Women's Labor Supply and Taxation —Analysis of the Current Situation Using Data—*

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Abstract

Regarding women's annual income distribution, annual income has declined for low- to medium-income women but increased for high-income women over the past 25 years. It was found that while the annual income decline for low- to medium-income women can be explained by the increase in the number of part-time workers, the annual income increase for high-income women can be explained by factors such as a rise in the level of academic achievement and an increase in the length of tenure. Next, we introduce findings from Yokoyama (2015) that analyzed the effects of the partial abolition of the special spousal exemption on the labor supply of married women. According to Yokoyama (2015), the tax system revision in 2004 increased working hours and income for married women with low income. In contrast, some medium- to high-income wives with annual income of 1.03 million yen or higher, who were not directly affected by the tax system revision, decreased their incomes, in response to the upward trend of their husbands' incomes during the same period, to the kink of the budget line (1.03 million yen), which became more conspicuous due to the tax system revision. Consequently, the tax system revision, which was intended to increase the labor supply of women, increased income for low-income women and reduced the income of some medium- to high-income women toward 1.03 million yen, thereby ironically making more conspicuous the distortion of the income distribution for married women in Japan that is observed around 1.03 million yen.

Keywords: labor supply of women, the barrier of 1.03 million yen, spousal exemption/special spousal exemption, DiNardo, Fortin, Lemieux decomposition, Firpo, Fortin, and Lemieux decomposition

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I. Introduction

Supporting women's participation and advancement in the workplace is one of the policy objectives of the Abe Cabinet. In a society experiencing population decline, creating an environment in which it is easy for women and older people to work and raising labor productivity, together with maintaining the population of labor force, are the key to whether or not Japan will be able to achieve ongoing growth in the future.

The 1.03 million ceiling, which we will largely look at in detail from Section II onward, is the ceiling that arises due to the fact that taxpayers are eligible for exemption of a certain portion of their income from taxation—known as "standard spousal exemption"—when they have a spouse whose annual salary is 1.03 million yen or less. On the other hand, the 1.3 million yen ceiling is generated by the fact that while people classed as "Category II insured persons" under the National Pension system bear the costs of insurance premiums such as employees' pension and health insurance, the dependent spouses of Category II insured persons ("Category III insured persons") are exempt from paying insurance premiums when they have an annual salary of less than 1.3 million yen. A major aim upon which both of these systems were initially established was rewarding full-time housewives for their "service within the home" supporting salaryman husbands.

However, in recent years, women's lifestyles are becoming increasingly diverse, with trends such as on one hand decreasing numbers of "single earner" households consisting of a male breadwinner and a wife who is not in employment, and on the other increasing numbers of "dual earner" households in which both partners are in employment. There have also been significant changes in the makeup of families, and the number of single households is also increasing among the generations that are currently in active employment. Moreover, it is also said that there are spouses who adjust their employment on the basis that it is favorable not to exceed a certain amount of annual earnings, and it has been highlighted that while policies are being pursued to support women's participation and advancement in the workplace, it is possible that tax and social security systems are deterring women's employment.

With such trends arising, part of the spousal exemption system was abolished in 2004 for taxpayers whose spouses' annual earnings were 1.03 million yen (USD 10,300) or less. Furthermore, in January 2018, the exemption systems for spouses changed again, with the reform expected to create a new income threshold at 1.5 million yen.

We start in Section II of this chapter by explaining the characteristics of Japan's tax system that are thought to have a particular influence on women's labor—namely, factors such as the aforementioned 1.03 million yen ceiling and 1.3 million yen ceiling—and reporting the current state of employment adjustment. 1.03 million yen is both the maximum amount of earnings exempt from income tax, and also adopted by many companies as the upper limit for eligibility for spousal allowances. The fact that annual earnings are concentrated around 1.03 million yen is therefore not only due to spousal exemptions, but is

also related to these spousal allowances paid by companies and other such causes. It was thus revealed that there are a considerable number of cases in which married women are adjusting their employment on the basis of their awareness of factors such as standard spousal exemptions and special spousal exemptions and status as a Category III insured person.

Using data from the Basic Survey on Wage Structure by the Ministry of Health, Labour and Welfare from 1989 to 2013, in Section III we discuss how the distribution of women's annual earnings changed over said period. These discussions show that women in the low- to medium-income brackets saw a decrease in annual earnings from 1989 to 2013, and the level of concentration around 1.03 million yen is greater in 2013. Among women in the high-income bracket, in 2013 earnings were higher in comparison with 1989. Analysis of these distribution changes using decomposition analyses revealed that changes in annual earnings distribution are primarily generated by changes in worker and company attributes. More specifically, it was found that while the drop in earnings in the low- to medium-income brackets can largely be attributed to the increase in part-time workers, the factors contributing to the increase in earnings in the high-income bracket are changes in attributes such as increases in the numbers of women with a higher education and in the numbers of women remaining in jobs long term.

However, the analysis in Section III is aimed only at breaking the changes in annual earnings distribution from 1989 to 2013 down into two parts: the changes in worker and company attributes themselves (composition effect) and the changes in the level of influence (profitability) of each attribute on earnings (structural effect). As a result, in the aforementioned decomposition method factors other than the changes in attributes—such as the impact of the abolition of part of the special spousal exemption in 2004, and the shift in awareness and growth in understanding of the system due to the recent increase in debate on spousal exemptions—fall under the so-called "residual" component. Moreover, as the data from the Basic Survey on Wage Structure used in this analysis does not cover factors such as the existence (or not) of a spouse or spouse's income, Section IV provides a closer policy assessment with a different set of data, which is taken from the Keio Household Panel Survey (KHPS).

Section IV refers to the analyses from Yokoyama (2015) to explore the impact of the 2004 partial abolition of the special spousal exemption on the working hours and earnings distribution of married women. Japan's system for spousal exemptions is characterized by the fact that exemptions are lower the higher the spouse's earnings. As Japanese society saw a rise in the labor force participation rate of women, in 2004 special spousal exemptions were abolished for any taxpayer whose spouse earns less than 1.03 million yen per year. Given that both the standard spousal exemption and the special spousal exemption system have the effect of preventing long working hours, this tax reform was predicted to increase the labor supply of married women, but the average statistical values do not confirm this expected impact. Instead of investigating the average effect of the tax reform, Section IV therefore provides a theoretical and empirical analysis of the impacts on working hours and income distributions overall. The theoretical model demonstrates that this tax reform made the kink

point at 1.03 million yen in the budget line for married women more conspicuous, and has a different impact on labor supply depending on the income group. In the empirical analysis, data from the KHPS (2004-2007) is used to estimate the impact of the tax reform through quantile difference-in-difference estimations and decomposition techniques that have been newly proposed in recent years (FFL and DFL decomposition analyses). In Section V, we present the conclusions.

II. The 1.03 Million Yen and 1.3 Million Yen Ceilings

The so-called "1.03 million yen ceiling" and "1.3 million yen ceiling" are tax systems and social security systems intended to reward full-time housewives for their "service within the home" (*naijo no kō*) supporting their salaryman husbands, as is characteristic of Japan. It is said that currently many dependent spouses adjust their labor supply to ensure that their income does not exceed these amounts. The actual circumstances of this shall be looked at in detail in Section II-3. This section focusses on tax systems that generate incentives to adjust labor supply, starting with spousal exemptions.

II-1. Spousal exemptions

In Japan, there are two types of spousal exemption: standard spousal exemption (*haigūsha kōjo*) and special spousal exemption (*haigūsha tokubetsu kōjo*). Standard spousal exemption was originally established in 1961 based on a belief that the contributions to households of housewives who engage in housework full-time should not be underestimated. The amount of this exemption was successively increased from the year after its establishment, and is currently 380,000 yen. However, the characteristic that the standard spousal exemption is no longer provided once the spouse's earnings reach a certain amount (900,000 yen at the time of the exemption's establishment) led to the reverse phenomenon that if the spouse's income even slightly exceeds that threshold, the household's disposable income is lower than the disposable income of households in which the income of the spouse is slightly below the threshold.[1] In order to correct this reverse phenomenon in disposable income at the threshold, the special spousal exemption was introduced in 1987 as an additional exemption. Table 1 shows the amounts of the standard and special spousal exemptions on income tax by spouse's annual earnings.[2]

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[1] This refers to the problem that the threshold in fact leads to a decrease in the net income of the household as a whole, because in addition to spousal exemption no longer being applied in calculating the husbands' income tax, housewives themselves become subject to taxation when their annual earnings reach the threshold. This is known as the *pāto mondai* (the "part-time work problem").

[2] The system of spousal exemption on residential tax is very similar to the structure of that on income tax, but differs in the fact that the amount of spousal exemption on residential tax starts from 330,000 yen, rather than 380,000 yen.

Table 1. Spousal Exemptions and the 2004 Partial Abolition of the Special Spousal Exemption

	Standard spousal exemption	Special spousal exemption			Total spousal exemption		
Spouse's annual earnings (Units: million yen)	1961-	1961-1987	1987-2003	2004-	1961-1987	1987-2003	2004-
0-0.699	0.38	0	0.38	0	0.38	0.76	0.38
0.70-0.749	0.38	0	0.33	0	0.38	0.71	0.38
0.75-0.799	0.38	0	0.28	0	0.38	0.66	0.38
0.80-0.849	0.38	0	0.23	0	0.38	0.61	0.38
0.85-0.899	0.38	0	0.18	0	0.38	0.56	0.38
0.90-0.949	0.38	0	0.13	0	0.38	0.51	0.38
0.95-0.999	0.38	0	0.08	0	0.38	0.46	0.38
1.00-1.029	0.38	0	0.03	0	0.38	0.41	0.38
1.03-1.049	0	0	0.38	0.38	0	0.38	0.38
1.05-1.099	0	0	0.36	0.36	0	0.36	0.36
1.10-1.149	0	0	0.31	0.31	0	0.31	0.31
1.15-1.199	0	0	0.26	0.26	0	0.26	0.26
1.20-1.249	0	0	0.21	0.21	0	0.21	0.21
1.25-1.299	0	0	0.16	0.16	0	0.16	0.16
1.30-1.349	0	0	0.11	0.11	0	0.11	0.11
1.35-1.399	0	0	0.06	0.06	0	0.06	0.06
1.40-1.409	0	0	0.03	0.03	0	0.03	0.03
1.41-	0	0	0	0	0	0	0

Note: Table 1 shows the spousal income tax exemptions that apply to different grades of annual earnings. This table applies only to salaried workers. For all income earners, spousal exemptions are defined by "total income," rather than total earnings. For salaried workers, "total income" is calculated by subtracting the employment income deduction from the total earnings, and for other workers, "total income" is calculated by subtracting necessary expenses from total earnings. Moreover, as the threshold was set at the current 1.03 million yen in 1995, when the spousal exemption was increased to 380,000 yen, for the years prior to that, the composition of the table is the same, but the values do not necessarily correspond with Table 1. For example, in 1961, the year that the standard spousal exemption was established, the threshold was set at 900,000 yen.
Source: Created by the author based on data from the National Tax Agency homepage.

