PRI Discussion Paper Series (No.21A-2)

Effects of Deductions on the Tax Burden Reduction and the Redistribution of the Income and Resident Taxes

Research Center for Social Systems, Shinshu University; Senior Researcher, Policy Research Institute of the Ministry of Finance

Taro Ohno

Researcher, PolicyResearch Institute, Ministry of Finance

Junpei Sakamaki

Graduate School of Agricultural and Life Sciences, The University of Tokyo; Senior Researcher, Policy Research Institute of the Ministry of Finance

Daizo Kojima

May 2021

The views expressed in this paper are those of the authors and not those of the Ministry of Finance or the Policy Research Institute.

Research Department Policy Research Institute, MOF
3-1-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8940, Japan
TEL 03-3581-4111

Effects of Deductions on the Tax Burden Reduction and the Redistribution of the Income and Resident Taxes*

Taro Ohno**

Junpei Sakamaki***

Daizo Kojima****

Abstract

The status of the deductions in Japan's income and resident tax systems is an important policy issue. To analyze this issue, it is essential to have an evidence-based understanding of the situation regarding the effect of deductions on the tax burden reduction and income redistribution. To this end, we use household microdata from the National Survey of Family Income and Expenditure during 1994–2014 to conduct a quantitative evaluation of the burden reduction and redistribution effects of deductions over a 20-year period. Initially, the higher the income group, the higher the burden reduction effect of the deductions (ratio of deductions to gross income). However, the advantageous treatment of the higher income group has been decreasing annually and, recently, the burden reduction effect has reached a proportional structure. Against this background, the redistribution effect of deductions has been increasing and now plays a more important role in correcting inequality. We show that the changes to the system made a significant contribution to this end.

JEL Classification: C15, H24

Keywords: Income tax, resident tax, deduction, National Survey of Family Income and Expenditure

* Part of this study is supported by Grants-in-Aid for Scientific Research (Basic Research (C) (General) 18K01647, 21K01538) and uses survey data from the National Survey of Family Income and Expenditure of the Statistics Bureau of the Ministry of Internal Affairs and Communications. The content of the paper presents entirely the findings of the authors and does not represent the official views of their organizations.

** Research Center for Social Systems, Shinshu University; Senior Researcher, Policy Research Institute of the Ministry of Finance

*** Researcher, Policy Research Institute, Ministry of Finance

**** Graduate School of Agricultural and Life Sciences, The University of Tokyo; Senior Researcher, Policy Research Institute of the Ministry of Finance

1. Introduction

In Japan, the review of the household tax burden has started to be recently considered as essential for maintaining the social insurance system, and there is also a call to reexamine the income and resident taxes. As such, the status of the deduction system has also become an important policy issue, with observers noting that the generous tax deductions significantly eroded the tax base.

These points are discussed in the international research on tax expenditure. Tax expenditure is represented by specific tax rules in the form of deductions, exclusions, credits, and favorable rates, which benefit specific activities, industries, or taxpayer groups (Burman et al., 2017, p. 109), which is why the burden reduction due to tax expenditure has been considered in the literature (Burman et al., 2008, 2017; Poterba, 2011; Altshuler and Dietz, 2011; Albarea et al., 2015; Avram, 2018). By contrast, in Japan, the income and resident tax systems mainly make extensive use of deductions, with several academic initiatives measuring the scale of the deductions and the resulting tax base erosion degree (Morinobu and Maekawa, 2001; Tajika and Yashio, 2006a, 2006b, 2008, 2010; Uemura, 2008; Mochizuki et al., 2010; Kaneda, 2014; Morinobu and Nakamoto, 2013; Matsuda et al., 2013; Nakamoto, 2014; Yashio and Hachisuka, 2014; Uemura and Adachi, 2015; Ohno et al., 2020). Furthermore, attempts to measure the contribution of deductions in the research on tax redistribution effects have also been made (Mochizuki et al., 2010; Miyazaki and Kitamura, 2016; Kaneda, 2018; Doi, 2017; Miyazaki et al., 2019). However, the Japanese government's Tax Commission has indicated that the status of the deduction system needs to be revised to restore the income redistribution function, given that the tax burden relief increases for higher income groups (Tax Commission, 2016, p. 6). As a result, the status of the deduction system has become an important policy issue for the tax system, with increasing discussions focusing on the burden reduction effect of deductions. Therefore, while there is increasing interest in the impact of the tax burden reduction through deductions and the associated impact on the redistribution effect, few studies quantitatively evaluate them. Further, there is little evidence to indicate (i) which taxpayer groups receive the greatest benefit from the tax burden reduction (i.e., the structure of the tax burden reduction effect) and (ii) how the tax burden reduction associated with deductions changes the effect of income disparity correction through tax (i.e., the impact on the redistribution effect). As such, there is no adequate analysis of the situation to enable discussions on the future of the deduction system.

In this study, we thus attempt to use household microdata (questionnaire based) from the National Survey of Family Income and Expenditure (NSFIE, 1994, 1999, 2004, 2009, 2014) to focus on Japan's income and resident taxes over 20 years and quantitatively evaluate the tax burden reduction and redistribution effects of deductions.[1] To this end, it is essential to consider what deductions are applied

[1] Examples of research conducting analysis of Japan's taxation and social insurance systems using microdata from the NSFIE include Tanaka and Shikata (2012, 2019), Tanaka et al. (2013), Kitamura and Miyazaki (2013), Miyazaki and Kitamura (2016), Ohno and Kodama (2017), Ohno et al. (2018), Kaneda (2018), Miyazaki et al. (2019), and Matsumoto et al. (2020).

to each household in the tax system, which is why we conducted a microsimulation by applying the actual tax system to the household income and family composition recorded by the questionnaire to estimate the deduction and tax amounts. Subsequently, to comprehend the tax burden reduction effect due to deductions, we estimated the size of the difference in the tax amount from the application of deductions. Specifically, we used the method of Burman et al. (2017) to estimate the tax burden reduction amount due to deductions for each household as follows. First, we applied a tax estimation process that reflects the actual tax system to estimate the tax amount when deductions were applied (tax amount a). Second, we estimated the hypothetical tax amount when deductions were not applied (tax amount b). Since deductions reduce tax, tax amount b is always higher than tax amount a. Finally, the difference between the two tax amounts (= tax amount b – tax amount a) is considered as the amount of the tax burden reduction due to deductions.

Moreover, there have been several research attempts using individual household data on the redistribution effect of the Japanese tax system and social insurance system.[2] One literature stream focuses on the redistribution effect in terms of the change in the income disparity due to the burdens and benefits of the tax and social insurance systems; however, the comparison of this redistribution effect between various points in time includes the impacts of not only the "system reform factors" associated with system changes, but also of the "non-system reform factors" associated with changes such as income distribution and demographic composition. To address this issue, we used a similar approach to that of Bargain and Callan (2010) and Bargain (2012) by separating the changes in the redistribution effect of the deductions into system and non-system reforms. By this approach, we consider "the impact on the redistribution effect of changes such as income distribution and demographic composition in the case where no system reform was made" (non-system reform factors), while also extracting the "true contribution to redistribution effect of system reforms themselves" (system reform factors).[3]

The remainder of this paper proceeds as follows. In Section 2, we present the background of the changes to the income and resident tax systems since 1994. In Section 3, we explain the data and the estimation method for the income and resident tax amounts. In Section 4, we analyze the structure of the burden reduction effect of deductions and, in Section 5, we consider the impact of deductions on

[2] Examples of research on the redistribution effect of Japan's tax and social insurance systems include Abe (2000), Ohishi (2006), Fukawa (2006), Tachibanaki and Urakawa (2006), Tanaka and Shikata (2012), Kitamura and Miyazaki (2013), Uemura and Adachi (2015), and Doi (2015). Moreover, research on the factor decomposition of the redistribution effect is also in progress, as follows. First, there are attempts to decompose the redistribution effect of the tax and social insurance systems into factors within and between age brackets. Examples of such research attempts include Oshio (2002, 2009), Ohtake (2005), and Oshio and Urakawa (2008). Second, there are attempts to decompose the redistribution effect into tax rate and deduction factors. Examples include Miyazaki and Kitamura (2016), Kaneda (2018), and Miyazaki et al. (2019). Third, there are also attempts to decompose the redistribution effect of tax and social insurance premiums into system and non-system change factors. An example is Ohno et al. (2018).

[3] Bargain (2014) surveys the factor decomposition of system and non-system change factors for such a redistribution effect.

the redistribution effect. Finally, in Section 6, we draw conclusions and discuss the implications of the results.

2. Background of the changes in the income and resident tax systems[4]

Here, we present the historical changes in Japan's income and resident tax systems, considering seven deductions—basic, spousal (including special spousal deductions), dependent, social insurance premium, employment income, public pension, and elderly deduction—and two tax credits—fixed rate tax reduction and adjustment credit. Tables 1 and 2 show the history of the changes in the income and resident tax systems. Since the changes to the resident tax system are the same as those made to the income tax system, the subsequent discussion focuses on the history of changes to the deduction system for income tax.

The basic deduction was uniform, at JPY 350,000, until 1994 and then increasing to a uniform JPY 380,000 in 1995. In 2020, the deduction changed, so that the maximum deduction amount became JPY 480,000 and was then reduced in stages when the total income exceeded JPY 24 million; it was then reduced to zero when the total income exceeded JPY 25 million.

Regarding spousal deductions, until 1994, the income requirement for eligibility was an income of no more than JPY 350,000. The general deduction amount was JPY 350,000 and JPY 450,000 for people aged 70 and over. In 1995, the deduction was expanded by increasing the income requirement and the various deduction amounts by JPY 30,000. In 2018, the system changed, retaining the same income requirement and maximum deduction amount of JPY 380,000, but reducing the deduction amount to zero when the total income exceeded JPY 10 million. Since 2020, the income requirement for spousal deductions has been expanded to JPY 480,000, but the deduction amount remained unchanged. For special spousal deductions, until 2003, an additional deduction of up to a maximum of JPY 380,000 was applicable to the eligible spouses. However, in 2004, the additional application of the special deduction for eligible spouses was abolished. In 2018, the maximum income requirement for spouses eligible for deduction was increased from of JPY 760,000 to JPY 1.23 million, and in 2020 it was increased again to JPY 1.33 million.

Regarding dependent deductions, until 1994, the eligibility income requirement for dependent family members was an income of no more than JPY 350,000, and the general deduction amount was JPY 350,000 and JPY 500,000 for dependents aged between 16 and 22, JPY 450,000 for elderly dependents (70 years old and over), and JPY 550,000 for cohabiting elderly dependents. In 1995, the income requirement and various deductions increased by JPY 30,000, expanding the application scope and value of the dependent deduction. In 1998, the deduction for specified dependents increased to JPY 580,000 and, in 1999, the deduction for young dependents (aged up to 15) increased from JPY 380,000 to JPY 480,000, while the deduction for specific dependents increased from JPY 580,000 to

[4] Background of the changes in the tax system is based on Ohno et al.(2020).

