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Decomposition Approach Applied on the Effects of Taxes and Social Insurance Premiums on Income Distribution: Contributions to the Size of the Middle Class in Japan[1]

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Abstract

Japan's middle class in recent years is declining in a similar way to the middle classes of other developed countries. However, since the tax system can reduce income disparity, it can affect the size of the middle class. This study employs household microdata from 1989-2014 to examine how taxes and social insurance premiums affect the size of the middle class in Japan. Further, the evolution of the effects of taxes and insurance premiums involves changes in the tax and social insurance systems (system reform effects) and income distribution or demographics (non-system reform effects). Therefore, this study decomposes the effects of taxes and social insurance premiums into system and non-system reform effects to capture the true contribution of the former. The research found that taxes and social insurance premiums mitigate the reduction of the middle-class share, while the system reform effect did not contribute to the change in this share. Thus, fundamentally reforming the tax systems for a greater effect to enhance the size of the middle class is necessary.

Keywords: Tax, Social insurance premium, Middle class, Decomposition
JEL classification: C15, D31, H24

[1] This study is conducted as a part of the project "Economic Growth and Fluctuations Under the Population Decline" undertaken at the Research Institute of Economy, Trade and Industry (RIETI) and the 2020 Joint Usage/Research Center research undertaken at Kyoto Institute of Economic Research (KIER) and Hitotsubashi Institute of Economic Research (HIER). Part of this work was supported by Grant-in-Aid for Scientific Research (Basic Research (c) (General) [grant numbers 18K01647, 21K01538]. The study employs microdata from "the National Survey of Family Income and Expenditure" questionnaire survey conducted by the Ministry of Internal Affairs and Communications. The authors are grateful for helpful comments and suggestions by Hiroshi Yoshikawa (Rissho University), Takashi Unayama (Kyoto University), and Masumi Kawade (Nihon University), respective seminar participants at RIETI, KIER, and Hitotsubashi University.

1. Introduction

Following the trend in other developed countries, the middle class in Japan is declining. Pressman (2007) notes that "a large and vibrant middle class is important to every nation, and contributes to economic growth, as well as to social and political stability" (Pressman, 2007, p. 181). Thus, the decline of this class is concerning. Prior studies have examined the size of the middle class in some developed countries (Kochhar, 2017; OECD, 2019; Pressman, 2007), including Japan (Tanaka & Shikata, 2019; Shinozaki, 2015), and developed an academic definition of this class (Atkinson & Brandolini, 2013; Pressman 2015). Further, the OECD (2019) notes that effective policy responses in tax and social security systems can mitigate the declining middle class.

Since the tax system can reduce income disparity, it can affect the middle-class size. Thus, this study examines how income taxes and social insurance premiums affect the size of the middle class in Japan. Moreover, changes in these effects over time include changes in the tax and social insurance systems (system reform effect) and income distribution or demographics (non-system reform effect). For example, the income tax system can inherently reduce income disparity via the progressivity of the tax rate structure. Thus, even without the income tax system reform, the effect of reducing income disparity could change by income distribution or demographics changes. Hence, we also capture the true system reform effect contribution on the middle class.

In particular, significant research capturing the contribution of the system reform effect has been conducted in the literature on the redistributive effects of tax and social security systems, with many studies examining this effect in Japan. Studies that employ household microdata are gaining traction (e.g., Abe, 2000; Fukawa, 2006; Kitamura & Miyazaki, 2013; Ohishi, 2006; Tachibanaki & Urakawa, 2006; Tanaka & Shikata, 2012; Uemura & Adachi, 2015). These studies indicate that the redistributive effect is larger (smaller) in the elderly (younger people) (Kitamura & Miyazaki, 2013), and the redistributive effect of taxes has decreased from the 1990s onward (Kitamura & Miyazaki, 2013; Ohishi, 2006; Tachibanaki & Urakawa, 2006; Uemura & Adachi, 2015).

Hence, many empirical studies employ household microdata in Japan. However, using taxes and social insurance premiums from the questionnaire data is insufficient to decompose changes in redistributive effects over time into system and non-system reform effects. Some studies overcome this challenge of decomposition by applying the microsimulation method, such as that of Bargain and Callan (2010), which focuses on France and Ireland since the late 1990s; that of Bargain (2012), focusing on the UK since the late 1990s; and Ohno et al. (2018), focusing on Japan since the 1990s.[1,2]

[1] Bargain (2014) presents the survey by decomposing the redistributive effect into system and non-system reform effects.

