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The Family, Marriage, and Gender Inequality

quantitative analysis of economic situation after divorce

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Abstract

In this presentation, I address how the institution of the family and marriage creates economic gender inequality. The focus is on the current situation in Japan, with an attention to recent changes. The main body of the presentation is based on quantitative analyses of living standards for divorced men and women. Data are drawn from the National Family Research of Japan (NFRJ) project, in which family sociologists have repeated large-scale surveys with national representative samples in fiscal 1998 (NFRJ98), 2003 (NFRJ03), and 2008 (NFRJ08). I conducted a series of regression analyses to determine the effect of gender on equivalent household income (i.e., household income divided by the square root of the number of people in the household) for divorced men and women, controlling such variables as age, education, household composition, and employment status. The results reveal strong effects of the gender differences in employment status and the presence of young children. These factors have maintained women's disadvantageous situation after divorce, while divorced men's situation has been getting worse in this decade. Another factor is remarriage, from which men and women receive different economic outcomes. We will discuss theoretical and political implications of the results.

1 Introduction

Increasing divorce is one of the major social changes in Japan today. According to the 2005 Population Census[1)], divorced (and remained single) people accounted for 5.4% of the population aged 25–69. The figure was lower in the past: 2.5% in 1975. Then it started to grow and has been doubled in these three decades. This change has been parallel to the increasing unmarried population. As a result of these changes, the proportion of married people has fallen to 70.4% in 2005.

Divorce has thus been a common phenomenon nowadays. In addition, the figure above does not include those who remarried. The proportion of those who underwent divorce, including those who remarried, should be greater by some percents. If the figure will continue to grow, it is highly possible that in the near future, a large proportion of the Japanese population will undergo divorce (Fukuda 2009).

This paper aims to determine the extent to which the gap in economic situations between divorced men and women, and to decomposite the factors creating the gender gap in post-divorce life. The aim has been derived from legal and policy-related concerns about gender equality. Japanese gender-equal policy, established since late 1990s, has never tackled to the impact of diversified marital status. Reformation of the divorce system has been discussed by law scholars, without quantitative evidence. Despite the growing probability of divorce, research on post-divorce life has been inactive and understaffed. In this paper, we will carry out an attempt to obtain quantitative evidence about the extent and the causal process of gender gap in post-divorce life.

2 Literature on Post-Divorce Life and Gender Gap

2.1 Quantitative approach to divorce and divorced people

In Japanese society, we have little literature of quantitative research on the economic gender gap in post-divorce life.

Under the Japanese family system, law notices of marriage and divorce are submitted to local governments. The Government of Japan has filed a record of notified divorces as a section of Vital Statistics (MHW 2000). These statistics form a reliable and official source for the frequency of divorces and the basic demographic variables of divorced people. However, it is not useful for our purpose, because it contains little detail on social and economic aspects.

Another data source is the follow-up surveys of divorced people sampled from the notifications of divorce submitted to the local governments (MHW 1999). These data can be used to ascertain, to some degree, social and economic aspects at the time of the survey. However, since such surveys do not explore long-term change in economic status, the data cannot be used to trace the impact of social and economic positions prior to marriage or changes in economic status after divorce.

2.2 Research of single-motherhood and the hypothesis of marital-life results

Under these circumstances, studies of single-mother households do provide some degree of data. Numerous researchers have conducted empirical studies on this topic, because single-mother households have been one of the major targets of social policy (Iwata, 2005). Most of these studies lack a perspective of male-female comparison, as a natural result of focusing on female subjects only. However, some such research offers suggestions for exploring gender differences.

The Japan Institute of Labour (JIL 2003) conducted a project aiming at the secondary analysis of the official statistics to establish policies promoting the independence of mothers in single-mother households. As a part of this project, Nagase (2004) presented a hypothesis on the conditions that cause economic problems for women after divorce: (1) Many women quit regular employment and are not employed before the divorce; (2) Mothers tend to take custody of young children; (3) It is difficult to forge a balance between work and childcare. Hamamoto (2005), Kambara (2006), Shinotsuka (1992), and Tamiya et al. (2008) also pointed out similar factors related to the economic difficulties of single-mother households.

Nagase (2004) implies that the post-divorce gender gap is created within the marital life before divorce. We accordingly refer to Nagase's hypothesis as the hypothesis of "marital-life results". If the hypothesis is correct, the gender gap is caused by faults in the family system. As Becker (1991) said, differences in human capital between spouses are due to the division of labor that is established to manage the household efficiently in marital life. We also mention responsibilities to provide for children, who are a outcome of marital life. Divorcing couple often fail a fair settlement of their human capital and childrearing responsibilities. As a result, gender differences created through the marital life bring about the gender gap in the post-divorce life. The hypothesis of marital-life results thereby implies the gender inequality after divorce is primarily attributable to marital life before marriage, although Nagase (2004) does not say so explicitly.

The hypothesis of marital-life results also suggests that the new principle for financial provision on divorce could dramatically reduce the gender gap. Since the establishment of the provisions on the distribution of marital property under an amendment to the Civil Code of Japan in 1947, legal scholars have for many years

asserted that financial provision on divorce should cover the husband's or wife's human capital and social status obtained through their cooperation (Tsuneta et al. 1955; Wagatsuma 1953). Recently, Suzuki (1992) clearly argued that spouse's earning capacity should be subjected to equal division at divorce, if it was gained during marital life. Motozawa (1998, pp. 272–276) described a practical standard for this purpose. This standard calls for treating any changes that have occurred during marriage

(1) by restoring to their original state those for which such restoration is feasible, and

(2) by balancing others through monetary transfer.

The subject of such treatment includes disadvantages in employment arising from the division of labor between husband and wife and various burdens related to the raising of their children, including the opportunity cost for an interrupted career or for shorter working hours.

Let us refer to that principle as "equity-oriented", because it is logically based on the idea of equitable liquidation on divorce. In practical consideration, however, the principle is interpreted as calling for equal division. This interpretation is in line with recent trend about the divorce law.

2.3 Recent progress

The hypothesis of marital-life results was based on insufficient empirical grounds. Nagase (2004) reached to the conclusion by inferences made through the comparison of data on single-mother households with other official statistics, without any evidence directly supporting the hypothesis.

