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Springer発行 The Japanese Economic Review 掲載
2023年3月28日出版 Volume 75, Page 1-28 (2024)

This is a post peer-review, pre-copyedit version of an article published in The Japanese Economic Review.

Final authenticated version is available online at <https://doi.org/10.1007/s42973-023-00125-6>

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(*Japanese Economic Review*, Volume 75, pp. 1–28, 2024)

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要約

日本では近年、社会保障制度の維持には家計の税負担の見直しが必須であると考えられている中、基幹税である所得税の再検討も求められている。こうした中、日本の所得税が抱えている課題の一つとして、手厚い所得控除により課税ベースが大きく侵食されていることが指摘されており、このことは所得税における財源調達能力ばかりでなく、所得再分配機能の低下にもつながる。

日本における控除の研究では、所得税制が主に所得控除を多用する仕組みとなっていることもあり、所得控除の大きさを計測する取り組みが多い。こうした一連の研究の中で、日本は諸外国と比較しても手厚い所得控除によって課税ベースが狭いことが確認されている。また、所得控除の大きさは収入・世帯属性などの要素によって納税者ごとに異なり、低所得層や高齢層ほど相対的に課税所得比率（課税所得が所得控除等の適用前所得に占める割合）が小さいことが確認されている。これらの結果を踏まえるとき、日本全体で見た課税所得比率の動向は所得分布の変化や高齢化といった人口構成の変化からも影響を受けることになる。近年、日本の所得分布は全体的に低所得層に移動しつつあることが指摘されるが。こうした低所得化は課税所得比率が低い世帯の割合を上昇させ、ここではこれを「(1)所得分布要因」と呼ぶ。また、所得税制の中で、高齢世帯は公的年金等控除が適用される。所得計算上の控除としては給与所得控除や公的年金等控除があるが、公的年金等控除の方が給与所得控除よりも控除額が大きい。このことはたとえ収入が同水準であっても、給与収入か年金収入かといった所得源泉の違いで控除額が異なることを意味する。このように所得控除制度は高齢世帯に対して相対的に寛大であるため、高齢化もまた課税所得比率が低い世帯の割合を上昇させ、ここではこれを「(2)年齢構成要因」と呼ぶ。このほか、低所得層や高齢層を含む（収入階層別・年齢階層別の）各層の課税所得比率それ自体も変化する。一つの理由は税制改正による所得控除制度の変更による影響であり、ここではこれを「(3)制度変更要因」と呼ぶ。もう一つの理由は収入や家族構成の変化などによる影響であり、ここではこれを「(4)その他控除比率要因」と呼ぶ。

課税ベースの変動は制度変更による影響と、低所得化や高齢化による影響のどちらが大きいのか？あるいは、低所得化や高齢化による課税ベースの縮小に対して、制度変更は課税ベースの維持にどの程度寄与しているのか？こうした点を検討するには、上述した(1)～(4)の要因を分析に取り入れる必要がある。本研究では『全国消費実態調査』の個票データ（1994～2014年）を用い、ここ20年間における世帯分布の動向と所得控除の実態を明らかにす

るとともに、所得税における課税ベースの変動について要因分解を通じて各要因の寄与を考察する。その結果、長期的視点からは主に低所得化や高齢化による影響から課税ベースの侵食を受ける一方、そうした圧力に対して制度変更の寄与は限定的であった。これは控除制度の拡大期と縮小期双方が含まれることも影響している。短期的視点でみれば制度変更は一定の影響を与え、特に2000年代は所得控除の縮小から課税ベースの拡大が進められたが、結局はその効果も所得分布や人口構成などの変化による影響で相殺されてきた。低所得化や高齢化といった変化が継続的に影響を与える中、所得税制は財源調達機能や所得再分配機能の回復に向けて、課税ベースのあり方を含め、これまでよりも大きな効果が期待できる抜本的な改革が求められる。

Factor decomposition of changes in the income tax base

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Abstract

Following generous tax deductions, Japan's income tax base is facing shrinkage; however, this trend has evolved not only due to changes to the tax system, but also due to changes in income distribution and population composition. In this study we use household micro data from the National Survey of Family Income and Expenditure (NSFIE, 1994–2014) to explicate the state of deductions and trends in household distribution over a 20-year period while considering the contribution of each factor to changes in the tax base through decomposition. Using a microsimulation analysis, we also assess the effects of recent changes to the tax system on the tax base. Based on a long-term perspective, while the tax base has primarily been eroded due to the effects of falling incomes and an aging population, the contributions of tax system changes responding to such pressures have been limited. Including both expansion and contraction periods in the deduction system also has an effect. From a short-term perspective, changes in the tax system have had a certain impact, particularly in the 2000s, when the tax base was expanded by reducing deductions. However, this effect has eventually been offset by changes in income distribution and population composition.

JEL Classification: C15, H24

Keywords: Income tax, tax deduction, tax base, Japan

Acknowledgments

Part of this study is supported by Grants-in-Aid for Scientific Research (Basic Research (C) (General) 18K01647, 21K01538), and uses questionnaire data from the Ministry of Internal Affairs and Communications Statistics Bureau “NSFIE.” We would like to extend our thanks to all those involved. We received valuable comments from Hirokuni Iiboshi, Hisakazu Kato, Masaki Nakahigashi, Shinichi Nishiyama, Toshiyuki Uemura, and Hiroyuki Yashio. We would like to extend our thanks to each of them. Note that the contents of this paper are the personal views of the authors and do not represent the official views of the institutions to which they belong.

1. Introduction

To sustain the Japanese social security system, it is necessary to review households' tax burden in response to demands to reexamine income tax which is a fundamental tax. Japan is facing a substantial erosion of its tax base due to generous tax deductions, which is tied to the degradation of income tax fiscal funding capabilities, as well as income redistribution effects. Income tax is considered to be a direct tax, implying that taxpayers' circumstances can be considered. Deductions are important in achieving this. Adjusting the tax-paying capacity through these deductions is indispensable for achieving a redistributive function; however, when viewed in terms of the burden-reducing effects of deductions, the benefits are greater for high-income earners, and the extensive use of deductions may also reduce its redistributive function.

Tax expenditure overseas has been extensively studied (Albarea et al., 2015; Altshuler and Dietz, 2011; Avram, 2018; Burman et al., 2008; Burman et al., 2017; Poterba, 2011). Expenditures, such as deductions, exclusions, credits, and favorable rates, are special taxation measures that provide tax relief to certain activities, industries, and taxpayer segments (Burman et al., 2017, p. 109); the scope of tax expenditure is broad. Conversely, in Japan, many efforts have been undertaken to measure the scale of deductions, partially because income tax is a mechanism that commonly uses extensive deductions (Matsuda et al., 2014; Morinobu and Maekawa, 2001; Morinobu and Nakamoto, 2013; Uemura, 2008; Yashio and Hachisuka, 2014).¹ This series of studies confirms that Japan has a shallow tax base due to its generous deductions compared to those of other countries (Tajika and Yashio, 2010; Nakamoto, 2014). Moreover, the scale of deductions differs between taxpayers depending on income and household factors, and previous studies have confirmed that the taxable income rate is comparatively smaller for low-income and elderly taxpayers (Tajika and Yashio, 2006a, 2006b, 2008, 2010; Kaneda, 2014).