The actual table of spousal exemptions is defined by the "total income" of the spouse.[3] For salaried workers, "total income" is the amount of salary minus the employment income deduction, and for other workers, such as self-employed people, the total income is the amount of earnings minus necessary expenditure. As the amount of employment income deduction is determined based on annual earnings, the total income corresponds one-to-one with original earnings (for instance, in the case of annual earnings of 1.8 million yen or less,

[3] Special spousal exemption is applied to people to whom spousal exemption does not apply, in cases where the total amount of income of the taxpayer themselves is no more than 10 million yen, and the total income of the spouse is over 380,000 yen and under 760,000 yen.

the employment income deduction is 650,000 yen). Thus, in order to simplify explanations, here we will use salaried workers' earnings in explaining the amounts of standard spousal exemption and special spousal exemption based on the annual earnings of spouses. The standard spousal exemption is fixed at 380,000 yen, and in the case of salaried workers, it is no longer applied as soon as the spouse's earnings exceed 1.03 million yen. The system is therefore such that standard spousal exemptions are suddenly no longer available when the spouse's earnings exceed a certain amount (1.03 million yen), and special spousal exemptions become gradually lower the higher the spouse's earnings. When the impact of these tax systems on labor supply is taken into account, the characteristic that applies to both standard spousal exemptions and special spousal exemptions is that they may provide incentives to prevent the spouse from working long hours. The potential impact of these spousal exemption systems on labor supply has been the subject of criticism for a long time, and particularly with increases in the employment rate of women, this criticism was growing progressively.

In response to this, at the end of March 2003 the Japanese Diet passed a bill to abolish the special spousal exemption for taxpayers whose spouse's annual earnings are less than 1.03 million yen. This bill took effect in the 2004 tax year. This partial abolition of the special spousal exemption was enforced with regard to income taxes in the 2004 fiscal year and with regard to residential taxes in the 2005 fiscal year.

II-2. Factors that may give rise to employment adjustment

Aside from the standard spousal exemption and special spousal exemption set out in Section II-1, in Japan there are also several thresholds in working hours at which workers lose or acquire benefits such as exemptions or allowances. The existence of these income and working hour thresholds may potentially act as an incentive for people to adjust their income or working hours to fall below or above the threshold. Here in Section II-2 we review the main factors that may become incentives for people to adjust labor supply, and reveal the influence that these factors have on income distribution.

II-2-1. Maximum tax-free earnings

In Japan, workers are obliged to pay income tax when their annual earnings exceed 1.03 million yen. Income tax is calculated as follows: {annual earnings – employment income deduction – basic deduction – other deductions/exemptions (if applicable)[4]} × tax rate[5] – deduction (corresponding to the tax rate) – tax credit (if applicable).[6] As shown in Table 2, the amount of employment income deduction can be expressed with the formula $aY+b$. Here Y represents annual earnings. As can be seen from this table, all salaried workers are qualified to receive a minimum employment income deduction of 650,000 yen.[7] If the amount of

Table 2. Employment Income Deductions in FY 2016

Earnings (salary, etc.) **(Payment as recorded on certificate of tax deducted at source for employment income)**		**Employment income deduction**
1,800,000 yen or under		Earnings × 40% (650,000 yen when earnings less than 650,000 yen)
Over 1,800,000 yen	3,600,000 yen or under	Earnings × 30% + 180,000 yen
Over 3,600,000 yen	6,600,000 yen or under	Earnings × 20% + 540,000 yen
Over 6,600,000 yen	10,000,000 yen or under	Earnings × 10% + 1,200,000 yen
Over 10,000,000 yen	12,000,000 yen or under	Earnings × 5% + 1,700,000 yen
Over 12,000,000 yen		2,300,000 yen (upper limit)

Source: National Tax Agency homepage (https://www.nta.go.jp/taxanswer/shotoku/1410.htm)

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[4] Other deductions/exemptions include: spousal exemptions, special spousal exemptions, exemptions for dependents, deductions for casualty losses, deductions for medical expenses, deductions for life insurance premiums, deductions for social insurance premiums, deductions for earthquake insurance premiums, deductions for donations, deductions for contributions to small enterprise mutual aid plans, etc., exemptions for people with disabilities, exemptions for widows, widowers, or working students, and exemptions for elderly people (abolished in 2005).

[5] The tax rate was changed from a four-tier system (10%, 20%, 30%, and 37%) to a six-tier system (5%, 10%, 20%, 23%, 33%, and 40%) in 2007. In 2014, it was changed to the current seven-tier system (5%, 10%, 20%, 23%, 33%, 40%, and 45%).

[6] If some kind of tax credit is applied, the tax credit can be directly deducted from the income tax amount calculated by multiplying the amount of taxable income by the tax rate. Examples of the main types of tax credit include dividend credit, foreign tax credit, special credit for donations to political parties, etc., special credit for donations to accredited NPOs, etc., and special credit for donations to public interest incorporated associations, etc., among other types.

[7] There is a system where if a salaried worker pays specified expenses stipulated in the provisions, if the total amount of specified expenses paid for the year exceeds the "standard amount for determining eligibility for deductions for specified expenses" for the relevant category, the amount by which it exceeds said standard amount can be deducted from the income after employment income deduction when submitting the final tax return. Specified expenses include the following: (1) commuting expenses, (2) relocation expenses, (3) training expenses, (4) expenses for acquiring qualifications, (5) expenses for visiting home when in a post away from one's family, etc., and (6) expenses required for attending work (National Tax Agency, 2011).

deduction, which is calculated using the percentages in Table 2, is 650,000 yen or under, it is set as 650,000 yen. Moreover, as all Japan's taxpayers are qualified to receive a basic deduction of 380,000 yen, the total deduction amount applied to all taxpayers is the combined total of the 650,000 yen minimum employment income deduction and the 380,000 yen basic deduction. That is, workers start paying income tax when their annual earnings exceed 1.03 million yen.[8] As earnings of up to 1.03 million yen are income tax free, and earnings exceeding 1.03 million yen are subject to income tax, it is possible that workers may see this as an incentive to adjust their working hours to ensure that their annual earnings do not exceed 1.03 million yen.

II-2-2. Standard spousal exemptions and special spousal exemption

As seen in Section II-1, when the spouse's annual earnings exceed 1.03 million yen the taxpayer loses their standard spousal exemption. Thus, it has been observed that there are cases in which spouses adjust their labor supply to ensure annual earnings of less than 1.03 million yen, out of concern that the taxpayer will lose their standard spousal exemption. There are also cases in which spouses adjust their employment on the grounds that special spousal exemptions are decreased along with an increase in earnings.

II-2-3. Annual earnings for which people are subject to pension and medical social insurance premiums

Persons insured under the Japanese pension system can be divided into "Category I insured persons" (self-employed people and farmers aged 20 or over but under 60 and their families, and students and people not in employment, etc.), "Category II insured persons" (people insured under employees' pension and mutual aid benefits, such as employees of private sector companies and public officers, etc.), and "Category III insured persons" (Category II insured persons' dependent spouses aged 20 or over but under 60, excluding those with annual earnings of 1.3 million yen or more). As there is a certain amount of margin to choose between each category, this system itself may also be a factor for the adjustment of

[8] The current guaranteed minimum amount for employment income deduction (650,000 yen) was set in 1989. Prior to that, the employment income deduction was 500,000 yen from 1975 to 1983, and 570,000 yen from 1984 to 1988. As the basic deduction has also been changed several times until now, the maximum tax-free earnings was not always 1.03 million yen. For example, as from 1975 to 1976 the basic deduction was 260,000 yen, in this period the maximum tax-free earnings was 760,000 yen (=500,000 yen [minimum guaranteed employment income deduction] + 260,000 yen). Following this, as from 1977 to 1982 the basic deduction was 290,000 yen, the maximum tax-free earnings was 790,000 yen (=500,000 yen + 290,000 yen), and for the same reason, the maximum tax-free earnings in 1983 was 800,000 yen (=500,000 yen + 300,000 yen), 900,000 yen (=570,000 yen + 330,000 yen) from 1984 to 1988, and one million yen (=650,000 yen + 350,000 yen) from 1989 to 1994. As since 1995 the basic deduction has been set at the current 380,000 yen, the maximum amount of earnings free from income tax is 1.03 million yen, the sum of 650,000 yen employment income deduction and the 380,000 yen deduction.

ways of working (Oishi, 2003). Here we look at those choices.

(1) Choice between Category I and Category III

Spouses whose annual earnings are under 1.3 million yen are classified as Category III insured persons. They are treated as the dependent spouses of Category II insured persons, and are not required to pay pension or health insurance premiums. However, when their annual earnings are equivalent to or exceed 1.3 million yen, they are classified as Category I insured persons, and expected to pay national pension and national health insurance premiums. There are therefore workers who adjust their employment to avoid their annual earnings reaching 1.3 million yen or over and thereby losing their status as a dependent spouse covered under their spouse's health insurance and employees' pension, etc. and having to enroll in those systems themselves.