[2] Other approaches apply the decomposition of redistributive effect in Japan. First, some studies decompose the redistributive effect of tax and social security system into intra- and inter-age redistributions (Ohtake, 2005; Oshio, 2002, Oshio & Urakawa, 2008; Oshio, 2009). Second, others decompose the redistributive effect of personal income tax into tax rate and

Similar to Ohno et al. (2018), we estimate the taxes and social insurance premiums (e.g., income tax, residence tax, pension insurance premium, health insurance premium, long-term care insurance premium, and employment insurance premium) by applying the system to the information (e.g., family unit and income) reported in the questionnaire and decompose the change in the effect of taxes and social insurance premiums on the middle-class size into the system and non-system reform effects. This method mirrors the microsimulation to create an original variable by applying the social system to available variables by household and estimate the burdens of households and variables not covered in the survey.[3]

This study aims to capture the true contribution of tax and social insurance system reforms to the effects on the middle-class size(system reform effect), considering the contribution of changes in income distribution or demographics to the effects, assuming tax and social insurance systems remain unchanged. We employ household microdata from the National Survey of Family Income and Expenditure (NSFIE), spanning the 1989–2014 period.

The rest of this paper is organized as follows. Section 2 traces the evolution of Japanese tax system reforms in income tax (national tax) and residence tax (local tax) since 1989. Section 3 presents the data and estimation method. Section 4 examines changes in the size of the middle class and the effects of tax and social security systems on the middle-class size. Section 5 shows the decomposition approach on changes in the effects of tax and social insurance premiums and examines the estimation results. Section 6 concludes the paper.

2. Income tax and residence tax reforms in Japan

This section traces the evolution of Japanese tax system reforms in income tax (national tax) and residence tax (local tax). It focuses on the tax rate and seven primary deductions: basic, spouse (including special spouse deduction), dependent, social insurance premium, employment, public pension, and elderly deductions. Table 1 summarizes the content of Japanese income tax and residence tax reforms from 1989 to 2014.

[Insert Table 1 here]

A feature of the tax reforms in the early 1990s was an increase in tax deductions. Income and residence taxes saw increases in public pension and dependent deductions. These reforms decreased households' tax base, particularly of elderly households, given the increased

tax base factors (Miyazaki & Kitamura, 2016; Miyazaki et al., 2019; Mochizuki et al., 2010).

[3] These values mean estimating a variable with strong individuality, such as taxes and social insurance premiums, by using limited information. Thus, they may contain a crucial measurement error. However, Ohno et al. (2015) and Tada et al. (2016) verified the validity of estimated values of taxes and social insurance premiums using micro data from the Comprehensive Survey of Living Conditions (CSLC) by the Ministry of Health, Labour and Welfare and showed that the estimated values had sufficient precision. We can now estimate the estimated value of taxes and social insurance premiums by using micro data from the National Survey of Family Income and Expenditure (NSFIE) by the Ministry of Internal Affairs and Communications because there are variables required to estimate them in the NSFIE. Sano et al. (2015) and Tada and Miyoshi (2015) showed that CSLC and NSFIE were consistent regarding information of family units and income. Therefore, we can apply the method to estimate values in the NSFIE and further render the estimated value to be sufficiently precise.

deduction for public pensions. Moreover, a temporary tax credit to stimulate the economy was implemented in 1994, giving a 20% fixed-rate cut to the gross tax liability. Given that the tax credit ceiling this year was large (two million yen), this policy effectively cutting taxes.

Another feature of these reforms was reduced tax rates and increased tax deductions. In income and residence taxes, the tax rates in every income bracket, especially those for the highest income bracket, decreased. Further, basic deduction, as well as deductions for salaries, spouses, and dependents, increased. These reforms reduced tax bases for households. The use of temporary tax credit to stimulate the economy continued until 2005.

In the early 2000s, the trend of income tax and residence tax reforms changed to tax increases. A feature of the tax reforms in this period was a decrease in tax deductions, increasing the tax base. In income and residence taxes, deductions such as the special deduction for spouses and the deduction for dependents narrowed. These reforms increased the tax base, particularly of younger households, given the reductions in the dependent deduction.