These results indicate that trends in Japan's taxable income rate are also affected by changes in income distribution and population composition, including expansive population aging. Tanaka and Shikata (2019) asserted that income distribution in Japan has been shifting toward lower income groups in recent years. This fall in income has prompted an increase in the proportion of households with low taxable income rates, which we refer to as (1) income distribution factors in this study. Moreover, in the income tax system, elderly households have been eligible for deductions for public pensions and age (note that this was abolished in 2005). Panel (a) in Figure 1 illustrates the scale of

¹ Prior research has examined the effect of Japan's tax deduction system reforms on tax burden and redistribution (Abe, 2003, 2008; Doi, 2010, 2016, 2017; Doi and Park, 2011; Kawade, 2016; Shiraishi, 2010; Tajika and Furutani, 2003, 2005; Takayama and Shiraishi, 2010, 2016, 2017; Yada, 2011). Some studies on the tax redistribution effect have also evaluated the contributions of deductions (Doi, 2017; Kaneda, 2018; Miyazaki and Kitamura, 2016; Miyazaki et al., 2019; Mochizuki et al., 2010). Other studies have investigated the effect of tax deduction systems on incentives to work (Adachi and Kaneda, 2016; Bessho, 2018; Bessho and Hayashi, 2014; Kaneda and Kurita, 2017; Hayashi, 2010). Additional research has examined the effect of tax deduction reforms on household consumption or income (Kurita, 2017, 2019).

deductions for employment and public pension income. Both deductions rise with income; however, in many cases, the amount of deductions is found to be greater for public pensions than for employment income. This means in cases in which income is similar, the amount of deductions varied depending on the source of income, be it a salary or pension income. Therefore, because the deduction system is comparatively generous for older households, population aging also increases the proportion of households with lower taxable income rates, which we referred to as (2) age composition factors in this study. Additionally, each group's taxable income ratio (by income and age segment), including low-income and elderly segments, also changes. One reason for this is the effect of changes in the deduction system resulting from tax reform, which we called (3) system change factors in this study. Another reason is the effect of changes to income and family composition, which we termed (4) other deduction ratio factors in this study.

Consequently, it is necessary to consider the effects of changes in income distribution and population composition when examining trends in the income tax base. However, this pursuit does not imply that previous research has not created awareness on this issue. For example, Yashio and Hachisuka (2014) examined the extent to which the aging population contributed to reductions in the income tax base over the period from 2000 through 2009. Moreover, based on future estimates of social insurance benefits, Matsuda et al. (2014) examined the extent to which the future income tax base would contract due to the expansion of social insurance premium deductions accompanying population aging. A certain degree of interest in the effects of these external environmental changes on the tax base is evident.

Notably, prior studies have not incorporated the combined effect of all the above factors, (1)–(4), on the tax base. This study aims to examine whether changes in the tax base are primarily due to changes to the tax system, falling incomes, or the aging population. Moreover, we endeavor to investigate the extent to which tax system change contributes to the continuation of the tax base in response to reductions due to falling incomes and the aging population. These examinations necessitate incorporating all the above factors (1)–(4) into the analysis.

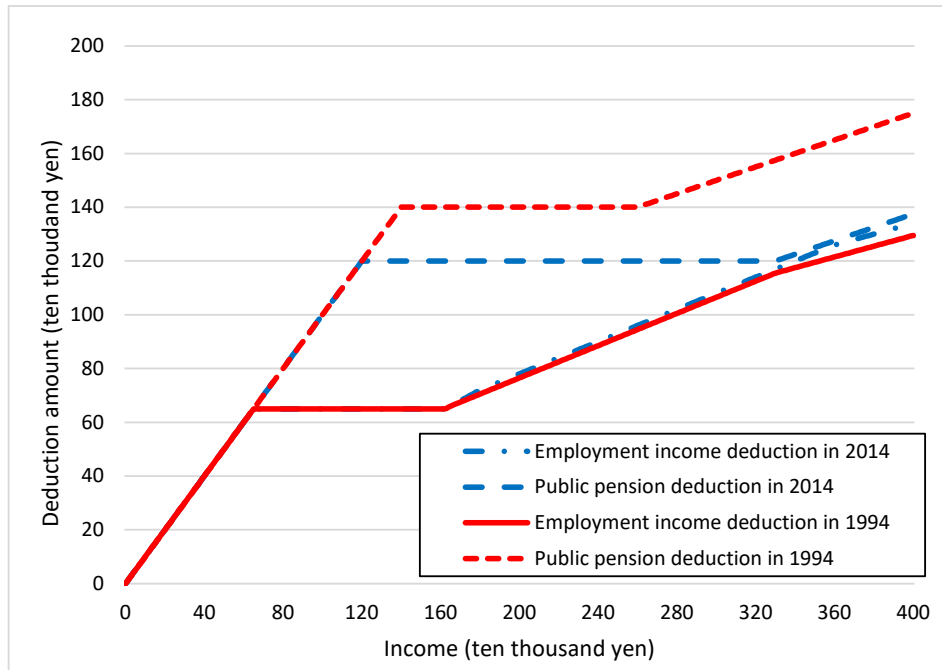
In light of the above, this study uses micro data (questionnaire data) from the National Survey of Family Income and Expenditure (NSFIE) (1994, 1999, 2004, 2009, 2014) to clarify trends in household distribution and tax deductions over the past 20 years. Moreover, applying factor decomposition, we consider each factor's contribution to changes in the income tax base. In this case, the use of micro data is essential because it is necessary to consider trends in the distribution of income and age when examining income distribution and age structure factors. Additionally, to uncover the effects of system changes and other deduction ratio factors, we used a microsimulation method to estimate the amount of deductions, applying the incomes and household attributes recorded in the questionnaire to the actual system, separating the contribution of tax system changes from the changes in the tax base at each layer. Additionally, since 2014, Japan has been

implementing widespread tax reform. In 2020, a major reform was enacted to promote work style reform and improve inter and intragenerational fairness. This study also subsequently assesses the impact of tax reforms from 2014 to 2020.

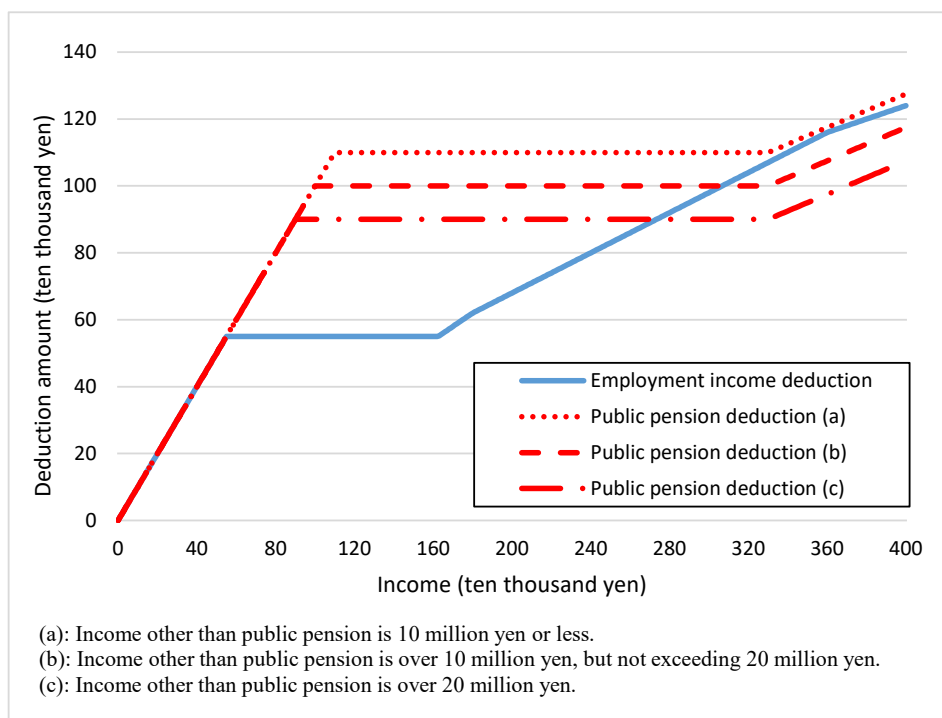
The remainder of the paper proceeds as follows. Section 2 reviews the evolution of Japan's tax deduction system since 1994. Section 3 describes the data and methodology used for estimating the amount of deductions and the tax base. Section 4 identifies the trends in deductions and income distribution, while Section 5 quantitatively considers each factor's respective contribution, applying factor decomposition of changes in the tax base. We also considered the impact of tax reforms between 2014 and 2020. Finally, Section 6 discusses our conclusions and their implications.

Figure 1: Employment income and public pension deductions

(a) Deduction amounts in 1994 and 2014



(b) Deduction amounts in 2020



Source: Policy Research Institute, Ministry of Finance, "Ministry of Finance Statistics Monthly."