A possible counterargument is that many single-mother households are impoverished due to the fact that disparities were already developed in human capital formation prior to marriage. In fact, a relatively large proportion of single-mother households are made up of those in which the mother has a low level of education (Fujiwara 2005). The large number of women who are impoverished after divorce could be due to the fact that divorce is concentrated among women suffering disadvantages in human capital formation prior to marriage. If so, we cannot think of the gender gap as a result of marital life. It should rather be results from the gender differences in pre-marriage factors.

Based on this point, Tanaka (2008; 2010) made the attempt to directly analyze the economic status after divorce using Japanese national representative data. The analyses were on equivalent household income of men and women after divorce. Data were drawn from different two projects: SSM2005-J (Tanaka 2008) and NFRJ03 (Tanaka 2010). The results of these analyses clarified that the post-divorce equivalent household income of men is 29% to 36% lower than that of men. Two variables had a major impact on the equivalent household income of divorced persons: (1) a continuous career as a full-time regular employee and (2) the co-residence with one's young children after divorce. These variables exerted a great effect after controlling the effect by the level of education. In addition, pre-marriage employment status did not exert a significant effect. The results of these analyses indicate that changes in economic situations that arise during marriage lead to a post-divorce inequality in living standards.

3 The Question to Be Answered

The author set our goal in this paper as confirmation of the findings on the gender gap and its factors. The above-mentioned studies have reported qualitatively stable results, in favor of the hypothesis of marital-life results. However, these results are not quantitatively stable. The estimate values produced by the analyses

differ widely. Therefore, we have not received reliable answers regarding the extent either of the post-divorce economic gap between men and women or of the effects exerted by the factors influencing this gap. We use datasets from a large-scale survey project in Japan, and replicate the method of Tanaka (2008; 2010).

4 Data

We use data from the 1999, 2004, and 2009 iterations of the National Family Research of Japan (NFRJ98, NFRJ03, and NFRJ08), conducted by the Japan Society of Family Sociology (Table 1). These are survey data from probability samples of Japanese nationals residing in Japan. The surveys were conducted using the self-administered questionnaire (home-delivery, leave-and-pick-up) method. Subjects were chosen through stratified two-stage probability sampling. These surveys, which focused on relations between family members and relatives, is characterized by their detailed questioning about marital history, including divorce, the attributes of individual children, and other family-related events.

For the first and second surveys (NFRJ98 and NFRJ03), respondents' age ranged from 28 to 77 years old (as of December 31, 1998/2003). For the third survey (NFRJ08), respondents' age ranged from 28 to 72 years old (as of December 31, 2008). In order to keep comparability among these three datasets, we truncate respondents over 72 years old in NFRJ98/NFRJ03 datasets.

Each survey collected data from a large sample of over 9,000 persons, which offers us an adequate size of subsample for the analysis on divorced people. The number of respondents who had undergone divorce is more than 400 for each dataset. We have thus ensured an enough number of cases to obtain statistically reliable estimate values through multivariate analysis.

5 Income and Gender Gap

5.1 Equivalent household income

The main variable for the analyses below is the equivalent household income. It is a gauge widely used to capture people's economic situation. This measure deflates household income (usually, disposable income) by household size —by dividing income by the square root of the number of people in the household. Assuming that there are economies of scale in the management of household finances and that all members of the household receive an equal distribution of income, equivalent household income traditionally has been used as an approximate measure of individual standards of living (OECD 2001).

The NFRJ surveys asked about annual household income (tax included) in the year previous to the survey. Respondents were required to select from pre-coded categories[2)] for their income level. The equivalent household income is calculated as the following equation, with l denoting the lower and h denoting the upper limit of the selected income level (each in units of 10,000 yen), and n denoting the number of members of the household.

$$\text{Equivalent household income} = \frac{l+h}{2\sqrt{n}} \tag{1}$$

The measure of equivalent household income derived in this equation has a skewed distribution. In the following analysis, we employ this measure converted using the natural logarithm to approximate a normal distribution. This conversion resulted in omission of a few cases with no household income (=0) from the following analyses, because logarithm cannot be defined for zero.

Table 2 shows the mean value of equivalent household income. Grand mean for the all respondents is slightly higher for NFRJ98 (3333 thousand yen) than other two surveys (2921 and 2973 thousand yen).

Gender gap is apparent in this equivalent household income. Figures for men are slightly higher than for women. A look at the values of equivalent household income shows that the figure for women was 7–10% lower than for men. However, when it comes to the magnitude of gender to determine equivalent household income, the difference by gender is not great. The coefficient of determination R^2 is between 0.003 and 0.006.

5.2 Gender gap by marital history

Table 3 shows gender differences in equivalent household income according to marital history.

According to these results, the equivalent household income for men does not vary greatly by marital history. For NFRJ98, the figure is 3125 thousand yen for divorced (and having no spouse) men, about 87% of that for men continuing their first marriage (3580 thousand yen). This ratio has falling to 78% (2448/3125) for NFRJ03 and 72% (2322/3230) for NFRJ08.

In contrast, the female equivalent household income show greater variance among categories for their marital history. The ratio of the figure for divorced (and having no spouse) women to that for women continuing their first marriage is 52% (1788/3425) for NFRJ98, 54% (1636/3023) for NFRJ03, and 55% (1746/3150) for NFRJ08.

The right column of Table 3 indicates the female/male ratio for each category of marital history. Women's equivalent household income for NFRJ98, NFRJ03, and NFRJ08 are respectively 57.2%, 68.8%, and 75.2% of men's among those who divorced and having no spouse. The gender gap has thus been lessened, because men's figure has been declined as we seen above. However, there has been a significant gender gap perpetuated in this category[3)].

6 Factors for the Gender Gap after Divorce

6.1 Cases and variables

From the above results, it is clear that the gender gap appears among divorced people. What does create the gap? We analyze these results in detail below. According to Table 3, the sample includes at least 160 valid respondents for both men and women for each survey. This sample offers a sufficient number of cases. Moreover, in principle the other divorced spouses should also be included in the survey population[4)], it should be possible to compare the risks borne by male and female spouses.

