

GENDER DIFFERENCE OF TOTAL WORK IN JAPAN: POSSIBLE EXPLANATIONS FROM AGE, LIFE STAGE AND ECONOMIC FACTORS

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ABSTRACT

While Michael Burda's study shows negative relationship between GDP per-capita and gender difference among 27 countries, analysis of panel data from The Survey on Time Use and Leisure Activities, conducted by the Statistics Bureau of Japan, suggests that gender difference in total work—paid or unpaid—negatively related to gross prefectural product per-capital. Age and life stage are also factors that affect people's daily time use directly and prominently. Econometric models were used to measure the extent of these factors' impacts on gender difference. These phenomenon and results of data analyses were explained with consideration to Japan's cultural background and social characteristics.

Keywords: *Gender Division of Labor, Gender Difference, Unpaid Work, Total Work, Time Use,*

1. INTRODUCTION

“Gender division of labor” is used to describe the common phenomenon that women take care of most of the housework while men focus on market work. But actually, this is not a voluntary choice for women—apart from the difference in physiology, other factors like social environment, economic development, customs and culture also unconsciously contribute to this gender division. Along with economic development, cultural communication, social progress and the promotion of female education and feministic hiring policies, more and more women took part in market work, what's more, women also began to play an important role in the global business. The rising participation rate of labor market of women is one of the characteristics that have shown among developed and developing countries in the course of globalization (Deere, 2005).

On one hand, traditional social norms have granted women to be housewives, thus participating in market work does not make any difference on the housework burden for women—women have commonly suffered from “double shift” (Ferrer, 1988; Fresser, 1994; Goldscheider and Waite, 1991; Tsutani, 2000, 2002). On the other hand, unpaid work like housework and caring

are usually done for use value, but not for exchange value, so these work were not paid in currency, as a result, this kind of work are not enclosed in the System of National Account, which make it difficult to do quantitative analysis.

However, the truth is that with the development of service sector, by hiring specialized workers, this kind of unpaid work can also be done, which is called the “third-party rule” by Reid (1934). In this concern, women's contribution to families and social welfare are ignored and underestimated if unpaid work is not included in the System of National Account.

In order to deal with this problem, monetary evaluation of unpaid work has become an important research subject. According to the related reports that released by the Cabinet Office, Government of Japan, there are mainly three methods to measure the monetary value of unpaid work: opportunity cost method (OC), replacement cost method-specialist approach (RC-S), replacement cost method-generalist approach (RC-G). But the potential disadvantage is that unpaid work, in fact, does not pay in real currency, the virtual monetary value measured by these methods will not make people essentially attach importance to the value of unpaid work.

In this concern, we shift perspectives to investigate into people's time use. Both paid and unpaid work cost time, and as a kind of scarce recourse, time is the same important as currency income to welfare. Since Becker (1965) first introduced time as constrain condition into economic analysis, more and more economists realized that the welfare of individual and household is not only determined by consumption and income level, but also depends on discretionary time. Amartya Sen (1933) believed that consumption and income are instruments of improving welfare level; when we want to measure welfare, much more attention should be paid to figure out whether people are capable to live as their wills and the contributions they have made to the society—these capability and functioning are the main elements of individual welfare. As Robins (2003) points out that longer working hours leads to insufficient leisure time, while leisure time is indispensable for people to restoring energy and improve life quality; besides, it also put an restriction on people's participation of social and political activities.

Econometrics research intentions of this kind have been limited by the relative paucity of available data sets. The Program of Action of the 4th United Nations' World Conference on Women, 1995, appeal countries to conduct Time Use Survey in order to measure women's contribution to national economy and welfare comprehensively. After that, time use survey had caused widespread concern in several areas, and the situation of absence of data has begun to change. This change enables us to examine gender differences in the allocation of total work time.

2. LITERATURE REVIEW

Traditional welfare economics takes time as working time and leisure time, in which time spend on unpaid work, such as caring and house work, are not taken into consideration. Until the 1960s, American economists Mincer, Beker and Gronau made efforts to invest household behavior in both domestic dimension and market dimension and founded New Home Economics, which had revolutionized the modeling of household behavior by unifying Marshallian demand functions for goods with labor supply and related time use decisions within the household, making unpaid work as a new research direction in mainstream economics.