2. Changes to the tax deduction system

This section briefly introduces the Japanese income tax system and the deductions that are the focus of this study. In the income tax system, taxable income is calculated by subtracting various deductions from gross income (earning minus expenses). The amount of tax is then calculated by multiplying taxable income by the income tax rate. This study focuses on seven primary personal deductions, including basic, spousal (including special spousal deductions), dependent, social insurance premium, employment income, public pension, and elderly deductions combined. Table 1 presents the evolution of these deduction systems.

The basic deduction was uniformly 350,000 yen until 1994, and was raised to 380,000 yen in 1995. Moreover, from 2020, the maximum deduction is 480,000 yen; however, when total income exceeds 24 million yen, the deduction gradually lowers, and when total income exceeds 25 million yen, the deduction is zero.

Regarding spousal deduction, until 1994, the income requirement for spouses to be eligible for the deduction was 350,000 yen or less, with a deduction amount of 350,000 yen in general, and 450,000 yen for those aged 70 or older. From 1995, the deduction amount and income requirement were expanded by 30,000 yen, respectively. From 2018, although the income requirement remained unchanged and the maximum amount of the deduction remained 380,000 yen, the deduction amount dropped to 0 when total income exceeded 10 million yen. In 2020, the income requirement for spouses eligible for the deduction was expanded to 480,000 yen, and the deduction amount remained unchanged. Regarding the special spousal deduction, until 2003, spouses who were eligible for the spousal deduction were also eligible for an additional deduction of up to 380,000 yen, but this was abolished in 2004. From 2018, the income requirement for spouses eligible for deduction was increased from a maximum of 760,000 yen to 1.23 million yen, and then to 1.33 million yen in 2020.

Regarding the dependent deduction, until 1994, the income requirement for dependent family members subject to deduction was 350,000 yen or less; the deduction amount was generally 350,000 yen; 500,000 yen for specified dependents (those aged between 16 and 22 years of age), 450,000 yen for elderly dependents (70 years or older), and 550,000 yen for cohabiting elderly dependents. From 1995, the income requirement and various deductions were increased by 30,000 yen, respectively, expanding the scope and amount of dependent deductions. From 1998, the deduction for specified dependents was increased to 580,000 yen. From 1999, the deduction for young dependents (those under 16 years of age) was increased from 380,000 to 480,000 yen, while that for specified dependents was increased from 580,000 to 630,000 yen. Notably, from 2000, the deduction for young dependents was decreased from 480,000 to 380,000 yen and treated similar to that of the general public. In 2010, the Japanese government's Democratic Party at the time introduced a child allowance, providing monetary allowance to parents and guardians of children under the age of 16, accompanied with exclusion from dependent deductions, beginning in 2011. Moreover, the

deductions for eligible dependents aged 16–18 decreased from 630,000 to 380,000 yen and treated similar to that of the general public. In 2020, the deduction amount remained unchanged; however, the income requirement for dependents eligible for deductions was increased from 380,000 to 480,000 yen, expanding the scope of dependent deductions.

Regarding employment income deductions, certain deduction rates are applied for each bracket of employment income; thus, as shown in Figure 1, the line graph follows a rightward trend, with deduction amounts increasing as salaries rise. From 2013, the upper limit of the deduction amount was set at 2.45 million yen. Subsequently, this limit was lowered reduced to 2.3 million yen in 2016, 2.2 million yen in 2017, and 1.95 million yen in 2020. Moreover, in 2020, the deduction amount for employment income was reduced by 100,000 yen, and the basic deduction was expanded by the same amount. These changes expanded the tax base among high-income earners, diminishing the tax-reducing effects of deductions.

The public pension deduction amount is set by combining a fixed-amount deduction and each bracket's fixed-rate deductions. Until 2004, the minimum deduction was 1.4 million yen for those aged 65 and above, and 700,000 yen for those under 65 years of age. From 2005 to 2019, the minimum deduction was 1.2 million yen for those aged 65 years and above and 700,000 yen for those under 65 years of age, easing the gap in deductions between these two age groups. In 2020, rather than increasing the basic deduction amount, the public pension deduction amount was reduced. Panel (b) in Figure 1 demonstrates the public pension deduction's structure in 2020, revealing that the reduction scale in the public pension deduction varied depending on the level of income other than the public pension. Additionally, the deduction amount was capped for pension incomes exceeding 10 million yen (deduction amount of 1.95 million yen). Similar to the employment income deduction, these changes expanded the tax base among high-income earners, limiting the deductions' tax-reducing effects.

Regarding the deduction for the elderly, until 2004, the applicability requirement was to be 65 years of age or older with an income of 10 million yen or less and a deduction amount of 500,000 yen; however, this system was abolished in 2005.

Table 1. Income tax system

	1994	1999	2004
Deduction for salaries	Deduction amount increases with employment income Minimum deduction: 650 thousand yen	(Same as on the left)	(Same as on the left)
Deduction for public pensions	Deduction amount increases with public pensions Minimum deduction 65 y/o or over: 1.4 million yen 64 y/o or under: 700 thousand yen	(Same as on the left)	(Same as on the left)
Basic deduction	350 thousand yen	380 thousand yen	(Same as on the left)
Deduction for spouses	Deduction General: 350 thousand yen 70 y/o or older: 450 thousand yen Income requirement for spouses 350 thousand yen or less	Deduction General: 380 thousand yen 70 y/o or older: 480 thousand yen Income requirement for spouses 380 thousand yen or less	(Same as on the left)
Special deduction for spouses	Maximum deduction: 350 thousand yen (Existence of additional application)	Maximum deduction: 380 thousand yen (Existence of additional application)	Maximum deduction: 380 thousand yen (No existence of additional application)
Deduction for dependents	Deduction General: 350 thousand yen 16-22 y/o: 500 thousand yen 70 y/o or older: 450 thousand yen who live together: 550 thousand yen Income requirement for dependents 350 thousand yen or less	Deduction General: 380 thousand yen 15 y/o or under: 480 thousand yen 16-22 y/o: 630 thousand yen 70 y/o or older: 480 thousand yen who live together: 580 thousand yen Income requirement for dependents 380 thousand yen or less	Deduction General: 380 thousand yen 16-22 y/o: 630 thousand yen 70 y/o or older: 480 thousand yen who live together: 580 thousand yen Income requirement for dependents 380 thousand yen or less
Social insurance premium deduction	Same as social insurance premium burdens	(Same as on the left)	(Same as on the left)
Deduction for the elderly	500 thousand yen	(Same as on the left)	(Same as on the left)
Tax Rate	5 brackets (10, 20, 30, 40, 50%)	4 brackets (10, 20, 30, 37%)	(Same as on the left)
Temporary tax cut	Tax cut of 20% up to 2 million yen	Tax cut of 20% up to 250 thousand yen	(Same as on the left)
Interest tax and dividend tax	Interest tax: separate taxation (Existence of exemption for the elderly) dividend tax: comprehensive or separate taxation (Existence of dividend tax credit)	(Same as on the left)	(Same as on the left)

Table 1. Income tax system (continued)