(2) Choice between Category II and the other two categories

Workers whose prescribed working hours and prescribed number of working days are roughly three quarters or more of those of normal workers are generally treated as persons who need to be insured under health insurance and employees' pension. These premiums are proportional to employees' wages, and are halved between employer and employee. As employees whose working hours are three quarters or more of the prescribed working hours of regular employees are therefore enrolled in health insurance and employees' pension, there are cases of employment being adjusted to avoid reaching or exceeding this threshold.

II-2-4. Spousal allowances provided by companies

The regulations regarding spousal allowances provided by companies differ from company to company. According to the 2015 Survey of Job-by-Job Pay Rates in the Private Sector conducted by the National Personnel Authority, 84.9% of companies that provide family allowances determine whether or not employees qualify for spousal allowance on the basis of the spouse's earnings. Of these companies, 68.6% set the threshold at which they stop providing spousal allowances at 1.03 million yen (that is, they provide spousal allowances only to employees whose spouse's annual earnings are less than 1.03 million yen), due to the fact that 1.03 million yen is the threshold over which standard spousal exemptions are no longer provided in the tax system. 25.8% of companies set 1.3 million yen, the threshold at and beyond which spouses must pay social insurance premiums, as the upper limit for receiving spousal allowances (5.4% have set different upper limits). Spousal allowances are 13,000 yen per month on average. Therefore, although, as mentioned above, the "reverse phenomenon" of disposable income may have been overcome through the introduction of the special spousal exemptions, there are also a significant number of cases in which there is still a drop in the household's budget line due to the threshold of the spousal allowances paid by companies (Takahashi et al., 2009).

II-2-5. Employment insurance premiums

Workers who work 20 hours or more per week, and are anticipated to be employed for a certain period and beyond, must be enrolled in employment insurance. The anticipated period of employment has been revised several times, but as it means that it is necessary to enroll in employment insurance when prescribed weekly working hours are 20 hours or more, there are cases in which people adjust their working hours to avoid reaching or exceeding this threshold.

II-2-6. Other cases

Aside from such cases, the main types of cases that have also been observed are those in which people try to avoid falling under the conditions under which they must enroll in employment insurance or employees' pension at the convenience of the company, or in which people adjust their employment in order to curb the rate of decrease or avoid decreases to pensions that are currently being paid.

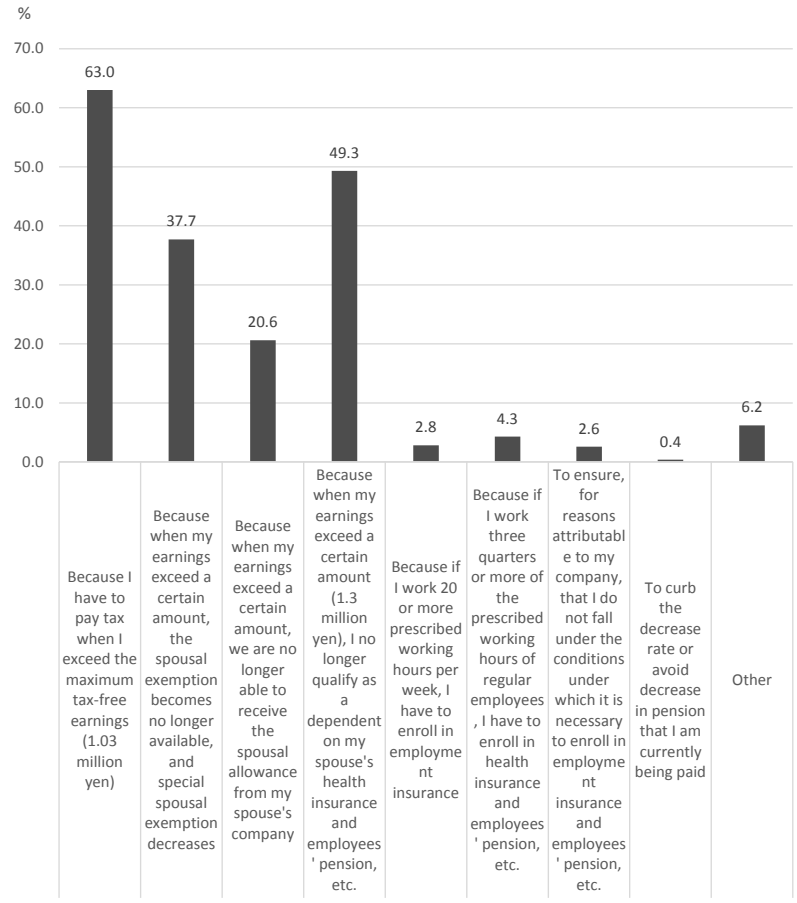
As we have seen in this section, when their spouse chooses earnings of less than 1.03 million yen, an employee qualifies for standard spousal exemption and tax exemption, and may be eligible to receive the spousal allowance provided by their employer (however, standards for receiving spousal allowance differ from company to company). It is also possible to choose one's category under the social insurance system oneself by adjusting annual earnings below or above 1.3 million yen, or adjusting working hours to below or above three quarters of regular employees' working hours. In light of this, the following section looks at what kinds of institutional factors and conventions lead to the adjustment of women's employment.

II-3. Current state of labor-supply adjustment

Figure 1 shows the impact that the factors introduced in this section have had on the labor supply of married women. The data used in the figure is from the 2011 General Survey on Part-time Workers by the Ministry of Health, Labour and Welfare. Among the married female part-time workers surveyed, 21% responded that they had adjusted their labor supply in the previous year. Figure 1 shows the potential factors influencing employment adjustment, and the percentages among that 21% (that is, the percentage of married female part-time workers who responded that they had adjusted their labor supply in the previous year) who responded that the factor influenced their labor-supply adjustment. As subjects were able to give multiple answers, the population is the number of part-time female workers who had adjusted their labor supply, and the percentages of those who answered that each factor influenced their labor-supply decision are shown in Figure 1.

Figure 1 reveals that the 1.03 million yen upper limit on the maximum tax-free earnings

Figure 1. Percentages of Married Female Part-Time Workers by Reason for Employment Adjustment (2010)

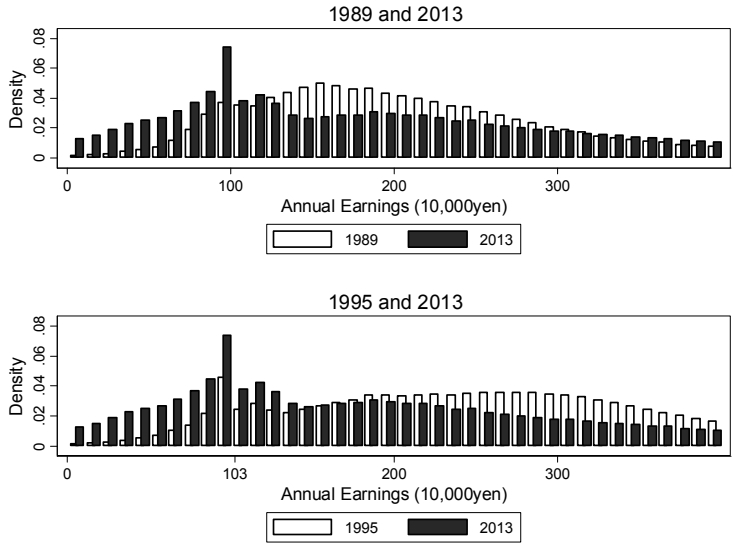


Source: Created by the author using data from the 2011 General Survey on Part-time Workers (Ministry of Health, Labour and Welfare).

had the greatest influence on employment adjustment, and standard spousal exemption and special spousal exemption have the third greatest influence among the factors. It can also be interpreted that the first three factors from the left-hand side are significantly related to the 1.03 million yen ceiling as many companies make this value the point of losing spousal allowances in line with the point of losing spousal exemption in the tax system. These survey results therefore also indicate that the 1.03 million yen ceiling is an important threshold for many female workers.

Figure 2 compares women's annual earnings histograms for 1989 and 2013, and 1995 and 2013. As the upper limits of both the maximum tax-free earnings and standard spousal exemption were set at one million yen for salaried workers in 1989, and became 1.03 million yen from 1995 onward, the bin values are set such that they do not stretch over these

Figure 2. Comparisons of Women's Annual Earnings Distribution in 1989 and 2013, and 1995 and 2013



Note: Annual earnings are calculated by multiplying monthly salary for June by 12 and adding the bonus for the previous year. Furthermore, annual earnings figures are nominal values. The bin width for the 1989 histogram is 100,000 yen, but the bin values around one million yen are from 900,000 yen and above to under one million yen, and the next bin starts from 1.01 million yen and above. The bin width for the 1995 and 2013 histograms is 100,000 yen, but just for the bin values around 1.03 million yen, 900,000 yen and above to 1.03 million yen and under, and 1.03 million to under 1.1 million yen are each included in one bin in order to avoid creating a bin that straddles 1.03 million yen.
Source: Created by the author from the Basic Survey on Wage Structure

thresholds.[9] Figure 2 indicates that the degree of concentration at the threshold is increasing year by year. This is thought to reflect the fact that for many women there is an increasing tendency to adjust labor supply in order to ensure that their annual earnings do not exceed each year's threshold. As the data of the Basic Survey on Wage Structure does not include the information of marital status, the sample is not limited to married women, but it is noteworthy that while the standard spousal exemption existed in both years, there is a significant difference in the magnitude of density in the bin directly before the threshold between the two years. The next and subsequent sections shall extend the analysis to address what occurred from 1989 to 2013, and what kinds of factors lead to this result.

[9] As in 1989 the basic deduction and standard spousal exemption were 350,000 yen, and the employment income deduction was 650,000 yen, the thresholds for the maximum tax-free earnings and spousal exemption for salaried workers were set at one million yen. As it was in 1995, the timing when the standard spousal exemption was increased to 380,000 yen, that the threshold became the current 1.03 million yen, the comparison of the distribution between 1995 and 2013 is also shown in the bottom figure of Figure 2.