The subject of the following analysis is restricted to respondents who have undergone divorce. In addition to gender and the equivalent household income, the following variables will be introduced: age (in 10-year intervals), education (converted to years of education in standard periods), whether the respondent has remarried (i.e., whether or not he or she has a spouse), whether or not the respondent lives alone, co-residence with the respondent's parents, co-residence with a young child, and continuous regular employment. We offer explanation on details about the last two variables in the next two paragraphs.

We define the variable "co-residence with a young child" considering for both of the child's age and the parent-child relationship. Unfortunately, NFRJ data collected information on the respondent's "children" without any distinction among a child in blood, an adopted child, and a stepchildren. They also include no information to tell whether the child is a child of one's (ex-)spouse or not. It cause a problem for us in specifying the children born from the marital life before divorce. Here we take a rough criterion to screen out the children not from

the former marriage: count the child under 13 years old, if the respondent had not remarried or the child's age was smaller than the duration since remarriage.

The variable of continuous regular employment is defined by the combination of two conditions: (1) the respondent's employment status was "常時雇用されている一般従業者" (ordinary regular employee) at the survey date, and (2) she or he did not answered as having an experience of quitting job because of childbirth or childcare. The former information was obtained with a question in a standardized format, which was common in all three surveys. But the question for the latter information was different among questions as a result of the efforts to revise the questionnaire for the precision in measurement, in sacrifice of comparability among surveys.

6.2 Gender differences in post-divorce life

Table 4 shows male and female averages for the variables used in this analysis. Most variables are two-value coded as 1 or 0 (i.e., so-called "dummy" variables), so that their means equate the proportion of the respondents for whom the condition is satisfied. Cases with missing values are deleted according to list-wise deletion criterion. For this reason, these data include fewer cases than Table 3.

Table 4 shows that the equivalent household income is higher for men and lower for women. This is the same result as seen in Table 3.

Age distribution differs slightly between men and women. The women tend to be younger and the men tend to be older[5)].

Gender differences are apparent in education. For both men and women, the modal category is high school, but the percentage is greater for women (50–52%) than for men (42–44%). Men show higher percentages of being university graduates (17–28%) than women do (less than 10%). Women show, instead, considerable percentage in the category of junior college (around 10%). Percentage at the compulsory level is almost equal in the NFRJ03 and NFRJ08 data, but slightly higher for men in the NFRJ98 data. On average, you can summarize that men received higher level education.

Now we turn to family and household conditions. While the proportion of men who remarried (i.e. those with spouses) is 44–59%, for women the proportion is 29–30%. Men thus tend to remarry after divorce at more higher likelihood than women. While the proportion of men living alone (in an one-person household) is 21–27%, for women this proportion is around 13%. The percentage is thus higher among men. However, almost no difference is found in the proportions of respondents living with parents for NFRJ03 and NFRJ08 at around 23%, while that figure for women in NFRJ98 data is lower (12.5%). On the other hand, while few men (3–6%) live together with young children, the cases of women doing so are sizable (13–20%).

Gender differences are apparent in employment conditions as well. The proportions who continued ordinary regular employees account to around the half of men, but less than 20% of women have that status.

6.3 Regression analysis

We use these variables in multiple linear regression analysis to predict equivalent household income. Three models are estimated (Table 5).

First, Model 1 checks for the effect of gender, controlling only age composition. The coefficient of the "female" variable is negative for all three surveys. This indicates that women's equivalent household income tends to be lower in comparison with men's. The effect varies between 0.683 and 0.819. These values largely correspond to

the weighted between the two categories of "Divorced" in Table 3. The value has been rising in this decade, which reflects the narrowing gender gap we have seen.

Model 2 introduces the other variables. Education has significant effect by which higher level education brings about higher income, roughly speaking. The effect of remarriage (=having spouse) is positive. Co-residence with young children has a powerful impact: income would be lowered to 60–70% level by the presence of one's children under 13 in the household. Other variables concerning household composition, co-residence with parents[6)] and one-person household, have no significant effect. Continuous regular employment also has a great impact, raising the income by about 50–60%.

Finally, Model 3 adds interaction effects between gender and household composition. To easily understand the results, we look at Table 6, which carries a summary of predicted effect based on the Model 3 in Table 5. Table 6 demonstrates the clear effects of these interaction for women, with higher income for remarried (=having spouse) women and lower income for women in one-person household. The former's income is almost twice of the latter's. However, the interaction is not clear for men, with no consistent effect.

7 Discussion

7.1 Summary of the findings

The results of analysis make the following points clear. The economic disadvantages of women appear among divorced and widowed persons. For the most part, the causes of the worsening of economic conditions for divorced persons can be reduced to four factors : (1) having young children, (2) not being an ordinary regular employee, (3) not remarrying, and (4) having a low level of education. The above results largely support the results of the analysis in Tanaka (2008).

It is also clear that there is a difference between SSM (Tanaka 2008) and NFRJ datasets because of the sample selection. As we mentioned in Section 2.3, Tanaka's (2008) analysis using the SSM2005-J data reported greater gender gap than Tanaka (2010) using the NFRJ03 data. This difference may be due to the fact that remarried people is not included in the analysis by SSM2005-J. Table 3 shows that, among those who divorced but having no spouse, women's equivalent income is 66.8% of men's. This is largely equivalent with the result from SSM2005-J.

7.2 Against Gender gap as a result of marital life

The above results indicate that the family system should bear the primary responsibility for the economic gender gap. Women are disadvantaged after divorce by the result of marital life —that is, interrupted career and childcare burden. Gender-equal policy should consider reformation of the family system to offset such disadvantage.

As discussed in Section 2.2, we already have a proposal for such reformation advocated by family law scholars. The two factors of women's disadvantage have been the main topics in legal research about divorce. The proposal for equity-oriented has its root in the consideration of such factors. In fact, Motozawa (1988, pp. 274–276) counted the followings as typical cases to be equitably settled under the new principle: (1) advantage and disadvantage resulted from division of labor within the marital life, and (2) opportunity costs for childrearing, as well as (3) disease caused or aggravated by the marital life.