With the development and prevalent of the Time Use Survey, many scholars have set foot in the study of time use, which also have promote the combination of time use study and public policies. Scholars from developed countries took advantages of the TUS data to investigate the factors on parents' time spent on children care. For example, Uustafsson and Kjulín (1994), Hallberg and Klémárken (2003) have found that parents' time spent on children care would not go down by sending children to nursery school; rise in expenditure on public education would have crowding out effects on parents' time spent on children care (Kim, 2001); Millerand Mulvey (2002) have found that the higher educational level mother has obtained, the longer hours may spent on children care, and so on. These studies have contributed to promote policies about children care, such as taxation, subsidies, and public nursery services.

Evenson (1978) analyzed time allocation of rural households in Philippines by comparing the characteristics of time use of single person household and two-person household, and investigated how the age of child, parents' educational level, and time of marriage affect people's daily time use. Aguiar and Hurst (2009) took advantage of the Time Use Survey of America and have found out some trends in time (1965-2005) of American residents' daily time use.

With the prevalence of TUS, comparisons among countries have become a hot topic, for example, Gauthier and Smeeding (2000) investigated into the time use condition of residents aged between 55 and 64 from Australia, Canada, Finland, Italy, Sweden and the America to find out effects of profession and gender have on time use. By analyzing housework difference of Spain's double income families, Alvarez, B and Miles, D (2003) have found out that Spanish men and women ' housework burden is mainly determined by gender, while factors like area and level of education make no difference.

Michael Burda, Daniel S. Hamermsh and Phipippe Weil (2013) use econometrics methods and data from 27 countries to analyze the relationship between GDP per capital and gender difference in total work, and by including an indicator for religious background, they have found that in rich non-Catholic countries, men and women average about the same amount of total work.

Enlighten by Michael Burda ' work, we adopted the definition of "total work" and took "time" as an indicator to describe men and women's contribution to families as well as to social welfare in the case of Japan.

3. DATA AND METHOD

3.1 Data

The Survey on Time Use and Leisure Activities, conducted by the Statistics Bureau of Japan, aims to obtain comprehensive data on daily patterns of time allocation and on leisure activities. The survey was first carried out in 1976, and has been conducted every five years. This survey provides statistics that are not obtainable from other surveys, all of which focus almost exclusively on economic aspects of living, which make it possible to observe the lifestyles of various groups and preferences for certain activities over others, and to improve the interpretation and the understanding of various social and economic phenomena. The Survey provides basic data to assist the formulation of policy aimed at promoting better work-life balance, maintaining a vital aging society, improving the childcare environment, facilitating gender equality, etc., taking the current social background (e.g., aging society with fewer children, and diversification of lifestyles) into account and making it possible to investigate gender difference of the allocation of time.

Considering the consistency of data set, we use the data of the seventh and eighth Survey, conducted in the year of 2006 and 2011 respectively. In the survey, "sleep" includes sleep at night, daytime nap, catnap, waiting time from going to bed until dropping off to sleep, Time from going to bed till getting up; "personal care and meals" includes washing face, bathing, toileting, dressing, change of clothes, makeup, hair-dressing, shaving, having a hair perm or cut at a hair salon, esthetic treatments, bathing using home-visit bathing service, eating and drinking at home and restaurants, etc., and school lunch, eating and drinking at workplace; "work" refers to works that produces income for the worker or the whole family, including normal work, preparation and cleanup for work, overtime work, work taken home, part-time job, sideline work, helping family business, moving during work; "school work" includes study in class (elementary, junior high and high schools, technical and junior colleges,