III. Comparison and Factor Decomposition of Annual Earnings Distributions for 1989 and 2013

The nominal annual earnings distribution of women in 1989 and 2013 seen in the previous section can be divided into two parts: 1) the effect of changes in the composition of attributes of the worker and company (composition effect), and 2) the effect of structural changes (structural effect). Changes in attributes include examples such as the rise in the ages of workers, the increasing numbers of workers with a higher education, the growing numbers of part-time workers, and changes in the sizes of companies. Structural effects represent the magnitude of influence that worker and company attributes have on earnings, namely changes in profitability (for instance, changes in the magnitude of the impact on annual salary of returns from education or increase in long-term continuous employment with the same employer, or changes in the magnitude of the influence on salary from being a part-time worker).

In this section, we visually divide the changes in annual earnings distribution into the two aforementioned effects using DFL decomposition (DiNardo et al., 1996). Depicting the counterfactual distribution for 2013 that would have been achieved if the attributes were as they were in 1989 allows us to visually decompose the distribution changes into the two effects through comparison of the counterfactual distribution and the actual annual earnings distribution for the two years.

We then use a method known as FFL decomposition (Firpo et al., 2007, 2010) to break down each of the two effects decomposed using the DFL decomposition into various factors such as education and number of years in continuous employment. This allows for closer analysis of the changes in earnings distribution from 1989 to 2013.

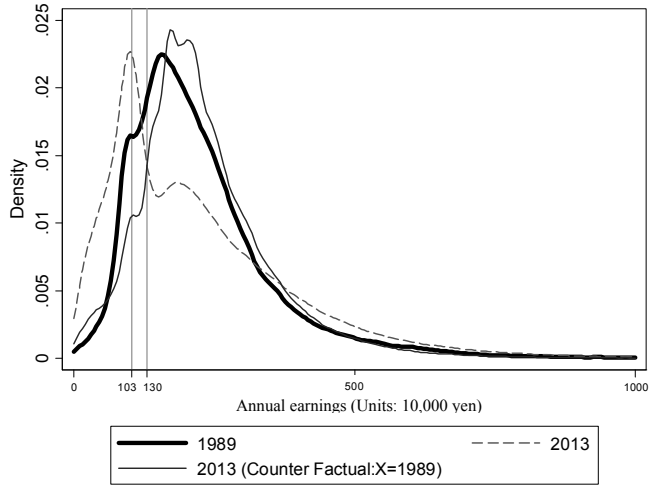
III-1. DFL Decomposition

In this section, we start with the DFL decomposition of women's annual earnings in Figure 3.[10] Here attributes include workers' academic backgrounds, potential numbers of years' experience, numbers of years in continuous employment in a certain job, industry, whether they work full- or part-time, and company size.

In Figure 3, the actual annual earnings distribution in 1989 (bold line) has a mode around 1.60 million yen, but the actual earnings distribution in 2013 (dotted line) has a mode around 1.03 million yen. Moreover, the polarization is conspicuous in the actual distribution in 2013, with two clusters—one around 1.03 million yen and one around two million yen. The remaining line (the thin solid line) represents the annual earnings distribution that is presumed would have been achieved in 2013 if the worker and company attributes had been fixed at those from 1989, hereafter referred to as the "counterfactual annual earnings distribution."

[10] See Appendix 1 for a detailed explanation of the method of DFL decomposition.

Figure 3. DFL Decomposition of Women's Annual Earnings Distribution



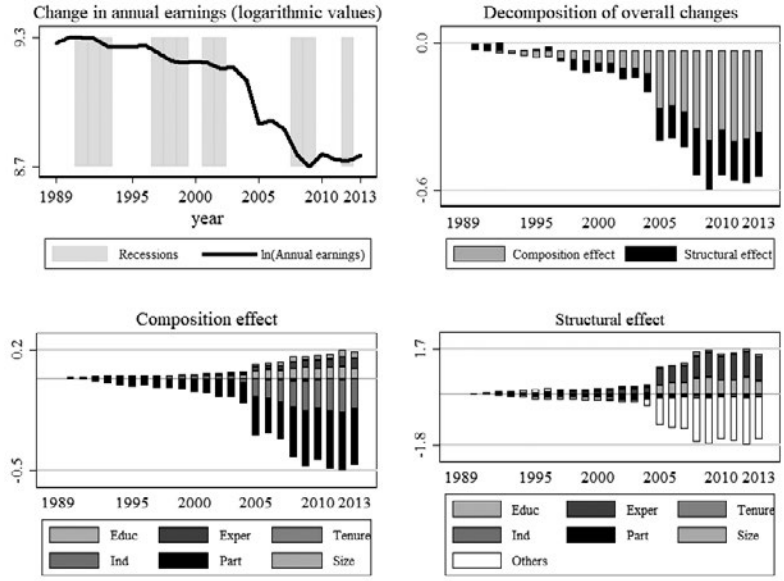
Note: The thin solid line ("2013 Counterfactual: X=1989") shows the counterfactual annual earnings distribution for 2013, calculated on the premise that in 2013 worker and company attributes were still at 1989 levels.
Source: Created by the author based on the Basic Survey on Wage Structure

If we compare the three annual earnings distributions, the gap between the actual distributions in 1989 and 2013 overall can largely be explained by the gap between the counterfactual annual earnings distribution and the actual distribution for 2013. In other words, as the attributes used in these two annual earnings distributions differ, the change in annual earnings distribution can largely be attributed to the changes in the attributes. The fact that the counterfactual annual earnings distribution for 2013 is positioned to the right overall in comparison with the actual annual earnings distribution for 2013 also suggests that the annual earnings of women would be higher if the distribution of workers' attributes had not changed. Moreover, the actual annual earnings distribution for 2013 in the bracket around five million yen is thicker in comparison with the actual annual earnings distribution for 1989. The fact that this gap can also be explained by the gap between the counterfactual distribution and the actual distribution for 2013 shows that this can be attributed to the composition effect (changes in the composition of attributes). In this way, DFL decomposition allows us to break the changes in actual annual earnings distribution down into the changes in the composition of attributes and the structural changes that also occur. At the same time, while we can attribute changes to the attributes collectively, the DFL decomposition in Figure 3 alone does not allow us to ascertain specifically which of the factors—workers' academic background, number of years of potential experience, number of years in continuous employment in a certain job, industry, whether they work full or part-time, or company size—explains this change in distribution.

III-2. FFL Decomposition

In order to interpret the results in Figure 3 in more detail, we conducted FFL decomposition[11] and presented the results in Figures 4a - 4c. Looking at Figure 4a, the upper left - hand figure shows that the earnings of the first decile of women were falling consistently from 1989 to 2013.[12] In the upper right - hand figure, where changes are divided into composition effect and structural effect, it can be seen that both effects contribute to changes in earnings in a negative direction. Moreover, on balance, the part that can be attributed to the composition effect is greater, and this is consistent with the results of the DFL. The lower left - hand figure shows the composition effect further broken down into the level of contribution of each of the attribute changes, and the lower right - hand figure shows the

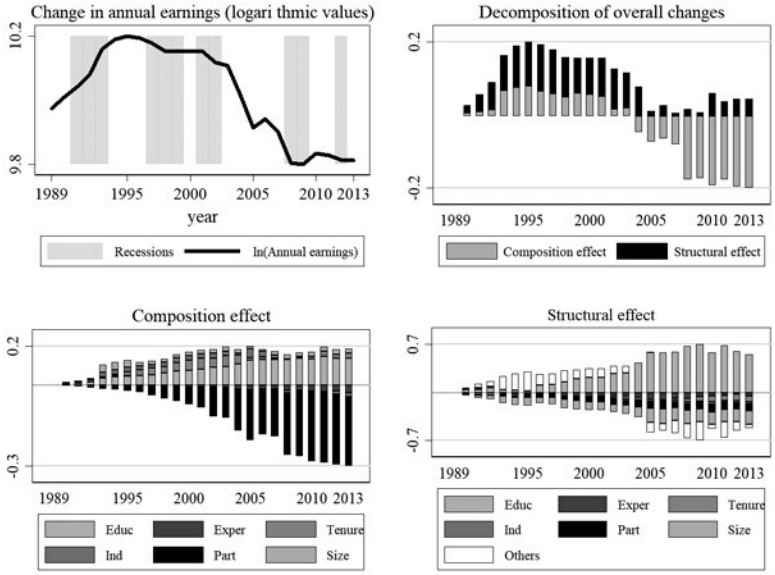
Figure 4a. FFL Decomposition of the First Decile in the Women's Annual Earnings Distribution



Note: The upper left-hand figure shows the change in annual earnings (logarithmic values). The figure to its right divides the overall changes confirmed in the left-hand figure into composition effect and structural effect. The lower left-hand figure breaks the composition effect down further into the following elements: years of education (Educ), potential years of experience (=current age minus age of starting professional employment) (Exper), number of years in continuous employment (Tenure), industrial dummy variables (Ind), the part-time dummy, for which part-time workers are set as 1 (Part), and company size (Size). The structural changes in the right-hand figure are also decomposed in the same way, but the elements that do not belong to the existing categories are included in "Others."
Source: Created by the author based on data from the Basic Survey on Wage Structure

[11] See Appendix 2 for a detailed explanation of the method of FFL decomposition.
[12] Strictly speaking, there was a slight increase from 2009 onward, but it can be said that it is feasible to suggest that it decreases on the whole from 1989 to 2013.

Figure 4b. FFL Decomposition of the Fifth Decile
in the Women's Annual Earnings Distribution



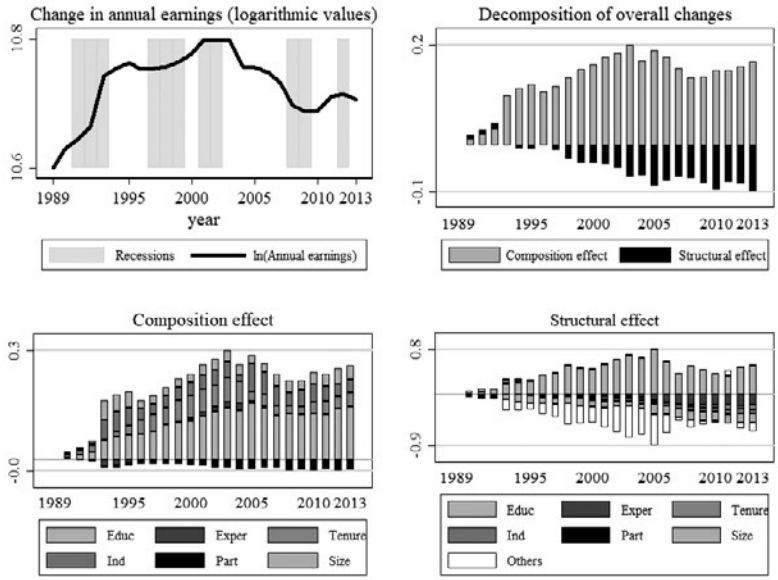
Note: As in note for Figure 4a
Source: Created by the author based on data from the Basic Survey on Wage Structure

overall structural effect broken down into changes in the influence of each attribute on earnings (changes in profitability).