Another feature was an enhancement to the progressive income tax rates, a reform to the proportional residence tax rate, decreases in tax deductions, and the temporary tax credit abolition. On the one hand, the reform to the proportional tax rate in residence tax was implemented as a part of the decentralization to enhance the benefit principle of taxation. On the other hand, the reform to the progressive tax rate in income tax was implemented to maintain each taxpayer's total income and residence tax. In income and residence taxes, public pension deduction decreased significantly, and those for the elderly was abolished. These reforms increased the tax base, mainly for the elderly, given reductions in the deduction for public pensions and for the elderly. In addition, temporary tax credits were abolished in 2006.

A feature of the tax reforms in the early 2010s was a decrease in tax deductions, which increased the tax base. The child allowance was introduced from 2010 onward to provide monetary allowance to parents and guardians of children under 16 years, followed by exclusion from the deduction for dependents from 2011. Further, the deduction for dependents aged between 16 and 18 years decreased from 630,000 to 380,000 yen, and were treated similar to those of the general dependents.

Overall, the Japanese income tax reforms in the 1990s were marked by tax cuts, while the 2000s and 2010s saw tax increases. These reforms have always employed both tax rates and tax deductions. Unlike tax rates, tax deductions exert different effects on the tax liabilities of households per demographic characteristics such as age, occupations, income, family, and composition.

3. Data and estimation method

3.1 Data

We use 1989–2014 microdata from the NSFIE (including Household Questionnaire, Yearly Income and Savings Questionnaire, and Family Account Book). The survey is

conducted every five years and targets approximately 57,000 family units in Japan from September (October, in cases of 4,400 single-person households) to November. Further, it surveys features such as several household types in the first month of the survey period, the yearly income of the last year, and consumption expenditure during the survey period. We estimate the values of yearly taxes and social insurance premiums by applying household type and income data to real tax and the social security system by each family unit. However, we eliminate the following family units whose values we cannot estimate:

- Family units with have a member without age or sex information
- Family units with have a member living away from home for business
- Family units with a member who deviated from the family during the survey period
- Family units with no information on some key items (e.g., income and consumption).

3.2 Estimation of income by individuals

We use yearly income data from the Yearly Income and Savings Questionnaire (rather than monthly data from the Family Account Book). This database includes the following items:

(1) Income from employment
(2) Income from agriculture, forestry, and fishery
(3) Income from business other than (2)
(4) Income through piecework
(5) Income from house and land rents
(6) Annuities or pensions
(7) Company and private pension benefits
(8) Interest and dividends
(9) Remittance from relatives
(10) Other income.

The Yearly Income and Savings Questionnaire of the NSFIE collects data on the yearly income of household heads, spouses, other household members (aged under 65,) and other household members (aged 65 or older). However, regarding the family unit with more than one "other household member" in each category (i.e., under 65 and 65 or older), we can only use the total income of members belonging to each category. We adopt the following rule to divide the total amount of income into members individually.

The income levels of income items (1), (2), (3), (6), and (7) are likely to differ by sex and age. Thus, we first calculate the average income by sex (male or female) and age group (15–19, 20–29, 30–39, 40–49, 50–59, 60–69, and 70 or older) from the income data of household heads and spouses whose individual income data are available. Second, we divide

the total income of other household members aged under 65 and those aged 65 or older into each member by applying the ratio of the average income calculated above.

Regarding income items (4), (5), (8), (9), and (10), we divide total income into each member equally by the number of members belonging to other household members aged under 65 or those aged 65 or older. However, members aged under 15 are not included in the subject for dividing total income.

3.3 Social insurance premium

Japan has several different social insurance systems for people per their employment type. Thus, to estimate the values of social insurance premiums, the social insurance system in which each member of the household participates in must be considered. We estimate which system each member participates in initially and estimate values of the public pension insurance, health insurance, long-term care insurance, and employment insurance premiums by applying the respective premium formula. Notably, several premiums differ by households' residential location in Japan, but specific information about their residential location is not available in NSFIE. Hence, we calculate them via the nationwide average.[4]

3.3.1 Public pension insurance premium

We regard household members as participants in employee pensions (so-called second insured persons) if income from employment is more than the average hourly wage of short-time workers × 30 (hours) × 52 (weeks), their spouses are third insured persons with annual incomes of less than the income criteria (e.g., 1.3 million yen in 2014), and other household members are participants in the national pension (so-called first insured persons). Household members under 20 years and those who are 60 years or over do not pay their premiums in principle. However, we regard household members who meet the above income criteria for the No. 2 category of insured as participants in the employee pension even if they are 70 years old or under.