JPY 630,000. Subsequently, in 2000, the deduction for young dependents decreased from JPY 480,000 to JPY 380,000, and was treated in the same way as the general dependent deduction. In 2010, a child allowance was introduced by the Democratic Party administration at the time, providing a monetary payment to the parents and guardians of children up to the age of 15; further, they were excluded from the dependent deduction in 2011. Additionally, the deduction for eligible dependents aged between 16 and 18 decreased from JPY 630,000 to JPY 380,000, and was treated in the same way as the general dependent deduction. In 2020, the income requirement for the dependents eligible for deductions increased from JPY 380,000 to JPY 480,000, thus expanding the application scope of the dependent deduction.

For employment income deductions, a fixed-rate deduction was applied to each income bracket. In 2013, an upper limit was applied to the deduction amount, so that the value of deductions could reach the limit of 2.45 million when employment income exceeded JPY 150.0 million. Subsequently, this income level at which the deduction limit was reached decreased further, to JPY 120.0 million (deduction amount JPY 2.3 million) in 2016, to JPY 100.0 million (deduction of JPY 22.0 million) in 2017, and to JPY 85.0 million (deduction of JPY 1.95 million) in 2020. Moreover, in 2020, the deduction amount for employment income was reduced to compensate for the increase in the basic deduction amount.

For public pension deductions, the deduction amount is a combination of a fixed amount deduction and a fixed-rate deduction for each bracket. Until 2004, the minimum deduction amount was JPY 1.4 million for people aged 65 and above and JPY 700,000 for those aged 64 and under. In 2005, the minimum deduction was set to JPY 1.2 million for people aged 65 and over and JPY 700,000 for those aged 64 and under, thus reducing the difference in deductions between those under 65 and those 65 and over. In 2020, the public pension deduction amount was reduced to compensate for the increase in the basic deduction amount. Additionally, a public pension upper limit of JPY 10 million (deduction amount of JPY 1.955 million) was applied.

For the deductions for the elderly, until 2004, the applicability requirement was to be 65 years of age or older and have an income of JPY 10 million or less with a deduction amount of JPY 500,000. However, this system was abolished in 2005.

For the fixed rate tax reduction, a rate of 20% was applied in 1994 up to a maximum deduction amount of JPY 2.0 million. However, in 1999, the maximum deduction amount was reduced to 250,000 and, in 2009, the system was abolished.

For adjustment credit, as part of Japan's decentralization reform, tax revenue sources were transferred from the national to the regional level and, in 2007, income tax became progressive and the resident tax proportional. At the time, adjustment credit was introduced to compensate for the increased tax burden arising from the difference in the personal deductions (e.g., basic deduction, spousal deduction, dependent deduction) in the income and resident taxes by deducting a certain

amount from the resident tax amount.

<Insert Tables 1 and 2>

3. Data and estimation method

3.1 Data

We used household microdata (questionnaire based) from the NSFIE (1994–2014). The survey was conducted at five-year intervals from September to November for approximately 57,000 households. Each household member was asked about his/her characteristics at the start of the survey (e.g., relationship status, age, gender, employment status) and income over the past year, and each household was asked about its savings at the time of the survey, among others. In this study, we apply the actual tax system to each household member's attributes and income information to estimate their social insurance premiums, income tax, and resident tax liabilities over a year. For this part of the study, the following households were excluded from the sample for reasons such as not being able to estimate their tax amount:

・Households with members whose ages or genders were unspecified;
・Households with a member who is living away from home because of work posting;
・Households where a person has moved out;
・Households where the survey items have blanks, unspecified codes, or top codes.

3.2 Method of estimating amounts of income, income tax, and resident tax[5]

3.2.1 Method of estimating income

For income other than interest and dividend income, we used the annual income from the annual income and savings questionnaire. The annual income under the NSFIE includes the following 10 sub-items:

(1) Income from employment;
(2) Income from agriculture, forestry, and fisheries;
(3) Business income from sources other than agriculture, forestry, and fisheries;
(4) Income from side jobs, etc.;
(5) Income from rent and land rent;
(6) Public pensions and government pensions;
(7) Income from corporate and private pensions;
(8) Interest and dividends;
(9) Remittance from relatives;
(10) Other annual income.

Each sub-item surveys the income of the household head, spouse, other household members aged

[5] We employ the method of Ohno et al. (2020) and Matsumoto et al. (2020) to estimate income, social insurance premiums, and income and resident taxes. See Appendix A for details.

under 65, and other household members aged 65 and over. However, in households with multiple household members aged 65 and over and household members aged under 65, only the total income of members in these categories can be ascertained. Therefore, for such households, the income of these members is apportioned as follows.

The average income is likely to vary by the gender and age of the household member for "income from employment," "income from agriculture, forestry and fishery," "business income," "public pensions and government pensions," and "income from corporate and private pensions." Therefore, we first identified the average income by gender and age group for the household head and spouse, whose individual income can be ascertained. Then, in cases where there are multiple individuals in the "other household member (aged under 65)" and "other household member (aged 65 and over)" categories, the summed income was apportioned for each householder using the ratios of the average income.

For "income from side jobs, etc.," "income from rent and land rents," "remittance from relatives etc.," and "other annual income" and for multiple individuals in the "other household member (aged under 65)" and "other household member (aged 65 and over)" categories, the income is apportioned equally between the number of household members. However, no apportionment was made for members aged below 15.

However, interest and dividends are conspicuous in their under-representation among the items in the Yearly Income and Savings Questionnaire. Therefore, to estimate income from interest and dividends, we used the balance of assets from the Yearly Income and Savings Questionnaire and multiplied the balance of financial assets held by household by the market interest rate. Since the balance of financial assets can only be ascertained on a household basis, the income from interest and dividends was estimated on a household basis.

3.2.2 Method of estimating amounts of income tax and resident tax[6]

In estimating the amounts of income tax and resident tax burden, it is also necessary to estimate the amount of social insurance premiums used for social insurance deduction. In this paper, we have assumed the highest earner to be the household head (rather than those listed in the questionnaire as dependents), then identified the spouse and dependent relationships for the tax and social insurance

[6] We estimated the amount of tax and insurance premiums by applying the actual system to the household income and attributes provided in the questionnaire. This methodology is the same as a microsimulation in which new variables are hypothetically constructed by applying, for instance, social systems by household from the available variables. This method can estimate the highly individual variables of tax and insurance premiums for each household based on limited information; however, it may include large measurement errors. However, Ohno et al. (2015) and Tada et al. (2016) have verified a method for estimating tax and insurance premiums by using the Comprehensive Survey of Living Conditions (CSLC), and confirmed that the estimated values are highly accurate. Furthermore, the NSFIE can also be used to provide the variables needed for estimating the household tax and insurance premiums. Sano et al. (2015) and Tada and Miyoshi (2015) have confirmed that the CSLC and NSFIE provide consistent information regarding household attributes and income. Therefore, this method for estimating tax and insurance premiums can also be applied to the NSFIE, and the validity of the constructed estimated variables can be considered to have the same accuracy level.

system based on the status of each household member's relationship to the household head, age, occupation, and income status.

In estimating the social insurance premium amount, it is first necessary to identify the social insurance systems under which each household member is enrolled. Specifically, we estimate under which system each household member is enrolled in from among public pension, health insurance, long-term care insurance, and employment insurance systems, and then apply the actual insurance premium calculation formula to estimate the amount of social insurance premiums.

To estimate the income tax and resident tax, we identify the amount of tax by applying the actual system to the information on household attributes and income. Income is classified under the 10 categories of the income tax law. Here, we calculate the total income for all income categories available in the NSFIE—salary income, business income, miscellaneous income, and real estate income. Next, we deduct the various deductions from the total income to calculate the taxable income. Here, the deductions to be applied are the basic deduction, spousal, deduction (including special spousal deduction), dependent deduction, and elderly deduction (up to 2004), social insurance deduction, employment income deduction, and public pension deduction. For social insurance deductions, we use the previously estimated social insurance premium amount.[7] Finally, the marginal tax rate table for income and resident taxes are applied to the taxable income to estimate the amounts of income and resident taxes for the total taxable portion. Here, the fixed rate tax reduction (from 1994 to 2006), adjustment credit (from 2007, only for resident tax), and the special reconstruction income tax (from 2013) are considered.

Additionally, the income tax and resident tax amounts also include the taxes on interest and dividends. The actual tax system is applied to the previously estimated value of the interest and dividend incomes to estimate the tax amount for the portion of tax on interest and dividends. For interest taxation, the burden amount is estimated by applying the applicable tax rates to the interest income under separate taxation. At this point, we also consider the tax exemption system for small savings for elderly persons (up until 2005). Further, for dividend taxation, since it is possible to choose comprehensive taxation, a taxation method that reduces the tax amount by household is applied. When comprehensive taxation is applied, the dividend tax amount deductions are also considered.

3.2.3 Method of estimating burden reduction amount due to deductions

We use the method of Burman et al. (2017) to determine the burden reduction amount due to deductions. First, we apply a tax amount estimation process that reflects the actual tax system to estimate the tax amount in the case where deductions are applied (tax amount a). Next, we estimate a hypothetical tax amount for the case in which deductions are not applied (tax amount b). Since

[7] We did not consider the deductions based on information not available from the questionnaire (e.g., disabled persons deduction, medical fee deduction, housing loan credit and other special deduction)

deductions are a measure for reducing tax, tax amount b is always higher than tax amount a. Then, the difference between the tax amounts (=tax amount b–tax amount a) is treated as the tax burden reduction amount due to deductions. The deductions used in this study are the basic deduction, spousal deduction, dependent deduction, social insurance deduction, elderly deduction, employment income deduction, public pension deduction, fixed rate tax reduction, and adjustment credit.

Finally, in the following discussion, we refer to household units and the levels of income, tax amount, and so forth are all used on an equivalent household basis.

4. The tax burden reduction effect of deductions

4.1 Structure of tax burden reduction effect

Here, we discuss the structure of the burden reduction effect due to deductions, focusing on the tax burden reduction amount due to deductions (hereafter, reduction amount) and the ratio of the reduction amount to gross income (hereafter, reduction ratio). Figure 1 shows the size of the tax burden reduction due to deductions by income bracket, with income deciles used for the income brackets. Figure 1 (a.1) shows the reduction amount, which is larger when the income bracket is higher. However, over time, the reduction amount decreases for each income bracket and, in particular, the higher the income bracket is, the larger is the decrease in the reduction amount. Figure 1 (a.2) shows the reduction ratio. In 1994, the reduction ratio increased as the income bracket increased, and the tax burden reduction effect owing to deductions was high. However, over time, the preferential treatment of the higher income brackets decreased gradually and, recently, the tax burden reduction effect has taken a proportional structure.

Table 3 shows the changes in the tax burden reduction effect over a 20-year period. The results in Table 3 show that the reduction ratio decreased by 2.9 percentage points (pp), on average, from 1994 to 2014. On the other hand, examining the result by income bracket, in the high-income bracket X, the reduction ratio decreased by 4.0 pp, while in the low-income bracket I, the decrease was only 0.7 pp. From the tax burden reduction effect of deductions, the results show that, over this 20-year period, taxation has been strengthened, mainly from the middle- to the high-income brackets.