Looking at the composition effect, it is largely the increase in part-time workers and industrial structure changes, such as the increasing predominance of the service industry, that contribute to the drop in annual earnings in the first decile. On the other hand, looking at the factors that constitute the negative structural effect, what is more notable than the changes in the value of each attribute is the substantial "residual" portion that cannot be explained by such changes. This "residual" portion includes various factors, such as policy changes and changes in people's awareness, etc. It is not possible to interpret this further with this FFL decomposition, as it includes only the attributes as explanatory variables. The following section will therefore look in more detail at the "residual portion," with a particular focus on policy changes.

Figure 4b focusses on the changes in the median annual earnings. Firstly, looking at the upper left-hand figure, it can be seen that during periods: 1989 to 2013, the median annual earnings increased until the mid-1990s, subsequently leveled off, and declined from the 2000s onward. Looking at the breakdown of the composition effect and structural effect in the upper right-hand figure, we notice that the decrease in median annual earnings in the 2000s can largely be attributed to the composition effect. This is also consistent with the DFL results. The lower left-hand figure breaks down the composition effect in further detail, showing that it is the increase in number of part-time workers that has a negative influence

Figure 4c. FFL Decomposition of the Ninth Decile
in the Women's Annual Earnings Distribution



Note: As in note for Figure 4a.
Source: Created by the author based on data from the Basic Survey on Wage Structure

on annual earnings.[13] The influence of the increase in the number of workers with a higher education has a positive influence, but the impact of the increase in supply of part-time workers exceeds that influence, and in the 2000s the composition effect makes a minus contribution to annual earnings overall. Unlike the negative impact of the first decile, the structural effect in the middle quantile contributes positively to annual earnings overall. This positive contribution can be largely attributed to the increase in returns from education. Moreover, while the structural effect in the first decile was largely attributed to the "residual" portion, it can be seen that in the middle quantile said portion is relatively small.

Finally, Figure 4c presents the results of the annual earnings distribution of the ninth decile. Firstly, in the upper left-hand figure of Figure 4c, a tendency to increase can be seen in annual earnings from 1989 up to 2003. While there is subsequently a slight decrease,

[13] The questionnaire used in the Basic Survey on Wage Structure, the source of the data used for this analysis, was revised significantly in 2005. It is necessary to keep this in mind when interpreting the results. More specifically, the greatest influence of the changes to the questionnaire in 2005 was the ways in which the survey defines part-time workers, and in this analysis this is assumed to have a significant influence on the change in numbers of part-time workers as one of the attributes that constitutes the composition effect. On the other hand, the changes to the questionnaire in 2005 are thought to have little effect on the estimated values for the structural effect. Given that the numbers of part-time workers have been rising constantly since prior to 2005 in both the first decile and the middle quantile (Figures 4a and 4b respectively), it is hard to imagine that the increase in the number of part-time workers is simply due to the changes to the questionnaire.

annual earnings themselves are higher in 2013 than in 1989. It can therefore be said that the ninth decile saw an increase in annual earnings throughout this period. This is consistent with the observation of an increase in density in the bracket around annual earnings of five million yen in the DFL decomposition. Moreover, the fact that in the upper right-hand figure of Figure 4c the composition effect has a positive influence on annual earnings that exceeds the magnitude of the structural effect is consistent with the fact that the gap in the DFL figure at five million yen can largely be attributed to the composition effect. Next, in the lower left-hand figure of Figure 4c, where the composition effect is decomposed into each attribute's level of contribution, it can be seen that changes such as the increasing numbers of women with a higher education, and the growing tendency for women to remain in jobs long term, increase in company size, and changes in industrial structure have contributed to increases in annual earnings. The effects of increasing numbers of women with a higher education and the growing tendency for women to remain in jobs long term are particularly conspicuous. On the other hand, looking at the decomposition of the structural effect in the lower right-hand figure, it can be seen that the decrease in earnings due to the drop in profitability of number of years of potential experience and drop in profitability of company size (decrease in the income gap between major companies and small- and medium-sized companies) exceeds the effect of the increase in returns from education, and has a negative influence on earnings overall.

To summarize the results of this section, from 1989 to 2013 earnings shift down in the low and medium brackets of women's annual earnings distribution, and increase in the high bracket, and these shifts are largely generated by the composition effect (namely, the impact of changes in worker and company attributes). The FFL decomposition revealed that while the drop in earnings in the low and medium brackets can largely be attributed to the increase in the numbers of part-time workers, the increase in earnings in the high bracket is contributed to by attribute changes such as the increasing numbers of women with a higher education and the growing tendency for women to remain in jobs long term.

However, as mentioned earlier in this section, the analysis using FFL decomposition, which does not include variables such as the policy treatment dummy variable, does not allow for close verification of policy effects, and is aimed only at decomposing the changes into changes in worker and company attributes themselves and changes in their profitability. As a result, in the FFL decomposition, factors other than the attribute composition changes—such as the effect of the partial abolition of the special spousal exemption in 2004 and the changes in awareness due to the recent increase in debate on spousal exemptions—fall under the residual portion of the structural changes. Moreover, as the data from the Basic Survey on Wage Structure used for this analysis does not include data on the existence (or not) of a spouse, or the spouse's annual earnings, etc., the following section shall provide a close analysis of the effects of policy.

IV. Analysis of the Effect of the 2004 Partial Abolition of the Special Spousal Exemption

The decomposition analyses in the previous section do not allow for close investigation of policy effects, as all factors other than each attribute and their profitability are captured by the residual portion of the structural effect. This section therefore closely analyzes those policy effects, with a focus on the 2004 partial abolition of the special spousal exemption.

While there is a significant amount of literature addressing the kind of influence the spousal exemption system itself had on the labor force of married women (Abe and Ohtake, 1995; Higuchi, 1995; Kantani, 1997; Akabayashi, 2006; Hagiwara, 2008; Takahashi, 2010; Takahashi, 2010; Bessho and Hayashi, 2014), there are still few studies analyzing what kind of impact the tax reform in 2004 had on women's labor supply.[14] There is also no research analyzing the influence that tax reform has on annual earnings distribution as a whole. As tax reform only has a direct impact on married women with low earnings, looking at average values for all women is misleading, and looking at the average values for married women overall may produce the result that the effect of the tax reform is insignificant.[15] Furthermore, limiting the sample only to women with low earnings, who are directly affected by tax reform, may also miss new potential findings, because some kind of behavioral change may occur among married women with high earnings who are not directly influenced by tax reform due to changes in the options of their potential labor-supply decisions. This research therefore takes into account the heterogeneity in the earnings groups, by analyzing what kind of impacts the tax reform had on the distribution of earnings, rather than focusing on the average.[16]

As noted in Section II, as both the spousal exemption and special spousal exemption have the characteristic of potentially curbing any tendencies among married women to work long hours, the 2004 partial abolition of the special spousal exemption was expected to lead to an increase in the labor supply of married women. In contrast, looking at the changes in the average values in Table 3, the annual earnings and weekly working hours of married women have decreased since the tax reform. However, it is necessary to practice caution when interpreting these values as a policy assessment. This is due to the fact that the same period also saw a rise in the average earnings of husbands. In this case, it is possible that the increase in husbands' earnings curbed the labor supply of women, and the influence of the tax reform

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[14] There is also a significant amount of research outside of Japan that estimates the effect of tax reform on labor supply, such as Eissa and Liebman (1996), which analyzes the influence of the US Tax Reform Act of 1986. Moreover, Blundell et al. (1998) analyzes the influence of the UK's 1980s tax reform on labor supply.

[15] This point is similar to the analysis of Bitler et al. (2006), which discussed the reform to the US social welfare system. Namely, they emphasize the importance of analyzing effects on the distribution as a whole, rather than evaluating on the basis of averages only.

[16] Sakata and McKenzie (2006) suggest that the 2004 tax reform did not have an effect on decisions on labor participation, but had a small positive effect on working hours. They analyze the average effects using women who work less than 35 hours per week as their sample.

Table 3. Comparison of Descriptive Statistics Before and After the Partial Abolition of the Special Spousal Exemption

	Before reform	After reform	Difference
Unemployment rate (%)	5.3 (2003)	4.10 (2006)	-1.20
Married women			
Weekly working hours	30.37	28.67	-1.69
	(19.11)	(15.93)	(0.54)
Annual earnings (million yen)	1.84	1.78	-0.06
	(1.92)	(1.76)	(0.04)
Husband's annual earnings (million yen)	5.23	5.36	0.13
	(3.32)	(3.23)	(0.04)
Hourly wage rate (100 yen)	8.81	8.95	0.14
	(8.64)	(8.61)	(0.09)
Single women			
Weekly working hours	36.18	37.46	1.28
	(18.38)	(17.56)	(1.33)
Annual earnings (million yen)	2.13	2.25	0.11
	(1.40)	(1.44)	(0.06)
Hourly wage rate (100 yen)	9.34	9.55	0.21
	(2.66)	(2.34)	(0.92)

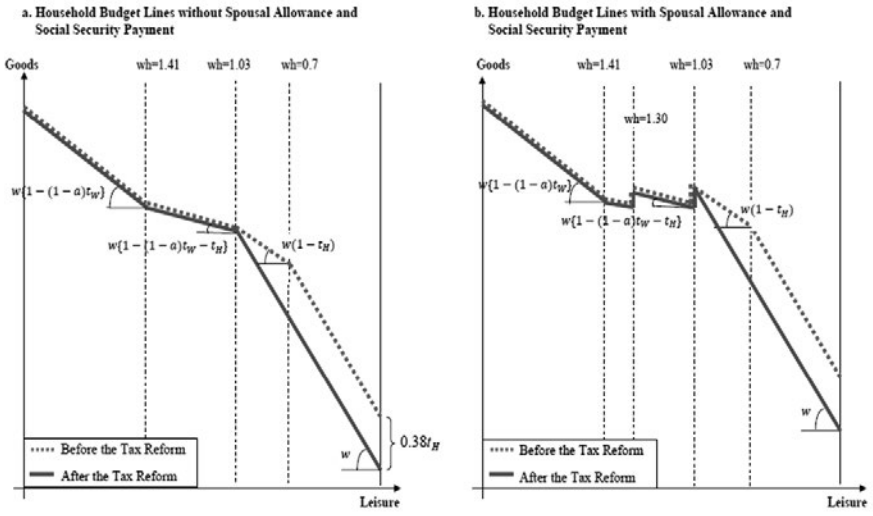
Source: Calculated by the author from the Keio Household Panel Surveys, 2004-2007. Values of averages and standard deviations are shown in parentheses. Cited from Yokoyama (2015).

may have become no longer visible.