colleges or universities, graduate schools, preparatory schools, etc.), preparation for class and review of lessons, homework, cleanup at school, homeroom activities, studying under a tutor, preparation for school festivals; "housework" includes cooking, tidying up after meals, cleaning house, taking out the garbage, laundry, ironing, mending clothes, drying the bedding, arranging and folding/storing clothes, caring for family members, keeping the household accounts, checking stock prices/exchanging stocks, removal of weeds in the yard, business at the bank, city office, etc., car care, repair of furniture; "volunteer and special help" includes cleaning up roads and parks, visits to welfare homes, braille translation, sign language, procurement of relief supplies for disaster areas, blood donations, providing daily life assistance to the elderly, serving as a welfare commissioner, caring for a children's group, serving as a guide at an art museum, recycling campaigns, road safety campaigns, (Social activities) Labor movements, political activities, doing missionary work, voting in an election; "other free time" includes rest and relaxation, Time to enjoy a family get-together, break time at work or school, snack/tea time, mealtime and quick nap; "watching TV and related" includes watching TV, listening to the radio, reading a newspaper or magazine, watching a recorded TV show, reading a newspaper on the Internet; "travel, travel to or from work" includes Time riding on a train or bus, waiting time, time for connection, time riding in a car, walking time; "others" refers to Job-seeking activities, visiting a grave, praying at the family altar, filling out a survey slip.

We extract data of weekly average time for "work" and "housework" (because these two articles contribute most to gender difference in time use, see "Preliminary Analysis" below) of hired population (aged no less than 15 years old) from the Survey on Time Use and Leisure Activities 2006 and 2011, and group the data by prefectures, age and life stage. In our study, we focus on population in two life stage groups: the single and the married population who have not bear any child, to investigate marriage's effect on the gender difference in time use.

With regard to other factors that may have an effect on the gender difference, we put our focus on macro-level variables that may indirectly and unconsciously affect individuals. We extract data from the Prefectural Account of Cabinet Office, Government of Japan, in which gross product of

each prefectural, income of prefectural residents, and other related articles are incorporated.

3.2 Preliminary Analysis

According to the definition of the Gender Inequality Index of Time Allocation, given by Yano (1995), the Gender Inequality Index of Time Allocation (noted GII^i) is:

$$GII^i = \frac{\sum_{j=1}^m |difference_j^i|}{\sum_{j=1}^m |TM_j^i - TF_j^i|}$$

$i = 1, \dots, n$ represents countries; $j = 1, \dots, m$ represents activities listed as follow: sleep, personal caring and meals, work, schoolwork, housework, volunteer work and help, other free time, watching TV and related, travel and travel to or from work, others. TM_j^i , TF_j^i represent the average amount of time spent on activity j of men and women respectively.

According to the definition of GII, the value of GII approaching 0 means that the difference of daily average time use between men and women is small; on the contrary, if the value of GII is getting large, that means there is a big difference between men and women in daily average time use. Putting the value of GII of each country in an axis (Figure 3.2.1), it is intuitive to observe the level of gender difference of each country: the GII of Japan is 6.57, the largest one among the 8 countries, while Germany's GII is the smallest 3.57, besides, GII of UK is 5.20, rank only second to Japan, and GIIs of the rest countries are all around 4. Compared with the 7 Europe Union countries, we can tell that the

gender difference of daily average time use of Japan is relatively large.

Putting the daily average time spend on each activity in a chart (Figure 3.2.2), it is obvious that gender difference of time spend on "work" and "housework" is much larger than the difference of time spend on other activities, and this difference takes over 50 percent of GII, which is a common trend among all the observed countries. Men's working hour is longer than women's, while women spend much more time on housework—the phenomenon of gender division of labor was shown in the 8 observed countries.

From the preliminary analysis above, gender difference in time use and the phenomena of gender division of labor in Japan are very prominent, along with the problems of work-life balance, men's overtime working and women's M-shaped employment mode, these are the factors contribute to the declining birthrate and "flight from marriage"(Consideration of Population Issues, 1997; Higuchi, 2007). In order to enhance social welfare, promote gender equality, and make women's voice being heard, investigating the difference of time allocation between men and women in Japan, and finding the factors that contribute to such difference are of great significance.

3.3 Method

Combining methodologies of management, economics and econometrics, this research paper investigate gender difference by both quantitative analysis methods and qualitative analysis method.