We estimate the premiums as follows. First insured persons pay a fixed amount of premium (15,250 yen per month in 2014). However, those who meet the income criteria for reduction and exemption always apply for the deduction and exemption. Since payment of the premium of second insured persons is shared equally between an employer and employee, we estimate their premiums by multiplying their incomes by half of the national average premium rate of employee pensions. Moreover, we consider the upper limit of standard monthly remuneration and bonus in employee pensions.

[4] We also consider the levy limit and reduction in each social insurance premium. Although these applications are decided based on the income of the previous year, we estimate the application based on the income in the survey year via a data constraint.

3.3.2 Health insurance premium

We regard household members aged 75 or over as participants in the medical care system for the latter-stage elderly. For members aged 74 or under, we regard the participants in the employee pensions as participants in the employee health insurance, and others as participants in the national health insurance. Nevertheless, we regard household members as the dependents of participants in the employee health insurance if their annual incomes are less than the income criteria, and another member participates in the employee health insurance.

We estimate the premiums as follows. First, since payment of the premium of employee health insurance is shared equally between the employer and employee, we estimate participant premiums by multiplying their incomes by half of the national average premium rate of employee health insurance. Next, regarding the national health insurance, we estimate the premiums by applying the national average premium rate levied on income, national average premium amount levied on property, and premium amount per capita and per household, after which we sum each household member's premium. Finally, regarding the medical care system for the latter-stage elderly, we estimate the premiums by applying the national average amount levied on income and per household. Further, we consider the levy limit and reduction in the national health insurance and medical care system for the latter-stage elderly and the upper limit of standard monthly remuneration and bonus in employee health insurance.

3.3.3 Long-term care insurance premium

Regarding the first insured persons in long-term care insurance (65 years old or over), we estimate the premiums by applying the weighted average premium amount among prefectures. Regarding the second insured persons (between 40 and 64 years old), we consider two cases in terms of participants, comprising participants in the national health insurance and those in the employee health insurance. Regarding the national health insurance, we estimate the premiums by applying the national average premium rate levied on income and national average premium amount levied on property, as well as premium amount per capita and per household, after which we sum each household member's premium. Regarding the employee health insurance, since the premium payment is shared equally by the employer and employee, we estimate it by multiplying participants' incomes by half of the national average premium rate. Moreover, we consider the levy limit and reduction in national health insurance and the upper limit of standard monthly remuneration and bonus in employee health insurance.

3.3.4 Employment insurance premium

We regard household members as employment insurance participants if income from employment is more than the income criteria (e.g., average hourly wage of short-time workers × 20 [hours] × 52 [weeks]). We estimate the premiums by multiplying their incomes by the employee burden rate of general industries.

3.4 Estimation of income and residence taxes

We estimate the values of income and residence taxes paid by each household.[5] Although there are 10 income types under the Japanese Tax Act, we use limited types, such as employment, employer, miscellaneous, and real estate incomes, whose data are available in the NSFIE. We assume that each household chooses the separate taxations per their interest or dividends; thus, we omit such incomes from the formula of comprehensive taxation. We calculate the total income as follows (the parenthesis indicates item names as applied in the questionnaire):

Employment income = [(1) Income from employment] − Employment income deduction

Pension income = [(6) Annuity or pensions] + [(7) Company and private pension benefits] − Public pension deduction

Employer income = [(2) Income from agriculture, forestry, and fishery] + [(3) Income from business other than (2)] + [(4) Income through piecework]

Real estate income = [(5) Income from house and land rents]

Total income = Employment income + Pension income + Employer income + Real estate income

Next, we apply the income deductions and estimate taxable income per household. The income deduction contains basic deduction, as well as deductions for spouse, special deduction for spouse, deductions for dependents, for the elderly, and for social insurance premium. The estimated values of social insurance premiums are employed as a social insurance premium deduction. The deductions are applied as follows:

Temporary taxable income 1 = Total income − Basic deduction − Social insurance premium deduction − Deduction for the elderly

Temporary taxable income 2 = Temporary taxable income 1 − Deduction for spouse − Special deduction for spouse

Taxable income = Temporary taxable income 2 − Deduction for dependents

[5] The residence tax is a local tax including prefectural and municipal taxes. Although the residence tax levies the income of the previous year, we estimate the residence tax burden based on the income and tax system in the survey year.