Let us now proceed to look at in what way the household budget line shifted in response to the 2004 reform, using the simplest case, as shown in the left-hand figure of Figure 5. This figure portrays the household budget line before and after tax reform, assuming a theoretical model in which the wife chooses her own optimal working hours, with the income of the husband treated as exogenous. We start by considering the Figure 5 budget line which is drawn based on the assumption that there were no other changes in exogenous variables, such as an increase in husbands' income when the tax reform occurred. It is important to note that a kink point at 1.03 million yen in the budget line existed prior to tax reform due to the fact that 1.03 million yen has been the maximum tax-free earnings for income tax of salaried workers from prior to the tax reform. However, as the 700,000 yen and above group were subject to a system by which special spousal exemption was gradually decreased along with an increase in earnings, the partial abolition of special spousal exemption in the case of spouses with earnings of 1.03 million yen or less caused the incline in the budget line from 700,000 yen to 1.03 million yen or under to become sharp. Moreover, as taxpayers with spouses with earnings of 1.03 million yen or less lost the exemption applied to them, this section of the household budget line dropped, and consequently changed from the dotted line to the solid line.

Furthermore, as noted in Section II-2-4, many companies have set 1.03 million yen as

Figure 5. Impact of the Partial Abolition of the Special Spousal Exemption on Household Budget Lines



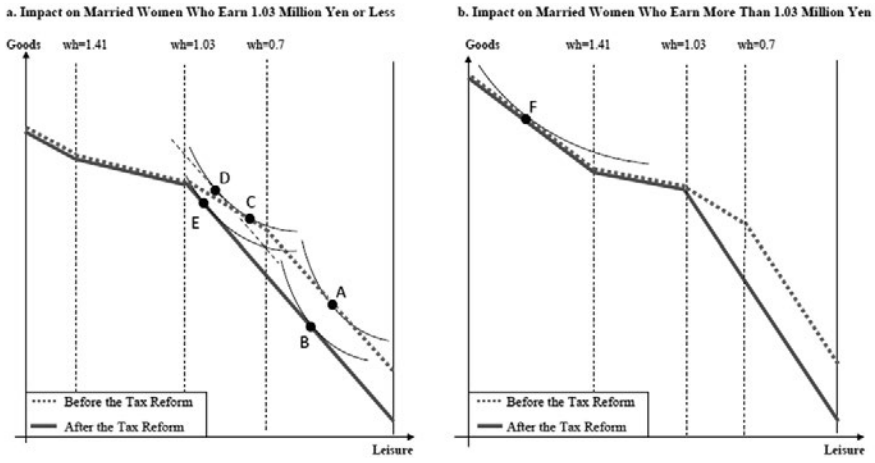
Source: Cited from Yokoyama (2015)

the amount of spouse's earnings from which employees cease to be eligible for a company spousal allowance, based on the fact that in the tax system 1.03 million yen is the point that the spousal exemption ceases to apply. For households with a taxpayer employed at such a company a drop in budget line can be observed where spouse's earnings are 1.03 million yen.

The right-hand figure of Figure 5 provides a more realistic budget line that also takes into account the budget line drop related to spousal allowances and the 1.3 million yen ceiling in social insurance premiums. The factor that is common to both the simplified figure on the left and the more realistic figure on the right is that the kink point generated by the special spousal exemption shifted from 700,000 yen to 1.03 million yen due to the 2004 tax reform. This caused the kink point at 1.03 million yen to become more conspicuous than before. This allows us to form the hypothesis that "this change in the budget line appears to have led to greater prominence of the conventional cluster in the earnings distribution at 1.03 million yen."

Figure 6 looks at the influence on working hours for each income category. The left-hand figure shows that while the 2004 tax reform increased the labor supply of low earners with earnings less than 1.03 million yen, it had no influence on spouses with earnings of 1.03 million yen or over. In the left-hand figure, while the group with annual earnings under 700,000 yen experienced only a positive income effect, the group with annual earnings between 700,000 yen and 1.03 million yen experienced both a positive income effect and a positive substitution effect, and therefore an increase in working hours. On the other hand, as the right-hand figure does not show a shift in the budget line at 1.03 million and above, there is no change in the optimal point.

Figure 6. Impact of the Partial Abolition of the Special Spousal Exemption on the Labor Supply of Married Women

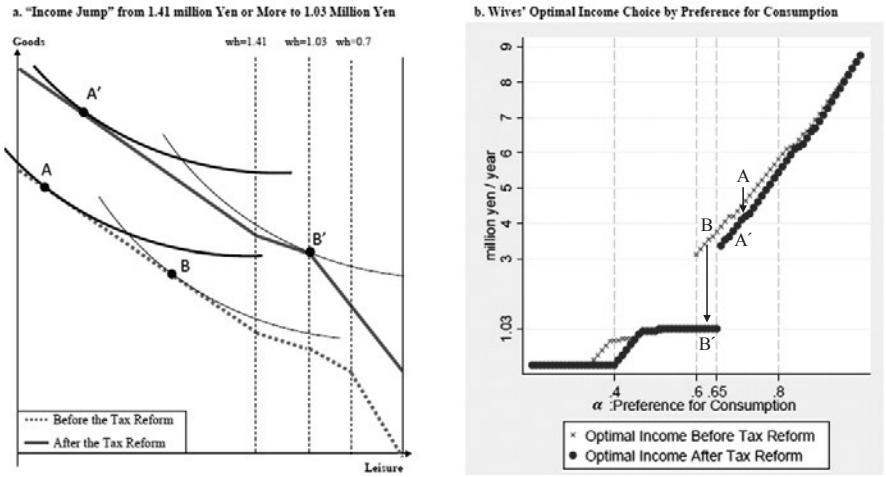


Source: Cited from Yokoyama (2015)

Up until this point, we have conducted analysis based on the assumption that there were no changes in the exogenous variables other than the tax reform, but Figure 7 works on the basis that the average income of married men increased at the time of reform, as confirmed from the descriptive statistics in Table 3, looking at what kind of changes occurred to the working hours of wives with high incomes—who would "normally have been expected not to have been influenced by the tax reform"—in cases where the husband's income increased at the same time as the tax reform. Let us start by assuming that the effect of the increase in husbands' income is added to the budget line after the tax reform. In this case, it is for example conceivable that a spouse who was originally at A, with earnings of 1.41 million yen or above, may decrease their working hours from A to A' due to income effect in response to the increase in their husband's income. On the other hand, let us assume that there are people such as spouse B, who was earning 1.41 million yen or above but does not have such a strong preference to consumption as spouse A. In such circumstances, there are cases in which if the husband's income increase is sufficiently large, spouse B jumps to a new kink point at 1.03 million yen. Yokoyama (2015) used a simulation to demonstrate that there are cases in which wives who were earning 1.41 million yen or more decreased their earnings to 1.03 million yen.

In the right-hand figure of Figure 7, we have calculated the optimal earnings for each preference for consumption parameter before and after the 2004 tax reform. Namely, the aim is to investigate the relationship between preference for consumption and the "income jump." More specifically, the figure presents the results of a simulation of wives' optimal earnings for each value of α, where α is the parameter value for preference for consumption in relation to the Cobb-Douglas utility function. The dotted line shows the optimal wives' earnings in 2003, and the bold line shows the optimal earnings in 2004. Of course, given that

Figure 7. Changes in Labor Supply of Medium- to High-Income Married Women in Response to Both the Partial Abolition of the Special Spousal Exemption and Increase in Husband's Income

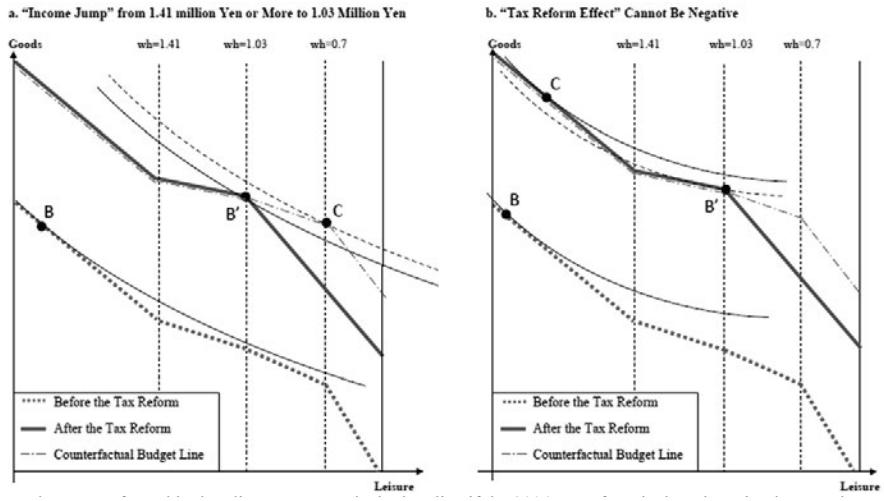


Source: Cited from Yokoyama (2015)

optimal earnings are higher the stronger the preference for consumption, the line rises diagonally up to the right, but what is more important is that when an increase in the husband's annual earnings and tax reform occurred at the same time, there may be cases in which the wife's optimal earnings jump from 1.41 million yen or above to 1.03 million yen in the scope of α. In terms of the left-hand figure discussed above, the people within this scope of α can be interpreted as people who shift from B to B'. Therefore, while it is necessary for the preference for consumption to be strong to a certain extent in order to belong to the high-income group before the tax reform, the jump from 1.41 million yen or above to 1.03 million yen does not occur if the preference for consumption is "excessively strong." This tells us that women with very strong preference for consumer goods, whose earnings were originally very high, will not suddenly decrease their annual earnings to 1.03 million yen because their husband's income increases or because the spousal exemption system is changed. In other words, the implication here is that the "income jump" to 1.03 million yen tends to be realized among married women with medium to high incomes (incomes that are not excessively high).