Such changes are impacted not only by changes to the tax system, but also by changes in the income distribution, demographic composition, among others. Therefore, we confirm the impact on the tax burden reduction effect of the deductions from system changes and the changes in the status of the economy and society. First, to eliminate the impact of the changes in the status of the economy and society, we fixed the data year and changed only the tax system year to measure the reduction ratio. This is also referred to as the “fixed income approach.” Table 4 shows the deduction ratio when the year was fixed to 2014. From Table 4, the reduction ratio decreased by 1.6 pp as an overall average from 1994 to 2014. Moreover, by checking the income bracket, the decline in the reduction ratio increased as the income bracket increased. Second, to eliminate the impact of the system changes, the

tax system year was fixed and the data year was changed to measure the reduction ratio. Table 5 shows the reduction ratio in the cases where the tax system year was fixed to 2014. From the results in Table 5, the reduction ratio decreased by 0.5 pp as an overall average from 1994 to 2014. Additionally, by income bracket, the decrease in the reduction ratio was greater for the middle-income brackets than for high-income ones. Based on these results, the change over time in the reduction ratio in Table 3 is shown to have received a greater impact from tax system changes than the changes in the status of the economy and society.

<Insert Figure 1 and Tables 3–5>

4.2 Tax burden reduction effect by household attribute

Next, we identify the tax burden reduction effect due to the deductions with regard to household attributes. Household attributes are classified into the sub-groups of working and retired households. Here, households under the age of 65 are referred to as working households and households aged 65 and over are retired households. Furthermore, the are regular and non-regular employment households. Here, the households where the household head is in regular employment are referred to as regular employment households, and those where the household head is in non-regular employment as non-regular employment households.

Table 6 shows the reduction ratio by sub-group. On the one hand, in 1994, the reduction ratio for working households was 16.6%, and 17.6% for regular employment households, showing a high tax burden reduction effect for these households. On the other hand, the reduction ratio for non-regular employment households was 13.8%, being 3.8 pp lower than that for regular employment households. The reduction ratio decreased for all sub-groups, but the amount of decrease differed between sub-groups. In 2014, the reduction ratio decreased to 14.1% for regular employment households, and the difference between regular and non-regular employment households narrowed to 1.1 pp. Compared to 1994, the divergence between sub-groups in 2014 decreased. The tax burden reduction effect due to deductions has gradually reached the same level of benefit across household attributes.

The decrease in the reduction ratio also differs between income brackets within sub-groups. As described above, Figure 1 shows the reduction ratio by income bracket. Panel (b) shows working households, panel (c) retired households, panel (d) regular employment households, and panel (e) non-regular employment households. For all of the different household attributes, the size of the reduction ratio decreases over the 20-year analysis period increases as the income bracket increases. For example, for regular employment households, the reduction ratio for income bracket X was 18.3% in 1994, but it decreased by 3.9 pp by 2014 to 14.3%. Even in non-regular employment households, where the change in the reduction ratio over the 20-year period was small, the reduction ratio for income bracket X was 17.1% in 1994, but it decreased by 4.1 pp in 2014 to 13.0%. Meanwhile, the decrease over the 20-year period for income bracket I in non-regular employment households was only 0.1%. In other

words, the decrease in the reduction ratio increased with the income bracket, while the lower-income brackets remained almost unchanged. In this way, the change in the tax burden reduction effect differs considerably, depending on household attributes such as the income bracket and employment mode.

<Insert Table 6>

5. The redistribution effect of deductions

5.1 Method of decomposition

In this study, we use the change in income disparity by tax, that is, the change in the disparity from pre-tax income (gross income) to post-tax income, as an indicator of the redistribution effect.[8] For tax, we examine the income and resident taxes.

The coefficient of variation (CV) is used as an indicator of disparity. Taking the standard deviation of income as σ and the mean as μ, CV can be expressed as follows:

$$\mathrm{CV} = \frac{\sigma}{\mu}. \tag{1}$$

To measure the redistribution effect, we apply the tax system to household data (e.g., family composition and income) to estimate the tax burden amount for each household. Then, we find the difference between the income disparity on a pre-tax and a post-tax income basis, which we treat as the redistribution effect. Here, as a general type, the data from year i are expressed as d_i and the gross income disparity calculated below is expressed as $CV(d_i)$. Additionally, the tax rate structure of year j (the system of the tax rate structure and separate income tax) is expressed as t_j, the deduction of year k (the system of income deduction, fixed-rate tax reduction, and adjustment credit) as a_k, and the disparity between post-tax income calculated under these as $CV^*(d_i, t_j, a_j)$. At this time, the redistribution effect calculated under data year i, tax rate structure year j, and deduction year k can be expressed as follows:

$$RE_{i,j,k} = CV^*(d_i, t_j, a_k) - CV(d_i). \tag{2}$$

For the observation time points, the reference year is expressed as 0, and the comparison year is 1. Further, the cases where deductions are not applied are expressed as N. At this time, equation (2) can be rewritten as:

$$\begin{aligned} RE_{i,j,k} &= CV^*(d_i, t_j, a_k) - CV(d_i) \\ &= \{CV^*(d_i, t_j, a_N) - CV(d_i)\} \cdot\cdot\cdot (a1) \end{aligned}$$

[8] The concept of income includes (1) "initial income," representing initially earned income; (2) "gross income," representing initial income with social security benefits added; and (3) "disposable income," representing gross income net of non-consumption expenditures, such as tax and insurance premiums. In this study, we focus on the redistribution effect of the income and resident taxes and, therefore, the gross income is considered to be the pre-tax income, while the post-tax income is considered to be the gross income after deducting the income and resident taxes.

$$+\{CV^*(d_i, t_j, a_k) - CV^*(d_i, t_j, a_N)\} \cdot\cdot\cdot (a2). \tag{3}$$

Equation (3) decomposes the redistribution effect into two factors. The first term on the right-hand side captures the impact of the hypothetical tax amount estimated by not applying deductions, which is referred to as the "(a1) tax rate factor." The second term captures the impact of the tax burden reduction due to deductions and is referred to as the "(a2) deduction factor."

We also consider a comparison of redistribution between various points in time. Here, we focus on the change in the income disparity captured by post-tax income, which we can decompose as follows:

$$\begin{aligned} & CV^*(d_1, t_1, a_1) - CV^*(d_0, t_0, a_0) \\ &= CV(d_1) - CV(d_0) \\ &\quad + \{CV^*(d_1, t_0, a_0) - CV(d_1)\} - \{CV^*(d_0, t_0, a_0) - CV(d_0)\} \\ &\quad + \{CV^*(d_1, t_1, a_1) - CV(d_1)\} - \{CV^*(d_1, t_0, a_0) - CV(d_1)\} \\ &= CV(d_1) - CV(d_0) \cdot\cdot\cdot (b1) \\ &\quad + (RE_{1,0,0} - RE_{0,0,0}) \cdot\cdot\cdot (b2) \\ &\quad + (RE_{1,1,1} - RE_{1,0,0}) \cdot\cdot\cdot (b3). \end{aligned} \tag{4}$$

In equation (4), the change in income disparity (post-tax income basis) between the reference year and the comparison year is decomposed into three factors. Term 1, on the right-hand side, expresses "(b1) the change in disparity of pre-tax income." Term 2 captures the impact when only the data year is changed using the tax rate structure and deduction systems of the reference year, from which we estimate "the impact on the redistribution effect of changes such as income distribution and demographic composition in the hypothetical case where the tax system was not changed." This is referred to as the "(b2) non-system reform factor." Term 3 captures the impact in the cases where only the year of the tax rate structure and deduction system is changed, using comparison year data. By this, we obtain the "true contribution of the system reform itself exerted on the redistribution effect," which is referred to as the "(b3) system reform factor." Additionally, the sum of non-system and system reform factors expresses the change in the redistribution effect.[9]

Applying equations (3) and (4), the change in income disparity captured with post-tax income can be decomposed as follows:

$$\begin{aligned} & CV^*(d_1, t_1, a_1) - CV^*(d_0, t_0, a_0) \\ &= CV(d_1) - CV(d_0) \cdot\cdot\cdot (c1) \\ &\quad + \{CV^*(d_1, t_0, a_N) - CV(d_1)\} - \{CV^*(d_0, t_0, a_N) - CV(d_0)\} \cdot\cdot\cdot (c2) \end{aligned}$$

[9] Studies that have decomposed the redistribution effect of the tax burden and benefits into system and non-system reform factors include Bargain and Callan (2010), Bargain (2012), and Ohno et al. (2018). Moreover, in Bargain and Callan (2010) and Bargain (2012), "(b1) change in difference in gross income" and "(b2) non-system reform factor" are treated together, and referred to as "other factors." Moreover, the "change in income difference (based on post-tax income)" is considered by decomposing it into "system reform factors" and "other factors."

$$+\{CV^*(d_1,t_0,a_0)-CV^*(d_1,t_0,a_N)\}-\{CV^*(d_0,t_0,a_0)-CV^*(d_0,t_0,a_N)\}\cdot\cdot\cdot(c3)$$
$$+\{CV^*(d_1,t_1,a_N)-CV(d_1)\}-\{CV^*(d_1,t_0,a_N)-CV(d_1)\}\cdot\cdot\cdot(c4)$$
$$+\{CV^*(d_1,t_1,a_1)-CV^*(d_1,t_1,a_N)\}-\{CV^*(d_1,t_0,a_0)-CV^*(d_1,t_0,a_N)\}\cdot\cdot\cdot(c5). \tag{5}$$

Equation (5) decomposes the change in the income disparity (post-tax income basis) in the reference year and comparison year into five factors. The first term on the right hand side expresses the "(c1) change in disparity in pre-tax income." The second term shows the level of contribution of the tax rate structure and others among the non-system reform factors, being referred to as the "(c2) non-system reform (tax rate, etc.) factor." Term 3 shows the level of contribution due to deductions among the non-system reform factors, and is referred to as "(c3) non-system reform (deduction) factors." The fourth term shows the level of contribution from the tax rate structure and others, among the system change factors, and is referred to as the "(c4) system reform (tax rate, etc.) factors." The fifth term shows the level of contribution due to deductions among the system reform factors, and is referred to as the "(c5) system reform (deduction) factors."

5.2 Redistribution effect of deductions: Measurement results

Before the decomposition, we confirm the impact of the tax burden reduction due to the deductions on the redistribution effect. Table 7 shows the redistribution effect (the size of the income disparity correction). Under "Income disparity (after tax, without deductions)," the post-tax income by household is obtained using the tax amount in the case where no deduction is applied, and then present the size of the coefficient of variation based on this post-tax income. Additionally, for "income disparity (post-tax, with deductions)," the post-tax income by household is obtained using the tax amount in the case where deductions were applied and the size of the coefficient of variation is then presented. Therefore, the change in the coefficient of variation from the pre-tax to the post-tax income (with deductions) shows the redistribution effect of the overall tax system. Further, the change in the coefficient of variation from pre-tax to post-tax income (without deductions) shows the contribution of the tax rate and others, where the contribution of interest and dividend tax is also included. By contrast, the change in the coefficient of variation from post-tax income (without deductions) to post-tax income (with deductions) shows the contribution of the tax burden reduction due to deductions.