First, we calculate temporary taxable income 1 by deducting the basic deduction, social insurance premium deduction, and deduction for the elderly from total income. Second, if a spouse meets the income criteria, we calculate temporary taxable income 2 by applying the deduction for spouse and special deduction for spouse to that of married couples with higher temporary taxable income 1. Third, if there are dependents, we apply the deduction for dependents to the family member with the highest temporary taxable income 2. Finally, we estimate both the income and residence tax burdens, after which we apply the real tax rate table to their taxable income. We consider some tax credits, which are the temporary 1994–2006 tax cut and the adjustment credit in residence tax since 2007.

4. Change in the share of the middle class

There are two approaches to measuring the share of the middle class: income and population share. On the one hand, the income share of the middle class is the share of income that households in this class hold to income that all households hold. For example, the middle class often includes households in the income class of the second to fourth quantiles (Atkinson & Brandolini, 2013). On the other hand, the population share of the middle class is the share of the middle-class population to the total population. This measure employs either the absolute or the relative approaches to set the middle-class income range.

Similar to OECD (2019) and Tanaka and Shikata (2019), we estimate the middle-class share by the population share and set the middle-class income range by the relative approach. We regard households that earn 200% of the equalized median income and over as the upper class, those that earn 75% to 200% as the middle class, those that earn 50% to 75% as the lower class, and those that earn below 50% as the poor class. Moreover, we divide the middle class into three subgroups: upper-middle class (150% to 200%), mid-middle class (100% to 150%), and lower-middle class (75% to 100%). While we divide each household into income classes based on the equalized household income, the shares of each income class are calculated by the population shares of the corresponding income class to the total population.

There are three income types: (1) Initial income is income individuals or households gain initially; (2) gross income is income after adding social security benefits to the initial income; and (3) disposable income is income after subtracting non-consumption expenditures, such as taxes and social insurance premiums, from the gross income.

We examine a change in the middle-class share by benefits (i.e., the difference between the middle class on the initial and gross income bases).[6] The thresholds of the middle-class

[6] On the one hand, the initial income implies sum of the following income items in the Yearly Income and Savings Questionnaire: (1) Income from employment, (2) Income from agriculture, forestry and fishery, (3) Income from business, (4) Income through piecework, (5) Income from house and land rents, (7) Company and private pension benefits, (8) Interest and dividends, and (9) Remittance from relatives. On the other hand, the gross income is the sum of the initial income, (6) Annuities or pensions, and (10) Other income that implies social security benefits other than public pensions.

income range based on initial income are set by the equalized median income of initial income. Similarly, the thresholds of middle-class income range based on gross income are set by the equalized median income of gross income. Further, we examine a change in the share of the middle class by taxes and social insurance premiums (i.e., the difference between the middle class on the gross and disposable income bases). The thresholds of the middle-class income range based on disposable income are set by the equalized median income of disposable income. Taxes and social insurance premiums include six items (income tax, residence tax, pension insurance premium, health insurance premium, long-term care insurance premium, and employment insurance premium).

Figure 1 presents the share of the middle class from 1989 to 2014 on the initial, gross, and disposable income bases. Panel (a) focuses on the middle-class share in the full sample case. In 1989, the middle-class shares were 60.4% on the initial income basis, 66.1% on the gross income basis, and 69.6% on the disposable income basis. This implies that both benefits and taxes contribute to increase the middle-class share. The middle-class share from 1989 to 2014 significantly decreased on the initial income basis and slightly decreased on the gross and disposable income bases. Thus, benefits make a greater contribution to increasing the middle-class share. The middle-class household breakdown illustrates these changes. Panel (b) focuses on households with heads aged under 65. The share of younger people in the middle class significantly decreased among the initial, gross, and disposable income bases. Hence, a decline in younger people is a reason for the reduction in the middle class on the initial income basis. Panel (c) focuses on households with heads aged 65 or over. The elderly share in the middle class increased on the gross and disposable income bases. Thus, an increase in the aging population is a reason for the greater contribution of benefits to increasing the middle-class share.