The left-hand figure of Figure 8 shows that there are cases in which the decrease in working hours accompanying the "income jump" is alleviated due to the small positive "tax reform effect." Let us also look at the right-hand figure, at whether there are cases in which the "tax reform effect" is negative. Firstly, let us assume cases in which spouses earning 1.41 million yen or more shifted to point C as a result of the increase in their husband's income, on the premise that the tax reform had not occurred. In this case, if it is suggested that if they made a jump from point C to 1.03 million yen due to the actual occurrence of the tax reform, this should make the effect of tax reform negative, but it is important to note that such a

Figure 8. Decomposition of the "Income Jump" into the Effect of Husband's Income and Effect of Tax Reform



Note: The counterfactual budget line represents the budget line if the 2004 tax reform had not been implemented.
Source: Cited from Yokoyama (2015)

situation is not possible. This is because as this person had originally chosen point C at a time when it was possible to choose both point B' and point C, this means that point C was always a more preferable option than point B'. Therefore, they would not choose point B' even with the occurrence of the tax reform. Namely, the jump from 1.41 million yen or above to 1.03 million is not attributed to a negative effect from tax reform.

Let us summarize the theoretical implications noted thus far:

(1) Under certain exogenous variables, the 2004 tax reform increases the working hours of spouses with earnings under 1.03 million yen. There is no influence on married women with earnings of 1.03 million yen or over.

(2)Changes in the exogenous variables that potentially curb work, such as increase in the husband's income, may give rise to a jump in earnings from 1.41 million yen or above to 1.03 million yen. This tends to occur in the medium- to high-income brackets.

(3)However, even in this case "tax reform effect" is not negative. (In both cases, the effect of the tax reform itself is not negative.)

(4)The decrease in working hours accompanying the "income jump" is largely attributed to the negative "husband's income effect," and is in some cases alleviated by the small positive "tax reform effect."

(5)The effect of the tax reform on employment choice is positive in theory, but as it is highly conceivable that there are also cases in which the decline in reservation wage along with the tax reform is not so great that it falls below the market wage, it is difficult to make theoretically firm statements with regard to the external margin.

Yokoyama (2015) investigates the hypothesis indicated by the model, using data from the KHPS (2004 - 2007). Firstly, it examines how married women in each income group reacted to the tax reform, using a difference - in - difference estimation under a quantile regression framework.[17] The results of the analysis indicate that there was not a significant influence on labor participation, but the influence of tax reform on annual earnings and working hours was significantly positive in the low-income bracket.[18] This seems to indicate the importance of not only looking at the average effect, but also estimating the influence on each income bracket. In contrast with the effect on the low-income bracket, the influence of tax reform on women with high earnings is not significant, and this corresponds with the hypothesis acquired from the theoretical model of a scenario in which there is no change to exogenous variables.

Yokoyama (2015) went on to adopt the FFL method to investigate whether or not married women with medium to high earnings actually decreased their earnings due to the negative effect of increase in their husband's income (rather than the influence of tax reform). The FFL method allows us to break the composition effect and structural effect down further into the level of contribution of each of the individual explanatory variables. As the structural effect attributable to the treatment dummy variable represents the changes in the coefficient of the treatment dummy variable, it corresponds to the interaction term in the difference - in - difference analysis. This structural effect that can be attributed to the treatment dummy variable is also positive and significant in the low-income bracket in the FFL decomposition, indicating that the tax reform contributed to the increase in earnings of married women with low earnings. Moreover, the negative effect of attribute changes that can be attributed to the husband's earnings is greatest in size among married women with medium to high earnings as shown in Figure 9, indicating the possibility that a discontinuous "income jump" actually occurred among married women in the medium to high earnings brackets in response to increase in their husband's earnings. This is because the theoretical model shows that this "income jump" can largely be attributed to a negative effect generated by the increase in husband's earnings rather than the effect of tax reform, and the FFL result is consistent with this theoretical prediction.

The results from the DFL decomposition shown in Figure 10 visually demonstrates that married women with low earnings and high earnings were gathered around the center of the

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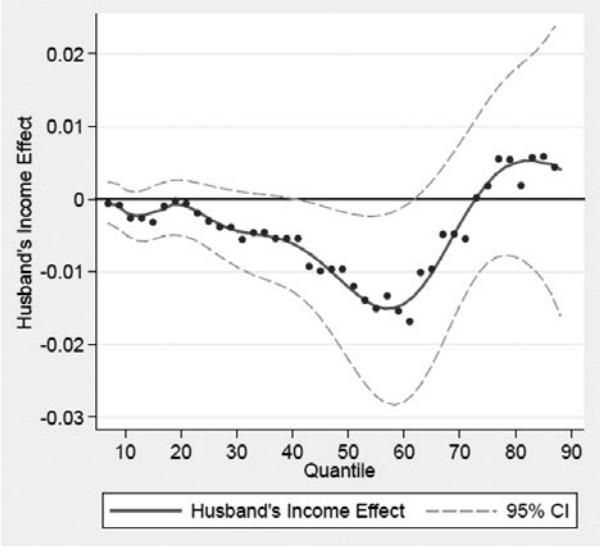
[17] See Yokoyama (2015) for tables and graphs of the results.

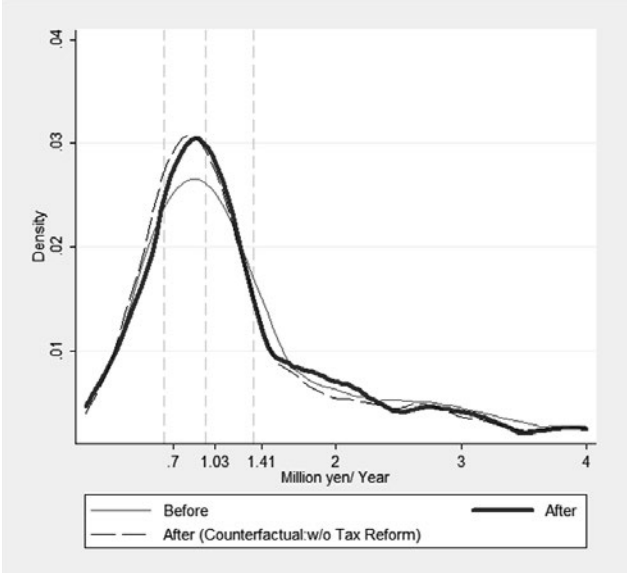
[18] Workers are able to adjust their earnings not only by adjusting working hours or the existence or not of employment, but also effort in the work place, choice of job, and means of accepting earnings (e.g. salary, dividends, or capital gains). As is often argued in public finance literature, people are able to adjust their disposable income by changing behaviors other than working hours in order to decrease their tax liability. For example, in the "new tax responsiveness" literature, the response of taxable income to the marginal tax rate is often treated as a statistic of the change in behavior toward taxation (Meghir and Phillips, 2008; Feldstein, 1995). Moreover, using earnings rather than working hours in order to analyze the influence of Japan's tax reform allows us to evade the concern that reform may lead to changes in behavior other than changes in working hours. Thus, this section discusses the influence that tax reform had on both earnings and working hours.

Figure 9. Composition Effect Attributable to Increase in Husband's Income in the FFL Decomposition, by Quantile



Note: "Husband's income effect" refers to the composition effect attributable to an increase in the husband's income in the FFL decomposition
Source: Cited from Yokoyama (2015)

Figure 10. Actual Distribution and Counterfactual Distribution (DFL decomposition result) of Married Women's Annual Earnings



Source: Cited from Yokoyama (2015)

annual earnings distribution from 2004 onward. As a result, concentration around 1.03 million yen became more conspicuous following revision to the tax system. As such, it is a fact that the tax reform contributed to increasing the earnings of married women with low earnings, and looking at the counterfactual annual earnings distribution, it also becomes apparent that if the tax reform had not been implemented, the annual earnings distribution would have seen a greater downward shift. In contrast, it is also a fact that the tax reform made the kink point in the household budget line at 1.03 million yen more conspicuous. Thus, it can be interpreted that there were cases in which married women in the medium to high earnings brackets, who were not directly influenced by the tax reform, decreased their annual earnings to 1.03 million yen, due to the fact that there were changes in their potential choices and a negative shock such as an increase in husbands' income occurred concurrent with the reform.

As a result, it can be interpreted that the decrease in earnings generated by the significant negative effect of the husband's income offsets the increase in the earnings of married women in the low earnings bracket, thereby leading to the slight decrease in the average earnings of married women shown in Table 3.

In summary, the partial abolition of the special spousal exemption in 2004 contributed to the increase in the labor supply of married women, but also made the conventional distortion at 1.03 million yen more conspicuous. Consequently, it is predicted that as long as the remaining spousal exemption exists, when a change occurs in the exogenous variables that curbs wives' labor supply, such as increase in the husband's income, etc., there is a greater likelihood than before of a drop in the earnings of medium to high income earners to 1.03 million yen. The credibility of this conclusion is also supported by the fact that the concentration around the 1.03 million yen threshold is in fact increasing year by year.

