3909	0.001	0.036	0	1
Engineering or technical (wife)	3909	0.088	0.283	0	1
Clerical (wife)	3909	0.144	0.351	0	1
Teacher (wife)	3909	0.038	0.191	0	1
Technical or manufacturing (wife)	3909	0.057	0.232	0	1
Retail and service industries (wife)	3909	0.124	0.329	0	1
Home industry (wife)	3909	0.009	0.094	0	1
Other job (wife)	3909	0.000	0.000	0	0
Self-employed or family business (husband)	3909	0.105	0.307	0	1
Self-employed professional (husband)	3909	0.024	0.154	0	1
Management (husband)	3909	0.054	0.225	0	1
Engineering or technical (husband)	3909	0.178	0.383	0	1
Clerical (husband)	3909	0.234	0.423	0	1
Teacher (husband)	3909	0.028	0.165	0	1
Technical or manufacturing (husband)	3909	0.266	0.442	0	1
Retail and service industries (husband)	3909	0.099	0.299	0	1
Home industry (husband)	3909	0.000	0.000	0	0
Other job (wife)	3909	0.000	0.000	0	0
Married couple's income	3840	662.801	276.441	0.0	1894.3
Husband's income	3909	558.933	242.450	0.0	1413.8
Wife's income	3840	104.840	155.261	0.0	733.1
1st quintile accumulated number of times	3909	1.145	2.201	0	12
1st quintile average number of times	3909	0.186	0.307	0	1
1st quintile (before 1st birth)	3864	0.311	0.463	0	1
2nd quintile (before 1st birth)	3864	0.262	0.440	0	1
3rd quintile (before 1st birth)	3864	0.225	0.417	0	1
4th quintile (before 1st birth)	3864	0.202	0.402	0	1
Number of years since birth (1st child)	3864	8.651	4.992	1	21

Table 5: Effect of employment sequences on upward transition

VARIABLES	(1) All	(2) First quintile	(3) Second quintile	(4) Third quintile	(5) Fourth quintile	(6) wave11-17	(7) wave18-24
emp_fb	1.798***	1.971***	2.792***	5.493***	6.271***	2.504***	1.821***
	(0.188)	(0.505)	(0.494)	(0.763)	(1.017)	(0.294)	(0.251)
unemp_fb	-1.506***	-1.280**	-2.152***	-1.869***	-3.583***	-1.260***	-1.316***
	(0.235)	(0.524)	(0.511)	(0.603)	(1.132)	(0.277)	(0.309)
drop2_fb	0.0898	0.433	0.159	-0.389	1.649	1.083**	-0.539
	(0.413)	(1.147)	(0.756)	(1.050)	(1.652)	(0.457)	(0.624)
Observations	14,176	2,324	2,355	2,317	2,405	7,623	6,552

Robust standard errors in parentheses

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

Table 6: Effect of taking childcare leave on upward transition

VARIABLES	(1) All	(2) First quintile	(3) Second quintile	(4) Third quintile	(5) Fourth quintile	(6) wave11-17	(7) wave18-24
leave	0.814***	1.081**	1.737***	2.453***	2.369***	1.377***	0.938***
	(0.135)	(0.446)	(0.480)	(0.548)	(0.566)	(0.233)	(0.167)
Observations	9,109	1,354	1,541	1,616	1,589	4,466	4,642

Robust standard errors in parentheses

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

Table 7: Changes to system of childcare leave law

1992	Act on Childcare Leave promulgated (does not apply to workplaces of fewer than 30 people)
	Children under age of 1 (prescribed working hours shortened)
1995	Revised Act on Childcare Leave promulgated (applies to all workplaces)
	Workers' responsibility for social insurance fee exempted
	Allowance of childcare leave benefits is 25% of wages before leave (Basic allowance of childcare leave benefits 20% plus return to work payment 5%)
1999	Act on Childcare Leave and Caregiver Leave promulgated
	Restrictions on night work (until children enter elementary school)
2000	Entrepreneurs exempted from welfare annuity insurance payments
2001	Entrepreneurs exempted from health insurance payments
	Allowance of childcare leave benefits is 40% of wages before leave (Basic allowance of childcare leave benefits 30% plus return to work payment 1%)
2002	Revised Act on Childcare Leave and Caregiver Leave promulgated
	Children under age of 3 (prescribed working hours shortened) selective measures and responsibilities
	Mandates five days per year (caregiver leave for children before preschool)
2005	Restrictions on overtime work (until children enter elementary school)
	Applies to temporary employees
	If child cannot enter kindergarten, until 1 year and 6 months
2007	From 10 months allowance of childcare leave benefits is 50% of wages before leave (Basic allowance of childcare leave benefits 30% plus return to work payment 20%)
2010	Allowance of childcare leave benefits is 50% of wages before leave (during general school holidays)
	Papa Mama ikukyuu plus (1 year and 2 months if the mother and father both take time off work)
	Children under age of 3 (prescribed working hours shortened) independent measures and responsibilities
	Children under age of 3 (prescribed working hours limited)
2014	Allowance of childcare leave benefits is 67% of wages before leave (67% up to 180 days, 50% above 181 days)

Table 8: Effect of continuous employment

Explanatory variable: upward transition	(1) All	(2) First quintile	(3) Second quintile	(4) Third quintile	(5) Fourth quintile
	Coef./M.E	Coef./M.E	Coef./M.E	Coef./M.E	Coef./M.E
Panel IV	0.323**	-0.257	-0.0879	0.243	0.484***
	(0.145)	(0.292)	(0.399)	(0.258)	(0.179)
Endogenous Treatment Effects	0.283***	0.142	0.14	0.0482	0.410***
	(0.076)	(0.121)	(0.216)	(0.145)	(0.077)

Robust standard errors in parentheses

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

Table 9: Effect of taking childcare leave on upward transition

Explanatory variable: upward transition	(1) All	(2) First quintile	(3) Second quintile	(4) Third quintile	(5) Fourth quintile
	Coef./M.E	Coef./M.E	Coef./M.E	Coef./M.E	Coef./M.E
Panel IV	0.554**	-0.208	0.375	0.538	0.516
	(0.258)	(0.311)	(0.436)	(0.425)	(0.346)
Endogenous Treatment Effects	0.193**	0.00962	0.0913	0.155	0.412***
	(0.089)	(0.123)	(0.200)	(0.131)	(0.095)

Robust standard errors in parentheses

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

Table 10: Estimation of the Long-term Effect of Employment Sequences

After first birth	After 2-4 years	After 5-9 years	After 10-14 years
emp_fb	3.599***	3.049***	2.403
	(0.627)	(0.623)	(1.546)
unemp_fb	0.0274	0.0485	0.433
	(0.514)	(0.497)	(0.608)
drop2_fb	2.057**	1.615*	3.688
	(0.808)	(0.895)	(2.766)
Observations	856	1,604	1,328
Number of id	331	433	335

Robust standard errors in parentheses

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

Table 11: Estimation of the Long-term Effect of taking childcare leave

After first birth	After 2-4 years	After 5-9 years	After 10-14 years
leave	0.791**	1.291***	2.507
	(0.365)	(0.332)	(16.76)
Observations	856	1,604	1,328
Number of id	331	433	335

Robust standard errors in parentheses

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