However, divorce is one of the largely ignored and understaffed fields in today's Japan. Today's reality is far from the establishment of norms that call divorced couples for a full settlement of human capital, social status, and responsibilities for children. Although some progress is being made from a legal perspective, no widespread consensus has been reached on the necessity for such reform. It is likely to take many years until a new principle of micro-level justice is established and norms are developed that effectively regulates people's behavior in circumstances of divorce. And, if the reformation was started, there would also be various difficulties to make decision for real cases (Tanaka 2007a; Tanaka 2007b).

7.3 Remaining problems

Among the four factors of gender gap, which we have confirmed in the sections above, two are clearly covered by the hypothesis of marital-life results. We can easily identify the social subsystem responsible to those factors, as we have seen. However, the other two factors are remained and are not clear in placing the responsibility.

First, there is a difference between men and women in terms of the likelihood of remarriage. This difference may make contribution to gender gap after divorce. It is obvious that remarriage is a problem with the family system, as a part of the mate-selection process. But it is not obvious whether the gender difference in probability of remarriage is the result of the former marital life.

On one hand, it is probable that the difference comes from the division of labor between husband and wife. In the typical sexual division of labor, the husband accumulates general human capital that can be easily applied outside of the marital relationship, while the wife accumulates specific human capital that is effective in a particular human relationship (England et al. 1990). This difference in their human capital can be a source of inequality in the marriage market. If this is the case, we can argue that the difference in the probability of remarriage is attributable to the former marital life. If so, financial provision on divorce should include compensation for such inequality, although such case has not been mentioned in the debate on the reform of divorce law.

On the other hand, it may be the case that the experience of divorce itself decreases a woman's competitiveness in the marriage market. If so, this is not a result from the couple's marital life. Although we can regard this factor as internal to the family system, it may not be suited to making a settlement on divorce, because it is not the responsibility of each couple.

Second, the gender difference in education involves problems difficult to solve. After completion of one's school education, it is difficult to eliminate the effect from educational gap. In most cases, one's academic career has been ended by the early 20s, and could hardly change afterwards. It will then continue to function as the source of knowledge, as the signal of cultural background, and as a screening device in competition. School education is so deeply instituted in the social stratification system that it is difficult to stop the differentiation process by education.

It is certain that the family is responsible for, at least, a part of the gender difference in educational attainment, because the parents are the first agent to make decision about the children's education (Brinton 1993; Hirao 2008; Abe et al. 2009). However, it is difficult to regulate the educational investment that parents make in their children. This is because there are no norms in the family prohibiting discrimination by gender. Anticipating a child's future life and attempting to give him or her suitable human capital is not recognized to be unjust, even if such anticipation of the child's future life is conducted through statistical discrimination using information

based on gender. So it is unlikely to force parents to compensate the educational gap caused by intra-family discrimination.

The key issue is how we can eliminate the effect of educational gap on one's lifecourse after the period of school educaion ended. Although it is a ignored and understaffed area, in the background of the discourses about educational equalization focusing on younger cohorts, it constitutes a fronteer for the study of gender equality, as well as the issue of equalization through divorce.

Notes

(1) Population Census, time series data, Table 4 "配偶関係 (4 区分), 年齢 (5 歳階級), 男女別 15 歳以上人口: 全国 (大正 9 年〜平成 17 年)" (da04.xls). Downloaded from e-stat, http://www.e-stat.go.jp, 2011-02-07.

(2) On the questionnaire, 9 categories are printed for NFRJ98, mostly separated in intervals of 2 million yen; 18 categories for NFRJ03, mostly separated in intervals of 1 million yen; 19 categories for NFRJ08, intervals are the almost same as NFRJ03. Note that respondent for NFRJ98 answered from fewer number of categories with wider intervals than for the other two surveys.

(3) There is also a great gender gap for those who widowed in Table 3. However, widowed cases will not be addressed in this paper. This is because our data is not suitable for analyses of widowed men and women for two reasons. First, the sample size is small. There were only 68, 75, and 50 valid cases among men (see Table 3). It would be difficult to obtain significant results on a gender gap through multivariate analysis. Second, there is a bias in the survey subjects. In the case of widowed subjects, the spouses were deceased. The spouse was therefore not included in the population of the survey. This makes it impossible to trace differences in the risks borne by each spouse, with data available only for the surviving spouse.

(4) This does not hold perfectly true for our data. There are limitations due to three reasons: (1) The subjects are limited to ages 28–72; (2) Non-Japanese nationals and residents abroad are excluded from the population; and (3) There were a large number of nonresponses and unanswered questions.

(5) This figure may reflect the tendency toward marriage between an older husband and a younger wife. Alternatively, it may be the case that marriages between spouses with greater age differences are more likely to end in divorce. Whichever the case, the data contain a truncation effect in the age of the survey subjects because they are sampled from the population of people ages 28–72.

(6) Murakami (2009) suggests that divorced women can receive the benefits of living with parents in their own home. Such an economic benefit related to house rent does not appear in our analysis using income as the dependent variable.

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Acknowledgement

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Table 1. Synopsis of NFRJ surveys

(A) About All NFRJ surveys (NFRJ98, NFRJ03, NFRJ08)

Survey name	全国家族調査 (National Family Research of Japan)
Survey organizer	日本家族社会学会 全国家族調査委員会(Japan Society of Family Sociology, NFRJ Committee
Survey company	社団法人 中央調査社 (Central Research Service Inc.)
Survey area	All over Japan
Sampling method	Stratified two-stage random sampling
Survey method	Self-administered questionnaire, home delivery, leave and pick-up
Website	http://www.wdc-jp.com/jsfs/english/nfrj.html

(B) The first survey (NFRJ98)

Subjects	Japanese nationals living in Japan and born between 1921 and 1970 (28 to 77 years old as of the end of 1998)*
Sample size	10,500 (response 6,985; response rate 66.5%)
Survey period	January to February 1999
Data availability	Deposited at the SSJ Data Archive by the University of Tokyo (Survey Number 0191)
Data used in this paper	From SSJ Data Archive, downloaded 2010-06-04

*: We used only respondents aged 28–72 in this paper.