	2009	2014	2020
Deduction for salaries	(Same as on the left)	Deduction amount increases with employment income Minimum deduction: 650 thousand yen Maximum deduction: 2.45 million yen	Deduction amount increases with employment income Minimum deduction: 550 thousand yen Maximum deduction: 1.95 million yen
Deduction for public pensions	Deduction amount increases with public pensions Minimum deduction 65 y/o or over: 1.2 million yen 64 y/o or under 700 thousand yen	(Same as on the left)	Deduction amount increases with public pensions Minimum deduction 65 y/o or over: 0.9-1.2 million yen 64 y/o or under 400-700 thousand yen Maximum deduction 1.75-1.95 million yen
Basic deduction	(Same as on the left)	(Same as on the left)	maximum deduction: 480 thousand yen
Deduction for spouses	(Same as on the left)	(Same as on the left)	Deduction General: 380 thousand yen 70 y/o or older: 480 thousand yen Income requirement for spouses 480 thousand yen or less
Special deduction for spouses	(Same as on the left)	(Same as on the left)	Maximum deduction: 130-380 thousand yen (No existence of additional application)
Deduction for dependents	(Same as on the left)	Deduction General(16 y/o or older): 380 thousand yen 19-22 y/o: 630 thousand yen 70 y/o or older: 480 thousand yen who live together: 580 thousand yen Income requirement for dependents 380 thousand yen or less	Deduction General(16 y/o or older): 380 thousand yen 19-22 y/o: 630 thousand yen 70 y/o or older: 480 thousand yen who live together: 580 thousand yen Income requirement for dependents 480 thousand yen or less
Social insurance premium deduction	(Same as on the left)	(Same as on the left)	(Same as on the left)
Deduction for the elderly	(No existence)	(No existence)	(No existence)
Tax Rate	6 brackets (5, 10, 20, 23, 33, 40%)	(Same as on the left) (Existence of special reconstruction tax)	7 brackets (5, 10, 20, 23, 33, 40, 45%) (Existence of special reconstruction tax)
Temporary tax cut	(No existence)	(No existence)	(No existence)
Interest tax and dividend tax	Interest tax: separate taxation dividend tax: comprehensive or separate taxation (Existence of dividend tax credit)	(Same as on the left)	(Same as on the left)

Source: Policy Research Institute, Ministry of Finance, “Ministry of Finance Statistics Monthly.”

3. Materials and methods

3.1 Data

Household micro data (questionnaire data) from the NSFIE (1994–2014) were used. This survey is conducted every five years, covering approximately 57,000 households across a survey period spanning September to November. At the start of the survey, each household member was questioned regarding their relationship status, age, gender, employment status, and among other attributes, income over the past year and household savings at the time of the survey. In this study, we applied the actual tax system to household members' attributes and income data to estimate each household's annualized social insurance premiums and income tax liability. We also estimated the amount of deductions in the course of this series of tasks, excluding the following types of households from the sample due to the inability to estimate their taxable income.

- Households with members whose age or gender were unknown.
- Households where a member was posted to a job away from the family.
- Households with persons moving out.
- Households with blanks, unknown codes, or top codes for items in the survey.

3.2 Method for taxable income and income tax liability estimation ²

3.2.1 Method for estimating income

Annual income data from the Annual Income and Savings Questionnaire were used for estimating income other than interest and dividend income. Annual income in the NSFIE is broken down into the following 10 detailed items.

- (1) Annual income from work ³
- (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

² This study references Ohno et al. (2018) and Matsumoto et al. (2020) to estimate income, social security premiums, and income tax liability.

³ Based on the NSFIE's survey form, this item refers to annual income before deductions and taxes.

Regarding the NSFIE's Annual Income and Savings Questionnaire, the detailed income items for household heads and spouses are obtained individually; however, two or more other members are in a household, their incomes are summed by two age groups. One group is other household members under 65 years, and the other group includes household members 65 years of age and above. For this reason, other household members' income was apportioned as described below to estimate other members' detailed income.

In the case of income items (1), (2), (3), (6), and (7), annual income may vary depending on the age and gender of household members; therefore, the average income based on gender and age group was first obtained from the incomes of household heads and their spouses, for whom individual income is known. The combined income of the members of the households with multiple persons in the under 65 years of age or 65 years and older classifications was prorated to each household member according to the ratio of the previously calculated average income.

In the case of income items (4), (5), (9), and (10), when more than one person in a household was in the above classifications, annual income was prorated by the number of household members. Note that household members under the age of 15 were excluded from this proration.

Among the items that constitute the Annual Income and Savings Questionnaire, item (8), interest and dividends, is conspicuous in its underrepresentation. We subsequently estimated interest and dividend income using the asset balance from the questionnaire, multiplying the balance of households' financial assets by the market interest rate (annual interest rate). Note that because financial assets can only be determined on a household basis, income from interest and dividends was also estimated on a household basis.

3.2.2 Method for estimating the amount of deductions and income tax liability⁴

Estimating income tax liability requires calculating the amount of social insurance premiums used in the social insurance premium deduction. This study assumed that the highest income earner was the head of the household (rather than referencing the dependent relationship written on the household questionnaire), designating spousal and dependents relationships in the tax and social

⁴ In this study, we estimated the tax base by applying the actual tax system to the incomes and attributes of the households listed in the questionnaire. The methodology represents a microsimulation, wherein new variables are constructed virtually by applying a social system to each household from the available variables. While it is possible to estimate highly individual variables, such as tax and insurance premiums, for each household from limited information, the estimations may also contain large measurement errors. However, Ohno et al. (2015) and Tada et al. (2016) have validated this method for estimating tax liability and insurance premiums using the Comprehensive Survey of Living Conditions (CSLC), confirming that the resulting values had high accuracy. Additionally, the NSFIE can be used for the variables required for estimating the amount of household tax liabilities and insurance premiums. Sano et al. (2015) and Tada and Miyoshi (2015) confirmed that the CSLC and NSFIE are consistent in terms of household attributes and income data; therefore, the microsimulation method for estimating liability can also be applied to the NSFIE, and the validity of the estimates are regarded as having the same degree of accuracy.

insurance system based on the circumstances of the household head in relationship to the family, including the ages, occupations, and incomes of other household members.

Estimating the amount of social insurance premiums requires identifying the social insurance system in which each family member is enrolled. In this study, for the public pension, health insurance, nursing insurance, and employment insurance systems, we first inferred which system each household member was enrolled in and then applied the actual premium calculation to estimate the burden.

In the estimation, the actual tax system was applied to data on household attributes and income to determine the amount of the deductions and the income tax liability. The Income Tax Act classifies income into 10 categories; however, we calculated the total income using salary, business, miscellaneous, and real estate incomes from the NSFIE. Taxable income was then calculated by subtracting various deductions from the total income. The deductions applied included basic, spousal (special), dependent, elderly (up to 2004), social insurance premium, employment income, and public pension deductions. The social insurance premium deduction used the paid social insurance premiums amount calculated earlier.⁵ Finally, the marginal income tax rate table was applied to taxable income to calculate the income tax liability for total taxable income. The fixed-rate tax reduction (from 1994 to 2006) and special reconstruction income tax (from 2013) were also considered.

Additionally, the income tax liability value included taxation of interest and dividends. We estimated the interest and dividends value of the income tax liability by applying the real tax system to the previously estimated interest and dividend income values. The taxation of earned interest was estimated by applying the applicable income tax rates to the interest income under separate taxation. We also considered the minor savings tax exemption system for the elderly (until 2005). Additionally, because it is possible to choose between comprehensive and separate taxation for dividend taxation, the taxation system offering the smaller liability is chosen for each household. When doing so, we also considered the dividend tax credit where comprehensive taxation is chosen.

4. The state of and changes to tax deductions

To understand the state of and changes to the deductions, we reviewed the deduction (average amounts) and its ratio (the ratio of deductions to gross income). Since this study also considered the deductions' breakdown, rather than the tax base, we focused on the size of deductions. Additionally, the sample is on a household basis, hence, the levels of income and deductions used an equivalent household basis.

⁵ We do not consider deductions based on information not obtained from the questionnaire (disability and medical expense deductions, special credits for home loans, etc.).

4.1 Changes in the amount and ratio of the tax deductions⁶

We focused on levels of deduction amounts and ratios and their changes. Table 2 shows each deduction's average amount and the gross income between 1994 and 2014. As shown in Table 2, the mean and median of gross income have been declining. It should be noted that Japan's aging population has led to an increase in the proportion of elderly households, resulting in the rise of relatively low-income households. Panel (a) in Table 2 focuses on all households; the ratio of the deduction is 65%–71%, consistent with previous studies which state that Japanese households benefit from broad deductions (Tajika and Yashio, 2010; Nakamoto, 2014). Focusing on trends in the past 20 years, the amount of deductions increased in the latter half of the 1990s; however, have been decreasing since the 2000s. Additionally, after rising in the late 1990s, the deduction ratio has been largely consistent since the 2000s, partially due to the falling gross income.