Table 7 (a) shows the results for all households. Over the 20-year period, the coefficient of variation on a pre-tax basis increased from 0.690 to 0.706, and the income disparity before tax widened. Next, we examine the redistribution effect of tax. First, for 1994, the coefficient of variation for the tax system overall decreases from 0.690 to 0.555, showing that the tax system reduced the income disparity by 19.6%. Although the tax rate and others reduced the income disparity by 21.4%, the deductions actually expanded the income disparity. By contrast, in 2014,

the coefficient of variance for the tax system overall decreased from 0.706 to 0.595, showing that the tax system reduced the income disparity by 15.8% and, within that, deductions exerted a disparity correction effect of 0.8 pp. Although the effect was small, it is clear that the deduction system played a part in correcting the disparity.

Examining the data by household attribute, in Table 7, the results in panel (b) are for working households, panel (c) for retired households, panel (d) for regular employment households, and panel (e) for non-regular employment households. For working households, the disparity correction effect for the tax system was overall largest in 1994, when the income disparity was reduced by 17.7%, but the deductions actually increased the income disparity. However, from 1999 onward, deductions have had the effect of correcting the income disparity. Furthermore, retired households have almost the same results as working households, but the redistribution effect of deductions is relatively larger. By contrast, in non-regular employment households, the results are consistent from 1994 to 2014 and the deductions contribute to expanding the disparity.

<Insert Table 7>

5.3 Decomposition related to comparison of redistribution effect between points in time: Measurement results

A comparison of the redistribution effect between various time points includes the impacts of the system reform factors associated with the changes in the tax system and non-system reform factors. For this reason, we decompose the system and non-system reform factors for the change in the redistribution effect over the 20-year period from 1994 to 2014 and extract the contribution from system reforms. Table 8 shows the results of factor decomposition of the change in disparity of post-tax income into five factors:[10] (1) change in disparity in pre-tax income, (2) non-system reform factors (tax rate, etc.),[11] (3) non-system reform factors (deductions),[12] (4) system reform factors (tax rate, etc.), and (5) system reform factors (deductions). Table 8 Panel (a) shows the changes from 1994 to 2014. Over this 20 years, the redistribution effect of tax decreased as a whole, but it can be seen that the influence of the system reform factors is larger than that of the non-system reform factors. Looking at the breakdown of the factors behind the system

[10] In this table, positive results indicate a difference expansion effect and the negative results show a difference correction effect.

[11] Non-system reform factors (tax rate, etc.) show the impact on the redistribution due to the tax rate, among others, caused by the changes in income distribution, population composition, and so forth, in the hypothetical case where system reforms did not occur. For example, if the income levels of all households decrease, the redistribution effect may be lowered by reducing the marginal tax rate applied to all households. Conversely, if income becomes high, the redistribution effect may be increased by increasing the marginal tax rate applied to all households. The non-system reform factors (tax rate, etc.) include these impacts.

[12] Non-system reform factors (deductions) show the impact on redistribution due to the deductions caused by changes in income distribution, population composition, and so forth, in the hypothetical case where system changes do not occur. For example, this includes the impacts caused by the changes in the reduction amount of deductions due to changes in household attributes, such as changes in the application of dependent deduction due to the nuclearization of families.

change, we found that the system change such as the tax rate change due to a reduction of the maximum tax rate contributed to increasing disparity, while the reform of the deduction system contributed to the reduction of the disparity. For example, the system reform factors (tax rate, etc.) was 0.038 for all households, 0.032 for working households, 0.047 for retired households, 0.016 for regular income households, and -0.001 for non-regular income households, showing that system change for the tax rate and others contributed to expanding the disparity across household attributes. Meanwhile, the system reform factor (deductions) was -0.025 for all households, -0.018 for working households, -0.036 for retired households, -0.010 for regular employment households, and -0.007 for non-regular employment households, showing that changes to the deduction system reduced the disparity across all household attributes. This deduction system change promoted a comparatively large increase in the redistribution effect, particularly for retired households. To comprehend this background, we also examine the changes at 5-year intervals. In Table 8, panel (b) shows the changes from 1994 to 1999, panel (c) from 1999 to 2004, panel (d) from 2004 to 2009, and panel (e) from 2009 to 2014. Among these, the years in which the changes to the deduction system increased the redistribution effect for retired households are in the 1990s (1994–1999) and the 2000s (2004–2009). Specific examples include the impacts of a decrease in the fixed rate in the late 1990s and a decrease in the public pension deduction and abolition of the elderly deduction in the late 2000s. Looking at the tax system reforms in Japan over this 20-year period, in terms of tax rates and others, the reforms decreased the overall redistribution effect of the tax system, but the deductions partially mitigated the decrease in this redistribution effect.

<Insert Table 8>

6. Conclusions

The status of the deduction system in Japan's income and resident tax systems is an important policy issue. However, an evidence-based understanding of the actual status of the effect of the tax burden reduction due to deductions and the impact on the income redistribution function is essential for its discussion. Therefore, in this study, we examined the actual status of the tax burden reduction effect due to deductions and the income redistribution function over a 20-year period using individual data from the NSFIE (1994–2014).

First, for the tax burden reduction effect of deductions, the tax burden reduction ratio (ratio of the reduction amount to gross income) increased initially. As the income bracket increased the tax burden reduction effect of deductions also increased. However, the tax burden reduction effect showed a decreasing trend, and the decrease was particularly large for the high-income bracket. This trend was the same across working, retired, regular employment, and non-regular employment households. As a result, recently, the tax burden reduction effect has taken a proportional structure.

Second, regarding the impact of the tax burden reduction due to deductions on the redistribution effect, although the redistribution effect of the deductions is small, it played a part in correcting the disparity. Looking at household attributes, the result was similar for all households, except for non-regular employment households, and we confirmed that deductions provide a disparity correction effect.

Finally, we decomposed the changes in the redistribution effect into system and non-system change factors and extracted the contribution of system changes. In the last 20 years, due to system changes, the effect of redistribution has decreased. However, looking at the breakdown of the system changes factors, both the contribution of tax rate and deductions are different. Although system changes such as the reduction of the maximum tax rate contributed to increasing disparities, the system changes in deductions contributed to the reduction of disparities, which can be said to have played a role in partially offsetting the contribution of widening disparities due to the reduction of tax rates.

Recently, the tax burden reduction effect due to deductions has been on a decreasing trend, but the deduction system played a role in the income redistribution function of the tax system, and that role is increasing. Against this background, we can also show that the revision of the deduction system has contributed to improving the redistribution effect. Amid the calls for a restoration of the redistribution function of tax, a review of the deduction system also seems to be an important policy measure.

References

Abe, A., 2000. Impact of regressive social insurance premiums on intragenerational income inequality. The Quarterly of Social Security Research 36(1), 67-80 (in Japanese).

Albarea, A., Bernasconi, M., Novi, C. D., Marenzi, A., Rizzi, D., Zantomio, F., 2015. Accounting for tax evasion profiles and tax expenditures in microsimulation modelling: The BETAMOD model for personal income taxes in Italy. International Journal of Microsimulation 8(3), 99-136.

Altshuler, R., Dietz, R., 2011. Reconsidering tax expenditure estimation. National Tax Journal 64(2), 459-490.

Avram, S., 2018. Who benefits from the “hidden welfare state”? The distributional effects of personal income tax expenditure in six countries. Journal of European Social Policy 28(3), 271-293.

Bargain, O., 2012. The distributional effects of tax-benefit policies under new labour: A decomposition approach. Oxford Bulletin of Economics and Statistics 74(6), 856-874.

Bargain, O., 2014. Decomposing changes in income distribution. In: O’Donoghue, C. (Ed.). Handbook of Microsimulation Modelling. Emerald Group Publishing Limited.

Bargain, O., Callan, T., 2010. Analysing the effects of tax-benefit reforms on income distribution: A decomposition approach. Journal of Economic Inequality 8(1), 1-21.

Burman, L., Geissler, C., Toder, E.J., 2008. How big are total individual tax expenditure, and who

benefits from them. American Economic Review: Papers & Proceeding 98(2), 79-83.

Burman, L., Toder, E., Berger, D., Rohaly, J., 2017. Economic and distributional effects of tax expenditure limits. In: Auerbach, A., Smetters, K. (Eds.). The Economics of Tax Policy. Oxford University Press.

Doi, T., 2017. Effects of deductions of personal income tax on income inequality in Japan: A microsimulation of reform of spousal tax deductions and tax credit. Economic Analysis 68(2), 150-168 (in Japanese).

Fukawa, T., 2006. Household changes and income distribution. In: Yashio, H., Tajika E., Fukawa, T. (Eds.). Income Distribution in Japan: Widening Disparity and the Role of Policy. University of Tokyo Press (in Japanese).

Kaneda, T., 2014. Status of deductions in income taxation: A microsimulation analysis. The Collection of Papers in Honor of The Institute of Tax Research and Literature Award 22(2), 181-223 (in Japanese).

Kaneda, T., 2018. Fairness and Efficiency in Personal Income Taxation: An Empirical Analysis by Microsimulation. Nihon Keizai Hyoronsha (in Japanese).

Kitamura, Y., Miyazaki, T., 2013. A Micro-Empirical Analysis of Tax Reform: A Household Economy Perspective on Income Tax and Consumption Tax. Iwanami Shoten (in Japanese).

Matsuda, K., Ozeki, Y., Kikuta, K., Ueda, J., 2014. The impact of demographic changes on social security payments and the individual income tax base: Long-term micro-simulation approach. Public Policy Review 10(3), 481-517.

Matsumoto, R., Ohno, T., Kojima, D., 2020. Household interest and dividend income and tax burden. The Journal of the Board of Audit 61, 13-33 (in Japanese).

Miyazaki, T., Kitamura, Y., 2016. Decomposition of redistributive effects of Japanese personal income tax, 1984–2009. FinanzArchiv 72(3), 334-368.

Miyazaki, T., Kitamura, Y., Ohno, T., 2019. Tax reforms, redistribution and population aging: Evidence from Japan. Japanese Economic Review 70(1), 105-122.

Mochizuki, M., Nomura, H., Fukae, K., 2010. An Empirical Analysis of Income Tax: Towards the Revival of Basic Tax. Nihon Keizai Hyoronsha (in Japanese).

Morinobu S., Maekawa, S., 2001. Macroeconomic estimates of the Japanese income tax base. Financial Review 57, 103-122 (in Japanese).

Morinobu, S., Nakamoto, A., 2013. A revised estimation of Japan's income tax base. Public Policy Review 9(2), 433-455.

Nakamoto, A., 2014. Japan's income tax base: Comparison with other countries and estimation of tax reform. Public Policy Review 10(3), 397-413.

Ohishi, A., 2006. Income equality trends and issues. In: Kaizuka, H., Ministry of Finance Policy Research Institute (Eds.). Study of Economic Disparity: Understanding the Distribution

Structure in Japan. Chuo Keizaisha (in Japanese).

Ohno, T., Kodama, T., 2017. Estimation of tax and social insurance burden on households: Verification of the validity and assessment of actual status. PRI Discussion Paper Series No. 17A-02.

Ohno, T., Kodama T., Matsumoto, R., 2018. Decomposition approach on changes in redistributive effects of taxes and social insurance premiums. Public Policy Review 14(4), 777-802.

Ohno, T., Nakazawa, M., Kikuta, K., Yamamoto, M., 2015. Comparison of taxes and social insurance premium burdens in household accounts. Public Policy Review 11(4), 547-571.