(C) The second survey (NFRJ03)

Subjects	Japanese nationals living in Japan and born between 1926 and 1975 (28 to 77 years old as of the end of 2003)
Sample size	10,000 (response 6,302; response rate 63.0%)
Survey period	January to February 2004
Data availability	Deposited at the SSJ Data Archive by the University of Tokyo (Survey Number 0517)
Data used in this paper	From SSJ Data Archive, downloaded 2010-06-04

*: We used only respondents aged 28–72 in this paper.

(D) The third survey (NFRJ08)

Subjects	Japanese nationals living in Japan and born between 1936 and 1980 (28 to 72 years old as of the end of 2008)
Sample size	9,400 (response 5,203; response rate 55.4%)
Survey period	January to February 2004
Data availability	Close to the members of Japan Society of Family Sociology until summer 2011
Data used in this paper	Version 4.0 (2011-02)

Table 2. Gender and equivalent household income (geometric mean in 10,000 yen)

		Male	Female	Total	Female/Male
NFRJ98	Geometric mean	352.1	315.8	333.3	0.897
R^2=0.006	(Number)	(2928)	(2989)	(5917)	
NFRJ03	Geometric mean	304.3	281.5	292.1	0.925
R^2=0.003	(Number)	(2603)	(2878)	(5481)	
NFRJ08	Geometric mean	308.8	287.7	297.5	0.932
R^2=0.003	(Number)	(2165)	(2394)	(4559)	

Table 3. Gender, marital history, and equivalent household income (geometric mean in 10,000 yen)

Survey	Marital History	Male		Female		Female/Male
		G. Mean	N	G. Mean	N	Ratio
NFRJ98	Continued 1st marriage	358.0	(2363)	342.5	(2337)	0.957
R^2=0.047	Widowed, but with spouse	461.3	(14)	374.5	(6)	0.812
	Widowed, no spouse	250.6	(54)	203.8	(202)	0.814
	Divorced, but with spouse	338.5	(108)	315.8	(94)	0.933
	Divorced, no spouse	312.5	(76)	178.8	(142)	0.572
	Unmarried	339.4	(313)	284.9	(208)	0.840
NFRJ03	Continued 1st marriage	312.5	(2038)	302.3	(2243)	0.968
R^2=0.040	Widowed, but with spouse	369.6	(15)	172.7	(9)	0.467
	Widowed, no spouse	284.9	(60)	192.9	(185)	0.677
	Divorced, but with spouse	282.2	(114)	305.2	(78)	1.081
	Divorced, no spouse	244.8	(91)	163.6	(170)	0.668
	Unmarried	279.5	(285)	280.6	(192)	1.004
NFRJ08	Continued 1st marriage	323.0	(1641)	315.0	(1762)	0.975
R^2=0.057	Widowed, but with spouse	496.9	(8)	339.9	(6)	0.684
	Widowed, no spouse	218.0	(42)	181.5	(136)	0.832
	Divorced, but with spouse	284.9	(72)	281.0	(72)	0.986
	Divorced, no spouse	232.2	(90)	174.6	(178)	0.752
	Unmarried	279.2	(311)	279.0	(240)	0.999

Results of ANOVA: $p < 0.01$ for all of the main and interaction effects (by Type III SS).

Those who were both divorced and widowed were categorized into “Divorced”.

Table 4. Descriptive statistics for regression analysis (only those who underwent divorce)

		Male		Female		Difference
		Mean	SD	Mean	SD	Female−Male
NFRJ98						
Equivalent household income*		5.792	0.728	5.413	0.865	−0.378
Age	28–39	0.207		0.198		−0.008
	40–49	0.234		0.293		0.059
	50–59	0.288		0.302		0.014
	60–72	0.272		0.207		−0.065
Education	Compulsory	0.326		0.250		−0.076
	High school	0.424		0.509		0.085
	Vocational school	0.027		0.103		0.076
	Junior college	0.049		0.112		0.063
	University	0.174		0.026		−0.148
Having spouse		0.587	0.494	0.392	0.489	−0.195
One-person household		0.212	0.410	0.125	0.331	−0.087
Co-residing with one's parents		0.228	0.421	0.125	0.331	−0.103
Children under 13**		0.033	0.178	0.129	0.336	0.097
Continuous regular employment †		0.446	0.498	0.190	0.393	−0.256
(Number)		(184)		(232)		
NFRJ03						
Equivalent household income*		5.578	0.798	5.301	0.812	−0.277
Age	28–39	0.152		0.257		0.105
	40–49	0.294		0.306		0.012
	50–59	0.284		0.261		−0.023
	60–72	0.270		0.176		−0.094
Education	Compulsory	0.181		0.184		0.002
	High school	0.431		0.506		0.075
	Vocational school	0.103		0.118		0.015
	Junior college	0.059		0.118		0.060
	University	0.225		0.073		−0.152
Having spouse		0.559	0.498	0.314	0.465	−0.245
One-person household		0.235	0.425	0.139	0.346	−0.097
Co-residing with one's parents		0.240	0.428	0.224	0.418	−0.016
Children under 13**		0.049	0.216	0.196	0.398	0.147
Continuous regular employment †		0.426	0.496	0.176	0.381	−0.251
(Number)		(204)		(245)		
NFRJ08						
Equivalent household income*		5.539	0.786	5.316	0.819	−0.222
Age	28–39	0.136		0.240		0.104
	40–49	0.278		0.280		0.003
	50–59	0.321		0.220		−0.101
	60–72	0.265		0.260		−0.005
Education	Compulsory	0.154		0.167		0.012
	High school	0.438		0.520		0.082
	Vocational school	0.080		0.138		0.058
	Junior college	0.043		0.085		0.042
	University	0.284		0.089		−0.195
Having spouse		0.444	0.498	0.293	0.456	−0.152
One-person household		0.272	0.446	0.138	0.346	−0.133
Co-residing with one's parents		0.228	0.421	0.236	0.425	0.007
Children under 13**		0.056	0.230	0.159	0.366	0.103
Continuous regular employment †		0.543	0.500	0.179	0.384	−0.364
(Number)		(162)		(246)		

Mean: arithmetic mean. SD: standard deviation.

*: Natural logarithm of equivalent household income in 10,000 yen.

**: For those who had spouse, children were counted only when their age was smaller than the duration since the remarriage.