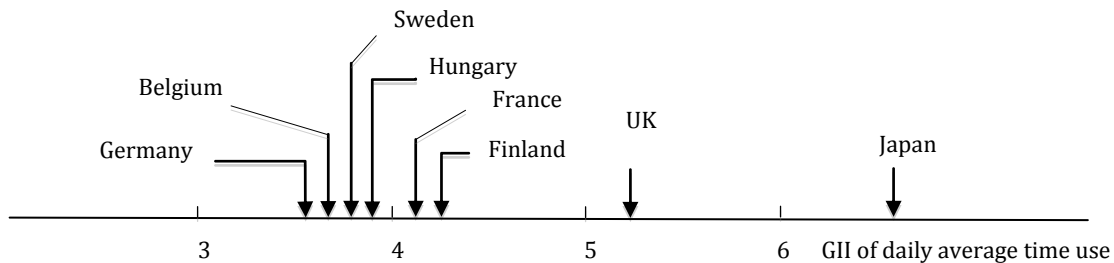


Figure 3.2.1 Comparison of GII of Each Country

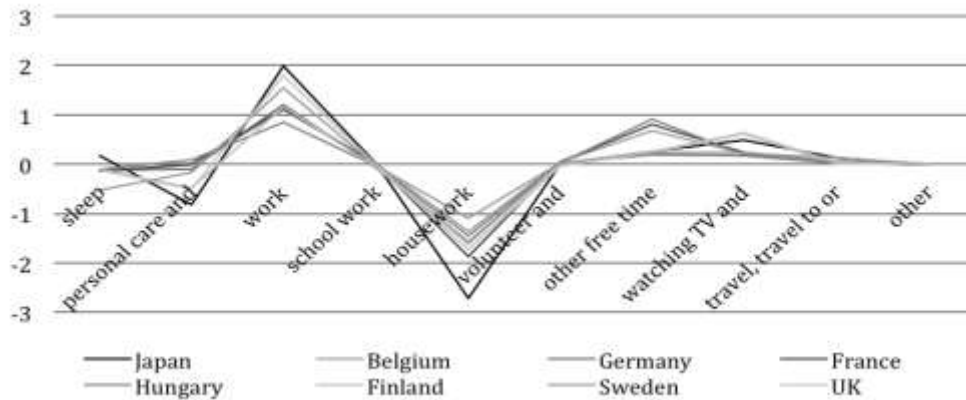


Figure 3.2.2 Gender Difference of Time Spend in Each Activity

Data Source: data of Japan is from "The Survey on Time Use and Leisure Activities of 2006, conducted by the Statistics Bureau, while the data of EU countries come from EUROSTAT, "Comparable time use statistics -National tables from 10 European countries - February 2005".

We pay attention to inducting facts, as well as deducing theories, and attach importance to interdisciplinary analysis on the base of Labor Economics, New Home Economics, Womenomics and etc. Besides, technologies of econometrics and statistics are used in order to achieve comprehensive results.

Specifically, we adopt graphic and tabular analysis to make it intuitive to see the characteristics of gender difference of total work in age groups and life stage (single or be married without baring any child); Mixed Effect Model is applied to test male total work against female total work between single and married groups; and we bring panel data of the year of 2006 and 2011 into Random-Effect Model, Fixed-Effect Model and Mixed-Effect Model to find out indicators of economic development that may have an effect on gender difference of total work, seeking to combine the results of quantitative analysis with facts to explain the gender-gap condition in Japan.

4. RESEARCH CONTENTS AND RESULTS

According to Robins (2003), time mainly spends on three categories of activities: work for pay, housework and other unpaid work, and leisure, and gender difference in time use contributes a lot to gender inequality. We take "time" dimension of Robeyns' analysis framework (2003) as an indicator to calculate gender difference of labor. Borrowing the definition of "total work" from Michael Burda, Daniel S.

Hamermsh and Phipippe Weil (2013), and make it an measurement of male and female's labor contributions. Total work can be calculated as follow:

$$totalwork_{i,j,k}^{gender} = marketwork_{i,j,k}^{gender} + housework_{i,j,k}^{gender}$$

in which, gender=M represents male, gender=F represents female; i=1,2,...,47 refer to the 47 prefectures of Japan, ranked from north to south; j is set as dummy variable, j=1 marks the single, while j=0 marks the population that are married without baring any child; k=1,2,3,4 marks the four age groups:[15,35], [35,45],[45,65],[65,+00).

Thus, the gender difference of the time spend on total work can be calculated as below:

$$difference_{i,j,k} = totalwork_{i,j,k}^M - totalwork_{i,j,k}^F$$

When difference>0 suggests that men's average time spend on total work exceed women's; difference<0 suggests that women's labor burden are larger than that of men; while the value of difference approaches 0 , that means men and women's labor contribution are balanced.