Ohno, T., Sakamaki, J., Kojima, D., 2020. Factor decomposition of changes in the tax base for income tax. PRI Discussion Paper Series No. 20A-12.

Ohtake, F., 2005. Inequality in Japan: The Illusion and Future of An Unequal Society. Nikkei Business Publications (in Japanese).

Oshio, T., 2002. Intra-age, inter-age and lifetime income redistribution. Journal of Population and Social Security 1(1), 36-49.

Oshio, T., 2009. The redistribution effect of the social security and tax systems. In: National Institute of Population and Social Security Research (Ed.). Analysis of the Effects of Social Security Financial Resources. University of Tokyo Press (in Japanese).

Oshio, T., Urakawa, K., 2008. The trend of poverty and redistribution policies in the first half of the 2000s. The Quarterly of Social Security Research 44(3), 278-289 (in Japanese).

Poterba, J.M., 2011. Introduction: Economic analysis of tax expenditure. National Tax Journal 64(2), 451-458.

Sano, S., Tada, S., Yamamoto, M., 2015. Method of household surveys and characteristics of surveyed households: Comparison regarding household composition, annual income and educational attainment. Public Policy Review 11(4), 505-529.

Tachibanaki, T., Urakawa, K., 2006. Research on Poverty in Japan. University of Tokyo Press (in Japanese).

Tada, S., Miyoshi, K., 2015. Verifying household incomes in Japanese statistics. Public Policy Review 11(4), 531-545.

Tada, H., Ohno, T, Unayama, T., 2016. Estimation of social insurance premiums using microdata, and verification of the validity thereof. PRI Discussion Paper Series No. 16A-02 (in Japanese).

Tajika, E., Yashio, H., 2006a. Status of the income tax and resident tax burden in Japan and its reform. In: Kaizuka H., Ministry of Finance Policy Research Institute (Eds.). Study of Economic Disparity: Understanding the Distribution Structure in Japan. Chuo Keizaisha, Chapter 7 (in Japanese).

Tajika, E., Yashio, H., 2006b. Income redistribution through the tax system: Use of tax credits in place of income deductions. In: Oshio, T., Tajika E., Fukawa, T. (Eds.). Income Distribution in

Japan: Widening Disparity and the Role of Policy. University of Tokyo Press, Chapter 4 (in Japanese).

Tajika, E., Yashio, H., 2008. Income tax reform: Integrated adjustment of tax and social insurance premium burden through tax credits. The Quarterly of Social Security Research 44(3), 291-306 (in Japanese).

Tajika, E., Yashio, H., 2010. Securing tax revenue and correcting disparity: The introduction of the tax credit system with benefits. In: Doi, T. (Ed.). How to Revise Tax in Japan. Nikkei Business Publications, Chapter 2 (in Japanese).

Tanaka, S., Shikata, M., 2012. Estimation of tax and social insurance premiums by microsimulation. RISS Discussion Paper Series No. 25, Kansai University Research Institute for Socionetwork Strategies (in Japanese).

Tanaka, S., Shikata, M., 2019. The middle class in Japan 1994–2009: Trends and characteristics. Keio-IES Discussion Paper Series DP2019-001.

Tanaka, S., Shikata, M., Komamura, K., 2013. Analysis of tax and social security burden for the elderly using individual data from the National Survey of Family Income and Expenditure. Financial Review 115, 117-133 (in Japanese).

The Tax Commission of the Japanese Government, 2016. Interim Report on the Ideal Tax System Considering Structural Changes in Economy and Society. Government of Japan Cabinet Office website (in Japanese).

Uemura, T., 2008. An estimation of tax expenditure in Japanese income tax from the viewpoint of the fiscal transparency. The Journal of the Board of Audit 38, 1-14 (in Japanese).

Uemura, T., Adachi, Y., 2015), Economic Analysis of Tax and Social Security Burden. Nihon Keizai Hyoronsha (in Japanese).

Yashio, H., Hachisuka, K., 2014. Impact of population aging on the personal income tax base in Japan: Simulation analysis of taxation on pension benefits using micro data. Public Policy Review 10(3), 519-541.

Appendix A: The methods used to estimate income, social insurance premiums and income and resident tax liability

In this addendum, we explained the respective methods used to estimate the income, social insurance premiums and income and resident tax referred to in Section 3.

A.1 The method for estimating income

A.1.1 Estimating income other than interest and dividend income

We used the annual incomes listed in the Annual Income and Savings Survey Questionnaire of the NSFIE for income data. Income is broken down into the following forms of income.

(1) Annual income from work
(2) Income from agriculture, forestry and fisheries
(3) Business income from sources other than agriculture, forestry and fisheries
(4) Annual income from side jobs etc.
(5) Annual income from rent and land rent
(6) Public pensions and government pensions
(7) Income from corporate and private pensions
(8) Interest and dividends
(9) Money sent from relatives etc.
(10) Other annual income

The Annual Income and Savings Questionnaire surveys the annual incomes of the head of the household, spouse of the head of the household, other household members under 65 years of age and those 65 years of age or older. However, for households with multiple persons in the other household members under 65 years of age and those 65 years of age or older, only the total value of income of all the household members in the respective categories can be known. For this reason, in these households, income from the above mentioned categories is prorated according to the following rule:

First, In the case of income items (1)(2)(3)(6)(7), the annual income differs depending on the age and gender of the household member. Therefore, from the income of the head of the household and their spouse, for whom individual incomes are known, the average income is calculated by gender (male / female) and age bracket (15-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70+ years of age). Where there is more than one individual in the above mentioned categories, the combined income is prorated to each household member according to the ratio of the average income calculated previously.

In the case of income items (4)(5)(9)(10), where there are multiple individuals in the two categories, the annual income is prorated based on the number of members in the household. However, household members under the age of 15 are excluded from proration.

A.1.2 Estimating income from interest and dividends

Since the Annual Income and Savings Questionnaire underestimates interest and dividends, we used the savings information from the Annual Income and Savings Questionnaire, and estimated the income by multiplying the financial assets held by households by the market interest rate (annual interest rate). Note that since financial assets can only be understood on a household basis, interest and dividend income is estimated on household basis. The breakdown of the savings information used is as follows;

・Cash-based savings at the Japan Post Bank etc. (herein termed ordinary savings)
・Periodic savings at the Japan Post Bank (Herein termed fixed-term savings)
・Cash deposits at ordinary banks (herein termed ordinary deposits)
・Periodic deposits at ordinary banks (herein termed fixed-term deposits)
・Stocks and stock investment trusts (Herein termed stocks)
・Bonds and corporate bond investment trusts (herein termed bonds)
・Loan and money trusts (herein termed trusts)
・Other deposits such as company internal deposits for employees (herein termed internal deposits)

Among these items, income earned from ordinary and fixed-term savings, ordinary, fixed-term and, bonds, trusts and internal deposits are termed "interest income.” Meanwhile, income earned from stocks is classified as "dividend income.” This study treats the sum of interest and dividend income as income from interest and dividends.

The interest rates published in the Ministry of Finance's Monthly Report of Fiscal and Monetary Statistics and on the Japan Post Bank's website are used for ordinary and fixed-term savings. Of these, the fixed-term savings’ interest rate (3 years or more) is applied to fixed-term savings. The interest rates published in the Monthly Report of Fiscal and Monetary Statistics were also used for ordinary and fixed-term deposits, stocks, and dividends. The average interest rate for fixed-term deposits (average interest rate for new deposits of less than 3 million yen for more than one year and less than two years) is applied to fixed-term deposits. Regarding stocks, the average yield of stocks of companies listed on the First Section of the Tokyo Stock Exchange is applied, and the 10-year government bond interest rate is applied to bonds. Regarding trusts, the five year expected dividend rates published in the Monthly Report of Fiscal and Monetary Statistics for 1994-2004 is applied. For the period from 2009 through 2014, we applied the expected five-year dividend rate at the

Mitsubishi UFJ Trust Bank as of 2015. In conclusion, the same interest rate applied to the fixed-term savings is applied to internal deposits.

A.2 The method for estimating social insurance premiums

In estimating social insurance premiums, we must first specify to which social insurance system each household member is enrolled. Regarding the public pension, health insurance, nursing insurance and employment insurance systems, we first inferred to which system each household member is enrolled and then applied the actual premium calculation to estimate the burden.

A.2.1 Estimating public pension premiums

Regarding the system of enrollment, household members whose annual income from work is greater than the average wage of a part-time worker multiplied by 30 hours and 52 weeks are considered enrolled in the employees' pension insurance (No. 2 insured persons), those whose annual income is below a certain amount, (For example, less than 1.3 million yen in 2014) whose spouse is a No.2 insured person are No.3 insured persons, and all others are considered enrolled in the state pension (No.1 insured persons). Additionally, household members under the age of 19 or over the age of 60 are principally not required to make pension contributions. However, those aged 70 and below that satisfy the income requirements to be No.2 insured persons are considered enrolled in the employees' pension insurance.

In terms of premiums, No.1 insured persons pay a fixed premium (for example, 15,250 yen per month in 2014, on an annual basis), and persons meeting the income criteria of the exemption system (full, three quarters, half or one quarter) always apply the exemption. For the No.2 insured persons, the average premium rate for the No.1 insured persons and the employees' pension listed on the home page of the Japan Pension Service is split between the employer and the insured, and the annual income from work is multiplied by the premium rate after that split. We also considered the standard monthly value of employees' pensions and the maximum value of standard bonuses.

A.2.2 Estimating health insurance premiums

Regarding the system of enrollment, household members aged 75 years and above are considered enrolled in the latter-stage of the elderly healthcare system (Only in 2009 and 2014 following the introduction of the system). Those aged 74 and below enrolled in the employee's pension were considered enrolled for health insurance (employee insurance), while all others were considered enrolled in the national health insurance system. Additionally, where annual income is less than a certain amount (e.g. less than 1.3 million yen in 2014) and there are relatives cohabiting with a person enrolled in the health insurance (employee insurance), those household members are considered dependent on that health insurance (employee insurance).

Regarding the health insurance, the premiums for health insurance (employee insurance) are considered the insurance premiums of the Japanese Health Insurance Association listed on their website, split between the employee and employer, and the annual income from work is multiplied by the premium rate following the split. The National Health Insurance premiums are calculated using the national average of levy on income, asset rate, per-capita rate, and per-household rate from the National Health Insurance Survey. We also considered the limit on the value of the national insurance premiums imposed, as well as the reduction system corresponding to the benefit rate. The premiums for the latter-stage of the elderly healthcare system used the national averages for per-capita income and income-based levies listed on the Ministry of Health, Labor and Welfare website. We also considered the upper limits on payments in the latter-stage of the elderly healthcare system, as well as the reduction system for the income-based levy and per capita rate.