Behind this shift lies not only changes to the tax system, but also their effects on income distribution and changes in population composition. One of the effects of changes to the tax system was related to the expansion of the deduction system in the latter half of the 1990s. This period saw a relaxation of requirements and expansion of the amounts allotted for basic, spouse, and dependent deductions. Cutbacks to the deduction system since the 2000s can also be cited. For example, in the early 2000s, the spouse deduction was reduced through the abolition of the additional special spousal deduction. Moreover, in the first half of the 2010s, the dependent deduction was reduced, accompanied by the introduction of the child allowance. The impact of changes in income distribution and population composition can also be attributed to population aging. In other words, the decrease in the proportion of working-age households and the increase in the share of aged households has lowered employment income deductions and raised public pension deductions. Additionally, while there is no significant apparent change in social insurance premium deductions, this is likely caused by the interaction of the increase in the social insurance premiums and the decline in the percentage of working-age households.

We further examined the sample by dividing it into working-age and elderly households. Panel (b) in Table 2 presents working-age households with heads under 65 years of age. Regarding the trends over the past 20 years, a decrease in employment income deductions is not evident; thus, the decrease in employment income deductions across all households in Panel (a) is due to the effects of population aging (i.e., an increase in the percentage of elderly households and a decrease in the percentage of working-age households). Panel (c) in Table 2 focuses on elderly households with heads 65 years of age or over, revealing that the level of the deduction ratio is 80%–87%, which is

⁶ The amount of deductions is estimated and obtained in this study. Depending on the household, the amount of deductions may exceed gross income and taxable income becomes negative. In such cases, taxable income is treated as zero; thus, no household has a deduction ratio that exceeds 100%.

larger than that of working-age households. Previous studies clearly show that elderly households benefit from higher deductions than working-age households. Although deductions were reduced in the late 2000s through the reduction of the public pension deduction and the abolition of the deduction for the elderly, elderly households continue to benefit from the deductions to a comparatively larger extent.

Table 2. Deduction amount and ratio

(a) Total households

		(ten thousand yen)				
		1994	1999	2004	2009	2014
Deduction ratio (%)		65.0%	71.3%	70.5%	69.6%	70.8%
Basic deduction		32.2	35.2	35.0	35.4	36.0
Spousal (special) deduction		22.0	24.1	13.4	14.4	14.0
Dependent deduction		24.7	28.3	24.1	22.0	10.6
Social insurance premium deduction		35.8	39.2	34.6	35.4	38.5
Employment income deduction		91.3	90.2	82.9	78.9	75.8
Public pension deduction		27.0	36.9	45.2	46.7	54.6
Deduction for the elderly		6.1	8.3	10.3	0.0	0.0
Gross income						
	Mean	409.4	397.1	377.1	361.3	348.8
	Standard deviation	282.6	257.7	257.0	252.3	246.3
	Median	353.8	343.6	323.0	303.7	295.1
	p5	132.1	121.3	117.9	105.3	102.9
	p95	845.0	828.1	783.6	781.2	757.1
	Gini coefficient	0.306	0.310	0.313	0.325	0.324
Real gross income (Mean)		409.4	390.6	383.1	366.7	344.9

(b) Households with heads under 65 years of age

		(ten thousand yen)				
		1994	1999	2004	2009	2014
Deduction ratio (%)		61.7%	66.8%	64.4%	65.8%	63.7%
Basic deduction		32.5	35.5	35.4	35.7	36.7
Spousal (special) deduction		21.7	23.6	13.4	13.3	12.6
Dependent deduction		27.3	32.6	28.3	27.9	11.7
Social insurance premium deduction		39.5	45.0	40.0	41.2	47.6
Employment income deduction		102.2	106.0	103.0	103.0	106.5
Public pension deduction		12.6	15.1	16.9	16.2	15.9
Deduction for the elderly		1.3	1.6	1.6	0.0	0.0
Gross income						
	Mean	425.4	422.3	403.9	393.5	391.5
	Standard deviation	264.9	255.6	247.0	253.2	242.6
	Median	371.8	372.0	355.1	343.7	346.7
	p5	152.5	142.6	133.5	117.8	120.3
	p95	852.0	851.1	803.8	828.4	801.5
	Gini coefficient	0.287	0.293	0.295	0.313	0.303
Real gross income (Mean)		425.4	415.4	410.4	399.3	387.1

(c) Households with heads 65 years of age or over

		(ten thousand yen)				
		1994	1999	2004	2009	2014
Deduction ratio (%)		80.2%	85.7%	86.5%	77.3%	81.5%
Basic deduction		32.2	34.2	33.7	34.6	34.8
Spousal (special) deduction		23.8	26.0	13.5	16.7	16.2
Dependent deduction		10.7	11.3	11.8	8.9	8.9
Social insurance premium deduction		15.3	16.2	18.7	22.3	24.1
Employment income deduction		30.4	28.2	24.3	24.6	27.3
Public pension deduction		107.1	122.7	128.3	115.3	115.8
Deduction for the elderly		32.8	34.9	35.5	0.0	0.0
Gross income						
	Mean	335.8	314.9	306.5	296.2	284.1
	Standard deviation	343.2	247.1	269.1	237.5	237.7
	Median	265.4	262.8	256.9	250.7	239.0
	p5	88.0	83.5	88.1	91.8	90.2
	p95	764.4	690.7	667.3	635.2	599.3
	Gini coefficient	0.372	0.339	0.331	0.320	0.320
Real gross income (Mean)		335.8	309.8	311.4	300.6	280.9

Note: Real gross income is calculated applying the consumer price index to nominal gross income, with the 1994 value taken as the reference.

We briefly reviewed the effects of changes to the income tax system and the economic and social changes related to the system. Table 3 presents the trends in levels of income, deductions, and income tax liability ratios. First, to exclude the effects of changes in economic and social conditions, we measured the effects of changes to the system by fixing the year of the data and changing only the year of the income tax system. Panel (a) in Table 3 shows the measurement results for which the year of the data was fixed to 2014.⁷ In terms of total households, in the late 1990s, the tax base shrank as the deduction ratio rose, and the maximum income tax rate declined; hence, the tax liability ratio fell significantly in the late 1990s. Since the 2000s, the tax base has subsequently expanded as the deduction ratio has declined, but tax liability ratios have changed slightly. When viewed in terms of long-term changes over the 20-year period, both the deduction ratio and the tax liability ratio have decreased. This means that the tax liability ratio has declined, despite the increase in the tax base, and one of the major reasons is the other system changes, including the reduction in the income tax rate. Capturing the long-term changes by separating working-age and elderly households, working-age households' deductions and tax liability ratios have decreased, similar to the result for total households. Elderly households have also experienced a decrease in deduction and tax liability ratios. As for the magnitude of change, the deduction ratio has declined more for elderly households, which is attributable to reduction of the public pension deduction and the 2005 abolition of the deduction for the elderly.

To exclude the effects of changes to the tax system, we measured the effects of economic and social changes by fixing the income tax system year and change in only the year of the data. Panel (b) in Table 3 shows the measurement results in 2014, which was the year of income tax system revision.⁸ Regarding total households, gross incomes have consistently declined over the past 20 years, while at the same time, the deduction ratio has risen, the tax base has shrunk, and the tax liability ratio has fallen accordingly. This finding indicates that changes in income distribution and population composition have reduced the tax base, diminishing the ability to raise tax revenue. The decrease in tax liability ratio also includes the impact of many households moving to a lower tax bracket. Regarding the magnitude of change, the impact of changes in economic and social conditions presented in Panel (b) is greater than that of the tax system changes shown in Panel (a). Capturing the long-term change by separating working-age and elderly households, the same trend is observed in both cases; however, this change is particularly greater for elderly households.

⁷ Measurements were also made fixing the data years to 1994, 1999, 2004, and 2009, obtaining qualitatively similar results.

⁸ Measurements were also made fixing the income tax system years to 1994, 1999, 2004, and 2009, respectively, obtaining qualitatively similar results.