[Insert Figure 1 here]

Table 2 presents the share of each income class and the contributions of benefits and taxes from 1989 to 2014. Panel (a) focuses on the change in the share of each class by benefits (i.e., the difference between a share of each class on the initial and gross income bases). In 1989, benefits increased (decreased) the middle-class (poor-class) share by 5.6%pt (6.8%pt). In 2014, benefits increased (decreased) the middle-class (poor-class) share by 13.8%pt (18.9%pt). Thus, benefits contributed to increasing the middle-class share and decreasing the poor-class share. Panel (b) focuses on the change in the share of each class by taxes and social insurance premiums (i.e., the difference between a share of each class on the gross and disposable income bases). This difference is the taxes and premiums effect (TPE). In 1989, taxes and social insurance premiums contributed to an increase in the middle-class share by 3.6%pt and to a decrease in the upper- and poor-class shares. In 2014, taxes and social insurance

premiums contributed to an increase in the middle-class share by 4.1%pt and to a decrease in the upper- and poor-class shares. Thus, taxes and social insurance premiums contributed to increasing the middle-class share. Panel (c) focuses on the share of each class based on disposable income. From 1989 to 2014, the middle-class share decreased from 69.6% to 66.3%; that is, by 3.4%pt, consistent with Tanaka and Shikata (2019). Moreover, OECD (2019) implied that the OECD average share of the middle-income class fell from 64% to 61% between the mid-1980s and mid-2014s (OECD 2019, p.47). Although the middle-class share in Japan is always larger than the OECD country average, the middle-class's decreasing trend is similar to the OECD country average. Further, upper- and poor-class shares increased in the past 25 years, similar to the results on the gross income basis.[7]

[Insert Table 2 here]

Table 3 demonstrates how the population shifted from an income class to the other income class due to benefits. Panel (a) focuses on the 1989 result. For example, 1.9% of the population belonging to the middle class on the initial income basis shifted to the upper class by benefits. Moreover, 21.2% (20.6%) of the lower (poor) class on the initial income basis shifted to the middle class by benefits. Panel (b) focuses on the 2014 result. Accordingly, 38.7% (35.4%) of the lower (poor) class on the initial income basis shifted to the middle class due to benefits. Further, shares of people shifting from the lower or poor class to the middle class due to benefits have increased in recent times.

[Insert Table 3 here]

Table 4 presents how the population shifted from an income class to the other income class through taxes and social insurance premiums. Panel (a) focuses on the 1989 result. For example, 25.0% of the population belonging to the upper class on the gross income basis shifted to the middle class by taxes. Moreover, 10.9% (0.6%) of the lower (middle) class on the gross income basis shifted to the middle (lower) class by taxes. Panel (b) focuses on the 2014 result. Accordingly, 13.3% (1.7%) of the lower (middle) class on the gross income basis shifted to the middle (lower) class by taxes. Further, shares of people shifting from the middle class to the lower or the poor class through taxes have increased in recent times.

[Insert Table 4 here]

[7] Notably, the middle-income thresholds (75% to 200% of the median income) vary across OECD countries. OECD (2019) shows that, in real terms, it takes an annual income of between USD 3,800 and USD 10,000 in Mexico and USD 26,500 and USD 70,600 in Luxembourg to be part of the middle class for a single person. Moreover, it takes an annual income of between USD 16,502 and USD 44,006 in Japan part of the middle class, which implies the middle-income thresholds in Japan are approximately equivalent to be median in OECD countries. However, most middle-income households from one OECD country would also be considered as middle income in another (OECD, 2019).

This trend may be derived from the structure of tax burdens that households bear. Table 5 details the burden ratios of taxes and social insurance premiums to gross income by the income classes. Panel (a) focuses on the 1989 burden ratios. The average total burden ratio was 17.0%, the tax burden ratio was 8.5%, and the burden ratio of social insurance premium was 8.5%. The total burden ratio of the upper (poor) class is the highest (lowest). Thus, the total burden structure is progressive, to which income and residence taxes contribute. Panel (b) focuses on the 2014 burden ratios. The average total burden ratio was 18.4%, the tax burden ratio was 7.5%, and the burden ratio of social insurance premium was 11.0%. Moreover, comparing 1989 and 2014, the tax (social insurance premium) burden decreased (increased). Similarly, relative to 1989, the structure of total burden is progressive in 2014, to which income and residence taxes contribute. However, it is important to ascertain the burden structure of each tax item. In the lower and poor classes, burden ratios of the health and long-term care insurance premiums are relatively large; further, they increased, especially by the long-term care insurance premium. Thus, social insurance premiums may weaken the total contribution of taxes and social insurance premiums to enhance the middle-class share.