A.2.3 Estimating nursing care insurance premiums

The national average (weighted average) of base premiums for each prefecture listed in the Ministry of Health, Labour and Welfare website are applied to the insurance premiums for the No.1 insured persons (65 years or older). The premiums for the No.2 insured persons (aged 40-64 years) are separated into those enrolled in the national health insurance system and those enrolled in employee health insurance. The national average for the income-based and asset-levy, per-capita rate and household rate for nursing care premiums from the National Health Insurance Survey were applied to persons enrolled under the National Health Insurance. (However, due to the characteristics of the statistics used, this method was applied only to years 2009 and 2014. Years previous to 2009 were estimated based on the sum of the health insurance premiums.) We also considered the limit on the value of the national insurance premiums imposed, as well as the reduction system corresponding to the benefit rate. For those enrolled in the employee health insurance, the national average premium rate recorded on the National Japan Health Insurance Association website was split between employee and employer, and the annual income from work multiplied by the premium rate following the split. We also considered the upper limit of the standard monthly income category and maximum standard bonus value for the employee health insurance.

A.2.4 Estimating employment insurance premiums

Regarding the enrollment in employment insurance, employees whose annual income from work exceeds a certain amount (e.g., in 2014, the average wage for part-time workers multiplied by 20 hours and 52 weeks) were considered enrolled.

Regarding the insurance premiums, we applied the worker contribution rate for general businesses listed in the Ministry of Health, Labor and Welfare website (e.g., 0.5% in 2014), and multiplied the contribution rate by the annual income from work.

A.3 The method for estimating income and resident tax liability

A.3.1 Estimating the income and resident tax liability (excluding interest and dividend income taxation)

To estimate income tax, we applied the actual tax system to the data on household attributes and income to calculate the value of the tax burden. Although the Income Tax Act classifies income into 10 categories, we used income available from the NSFIE, that is, the salary, business, miscellaneous and real estate income. Specifically, the income categories were classified as follows, and total income calculated.

Salary income = [(1) Annual income from work] - employment income deductions
Pension income = [(6) Public pensions and government pensions]
+ [(7) Income from corporate and private pensions]
- Public pension deductions
Business income = [(2) Income from agriculture, forestry and fisheries]
+ [(3) Business income from sources other than agriculture, forestry and fisheries]
+ [(4) Annual income from side jobs etc.]
Real estate income = [(5) Annual income from rent and land rent]
Total income = Salary income + Pension income + Business income + Real estate income

Taxable income is then calculated by subtracting various deductions from the total income. The deductions applied here are the basic, spousal (special), dependent, elderly (up to 2004) and the social insurance premium deductions. The social insurance premium values estimated earlier were used for social insurance premium deductions. Note that deductions based on information not obtained from the questionnaire (e.g., disability deductions, medical expense deductions, special credits for home loans etc.) were not considered. Specifically, we calculated this as follows;

Provisional taxable income 1 = Total income - basic deduction
- social insurance premium deduction – deduction for the elderly
Provisional taxable income 2 = Provisional taxable income 1 - Spousal deduction
- Special spousal deduction
Taxable income = Provisional taxable income 2 - Dependent deduction

First, the value after subtracting the basic, social insurance premium and elderly deductions from the total income is considered a provisional taxable income 1. The (special) spousal deduction is applied to the household member whose provisional taxable income 1 is higher within the couple, which is considered provisional taxable income 2. The dependent deduction is applied to the

member with the highest provisional taxable income 2 in a household where there are members subject to the dependent deduction. This is then considered taxable income. In conclusion, the marginal income and resident tax rate table is applied to that taxable income to estimate the income and resident tax liability. We also considered the fixed-rate tax reductions (from 1994 to 2006).

A.3.2 Estimating tax liability for interest and dividends

We calculated the value of income and resident tax liability for the interest and dividends income by applying the real tax system to the values estimated for the interest and dividend income.

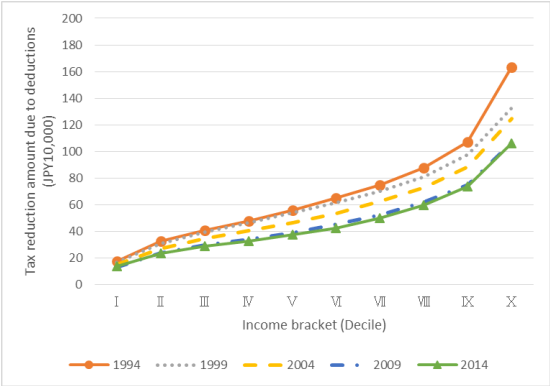
The taxation of earned interest is estimated by applying the applicable tax rates to interest income under separate taxation. Additionally, we also assumed that until 2005, household members aged 65 and above made maximum use of the tax exemption under the tax-free small deposit system for the elderly (maruyu). Specifically, first we took the maximum applicable maruyu value per person multiplied by the number of household members aged 65 and above as the household maruyu limit. The maruyu is then applied up to the household maruyu limit while prioritizing assets with higher interest rates. The earned interest from maruyu-eligible assets is exempted from taxation. In 2014 we also considered the special reconstruction income and resident tax.

Regarding dividend taxation, because it is possible to choose between comprehensive and separate taxation (taxed at the source or through declaration), we applied the method of taxation with the lowest tax liability for each household. In so doing, we also considered dividend tax credit. Assuming the maximal use of the dividend tax credit, the highest earner is assumed to be the head of the household (rather than a dependent relationship entered on the questionnaire), and the head of the household is considered to earn all the dividend income. In other words, all the dividend income estimated on a household basis is regarded as the income of the head of the household.

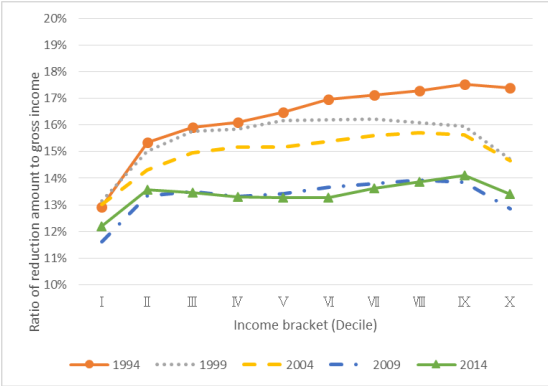
Figure 1. Tax burden reduction effect of deductions