Table 3. Gross income, deduction ratio, and tax liability ratio

(a) The year of data is fixed to 2014

(ten thousand yen)						
Year of data	2014	2014	2014	2014	2014	
Year of tax system	1994	1999	2004	2009	2014	1994–2014
Total households						
Gross income	348.8	348.8	348.8	348.8	348.8	0.0
Deduction ratio (%)	74.9%	77.7%	75.5%	72.0%	70.8%	−4.1%
Tax liability ratio to gross income (%)	2.6%	2.0%	2.1%	1.9%	2.0%	−0.6%
Working-age households						
Gross income	391.5	391.5	391.5	391.5	391.5	0.0
Deduction ratio (%)	65.0%	69.2%	65.7%	66.1%	63.7%	−1.3%
Tax liability ratio to gross income (%)	3.5%	2.7%	3.0%	2.4%	2.6%	−0.9%
Elderly households						
Gross income	284.1	284.1	284.1	284.1	284.1	0.0
Deduction ratio (%)	89.8%	90.6%	90.2%	80.9%	81.5%	−8.4%
Tax liability ratio to gross income (%)	1.3%	0.9%	0.9%	1.2%	1.2%	−0.2%

(b) The income tax system year is fixed to 2014

(ten thousand yen)						
Year of data	2014	2014	2014	2014	2014	
Year of tax system	1994	1999	2004	2009	2014	1994–2014
Total households						
Gross income	409.4	397.2	377.1	361.4	348.8	−60.6
Deduction ratio (%)	61.4%	63.6%	66.2%	68.2%	70.8%	9.4%
Tax liability ratio to gross income (%)	3.2%	2.8%	2.5%	2.3%	2.0%	−1.2%
Working-age households						
Gross income	425.4	422.4	403.9	393.5	391.5	−33.9
Deduction ratio (%)	59.4%	60.3%	62.5%	63.4%	63.7%	4.4%
Tax liability ratio to gross income (%)	3.3%	3.1%	2.8%	2.7%	2.6%	−0.8%
Elderly households						
Gross income	335.9	315.0	306.5	296.2	284.1	−51.8
Deduction ratio (%)	70.5%	74.5%	76.2%	78.0%	81.5%	10.9%
Tax liability ratio to gross income (%)	2.7%	1.7%	1.5%	1.4%	1.2%	−1.5%

4.2 Deduction ratios and household shares viewed by income bracket

We also reviewed the deduction ratios and household shares (the proportion of households in each income bracket) to examine the deduction ratios and income distribution. Table 4 compares the deduction ratios and household shares in 1994 and 2014 by income group. The number of income brackets is set to 10, and each bracket's threshold was created from income deciles based on the equivalent gross income for all households in 1994, and were fixed for other data years. Panel (a) in Table 4 presents the result for total households. Although all household shares were 10% in 1994 (by definition), in 2014, household shares of low-income brackets rose and those of high-income brackets declined. As noted above, this finding suggests that average household income has been on declining trend in Japan. To examine these results in more detail, total households were divided into working-age and elderly households.

Panel (b) in Table 4 focuses on working-age households. In both 1994 and 2014, the low-income brackets' deduction ratio was higher. Comparing the two points in time, the low-income brackets' deductions ratio has fallen and increased for high-income groups, slightly narrowing the difference between the groups. Comparing the household shares between the two points in time, except the first income bracket, the proportion of households in all income brackets has decreased due to the effects of population aging. The proportion of households in high-income brackets was higher in 1994, whereas the proportion in lower income brackets was higher in 2014. These results indicate that, in addition to declining working-age household shares due to the effects of population aging, incomes have also fallen.

Panel (c) in Table 4 focuses on elderly households. In both 1994 and 2014, the low-income brackets' deduction ratio was higher. Comparing the two points in time reveals that majority of the income brackets' deduction ratios have fallen, which is assumed to represent the impact of the reduction in public pension deductions and the abolition of the deduction for the elderly. Moreover, comparing the household rates between the two points in time indicates that the proportion of households in each income bracket has increased due to the effects of population aging. Regarding each year's distributions, the share of households in the lower income brackets was higher in 1994, and increased further in 2014. From these results, it is clear that in addition to an increase in the proportion of elderly households, due to the effects of population aging, their incomes have also fallen.

In this way, the changes in the Japanese tax deduction ratio are subject to the influence of not only system changes but also from changes to the income distribution and population composition. Therefore, in the next section, we clarified the state of changes to the deduction ratio through decomposing four factors of system change, other deduction ratios, age structure, and income distribution.

Table 4. Deduction and household share by income bracket

(a) Total households

		Deduction ratio		Household share	
		1994	2014	1994	2014
Income brackets					
I	1.84 million yen or less	87.1%	89.0%	10.0%	17.0%
II	1.84–2.36 million yen	84.1%	83.7%	10.0%	15.0%
III	2.36–2.77 million yen	77.4%	77.2%	10.0%	12.2%
IV	2.77–3.17 million yen	71.0%	71.1%	10.0%	10.2%
V	3.17–3.59 million yen	66.0%	67.0%	10.0%	8.9%
VI	3.59–4.09 million yen	61.7%	62.7%	10.0%	8.6%
VII	4.09–4.69 million yen	57.8%	59.2%	10.0%	7.9%
VIII	4.69–5.51 million yen	54.1%	56.0%	10.0%	7.3%
IX	5.51–6.68 million yen	48.9%	51.6%	10.0%	6.8%
X	over 6.88 million yen	37.2%	40.9%	10.0%	6.1%

(b) Households with heads under 65 years of age

		Deduction ratio		Household share	
		1994	2014	1994	2014
Income brackets					
I	1.84 million yen or less	85.1%	81.4%	6.8%	7.9%
II	1.84–2.36 million yen	79.8%	75.2%	7.8%	6.8%
III	2.36–2.77 million yen	73.4%	71.2%	8.0%	6.5%
IV	2.77–3.17 million yen	68.4%	67.1%	8.5%	6.0%
V	3.17–3.59 million yen	64.0%	64.3%	8.6%	5.9%
VI	3.59–4.09 million yen	60.4%	60.9%	8.9%	6.1%
VII	4.09–4.69 million yen	56.7%	58.1%	8.9%	5.9%
VIII	4.69–5.51 million yen	53.1%	55.1%	9.0%	5.8%
IX	5.51–6.68 million yen	48.3%	51.3%	9.1%	5.5%
X	over 6.88 million yen	37.5%	42.2%	9.0%	4.8%

(c) Households with heads 65 years of age or over

		Deduction ratio		Household share	
		1994	2014	1994	2014
Income brackets					
I	1.84 million yen or less	90.2%	94.8%	3.2%	9.1%
II	1.84–2.36 million yen	96.1%	90.3%	2.2%	8.1%
III	2.36–2.77 million yen	91.3%	83.1%	2.0%	5.7%
IV	2.77–3.17 million yen	84.0%	77.2%	1.5%	4.2%
V	3.17–3.59 million yen	78.2%	72.1%	1.4%	3.0%
VI	3.59–4.09 million yen	71.2%	67.4%	1.1%	2.5%
VII	4.09–4.69 million yen	66.8%	63.3%	1.1%	2.0%
VIII	4.69–5.51 million yen	62.5%	59.9%	1.0%	1.5%
IX	5.51–6.68 million yen	54.8%	53.1%	0.9%	1.3%
X	over 6.88 million yen	34.8%	35.9%	1.0%	1.3%

5. Decomposition of factors in the change in deduction ratios

5.1 Factor decomposition method

First, we explained the factor decomposition method of changes in the deduction ratio. When the deduction ratio (average of all households) at time t is A^t , the following Equation (1) holds.

$$A^t = \sum_{i=1}^I \sum_{j=1}^J a_{ij}^t \cdot m_{ij}^t \cdot r_i^t \quad (1)$$

where i and j denote income and age brackets, respectively. Variable a_{ij}^t denotes the deduction ratio in income bracket i of age bracket j , m_{ij}^t denotes the ratio of the age structure of age bracket j in income bracket i (= the number of households in income bracket i and age bracket j /the number of households in income bracket i), and r_i^t denotes the proportion of households in income bracket i (= the number of households in income bracket i /total number of households). Therefore, Equation (1) shows that deduction ratio (average value for all households) A^t is composed of each brackets' deduction ratio, age structure ratio, and the household share.