†: Those who had no experience of quitting their job because of childbirth or similar reasons, and were ordinary regular employee (常時雇用されている一般従業者) at the survey date.

Categories for education: Compulsory (中学校); High school (高等学校, including miscellaneous category); Vocational school (専門学校, after graduation of high school); Junior college (短期大学, in two years, and 高等専門学校=technical collage); University (大学, in four years or more, and graduate school)

Table 5. Regression analysis of equivalent household income (in 10,000 yen)

(A) NFRJ98

Independent variables		Effect Exp B	95% confidence interval Lower	Upper
Model 1: R^2=0.062				
Female		0.683	0.583	0.799
Age	28–39	0.866	0.692	1.083
(ref.: 50–59)	40–49	0.829	0.674	1.020
	60–72	0.811	0.655	1.006
(Constant)		373.082	315.244	441.531
Model 2: R^2=0.263				
Female		0.890	0.756	1.047
Age	28–39	0.802	0.639	1.007
(ref.: 50–59)	40–49	0.752	0.622	0.910
	60–72	0.863	0.706	1.055
Education	Compulsory	0.692	0.581	0.824
(ref.: high school)	Vocational school	1.198	0.895	1.603
	Junior college	1.045	0.804	1.358
	University	1.481	1.135	1.933
Having spouse		1.526	1.287	1.811
One-person household		1.167	0.926	1.471
Co-residing with one's parents		0.886	0.720	1.090
Children under 13		0.603	0.452	0.803
Continuous regular employment		1.536	1.296	1.822
(Constant)		259.837	205.223	328.985
Model 3: R^2=0.296				
Female		0.835	0.616	1.131
Age	28–39	0.772	0.617	0.966
(ref.: 50–59)	40–49	0.737	0.611	0.890
	60–72	0.908	0.745	1.108
Education	Compulsory	0.690	0.581	0.819
(ref.: high school)	Vocational school	1.131	0.848	1.510
	Junior college	1.055	0.815	1.366
	University	1.538	1.183	1.999
Having spouse		1.300	0.991	1.706
One-person household		1.466	1.045	2.055
Co-residing with one's parents		0.884	0.671	1.164
Children under 13		0.616	0.464	0.817
Continuous regular employment		1.548	1.309	1.830
Female × Having spouse		1.367	0.973	1.920
Female × One-person household		0.570	0.363	0.895
Female × Co-residing with one's parents		1.108	0.742	1.656
(Constant)		269.503	200.556	362.153

N = 416 (only for those underwent divorce)

[continuing]

Table 5. Regression analysis of equivalent household income (in 10,000 yen) [continued]

(B) NFRJ03

Independent variables		Effect Exp B	95% confidence interval Lower	Upper
Model 1: R^2=0.041				
Female		0.748	0.643	0.870
Age	28–39	0.924	0.743	1.149
(ref.: 50–59)	40–49	0.856	0.703	1.043
	60–72	0.781	0.631	0.969
(Constant)		299.490	254.301	352.708
Model 2: R^2=0.238				
Female		0.995	0.850	1.164
Age	28–39	0.995	0.798	1.239
(ref.: 50–59)	40–49	0.813	0.676	0.979
	60–72	0.947	0.774	1.159
Education	Compulsory	0.759	0.624	0.923
(ref.: high school)	Vocational school	1.199	0.957	1.504
	Junior college	1.120	0.877	1.430
	University	1.633	1.323	2.014
Having spouse		1.307	1.092	1.565
One-person household		0.886	0.706	1.112
Co-residing with one's parents		0.928	0.767	1.123
Children under 13		0.669	0.528	0.848
Continuous regular employment		1.470	1.249	1.729
(Constant)		204.496	160.537	260.493
Model 3: R^2=0.268				
Female		0.741	0.530	1.034
Age	28–39	0.950	0.765	1.181
(ref.: 50–59)	40–49	0.830	0.691	0.996
	60–72	0.993	0.812	1.213
Education	Compulsory	0.756	0.624	0.917
(ref.: high school)	Vocational school	1.160	0.928	1.450
	Junior college	1.097	0.862	1.396
	University	1.652	1.344	2.031
Having spouse		0.908	0.675	1.221
One-person household		0.803	0.564	1.144
Co-residing with one's parents		0.888	0.664	1.187
Children under 13		0.703	0.556	0.890
Continuous regular employment		1.559	1.325	1.834
Female × Having spouse		1.898	1.305	2.759
Female × One-person household		0.996	0.632	1.570
Female × Co-residing with one's parents		1.068	0.734	1.553
(Constant)		250.015	181.293	344.787

N = 449 (only for those underwent divorce)

[continuing]

Table 5. Regression analysis of equivalent household income (in 10,000 yen) [continued]

(C) NFRJ08

Independent variables		Effect Exp B	95% confidence interval Lower	Upper
Model 1: R^2=0.050				
Female		0.819	0.698	0.961
Age	28–39	0.790	0.626	0.998
(ref.: 50–59)	40–49	1.059	0.857	1.309
	60–72	0.761	0.614	0.943
(Constant)		277.827	233.836	330.094
Model 2: R^2=0.269				
Female		1.109	0.939	1.310
Age	28–39	0.884	0.703	1.112
(ref.: 50–59)	40–49	1.019	0.838	1.239
	60–72	0.966	0.787	1.185
Education	Compulsory	0.683	0.545	0.856
(ref.: high school)	Vocational school	1.293	1.030	1.625
	Junior college	1.242	0.934	1.653
	University	1.377	1.125	1.685
Having spouse		1.347	1.129	1.607
One-person household		0.994	0.803	1.230
Co-residing with one's parents		1.084	0.893	1.315
Children under 13		0.597	0.467	0.763
Continuous regular employment		1.612	1.366	1.903
(Constant)		166.926	131.541	211.830
Model 3: R^2=0.281				
Female		1.072	0.787	1.459
Age	28–39	0.880	0.701	1.106
(ref.: 50–59)	40–49	1.030	0.847	1.251
	60–72	0.972	0.792	1.191
Education	Compulsory	0.686	0.549	0.859
(ref.: high school)	Vocational school	1.264	1.005	1.589
	Junior college	1.264	0.951	1.680
	University	1.378	1.126	1.687
Having spouse		1.181	0.879	1.587
One-person household		1.110	0.791	1.558
Co-residing with one's parents		1.081	0.789	1.482
Children under 13		0.596	0.466	0.761
Continuous regular employment		1.643	1.391	1.941
Female × Having spouse		1.280	0.887	1.847
Female × One-person household		0.759	0.491	1.174
Female × Co-residing with one's parents		1.015	0.692	1.491
(Constant)		169.390	125.555	228.530