(a)All households

(a.1)Burden reduction amount



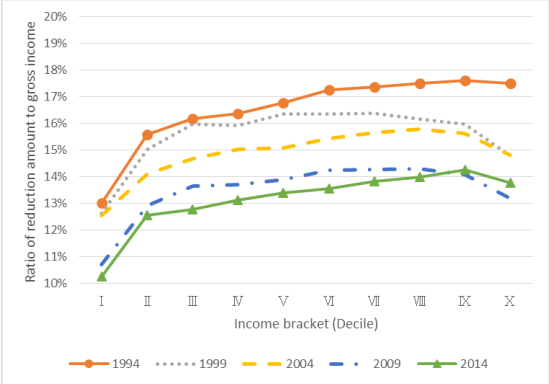
(a.2) Burden reduction ratio



(b)Working households

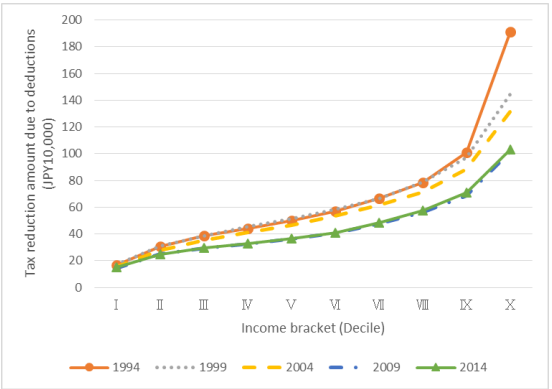
(b.1) Burden reduction amount

(a.2) Burden reduction ratio

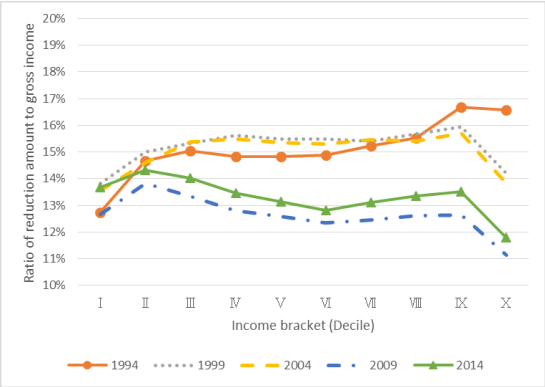


(c)Retired households

(c.1) Burden reduction amount

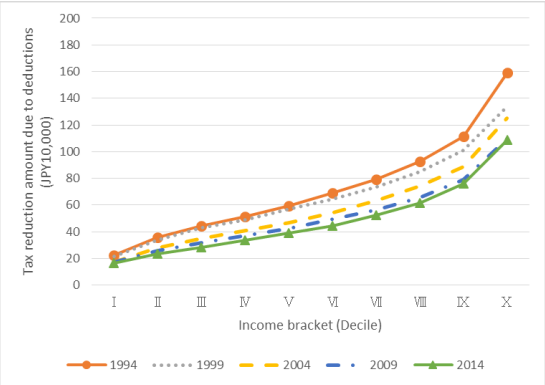


(c.2) Burden reduction ratio

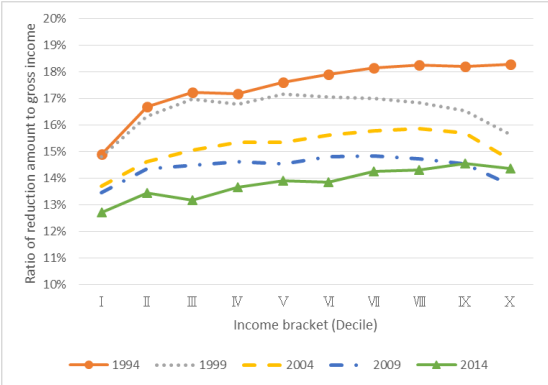


(d) Regular employment households

(d.1) Burden reduction amount



(d.2) Burden reduction ratio



(e) Non-regular employment households

(e.1) Burden reduction amount

(e.2) Burden reduction ratio

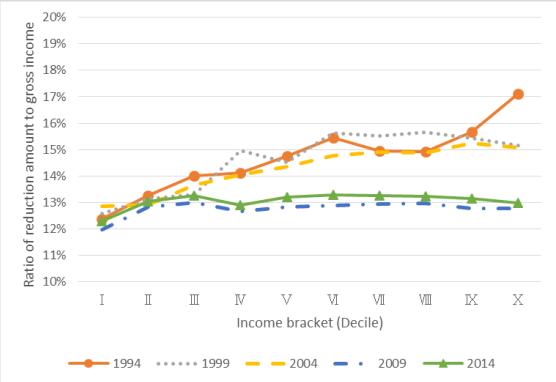


Table 1. Background of the changes in the income tax system

	1994	1999	2004
Employment income deduction	Fixed rate deduction *Deduction amount increases with income Minimum deduction amount: JPY 650,000	Fixed rate deduction *Deduction amount increases with income Minimum deduction amount: JPY 650,000 *Change to income classification	Same as left
Public pension deduction	Total of fixed amount deduction and fixed rate deduction *Deduction amount increases with income Minimum deduction amount 65 years old and over: JPY 1,400,000 Under 65 years old: JPY 700,000	Same as left	Same as left
Basic deduction	JPY 350,000	JPY 380,000	Same as left
Spousal deduction	Deduction amount General: JPY 350,000 70 years old and over: JPY 450,000 Income requirement for deduction eligibility JPY 350,000 or less	Deduction amount General: JPY 380,000 70 years old and over: JPY 480,000 Income requirement for deduction eligibility JPY 380,000 or less	Same as left
Spousal special deduction	Deduction amount: JPY 350,000 *Deduction amount decreases with income *May be applied additionally to persons eligible for deduction	Deduction amount: JPY 380,000 *Deduction amount decreases with income *May be applied additionally to persons eligible for deduction	Deduction amount: JPY 380,000 *Deduction amount decreases with income *May be applied additionally to persons eligible for deduction
Dependent deduction	Deduction amount General: JPY 350,000 16 to 22 years old: JPY 500,000 70 years and over: JPY 450,000 Of which, cohabiting parent: JPY 550,000 Income requirement for deduction eligibility JPY 350,000 or less	Deduction amount General: JPY 380,000 Under 16 years old: JPY 480,000 16 to 22 years old: JPY 630,000 70 years old and over: JPY 480,000 Of which, cohabiting parent: JPY 580,000 Income requirement for deduction eligibility JPY 380,000 or less	Deduction amount General: JPY 380,000 16 to 22 years old: JPY 630,000 70 years old and over: JPY 480,000 Of which, cohabiting parent: JPY 580,000 Income requirement for deduction eligibility JPY 380,000 or less
Social insurance deduction	Same amount as social insurance premium payment	Same as left	Same as left
Elderly deduction	Deduction amount: JPY 500,000	Same as left	Same as left
Tax rate	Five steps (10, 20, 30, 40, 50)	Four step (10, 20, 30, 37)	Same as left
Fixed rate tax reduction	Fixed rate tax reduction 20% Maxmimum deduction amount: JPY 2,000,000	Fixed rate tax reduction 20% Maxmimum deduction amount: JPY 250,000	Same as left
Interest and dividend tax	Interest tax: Separate tax *Elderly small amount savings tax exemption system, etc. applies Dividend tax: Select comprehensive or separate tax *Dividend tax credit applies	Same as left	Same as left

(Note) Created by the authors based on data from the Ministry of Finance Policy Research Institute's Monthly Financial Statistics Bulletin

Table 1. Background of the changes in the income tax system (continued)

	2009	2014
Employment income deduction	Same as left	Fixed rate deduction *Deduction amount increases with income Minimum deduction amount: JPY 650,000 Deduction amount upper limit: JPY 2,450,000
Public pension deduction	Total of fixed amount deduction and fixed rate deduction *Deduction amount increases with income Minimum deduction amount 65 years old and over: JPY 1,200,000 Under 65 years old: JPY 700,000 *Change to income classification	Same as left
Basic deduction	Same as left	Same as left
Spousal deduction	Same as left	Same as left
Spousal special deduction	Same as left	Same as left
Dependent deduction	Same as left	Deduction amount General (16 years and over): JPY380,000 19 to 22 years old: JPY 630,000 70 years old and over: JPY 480,000 Of which, cohabiting parent: JPY 580,000 Income requirement for deduction eligibility JPY 380,000 or less
Social insurance deduction	Same as left	Same as left
Elderly deduction	Abolished	Same as left
Tax rate	Six steps (5, 10, 20, 23, 33, 40)	Same as left *Addition of special reconstruction income tax
Fixed rate tax reduction	Fixed rate tax reduction	Same as left
Interest and dividend tax	Interest tax: Separate tax Dividend tax: Select comprehensive or separate tax *Dividend tax credit applies	Same as left

Table 2. Background of the changes in the resident tax system

	1994	1999	2004
Employment income deduction	JPY 1.65 million and below: 40% JPY 3.3 million and below: 30% JPY 6 million and below: 20% JPY 10 million and below: 10% Over JPY 10 million: 5% Minimum deduction amount: JPY650,000	JPY 1.8 million and below: 40% JPY 3.6 million and below: 30% JPY 6.6 million and below: 20% JPY 10 million and below: 10% Over JPY 10 million: 5% Minimum deduction amount: JPY 650,000	Same as left
Public pension deduction (same as income tax of previous year)	Total of fixed amount deduction and fixed rate deduction Fixed amount deduction General: JPY 1 million Under 65 years: JPY 500,000 Minimum deduction amount 65 years old and over: JPY 1.4 million Under 65 years old: JPY 700,000	Same as left	Same as left
Basic deduction	JPY310,000	JPY 330,000	Same as left
Spousal deduction	General: JPY 310,000 70 years old and over: JPY 360,000	General: JPY 330,000 70 years and over: JPY 380,000	Same as left
Spousal special deduction	Maximum JPY 310,000 *May be applied additionally to persons eligible for deduction	Maximum JPY 330,000 *May be applied additionally to persons eligible for deduction	Same as left
Dependent deduction	General: JPY 310,000 70 years old and over: JPY 360,000 Of which, cohabiting parent: JPY430,000	General: JPY 330,000 16 years to 22 years: JPY 430,000 70 years and over: JPY 380,000 Of which, cohabiting parent: JPY 450,000	General: JPY330,000 16 to 22 years old: JPY 450,000 70 years old and over: JPY 380,000 Of which, cohabiting parent: JPY 450,000
Social insurance deduction	Same amount as social insurance premium payment	Same as left	Same as left
Elderly deduction	JPY 480,000	Same as left	Same as left
Tax rate	Income percentage Municipal tax JPY 1.6 million and below: 3% JPY 1.6 million and below: 8% JPY 5.5 million and below: 11% Prefectural tax JPY 5.5 million and below: 2% Over JPY 5.5 million: 4% Per capita rate Municipal tax Population 500,000 and below: JPY 2,500 Population 50,000-500,000: JPY 2,000 Other: JPY 1,500 Prefectural tax: JPY 700	Income percentage Municipal tax JPY 2 million and below: 3% JPY 2 million and below: 8% JPY 7 million and below: 10% Prefectural tax JPY 7 million and below: 2% Over JPY 7 million: 3% Per capita rate Municipal tax Population 500,000 and below: JPY 3,000 Population 50,000-500,000: JPY 2,500 Other: JPY 2,000 Prefectural tax: JPY 1,000	Income percentage Municipal tax JPY 2 million and below: 3% JPY 2 million and below: 8% JPY 7 million and below: 10% Prefectural tax JPY 7 million and below: 2% Over JPY 7 million: 3% Per capita rate Municipal tax: JPY 3,000 Prefectural tax: JPY 1,000
Fixed rate tax reduction	Fixed rate tax reduction 20% (max. JPY 200,000)	Fixed rate tax reduction 15% (max. JPY 40,000)	Same as left
Interest and dividend tax	Interest tax: Separate tax *Elderly small amount savings tax exemption system, etc. applies Dividend tax: Select comprehensive or separate tax *Dividend tax credit applies	Same as left	Same as left

(Note) Created by the authors based on data from the Ministry of Finance Policy Research Institute's Monthly Financial Statistics Bulletin

Table 2. Background of the changes in the resident tax system (continued)

	2009	2014
Employment income deduction	Same as left	JPY 1.8 million and below: 40% JPY 3.6 million and below: 30% + JPY 180,000 JPY 6.6 million and below: 20% + JPY 540,000 JPY 10 million and below: 10% + JPY 1.2 million JPY 15.00 million and below: 5% + JPY 1.7 million Over JPY 15.00 million: JPY 2.45 million Minimum deduction amount: JPY 650,000
Public pension deduction	Total of fixed amount deduction and fixed rate deduction Fixed amount deduction: JPY 500,000 Minimum deduction amount 65 years old and over: JPY 1.2 million Under 65 years old: JPY 700,000	Same as left
Basic deduction	Same as left	Same as left
Spousal deduction	Same as left	Same as left
Spousal special deduction	Maximum JPY 330,000 May not be applied additionally to persons eligible for deduction	Maximum JPY 330,000 May not be applied additionally to persons eligible for deduction
Dependent deduction	Same as left	General (16 years and over): JPY 330,000 19 years to 22 years: JPY 450,000 70 years and over: JPY 380,000 Of which, cohabiting parent: JPY 450,000
Social insurance deduction	Same as left	Same as left
Elderly deduction	Abolished	Same as left
Tax rate	Income percentage Municipal tax: Uniform 6% Prefectural tax: Uniform 4% Per capita rate Municipal tax: JPY 3,000 Prefectural tax: JPY 1,000	Income percentage Municipal tax: Uniform 6% Prefectural tax: Uniform 4% Per capita rate Municipal tax: JPY 3,500 Prefectural tax: JPY 1,500 *Increase in per capita rate associated with special reconstruction income tax
Fixed rate tax reduction	Abolished fixed rate tax reduction Introduced adjustment deduction	Same as left
Interest and dividend tax	Interest tax: Separate tax Dividend tax: Select comprehensive or separate tax *Dividend tax credit applies	Same as left

Table 3. Tax burden reduction effect due to deductions

Income bracket	1994	1999	2004	2009	2014	Change over 20-year period
I	12.9%	13.1%	13.0%	11.6%	12.2%	-0.7 pp
II	15.3%	15.0%	14.3%	13.3%	13.6%	-1.8 pp
III	15.9%	15.8%	15.0%	13.5%	13.5%	-2.5 pp
IV	16.1%	15.8%	15.2%	13.3%	13.3%	-2.8 pp
V	16.5%	16.2%	15.2%	13.4%	13.3%	-3.2 pp
VI	17.0%	16.2%	15.4%	13.6%	13.3%	-3.7 pp
VII	17.1%	16.2%	15.6%	13.8%	13.6%	-3.5 pp
VIII	17.3%	16.1%	15.7%	13.9%	13.9%	-3.4 pp
IX	17.5%	16.0%	15.6%	13.8%	14.1%	-3.4 pp
X	17.4%	14.7%	14.7%	12.9%	13.4%	-4.0 pp
Overall average	16.2%	15.4%	14.9%	13.3%	13.4%	-2.9 pp

Table 4. Tax burden reduction effect due to deductions (with data fixed in 2014)

Income bracket	1994	1999	2004	2009	2014	Change over 20-year period
I	12.0%	12.8%	12.7%	12.1%	12.2%	0.2 pp
II	13.9%	14.5%	14.4%	13.7%	13.6%	-0.3 pp
III	14.5%	14.9%	14.7%	13.6%	13.5%	-1.0 pp
IV	14.8%	15.2%	15.0%	13.4%	13.3%	-1.5 pp
V	14.8%	15.3%	15.0%	13.4%	13.3%	-1.5 pp
VI	15.0%	15.3%	15.1%	13.4%	13.3%	-1.7 pp
VII	15.6%	15.6%	15.3%	13.7%	13.6%	-2.0 pp
VIII	16.0%	15.7%	15.4%	13.8%	13.8%	-2.2 pp
IX	16.6%	15.8%	15.6%	13.9%	14.1%	-2.5 pp
X	17.2%	14.9%	14.8%	12.9%	13.4%	-3.8 pp
Overall average	15.0%	14.9%	14.7%	13.3%	13.4%	-1.6 pp

Table 5. Tax burden reduction effect due to deductions (with system year fixed in 2014)