A comparison of the deduction ratio (average of all households) between different points in time can be expressed as follows, where base and comparison years are expressed as 0 and 1, respectively.

$$\Delta A = A^1 - A^0 \quad (2)$$

If Equation (2) is transformed after including the relationship in Equation (1), the following Equation (3) is obtained:

$$\begin{aligned} \Delta A = & \sum_{i=1}^I \sum_{j=1}^J (a_{ij}^1 - a_{ij}^0) \cdot \frac{2 \cdot m_{ij}^1 \cdot r_i^1 + m_{ij}^1 \cdot r_i^0 + m_{ij}^0 \cdot r_i^1 + 2 \cdot m_{ij}^0 \cdot r_i^0}{6} \\ & + \sum_{i=1}^I \sum_{j=1}^J (m_{ij}^1 - m_{ij}^0) \cdot \frac{2 \cdot r_i^1 \cdot a_{ij}^1 + r_i^1 \cdot a_{ij}^0 + r_i^0 \cdot a_{ij}^1 + 2 \cdot r_i^0 \cdot a_{ij}^0}{6} \\ & + \sum_{i=1}^I \sum_{j=1}^J (r_i^1 - r_i^0) \cdot \frac{2 \cdot a_{ij}^1 \cdot m_{ij}^1 + a_{ij}^1 \cdot m_{ij}^0 + a_{ij}^0 \cdot m_{ij}^1 + 2 \cdot a_{ij}^0 \cdot m_{ij}^0}{6} \end{aligned} \quad (3)$$

Equation (3) is a factor decomposition of changes in the deduction ratio, averaging all households into three factors. The first term on the right shows the effect of changes in the deduction ratio (deduction ratio factor) in individual brackets, the second term shows the effect of changes in the age composition ratio (age composition factor) within a given income bracket, and the third term shows the effects of changes in the household share (income distribution factor) across all income brackets. Referencing Bargain and Callan (2010) and Bargain (2012), Equation (4) is established to further separate the deduction ratio factor into the effects of tax system changes and other factors.

$$\begin{aligned}
\Delta A = & \sum_{i=1}^I \sum_{j=1}^J (a_{ij}^1 - a_{ij}^{1(0)}) \cdot \frac{2 \cdot m_{ij}^1 \cdot r_i^1 + m_{ij}^1 \cdot r_i^0 + m_{ij}^0 \cdot r_i^1 + 2 \cdot m_{ij}^0 \cdot r_i^0}{6} \\
& + \sum_{i=1}^I \sum_{j=1}^J (a_{ij}^{1(0)} - a_{ij}^0) \cdot \frac{2 \cdot m_{ij}^1 \cdot r_i^1 + m_{ij}^1 \cdot r_i^0 + m_{ij}^0 \cdot r_i^1 + 2 \cdot m_{ij}^0 \cdot r_i^0}{6} \\
& + \sum_{i=1}^I \sum_{j=1}^J (m_{ij}^1 - m_{ij}^0) \cdot \frac{2 \cdot r_i^1 \cdot a_{ij}^1 + r_i^1 \cdot a_{ij}^0 + r_i^0 \cdot a_{ij}^1 + 2 \cdot r_i^0 \cdot a_{ij}^0}{6} \\
& + \sum_{i=1}^I \sum_{j=1}^J (r_i^1 - r_i^0) \cdot \frac{2 \cdot a_{ij}^1 \cdot m_{ij}^1 + a_{ij}^1 \cdot m_{ij}^0 + a_{ij}^0 \cdot m_{ij}^1 + 2 \cdot a_{ij}^0 \cdot m_{ij}^0}{6}
\end{aligned} \tag{4}$$

where $a_{ij}^{1(0)}$ denotes the deduction rate applying the deduction system of the base year using the data of comparison years. Thus, the first term on the right-hand side of Equation (4) indicates the effect of using data from comparison years while changing only the year of the deduction system, thereafter measuring the true contribution that system changes have made to the deductions ratio. For example, this corresponds to the effects of an increase or decrease in the amount of various deductions and an increase in the amount of social insurance premium deductions as a result of increases in premium rates. We referred to this as system change factors. The second term indicates the effect of using the base year's deduction system to change only the year of the data, after which it measures the effect on the deduction ratio due to changes in income level and family structure, assuming the absence of changes to the tax system. For example, this corresponds to the impact of the decline in the number of dependents due to family nuclearization and declining birthrate. We referred to this as other deduction ratio factors. The third term measures the effects of changes in age composition. Under the

Japanese deductions system, the amount of deductions differ depending on the source of income, whether it is employment or pension income, even when the two are equivalent. Following the comparative generosity of the deduction systems to elderly households, population aging will increase the proportion of households with high deduction ratios. We referred to this as age composition factors. The fourth term measures the effects of changes in income distribution. Essentially, the lower the income bracket, the higher the deduction ratio. As such, falling incomes will increase the proportion of households with higher deduction ratios. We referred to this as income distribution factors. Note that when an individual transitions from employment to an unemployment (pensioner) due to retirement, the primary source of income transitions from employment to pension income. At this point, not only does the type of income source change, but it also usually results in a fall in income level. Income distribution factors include the effects of the decline in income due to population aging.

5.2 Results of factor decomposition measurement

While measuring the factor decomposition of Equation (4), the income and age brackets' numbers are set at 10 and 2, respectively (those in which the household head is under age 65, and those in which they are 65 years of age or older). Table 5 presents the results of the factor decomposition measurements.⁹

We first considered the results of long-term change, revealing that the deduction ratio has increased by 6% over the 20 years from 1994 to 2014, indicating a contraction in the tax base. In the background to this, income distribution factors have made the largest contribution, wherein falling incomes are affecting both working-age and elderly households. The contribution of age composition factors is also considerable. Conversely, tax system change factors have had a negative sign, but these effects have been offset by the other deduction ratio factors. Although the analysis shown above is suitable for capturing long-term changes, it is possible that these effects may have offset one another over the 20 years; therefore, it is necessary to consider the consequences of short-term changes.

Subsequently, we then considered the consequences of short-term changes by dividing the period into five-year intervals. Changes in the second half of the 1990s (from 1994 to 1999) caused the deductions ratio (average of all households) to increase by 5.9%, indicating that the tax base contracted. In the background to this, the contribution of tax system change factors was the largest. In particular, the deduction ratio for working-age households increased significantly. Revisions to the tax system in the second half of the 1990s included an increase in the amount of basic, spouse, and

⁹ The contributions of each of the four factors in the factor decomposition were respectively measured by income and age bracket. Regarding age composition factors, the contributions of working-age and elderly households essentially offset one another, both are totaled and recorded in the measurement results table.

dependent deductions, in addition to expansion of employment income deductions from low-income brackets to include middle-income brackets.

The changes were minor in the first half of the 2000s (from 1999 to 2004), with the deduction ratio (average of all households) falling by 0.1%; however, the tax system change factors had a negative contribution in the background. Moreover, working-age households' deduction ratio particularly decreased. Revisions to the system in the early 2000s included abolition of the additional special spousal deduction payment and reduction in the amount of the deduction for dependents under 16 years of age, indicating an expansion in the tax base. In contrast, income distribution and age composition factors made a positive contribution. Consequently, although the tax base expanded in this period following revisions to the system, the effect was offset by changes in income distribution and population composition.

Changes in the latter half of the 2000s (from 2004 to 2009) caused the deduction ratio (average of all households) to fall by 0.8%. In the background to this, tax system change factors had a negative contribution. In particular, elderly households' deduction ratio declined. Revisions to the system in the latter half of the 2000s included a reduced deduction amount for taxpayers aged 65 and above in the public pension deduction and abolition of the deduction for the elderly, expanding the tax base. Conversely, income distribution and age composition factors made a positive contribution. As in the first half of the 2000s, although the tax base expanded through system change factors, this effect was offset by changes in income distribution and population composition.