[Insert Table 5 here]

5. Decomposition on changes in taxes and premiums effect

5.1 Method of decomposition

Taxes and social insurance premiums are first estimated by applying the system for a given year to information, such as family unit and income, for the year to calculate the TPE. Next, the difference between the income-class share on the gross and disposable income bases is the TPE for the year. Thus, assuming the data for year i to be d_i, the share of income class c on the gross income basis calculated using d_i is defined as $S_c(d_i)$. Further, assuming the system for year j to be p_j, the share of income class c on the disposable income basis calculated using d_i and p_j is defined as $S_c^*(d_i,p_j)$. The TPE is then calculated using d_i and p_j:

$$E_{i,j}^{c} = S_c^*(d_i, p_j) - S_c(d_i). \quad (1)$$

We assume the base year to be 0 and target year to be 1 to make comparisons over time. The change in share of income class c on the disposable income basis from the base to target year is then decomposed into three factors in three cases similar to Bargain and Callan (2010) and Bargain (2012).

(Case 1)

$$
\begin{aligned}
S_c^*(d_1,p_1)-S_c^*(d_0,p_0) &= S_c(d_1)-S_c(d_0)\\
&+\{S_c^*(d_1,p_1)-S_c(d_1)\}-\{S_c^*(d_1,p_0)-S_c(d_1)\}\\
&+\{S_c^*(d_1,p_0)-S_c(d_0)\}-\{S_c^*(d_0,p_0)-S_c(d_0)\}\\
&= S_c(d_1)-S_c(d_0)\ \cdot\cdot\cdot(a)\\
&+\left(E_{1,1}^c-E_{1,0}^c\right)\cdot\cdot\cdot(b)\\
&+\left(E_{1,0}^c-E_{0,0}^c\right)\cdot\cdot\cdot(c)
\end{aligned}
\tag{2.1}
$$

(Case 2)

$$
\begin{aligned}
S_c^*(d_1,p_1)-S_c^*(d_0,p_0) &= S_c(d_1)-S_c(d_0)\\
&+\{S_c^*(d_0,p_1)-S_c(d_0)\}-\{S_c^*(d_0,p_0)-S_c(d_0)\}\\
&+\{S_c^*(d_1,p_1)-S_c(d_1)\}-\{S_c^*(d_0,p_1)-S_c(d_0)\}\\
&= S_c(d_1)-S_c(d_0)\ \cdot\cdot\cdot(a)\\
&+\left(E_{0,1}^c-E_{0,0}^c\right)\cdot\cdot\cdot(b)\\
&+\left(E_{1,1}^c-E_{0,1}^c\right)\cdot\cdot\cdot(c)
\end{aligned}
\tag{2.2}
$$

(Case 3)

$$
\begin{aligned}
S_c^*(d_1,p_1)-S_c^*(d_0,p_0) &= S_c(d_1)-S_c(d_0)\ \cdot\cdot\cdot(a)\\
&+\frac{1}{2}\left\{\left(E_{0,1}^c-E_{0,0}^c\right)+\left(E_{1,1}^c-E_{1,0}^c\right)\right\}\cdot\cdot\cdot(b)\\
&+\frac{1}{2}\left\{\left(E_{1,0}^c-E_{0,0}^c\right)+\left(E_{1,1}^c-E_{0,1}^c\right)\right\}\cdot\cdot\cdot(c)
\end{aligned}
\tag{2.3}
$$

Case 1 implies the decomposition expressed in Equation (2.1). On the right-hand side of Equation (2.2), the first term (a) is "the change in share of the income class *c* on the gross income basis." The second term (b) is the effect when the system changes from the base year (0) to the target year (1) while the data remains fixed in the target year (1). It implies the true contribution of tax and social insurance premium reforms to the TPE. This term is represented as "(b) system reform effect." The third term (c) is the effect when the data changes from the base year (0) to the target year (1) while the system remains fixed in the base year (0). It implies the contribution of changes in income distribution or demographics to the TPE on the condition that the tax and social insurance systems would remain unchanged. This term is represented as "(c) non-system reform effect." Finally, the sum of the system and non-system reform effects is equivalent to total TPE.[8] Next, Case 2 implies the decomposition expressed in Equation (2.2). The system reform effect is the effect when the system changes from the base year (0) to the target year (1) while the data remains fixed in the base year (0). Moreover, the non-system