N = 408 (only for those underwent divorce)

Table 6. Effects of remarriage and household composition

	Female			Male		
	Having spouse	One-person household	Co-residing with one's parents	Having spouse	One-person household	Co-residing with one's parents
NFRJ98	1.483	0.697	0.818	1.300	1.466	0.884
NFRJ03	1.276	0.592	0.702	0.908	0.803	0.888
NFRJ08	1.621	0.903	1.177	1.181	1.110	1.081

Calculated based on the estimated effects for the Model 3 on Table 5.
The baseline (=0) is men who have no spouse, are not in one-person household, and are not co-residing with one's parents.

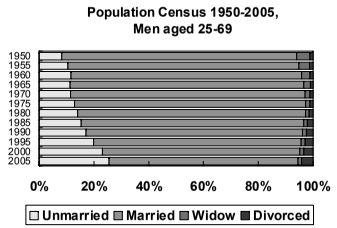
Tohoku Univ. GCOE: The 23rd Monthly Seminar
2011.2.16 Sendai

The Family, Marriage, and Gender Inequality

quantitative analysis of economic situation after divorce

TANAKA Sigeto
(Tohoku University)

Trend in marital status



Post-Divorce Life

Literature review:

- ✓ **No quantitative analysis**
- ✓ **Research on single-motherhood**
- ✓ **Hypothesis of marital-life results**
- ✓ **Pre-marriage effect?**

Recent findings

Tanaka (2008): Effect of interrupted career / young children after controlling pre-marriage status

Tanaka (2010): Similar results with more reliable data (NFRJ03)

→ Replication by other data

Contents

1. **Sociological theory of inequality**
2. **Results from data analysis**
3. **Introduction to quantitative analysis**
4. **Implication from the findings**

Social System Theory

Family	Market	School
State	Local community	……

Interaction between autonomous subsystems

Perspectives to inequality

Inequality:
Uneven distribution of **resources**

Resource:
Something scarce
but needed by people

(1) Resulted distribution

- ✓ **Poverty**
- ✓ **Variance, Gini coefficient, etc…**
- ✓ **格差**

(2) Discrimination

Different treatment
based on social categories
with no justified reason

No discrimination but ……

Reproduction of meritocracy:
Early socialization by well-educated parents
→ Good academic performance
→ Good job / high wage

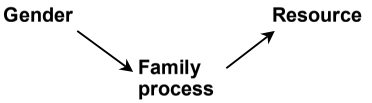
Injustice in this process?

(3) Stratification

Social process allocating people to the hierarchical order of status

Gender stratification

Process of differentiating men/women on the hierarchical order of status



全国家族調査 (NFRJ)

By Japan Society of Family Sociology

- ★ **Detailed information on kinship and life events**
- ★ **National representative samples: 1998, 2003, 2008**
- ★ **Huge number: 473, 494, 463** divorced

Annual household income

NFRJ98: on page 5/25

問15 去年1年間のお宅の収入（生計をともにしている家族全員の収入の合計）は、税込みでは次の中のどれに近いでしょうか。

1	収入はなかった	6	600～799万円台
2	100万円未満	7	800～999万円台
3	100～199万円台	8	1000～1199万円台
4	200～399万円台	9	1200万円以上
5	400～599万円台	10	わからない

NFRJ03: on page 5/18

問8 去年1年間のお宅（生計をともにしている家族）の収入は、税込みでは次の中のどれに近いでしょうか。他の家族の方の収入も含めてお答えください。（○は1つだけ）

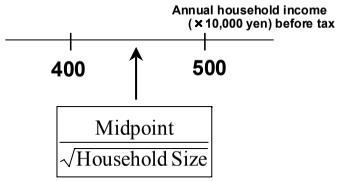
1 収入はなかった	7 500～ 599 万円台	**13** 1100～1199 万円台
2 100 万円未満	8 600～ 699 万円台	**14** 1200～1299 万円台
3 100～199 万円台	9 700～ 799 万円台	**15** 1300～1399 万円台
4 200～299 万円台	**10** 800～ 899 万円台	**16** 1400～1499 万円台
5 300～399 万円台	**11** 900～ 999 万円台	**17** 1500～1599 万円台
6 400～499 万円台	**12** 1000～1099 万円台	18 1600 万円以上

NFRJ08: on page 23/24

問18 去年1年間のお宅（生計をともにしている家族）の収入は、税込みでは次の中のどれに近いでしょうか。他の家族の方の収入も含めてお答えください。（○は1つだけ）

1 収入はなかった	**8** 500～ 599 万円台	**15** 1200～1299 万円台
2 100 万円未満	**9** 600～ 699 万円台	**16** 1300～1399 万円台
3 100～129 万円台	**10** 700～ 799 万円台	**17** 1400～1499 万円台
4 130～199 万円台	**11** 800～ 899 万円台	**18** 1500～1599 万円台
5 200～299 万円台	**12** 900～ 999 万円台	**19** 1600 万円以上
6 300～399 万円台	**13** 1000～1099 万円台	
7 400～499 万円台	**14** 1100～1199 万円台	