Changes in the first half of the 2010s (from 2009 to 2014) caused the deduction ratio (average of all households) to increase by 1.1%. In the background to this, tax system change factors had a negative contribution, and working-age households' deduction ratio particularly decreased. Revisions to the tax system in the first half of the 2010s included exclusion of those under 16 years of age from the dependent deduction, a reduced deduction amount for those between 16 and 19 years of age and an upper limit cap for the employment income deduction, indicating an expansion of the tax base. In contrast, income distribution and age composition factors made a positive contribution. Consequently, the effects of changes in income distribution and population composition were dominant in this period, resulting in a contraction in the tax base.

From a long-term perspective, while the tax base has primarily been eroded by the effects of falling incomes and population aging, the contributions made by changes to the tax system in response to these pressures have been limited. Including both expansion and contraction periods in the deduction system also has an effect. From a short-term perspective, changes to the system have had a certain effect, particularly in the 2000s, as reduced deductions expanded the tax base; however, this effect was eventually offset by changes in income distribution and population composition.

Table 5. Decomposition of changes to deduction ratio

	System change factors		Other deduction ratio factors		Income distribution factors		Age composition factors	Changes to deduction ratio
	Working-age households	Elderly households	Working-age households	Elderly households	Working-age households	Elderly households		
1994–2014	−0.88%	−2.39%	0.84%	1.57%	0.79%	3.86%	2.21%	6.01%
1994–1999	4.20%	0.59%	−0.09%	0.22%	0.08%	0.26%	0.59%	5.85%
1999–2004	−3.05%	−0.16%	0.18%	0.09%	0.74%	1.56%	0.52%	−0.11%
2004–2009	0.30%	−3.10%	0.09%	0.20%	0.31%	0.95%	0.44%	−0.81%
2009–2014	−1.62%	0.22%	0.29%	0.77%	0.02%	0.81%	0.57%	1.08%

5.3 Microsimulation analysis of recent tax reforms

Since 2015, extensive revisions have been made to the Japanese tax deduction system, and several important reforms were implemented in 2020 to promote work style reform and improve intra and intergenerational fairness. We estimated the amount of household deductions by applying the 2020 tax system to our 2014 data to assess the effect of tax system reforms from 2014 to 2020. However, the 2014 social insurance premium rate remained unchanged; hence, the assessment does not reflect the effects of social insurance premium deductions.¹⁰

Panel (a) in Table 6 presents the changes in the deduction ratio due to the tax reform. Evidently, the deduction ratio for all households increased by 0.7% and the tax base contracted following the recent tax reform. Regarding age brackets, both working-age and elderly households have experienced an increase in the deduction ratio; however, the increase was higher for working-age households. Notably, while the deduction ratio increased for the majority of income brackets, the deduction ratio for high-income brackets did not change or even fell. In the background to this are several system changes, including both expansion and reduction in the deduction system. Specifically, expansion factors including increases in the amount of the basic deduction and relaxation of income requirements for spouse and dependent deductions. Deduction reducing factors included reduced deductions for employment income and public pension, and a cap on the deduction amount.

The breakdown of the effects of these individual deductions reveals clear results. Panel (b) in Table 6 shows the changes in the amount of deductions following the tax reform. Evidently, following the recent reforms, both working-age and elderly households have benefited from increased deductions in basic, spousal, and dependent deductions, and working-age households experienced the effects of a reduction in the employment income deduction, while elderly households have experienced a reduction in the amount of public pension deductions.

In light of the above, first, while intergenerational disparities in deduction ratios has decreased as a result of the recent tax system reform, this gap remained wide even after the reform. Second, employment income and public pension deductions are important factors that diminish the income tax base. These characteristics have persisted, despite tax reforms. This intergenerational disparity in deduction ratios and the scale of expense deductions remains an important policy issue in reviewing the income tax base.

¹⁰ Here we only capture the effects of tax system reform by swapping the year of the system while holding the data years fixed. The effect of the trial calculation corresponds only to the tax system change factors in the earlier factor decomposition.

Table 6. Changes to deduction ratios and amounts from 2014 to 2020

(a) Deduction ratio

		Deduction ratio in 2014		Deduction ratio in 2020		Changes to deduction ratio	
		(A)		(B)		(C) = (B) - (A)	
		Working-age households	Elderly households	Working-age households	Elderly households	Working-age households	Elderly households
Income brackets							
I	1.84 million yen or less	81.4%	94.8%	82.4%	95.0%	1.0%	0.2%
II	1.84–2.36 million yen	75.2%	90.3%	76.4%	90.5%	1.2%	0.2%
III	2.36–2.77 million yen	71.2%	83.1%	72.5%	83.5%	1.3%	0.4%
IV	2.77–3.17 million yen	67.1%	77.2%	68.2%	77.9%	1.1%	0.7%
V	3.17–3.59 million yen	64.3%	72.1%	65.5%	73.0%	1.2%	0.9%
VI	3.59–4.09 million yen	60.9%	67.4%	62.0%	68.3%	1.2%	0.8%
VII	4.09–4.69 million yen	58.1%	63.3%	59.1%	63.9%	1.0%	0.6%
VIII	4.69–5.51 million yen	55.1%	59.9%	55.9%	60.1%	0.8%	0.3%
IX	5.51–6.68 million yen	51.3%	53.1%	51.8%	53.4%	0.5%	0.2%
X	over 6.88 million yen	42.2%	35.9%	42.2%	35.7%	0.0%	–0.2%
Average		63.7%	81.5%	64.7%	81.8%	0.9%	0.4%
Average (total households)		70.8%		71.5%		0.7%	

(b) Deduction amount

		Deduction amount in 2014		Deduction amount in 2020		Changes to deduction amount	
		(A)		(B)		(C) = (B) - (A)	
		Working-age households	Elderly households	Working-age households	Elderly households	Working-age households	Elderly households
Basic deduction		36.7	34.8	47.4	45.8	10.6	11.0
Spousal (special) deduction		12.6	16.2	13.8	17.1	1.2	0.9
Dependent deduction		11.7	8.9	12.1	9.4	0.4	0.5
Social insurance premium deduction		47.6	24.1	47.6	24.1	0.0	0.0
Employment income deduction		106.5	27.3	97.2	24.3	–9.3	–3.0
Public pension deduction		15.9	115.8	14.6	108.7	–1.2	–7.0
Total		230.9	227.0	232.7	229.5	1.7	2.5

6. Conclusion

One of the issues facing Japan's income tax revenue is the nation's shrinking tax base due to generous deductions; however, this trend in the tax base is not only due to changes in the tax system, but is also affected by changes in income distribution and population composition. In this study, using household questionnaire data from the NSFIE (1994–2014), we clarified the state of deductions and trends in household distribution over this 20-year period, also considering the contributions of various factors to changes in the tax base through factor decomposition. Moreover, extensive revisions to the Japanese deduction system have been implemented since 2015, and several important changes were made in 2020 to promote work style reform and improve intra and intergenerational fairness. Therefore, we also assessed the effects of recent tax system reforms on the tax base through a microsimulation analysis.

From a long-term perspective, our factor decomposition demonstrates that the erosion of the tax base is primarily due to falling incomes and population aging, while the contributions of tax system changes in response to these pressures have been offset by other deduction factors. Including both expansion and contraction periods in the deduction system also has an effect. From a short-term perspective, changes to the tax system have had a certain impact, particularly in the 2000s, as the tax base expanded through reducing deductions. Nevertheless, the effects were eventually offset by changes in income distribution and population composition. This suggests that it is essential to consider changes in income distribution and age structure for examination and strategic revision of the tax system.

Regarding Japan's deduction system, a considerable amount of employment income and public pension deductions is one of its significant characteristics, in addition to large intergenerational disparities in deduction ratios. A microsimulation analysis of the tax reforms up to 2020 reveals that while some improvements have been made to these issues through reforms to the tax system in recent years, the effects have been limited and remain critical policy issues.

Following the ongoing impact of notable changes, such as falling incomes and population aging, the fundamental future reform of the income tax system must necessarily have a stronger effect than previous reforms to demonstrate income redistribution while also considering individual taxpayers' tax-bearing capacity.

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