Income bracket	1994	1999	2004	2009	2014	Change over 20-year period
Ⅰ	12.6%	12.3%	12.2%	11.6%	12.2%	-0.4 pp
Ⅱ	13.5%	13.0%	13.1%	13.0%	13.6%	0.1 pp
Ⅲ	13.8%	13.4%	13.3%	13.3%	13.5%	-0.3 pp
Ⅳ	13.9%	13.6%	13.3%	13.1%	13.3%	-0.6 pp
Ⅴ	14.0%	13.8%	13.4%	13.3%	13.3%	-0.8 pp
Ⅵ	14.2%	14.0%	13.6%	13.5%	13.3%	-0.9 pp
Ⅶ	14.3%	14.1%	14.0%	13.7%	13.6%	-0.7 pp
Ⅷ	14.4%	14.2%	14.2%	14.0%	13.9%	-0.6 pp
Ⅸ	14.4%	14.3%	14.2%	14.1%	14.1%	-0.3 pp
Ⅹ	13.5%	13.4%	13.3%	13.4%	13.4%	-0.1 pp
Overall average	13.8%	13.6%	13.4%	13.3%	13.4%	-0.5 pp

Table 6. Tax burden reduction effect due to deductions by sub-group

	1994	1999	2004	2009	2014
(1) All households	16.2%	15.4%	14.9%	13.3%	13.4%
(2) Working households	16.6%	15.6%	14.9%	13.5%	13.3%
(3) Retired households	14.6%	15.0%	14.9%	12.8%	13.5%
(4) Regular employment households	17.6%	16.6%	15.3%	14.5%	14.1%
(5) Non-regular employment households	13.8%	13.8%	13.7%	12.6%	13.0%
(4)-(5)	3.8 pp	2.8 pp	1.6 pp	1.8 pp	1.1 pp

Table 7. Redistribution effect

(a) All households

		1994	1999	2004	2009	2014
Income disparity (pre-tax)	(1)	0.690	0.649	0.682	0.698	0.706
Income disparity (post-tax, without deductions)	(2)	0.542	0.572	0.584	0.602	0.601
Income disparity (post-tax, with deductions)	(3)	0.555	0.564	0.580	0.598	0.595
Redistribution effect (tax overall)	(4)=((3)-(1))/(1)	-19.6%	-13.0%	-14.9%	-14.4%	-15.8%
Of which, the contribution of the tax rate, etc. (pp)	(5)=((2)-(1))/(1)	-21.4%	-11.9%	-14.3%	-13.8%	-14.9%
Of which, the contribution of deductions (pp)	(6)=((3)-(2))/(1)	1.8%	-1.1%	-0.6%	-0.6%	-0.8%

(b) Working households

		1994	1999	2004	2009	2014
Income disparity (pre-tax)	(1)	0.623	0.605	0.611	0.644	0.620
Income disparity (post-tax, without deductions)	(2)	0.503	0.538	0.534	0.563	0.539
Income disparity (post-tax, with deductions)	(3)	0.513	0.528	0.532	0.560	0.538
Redistribution effect (tax overall)	(4)=((3)-(1))/(1)	-17.7%	-12.8%	-13.0%	-13.0%	-13.1%
Of which, the contribution of the tax rate, etc. (pp)	(5)=((2)-(1))/(1)	-19.2%	-11.1%	-12.7%	-12.5%	-13.0%
Of which, the contribution of deductions (pp)	(6)=((3)-(2))/(1)	1.5%	-1.6%	-0.3%	-0.6%	-0.2%

(c) Retired households

		1994	1999	2004	2009	2014
Income disparity (pre-tax)	(1)	1.022	0.784	0.878	0.802	0.837
Income disparity (post-tax, without deductions)	(2)	0.724	0.667	0.713	0.665	0.678
Income disparity (post-tax, with deductions)	(3)	0.751	0.667	0.700	0.653	0.658
Redistribution effect (tax overall)	(4)=((3)-(1))/(1)	-26.5%	-15.0%	-20.3%	-18.5%	-21.3%
Of which, the contribution of the tax rate, etc. (pp)	(5)=((2)-(1))/(1)	-29.1%	-14.9%	-18.7%	-17.1%	-18.9%
Of which, the contribution of deductions (pp)	(6)=((3)-(2))/(1)	2.6%	0.0%	-1.6%	-1.4%	-2.4%

(d) Regular employment households

		1994	1999	2004	2009	2014
Income disparity (pre-tax)	(1)	0.506	0.484	0.642	0.499	0.466
Income disparity (post-tax, without deductions)	(2)	0.430	0.444	0.546	0.455	0.424
Income disparity (post-tax, with deductions)	(3)	0.442	0.441	0.536	0.455	0.430
Redistribution effect (tax overall)	(4)=((3)-(1))/(1)	-12.7%	-9.0%	-16.4%	-9.0%	-7.6%
Of which, the contribution of the tax rate, etc. (pp)	(5)=((2)-(1))/(1)	-15.1%	-8.4%	-14.9%	-8.8%	-9.0%
Of which, the contribution of deductions (pp)	(6)=((3)-(2))/(1)	2.4%	-0.6%	-1.5%	-0.1%	1.4%

(e) Non-regular employment households

		1994	1999	2004	2009	2014
Income disparity (pre-tax)	(1)	0.625	0.620	0.618	0.557	0.526
Income disparity (post-tax, without deductions)	(2)	0.565	0.578	0.568	0.517	0.487
Income disparity (post-tax, with deductions)	(3)	0.587	0.592	0.584	0.523	0.494
Redistribution effect (tax overall)	(4)=((3)-(1))/(1)	-6.0%	-4.4%	-5.6%	-6.1%	-6.2%
Of which, the contribution of the tax rate, etc. (pp)	(5)=((2)-(1))/(1)	-9.6%	-6.8%	-8.2%	-7.3%	-7.5%
Of which, the contribution of deductions (pp)	(6)=((3)-(2))/(1)	3.5%	2.4%	2.6%	1.2%	1.3%

Table 8 Decomposition related to the comparison of redistribution effect between points in time

(a) From 1994 to 2014

		Factor decomposition					(Reference) Change in redistribution effect		
	Disparity change (Post-tax)	Disparity change (Pre-tax)	Non-system reform factor (Tax rate, etc.)	Non-system reform factor (Deductions)	System reform factor (Tax rate, etc.)	System reform factor (Deductions)	Overall	Of which, the contribution of the tax rate, etc.	Of which, the contribution deductions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3)+(4)+(5)+(6)	(8)=(3)+(5)	(9)=(4)+(6)
All households	0.041	0.016	0.005	0.007	0.038	-0.025	0.025	0.043	-0.018
Working households	0.027	-0.003	0.008	0.008	0.032	-0.018	0.030	0.040	-0.011
Retired households	-0.093	-0.185	0.093	-0.011	0.047	-0.036	0.093	0.139	-0.047
Regular employment households	-0.011	-0.041	0.018	0.005	0.016	-0.010	0.029	0.035	-0.005
Non-regular employment households	-0.094	-0.099	0.022	-0.008	-0.001	-0.007	0.005	0.020	-0.015

(b) From 1994 to 1999

	Disparity change (Post-tax)	Factor decomposition: Disparity change (Pre-tax)	Non-system reform factor (Tax rate, etc.)	Non-system reform factor (Deductions)	System reform factor (Tax rate, etc.)	System reform factor (Deductions)	(Reference) Change in redistribution effect: Overall	Of which, the contribution of the tax rate, etc.	Of which, the contribution deductions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3)+(4)+(5)+(6)	(8)=(3)+(5)	(9)=(4)+(6)
All households	0.010	-0.041	0.041	0.001	0.029	-0.021	0.051	0.071	-0.020
Working households	0.015	-0.018	0.025	0.000	0.027	-0.019	0.033	0.052	-0.019
Retired households	-0.084	-0.238	0.145	0.001	0.036	-0.028	0.154	0.180	-0.027
Regular employment households	-0.001	-0.022	0.018	0.000	0.018	-0.015	0.021	0.036	-0.015
Non-regular employment households	0.005	-0.005	0.010	0.000	0.007	-0.008	0.010	0.017	-0.007

(c) From 1999 to 2004

	Disparity change (Post-tax)	Factor decomposition: Disparity change (Pre-tax)	Non-system reform factor (Tax rate, etc.)	Non-system reform factor (Deductions)	System reform factor (Tax rate, etc.)	System reform factor (Deductions)	(Reference) Change in redistribution effect: Overall	Of which, the contribution of the tax rate, etc.	Of which, the contribution deductions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3)+(4)+(5)+(6)	(8)=(3)+(5)	(9)=(4)+(6)
All households	0.015	0.033	-0.021	0.001	0.000	0.002	-0.017	-0.020	0.003
Working households	0.004	0.006	-0.011	0.005	0.000	0.003	-0.003	-0.010	0.008
Retired households	0.033	0.093	-0.048	-0.015	0.001	0.001	-0.061	-0.047	-0.013
Regular employment households	0.096	0.158	-0.056	-0.010	0.001	0.003	-0.062	-0.055	-0.007
Non-regular employment households	-0.009	-0.001	-0.008	0.000	0.000	0.001	-0.007	-0.008	0.001

(d) From 2004 to 2009

	Disparity change (Post-tax)	Factor decomposition: Disparity change (Pre-tax)	Non-system reform factor (Tax rate, etc.)	Non-system reform factor (Deductions)	System reform factor (Tax rate, etc.)	System reform factor (Deductions)	(Reference) Change in redistribution effect: Overall	Of which, the contribution of the tax rate, etc.	Of which, the contribution deductions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3)+(4)+(5)+(6)	(8)=(3)+(5)	(9)=(4)+(6)
All households	0.018	0.017	0.001	0.004	0.000	-0.004	0.001	0.001	0.000
Working households	0.028	0.032	-0.002	0.002	0.000	-0.004	-0.004	-0.002	-0.002
Retired households	-0.046	-0.076	0.027	0.009	0.000	-0.006	0.030	0.028	0.002
Regular employment households	-0.082	-0.142	0.052	0.013	0.000	-0.004	0.061	0.052	0.009
Non-regular employment households	-0.060	-0.061	0.012	-0.004	-0.001	-0.005	0.001	0.010	-0.009

(e) From 2009 to 2014

	Disparity change (Post-tax)	Factor decomposition: Disparity change (Pre-tax)	Non-system reform factor (Tax rate, etc.)	Non-system reform factor (Deductions)	System reform factor (Tax rate, etc.)	System reform factor (Deductions)	(Reference) Change in redistribution effect: Overall	Of which, the contribution of the tax rate, etc.	Of which, the contribution deductions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3)+(4)+(5)+(6)	(8)=(3)+(5)	(9)=(4)+(6)
All households	-0.003	0.008	-0.006	-0.005	-0.003	0.003	-0.010	-0.009	-0.002
Working households	-0.021	-0.024	0.003	-0.002	-0.002	0.005	0.004	0.001	0.003
Retired households	0.004	0.034	-0.018	-0.011	-0.004	0.002	-0.030	-0.021	-0.009
Regular employment households	-0.024	-0.034	0.003	0.002	-0.001	0.005	0.010	0.002	0.007
Non-regular employment households	-0.030	-0.031	0.002	-0.001	-0.001	0.001	0.001	0.001	0.000