4.1 Descriptive Results of Average Difference of Each Group

In this chapter, we take cross-section data of the year of 2006 as example to descriptively but intuitively analyze the effect that age and life stage may have on the average gender difference in total work.

Organizing average gender difference in total work of each group into a chart (see Figure 4.1.1), we can see a trend that is obvious that average gender difference in total work tends to become negative with age growth, and the point of negative comes earlier among married population than that of single; what's more, the difference of married population aged from 45 to over 65 are much larger than that of single population. It suggests that married women tend to suffer more labor burden than single women with age.

As many scholars have found, we come to the same conclusion that men spend much more time in market work than women, while women take care of most of the housework. But when taking “total work” as an indicator of men and women’s labor contribution, women’s total work time even exceed men’s in many conditions.

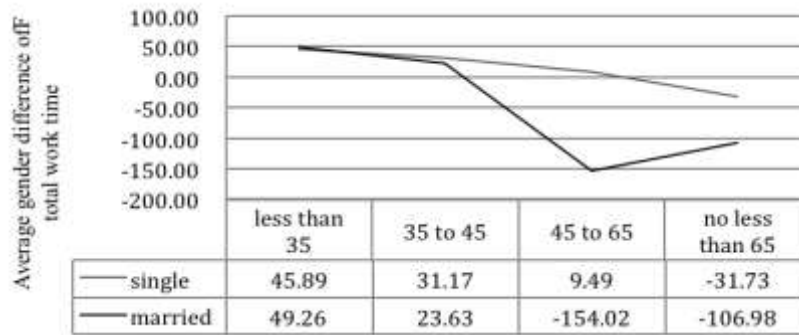


Figure 4.1.1 Average gender difference of total work by groups

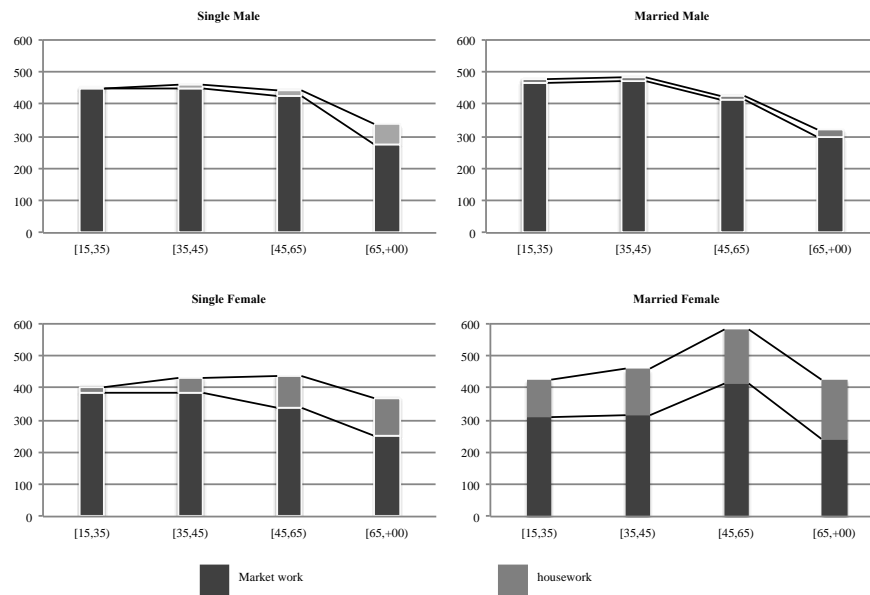


Figure 4.1.2 The Composition of Average Total Work Time by Groups

4.2 Effects of Age and Life Stage on Total Work

We have found that age and marriage do have effects on Male and Female’s total work from descriptive analysis, and in order to do quantitatively test, we extract data of 2006, 2011 to conduct panel data analysis. Since the data

released on Statistic Japan were arranged according to age groups and life stages, these variables will certainly be omitted because of collinearity in Fixed Effects Model, and it is impossible to conduct Hausman test. In such a circumstance, we do a series of tests, and the results are shown in the table below:

Table 4.2.1 Results of Regressing Age and Marriage on Gender Difference

Dependent variable	Independent variables	Models or Tests	Parameters & Results	
Difference	Age, Marriage	R&P test	Prob>chibar2=0.3646	
		Mixed Effects	Coef.	(170.434, -4.016(0.226), 42.205(5.046))
			P	(0.000,0.000)
			Adj-R2	0.343

According to the result of R&P test, Mixed Effects Model could describe the relationship better than Random Effects Model, and the result of Mixed Effects Model yields:

$$difference = 170.43 - 4.02(0.23)age + 45.21(5.05)marriage; Adj - R^2 = 0.34$$

Apart from the effects from age and life stage, other factors have a joint effect of 170.43 minutes difference in man and women’s total work time; difference (Mtotalwork—Ftotalwork) tends to be smaller in elder groups, this is probable because that men’s working hours decline after retirement and may help with some amount of housework; there seems to be a 45.21 minutes’ gap between married and single population, married women tend to work longer than single women.

By regressing women’s total work on men’s total work, including an indicator for life stage (single or married), we have:

$$Mtotalwork = 274.68 + 0.32(0.04)Ftotalwork + 11.76(5.51)marriage$$

The scatter diagrams in Figure 4.2.1 compares total work of single group and married group respectively, and the line in red (45° - line) represents equality total work (points on this line means women and men spend the same amount of time on total work). Figure 3-2-1 shows that in single group, points of (Ftotalwork, Mtotalwork) concentrate above the 45° - line , while in married group, points tend to be scattered and move below the 45° - line .

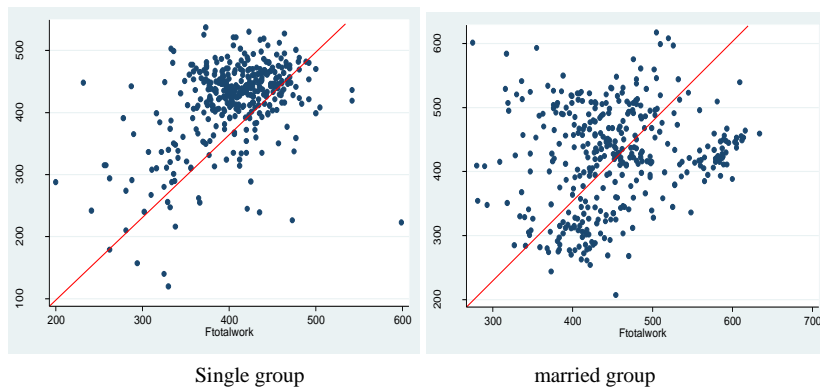


Figure 4.2.1 Scatter Diagram of Male and Female’s Average Total Work of 47 prefectures

4.3 Panel Data Analysis on Economic Factor

In this chapter, we try to found out other factors that may have an effect on the gender difference. We put our focus on macro-level variables that may indirectly and unconsciously affect individuals. According to Michael Burda’ findings (2012), data from 27 countries show a negative

relationship between GDP per-capita and gender differences in total work, the regression yields:

$$F - Mtotalwork = 68.16 - 2.39(0.56)RealGDP / Capital; Adj - R^2 = 0.394$$

Figure 4.3.1 shows a scatter of the difference in average minutes per day of female over male total work time and real GDP/capita and a line fitting these points. It suggests that in countries with relatively high real GDP/capita, female tend to spend equal or less time on total work compared with male, implying a negative relationship between economic development and gender difference in total work.

Can this conclusion be narrowed down to a certain country? In order to do this test on Japan, we choose Gross Prefectural Product (GPP)/capita corresponding to Michael Burda's real GDP/capita as an indicator of economic development of Japan's 47 prefectures. We construct panel data by using the data of 2006 and 2011. Considering the characteristics of panel data, Mixed Effects Model, Random Effects Model and Fixed Effects Model were adopted to investigate the relationship.



Figure 4.3.1 Female-male Total Work and Real GDP per-capita, 27 countries
(Source: M. Burda, D.S. Hamermesh, P. Weil, "Total Work and Gender: Facts and Possible Explanations", *Journal of Population Economics*, Vol. 26, No. 1, 2013, pp. 239-261.)