V. Conclusion

This chapter began by explaining the characteristics of Japan's tax system that generate employment adjustment, and introduced the current state of employment adjustment. Section II looked particularly at the standard and special spousal exemption systems, and discussed to what extent people are adjusting their employment due to consciousness of factors such as the 1.03 million yen ceiling and the 1.3 million yen ceiling. In addition to the influence of the spousal exemptions, the concentration of annual earnings around 1.03 million yen is also due to the fact that 1.03 million yen is also the maximum amount of income tax-free earnings, and increasingly used by many companies as the threshold beyond which they no longer provide spousal allowances. However, investigation of the results of the 2011 General Survey on Part-time Workers (Ministry of Health, Labour and Welfare) revealed that women who adjust their employment due to concerns regarding standard or special spousal exemptions account for 37.7% of the females who responded that they had adjusted employment in the previous year.

In Section III we proceeded to utilize data from the Basic Survey on Wage Structure

(Ministry of Health, Labour and Welfare) from 1989 to 2013 to conduct decomposition analysis. This showed that among women in the lower and middle brackets of women's annual earnings distribution, earnings shifted down from 1989 to 2013, and were more concentrated around 1.03 million yen in 2013. For women in the high earnings bracket, earnings were higher in 2013 in comparison with 1989. Decomposition analysis including DFL and FFL decomposition revealed that these distribution changes are largely generated by changes in the composition of attributes (composition effect). More specifically, it was shown that while the drop in earnings in the lower and middle brackets can largely be attributed to the rise in the numbers of part-time workers, the increase in earnings in the high earnings bracket is contributed to by attribute changes such as the increase in women with a higher education and the growing numbers of women remaining in jobs long term.

However, these DFL and FFL decomposition analyses are only aimed at breaking down the changes into changes in worker and company attributes and changes in the profitability of each of those attributes, and does not allow for close investigation of policy effects. In Section IV we therefore analyzed the influence of the 2004 partial abolition of the special spousal exemption on the working hours and earnings distributions of married women. The theoretical model demonstrated that the tax reform caused the kink point in the budget line of married women at 1.03 million yen to become conspicuous, and made theoretical predictions about the impact of the tax reform on labor supply for each income group. In the empirical analysis, we used data from the Keio Household Panel Survey (2004-2007) to estimate the impact of the tax reform using quantile difference-in-difference estimation and new techniques for decomposition analyses (FFL and DFL decompositions) proposed in recent years. These empirical analyses produced the following results to support the theoretical model: among married women in the low earnings bracket, the 2004 tax reform increased working hours and earnings, while on the other hand, among married women with annual earnings of 1.03 million or over—who were not directly affected by the tax reform—there were cases in which the concurrent rise in husbands' income brought them their annual earnings to the kink point, namely the 1.03 million yen threshold, that was made more conspicuous due to the tax reform. This is a fact that was demonstrated both by the simulation in the theoretical model, and also by the empirical analysis using actual data.

This consequently demonstrated that there was an increase in income in the low income bracket and a discontinuous income shift toward 1.03 million yen in the medium to high income brackets, ironically causing the conventional "distortion" in the earnings distribution of Japanese married women at 1.03 million yen to become more pronounced. This result is also consistent with the concentration of earnings toward 1.03 million yen over the years up to 2013 in the women's annual earnings distribution for 1989 and 2013 ascertained using the Basic Survey on Wage Structure.

These studies therefore indicate that while the special spousal exemption was partially abolished in 2004, as long as the remaining spousal exemption continues to exist, there is a greater likelihood than before for a drop in earnings to 1.03 million yen to occur in the medium to high income married women if there is a shock on exogenous variables that have

the effect of curbing the wife's labor supply, such as an increase in the husband's income. In other words, this suggests that when policies are implemented without investigating theoretical predictions of the potential outcomes based on consideration of the budget lines in economics, tax reform may generate unintended effects.

Moreover, while the analysis in Section IV only looks at the period around the time of the tax reform measures (namely, 2003 to 2007), there is an undeniable possibility that awareness of the impact of the reform measures rose gradually, after some delay. It is also conceivable that there are a growing number of people whose behavior is influenced by awareness of the 1.03 million ceiling that has arisen due to the recent increase in discussion on spousal exemptions. This is consistent with the recent discourse on tax salience, and it is possible that the concentration around the 1.03 million yen ceiling may continue in the future (Finkelstein, 2009; Chetty et al., 2009). In the situation, with the special spousal exemption partially abolished, there is a substantial possibility that the concentration toward 1.03 million yen will also continue in the future should some form of exogenous shock occur.

Lastly, what is important is that policies should be proposed on the basis of economic theory and developed such that they do not create unexpected kinks in the household budget line. Furthermore, while a topic that must be approached with great caution, there is also an argument that policies must be set out such that they are easy for normal citizens to understand and can be interpreted without misunderstandings. As complex tax systems carry the possibility that they may not be correctly understood by the people, it is possible that they may develop in a different direction from which the government intended. We therefore conclude this chapter by expressing our hope that progress will be made in developing and providing the data needed for neutral policy assessment from an objective viewpoint, thereby allowing closer empirical analysis based on economic theory to guide policies in a more positive direction.

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Appendix 1
The DiNardo-Fortin-Lemieux (DFL) Decomposition

This appendix explains the DiNardo, Fortin and Lemieux (DFL) decomposition in more detail (DiNardo, Fortin and Lemieux, 1996; DiNardo, 2002; Lemieux, 2002). By using a semiparametric technique beyond the limits of decomposing averages, this technique allows us to visually break down the distribution changes. The merit of this method is that the distribution changes can be visually decomposed into two elements: namely, changes in composition of attributes (composition effect) and changes in the influence of the attributes on annual earnings (structural effect). Here, using a sample of women's annual earnings in 1989 and 2013, it is possible to break the distribution down into composition effect and structural effect by comparing the actual annual earnings distribution for each year with a counterfactual distribution depicting what the distribution would have been in 2013 if worker and company attributes were as they were in 1989.

Below we provide a simple description of the steps of DFL decomposition, with the comparison between the distributions for 1989 and 2013 as an example. Firstly, the earnings distribution in 1989 is expressed as:

$$f^{1989}(Y) = \int f^{1989}(Y \mid X) h(X \mid t = 1989)\, dX \tag{A.1}$$

Where $f^{1989}(Y \mid X)$ in this equation is the earnings determination mechanism in 1989 that maps the workers and company attributes X to the annual earnings distribution Y. Likewise, the earnings distribution in 2013 is expressed as:

$$f^{2013}(Y) = \int f^{2013}(Y \mid X) h(X \mid t = 2013)\, dX \tag{A.2}$$

The counterfactual earnings distribution for 2013, representing the case that the X distribution is fixed at the X distribution for 1989, is expressed as:

$$f_{1989}^{2013}(Y) = \int f^{2013}(Y \mid X) h(X \mid t = 1989)\, dX \tag{A.3}$$

However, as in the vector X there are generally many explanatory variables and thereby integration is conducted over a very high dimension, it is difficult to directly calculate this counterfactual distribution. In the DFL approach the following reweighting technique is therefore used in order to overcome this problem. In this case, the counterfactual distribution in Equation (A.3) can be rewritten as follows:

$$f_{1989}^{2013}(Y) = \int f^{2013}(Y \mid X) h(X \mid t = 1989)\, dX = \int \omega f^{2013}(Y \mid X) h(X \mid t = 2013)\, dX \tag{A.4}$$

ω in this equation is defined as $\omega \equiv h(X \mid t{=}1989)/h(X \mid t{=}2013)$. This ω can be rewritten using the Bayes' theorem as follows:

$$\omega = \frac{h(X \mid t = 1989)}{h(X \mid t = 2013)} = \frac{P(X)P(t = 1989 \mid X) / P(t = 1989)}{P(X)P(t = 2013 \mid X) / P(t = 2013)} \tag{A.5}$$

Conditional probabilities $P(t=1989 \mid X)$ and $P(t=2013 \mid X)$ represent the propensity scores that indicate the likelihood of appearing as a sample for each year when taking the attribute X. In this analysis, these propensity scores are calculated as predictive values using a probit or logit model. On the other hand, $P(t=1989)$ and $P(t=2013)$ represent the proportion of the sample for each year among the pooled data for both years. Therefore, by using the weight ω calculated as in Equation (A.4) with these materials, the counterfactual distribution is estimated using kernel density estimation.

Appendix 2
The Firpo-Fortin-Lemieux (FFL) Decomposition

In the Firpo-Fortin-Lemieux (FFL) decomposition the total change in the explained variable Y (in this case, earnings) is broken down into the composition effect and structural effect, and they are further decomposed into the contributions of each explanatory variable. In this sense, the Oaxaca-Blinder decomposition (OB) would be the counterpart of this method (Jones, 1983; Jones and Kelley, 1984; Oaxaca and Ransom, 1999; Jann, 2008). However, two characteristics in the FFL decomposition differentiate it from the classic OB decomposition. The first of these characteristics is that in FFL the usual explained variable Y is replaced with the recentered influence function (RIF) of Y. This means that while using the classic OB decomposition it is only possible to decompose the mean values, this enables us to decompose not only the mean but the overall distribution of Y (Firpo et al., 2007, 2010).

Conceptually, the influence function (*IF)* represents the influence of increasing an individual observation (Y) on the distributional statistic (such as means, dispersions, quantiles, and Gini coefficients). The objective here is to represent the distributional statistic of Y as a function of X. The process of fulfilling this objective is divided into two steps: (1) changes in $X \rightarrow$ changes in the distribution of Y, and (2) changes in the distribution of $Y \rightarrow$ changes in the distributional statistic (e.g. q_τ).

As the *IF* only does step two, the Law of Iterated Expectations (LIE) is required to connect steps one and two, and utilizing LIE generates the necessity of using the RIF. The key point here is that the RIF has the highly convenient feature that its expectation is equal to its distributional statistics (in this case, q_τ) as follows:

$$q_\tau = E[\mathrm{RIF}] = E_X(E[RIF|X]) \tag{A.6}$$

As shown in Equation (A.6), applying the LIE to the expectations of RIF, which are equal to the distributional statistics, allows us to represent the distributional statistics as a function of X. Thus, whereas using the IF it is only possible to conduct step two, by using RIF it is possible to connect step one to step two, and possible to express the distributional statistics of Yas a function X (Firpo et al., 2007, 2010).