Equivalent household income



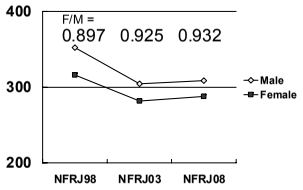
Geometric mean

$$G = \sqrt[n]{X_1 \times X_2 \times \cdots \times X_n}$$

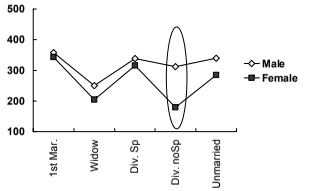
$$\Updownarrow$$

$$\log G = \frac{\log X_1 + \log X_2 + \cdots + \log X_n}{n}$$

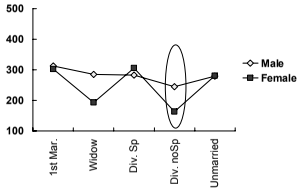
Gender gap in EHI



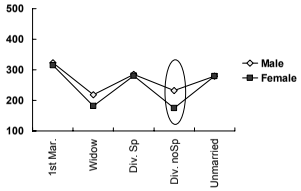
Marital history and EHI: NFRJ98



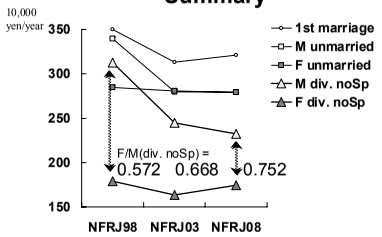
Marital history and EHI: NFRJ03



Marital history and EHI: NFRJ08



Summary



Regression Analysis

$$\hat{Y} = A \times B_1^{X_1} \times B_2^{X_2} \times \cdots \times B_n^{X_n}$$

$$\Updownarrow$$

$$\log \hat{Y} = \log A + X_1 \log B_1 + X_2 \log B_2 + \cdots + X_n \log B_n$$

Decomposition of gender effect:
- Indirect (mediated) effect
- Interaction effect
- Direct (unidentified) effect

Indirect (mediated) effect: example

EHI for regular employment: 267
EHI for others: 167

Male regular employment: 42.6%
Female regular employment: 17.6%

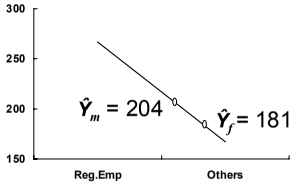
Indirect (mediated) effect: example

$\hat{Y}_m = 267^{0.426} \times 167^{0.574} = 204$
$\hat{Y}_f = 267^{0.176} \times 167^{0.824} = 181$

$\hat{Y}_f / \hat{Y}_m = 181/204 = (167/267)^{0.426-0.176}$
$= 0.889$

→ Female EFI is **11.1%** reduced
due to difference in employment status

Indirect (mediated) effect: example

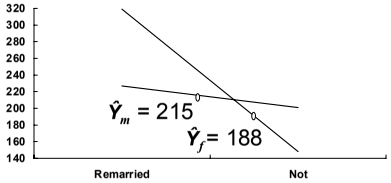


Interaction effect: example

EHI for remarried men: 227
EHI for non-remarried men: 201
EHI for remarried women: 319
EHI for non-remarried women: 148

Male remarried: 55.9%
Female remarried: 31.4%

Interaction effect: example



Interaction effect: example

$\hat{Y}_m = 227^{0.559} \times 201^{0.441} = 215$
$\hat{Y}_f = 319^{0.314} \times 148^{0.686} = 188$

$\hat{Y}_f / \hat{Y}_m = 188/215 = 0.876$

→ Female EFI is **13.4%** reduced
due to difference related to remarriage

Direct (unidentified) effect

Female / male gap remained after all indirect/interaction effects are controlled

= if all variables were kept constant

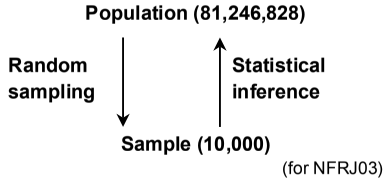
OLS

All variables' effects should be decomposed.

Ordinary Least Square method to determine all parameters simultaneously

Mean is OLS solution for one-variable regression

Evaluation of sampling error



Confidence interval

95% probability range of population value

Upper limit

Most likely value

Lower limit

Statistical test terminology

"Significant"

if C.I **< 1** (=negative effect)

or 1 < (= positive effect)

"Not significant"

if 1 (=unclear effect)

In Table 5 (A)

Model 1

Direct negative effect of "female" after controlling age composition is …

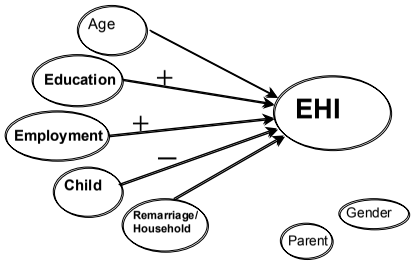
0.683 (0.583 ~ 0.799)

Model 2

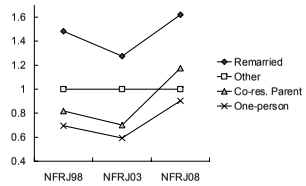
The effect is not significant

0.890 (0.756 ~ 1.047)

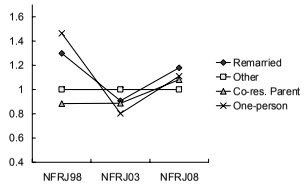
Result (Model 3)



Effect of remarriage/household (female)



Effect of remarriage/household (male)



Findings

- ✓ Female EHI is 10% lower than male
- ✓ Mainly caused by widowed/divorced
- ✓ Divorced men's EHI is decreasing
- ✓ 4 factors of gender gap after divorce

Four factors (female/male)

	NFRJ98	NFRJ03	NFRJ08
Pre-marriage:			
Education	2.2%	6.4%	3.8%
Marital life:			
Employment	10.6%	6.7%	9.8%
Children	4.5%	6.5%	5.3%
Post-divorce:			
Remarriage	10.8%	12.5%	6.1%

Policy Implication

Distance from stratification study to policy

- ✓ Social consensus about justice
  → Gender-equal policy since 1980s
- ✓ Implement of norm for subsystem
  → ?

Education

Gender

↓ School / Family

Education

↓ Labor market / etc.

Living standards

Employment status

Gender

↓ Labor market / Family

Continuous career

↓ Labor market / Family

Living standards

Childrearing

Gender

↓ Family

Childcare/Custody

↓ Labor market / Family

Living standards

Remarriage

Gender

↓ Family

Remarriage

↓ Family

Living standards

Importance of Statistics

Monitoring system of inequality

- ➢ Real-time picture of stratification
- ➢ Strategic policy to stop stratification process
- ➢ Focus on minority

Acknowledgement

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