Table 4.3.1 Result of Regression on Gross Prefectural Product per capital

Dependent Variable	Independent Variable	Results & parameters		
Difference	Product/capital	F-test	Prob>F=0.0000	
		Hausman test	Prob>chi2=0.0042	
		R&P test	Prob>chi2=0.0000	
		Fixed Effects	Coef.	(197.5814, -0.0000563(0.0000192))
			P	0.003
R2	0.0231			

The result of F-test manifests that it is better to choose Fixed Effects Model rather than Mixed Effects Model, and then, according to the results of Hausman test and R&P test, the ranking of models that is suitable to describe the relationship is as follow:

Mixed Effect < Random Effect < Fixed Effect

In this circumstance, we report the regression result of Fixed Effect, which yields:

$$difference = 197.58 - 0.000056(0.000019) \frac{product}{capital}$$

The result shows a negative relationship between gender difference in total work and prefectural product per capital, which is coincide

with Michael Burda's finding. To be specific, according to Michael Burda's finding, women work longer than men in among the 27 countries, while in Japan, men work totally 197.5813 minutes longer than women in average, but the negative relationship between economic development and gender difference do exist in Japan as well: a 1 million yen (around 8 thousand USD) rise in gross prefectural product per capital, tends to bring 56.3 minutes' gender difference down. This phenomenon could be explained considering the social characteristics of Japan: men's over-time working, women's M-shaped employment mode, and couple's life after retirement.

5. SUMMERY AND CONCLUSIONS

Though the phenomenon of “Gender division of labor” and women’s “double shift” have been hinted by a number of sociologists and economists, attentions are usually put upon currency payment because of its materiality and measurability, as a consequence, the real value of unpaid work itself, which are mostly be taken care of by women, is being underestimated.

Enlighten by Michael Burda ’ findings (2012), we adopted the definition of “total work” and took “time” as an indicator to describe men and women’s contribution to families as well as to social welfare. In this paper, we have discussed gender difference in total work and factors that may put impacts upon such difference in the case of Japan.

Firstly, our results suggest that the most prominent variables that influence gender difference in total work are age and life stage (single or married). These two indicators affect people’s time use directly and most obviously. Our result of regression manifested that age negatively affect gender difference in total work, while marriage (1-single, 0-married) has a positive effects on such difference. According to Yukawa’s founding (2013), while marriage has no prominent effect on men’s payments, men’s yearly income do rise after getting married—the income were actually increased by extending working hours. We have also found that married men aged from 35 to 45 tend to work much longer than single men in that age group, this is probably because that married men are under pressures of forming family considering Japan’s traditional conventions. But the effects that marriage has upon women are obvious as well: even though resignation is common among Japanese wives, most of them do part-time jobs and take care of most of the housework. Our regression result has proved that married women’s time spent on “double shift” is longer than married men’s extension of working hours.

The most important implication of our findings and attempts at explanation is linked to economic development. Based on Michael Burda ’ finding that gender difference related negatively with GDP per-capita among 27 countries, and we have presented evidence in section 4.3 suggesting a negative relationship between gender difference in total work and gross prefectures product per

capital among Japan’s 47 prefectures. The difference in cultural background within a nation is smaller than that among countries, so the relationship between gender difference and economic development within Japan could be explained under the same cultural tradition. General level of education tends to rise with economic development, and in developed areas, people generally adopt modern lifestyle rather than traditional one: both men and women participate in market work, and women are willing to be self-reliance rather than becoming housewives. Since the costs of living and life pressure in developed areas are relatively higher, for those women who have resigned after getting marry and whose husband’s income is not enough, they usually take part-time jobs to support family expenditures. In such a circumstance, along with time spent on housework, these women’s total working time will extend even exceed men’s total working time. And for elder population who are approaching retirement (or retired), time spend in market work goes down while men tend to help with some amount of housework (though very little, see Chat 4-2-1), but the amount of housework still remain the same level and are almost taken care by women, so the value of gender difference in these population tends to be low or negative.

In this study, our target group is single population and married population that without baring any child (since the grouping of data of population with child is not in line with the single and married population), so activities like “caring or nursing” and “child care” was not taken into account; even though, the results of regression are still very prominent. We could predict that, if the original data of The Survey on Time Use and Leisure Activities is available, the Hierarchical Linear Model could be adopted to investigate the regional effect on gender difference, which would certainly make much more sense.

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