[8] Bargain and Callan (2010), Bargain (2012), and Ohno et al. (2018) examined the decomposition of the change in the redistributive effect (i.e., effect of taxes and social insurance premiums on reducing an income disparity) using a similar approach to this study. They decomposed the change in redistributive effect into non-system and system reform effects.

reform term is the effect when the data changes from the base year (0) to the target year (1) while the system remains fixed in the target year (1). Finally, Case 3 implies the decomposition expressed in Equation (2.3). The system and non-system reform effects are equivalent to the average between Cases 1 and 2.

5.2 Estimation results

Table 6 shows the decomposition of the change in the class share on the disposable income basis from 1989 to 2014. Panel (a) focuses on the estimation result of system and non-system reform effects decomposed in Equations (2.1) to (2.3). Cases 1 and 2 imply almost the same results; thus, Case 3 is equivalent to Cases 1 and 2.

[Insert Table 6 here]

Panel (b) focuses on the estimation result regarding the decomposition of Equation (2.3). While the middle-class share on the gross income basis decreased by 3.9%pt, the middle-class share on the disposable income basis decreased by 3.4%pt. Thus, although the middle-class share decreased, taxes and social insurance premiums increased it by 0.6%pt. For the same period, upper- and poor-class shares increased by 2.7%pt and 1.8%pt, respectively, on the gross income basis. Regarding the result of the upper class, taxes and social insurance premiums reduced it by 0.9%pt. Moreover, the decomposition result shows that although the non-system reform effect increased the middle-class share by 1.9%pt, the system reform effect decreased it by 1.4%pt. Hence, the negative 1989 system reforms effect weakened the contribution of taxes and social insurance premiums in enhancing the middle-class share. For the same period, the system reform effects increased the upper-class (lower-class) share by 0.7%pt.

Panel (c) shows the system and non-system reform effects of taxes or social insurance premiums between 1989 and 2014.[9] While the system reform effect of taxes decreased the middle-class share by 1.4%pt, that of social insurance premiums did not contribute to the change in the middle-class share. The total system reform effect of taxes and social insurance premiums in decreasing the middle-class share is primarily because of the tax reform. A feature of the tax reforms was reduced tax rates and increased tax deductions.

Table 7 shows the decomposition of the change in five years by income classes. Every five years, except in the later 1990s, while a change in the middle-class share on the gross income basis decreased, the non-system reform effect contributed to absorb a decrease of the middle class share. On the contrary, while a change in the upper-class share on the gross income basis increased, the non-system reform effect contributed to absorb an increase of the upper-class share. Thus, taxes and social insurance premiums contributed to absorb changes in the

[9] The effect of either taxes or social insurance premiums is estimated as the difference between the income-class share on the gross income basis and the basis of income calculated by subtracting either only taxes or social insurance premiums from gross income.

middle- and upper-class shares. However, the system reform effect contributed to a decrease in the middle-class share in the early 1990s and did not change the middle-class share since the latter part of the 1990s. Similarly, the system reform effect contributed to an increase in the upper-class share in the early 1990s and almost did not contribute to changes in the upper-class share since the later 1990s. That is, the system reform in taxes and social insurance premiums did not contribute to enhance the middle-class share since the 1990s.

[Insert Table 7 here]

6. Conclusion

Recent years have seen a declining middle class in Japan, following other developed countries. Nonetheless, the tax system can reduce an income disparity and, thus, affect the middle-class size. We examine how taxes and social insurance premiums affect the middle-class size in Japan (i.e., the difference between the middle class on the gross and disposable income bases). Moreover, changes in these effects over time include changes in the system and non-system reform effect, by which we capture the true contribution of the system reform effect.

Accordingly, we use household microdata from the 1989–2014 NSFIE to estimate the tax and social insurance burdens on households by applying the system to reported information, such as family unit, income. Further, we decompose the effect of taxes and social insurance premiums into the system and non-system reform effects.

The middle-class share decreased by 3.4%pt in the past 25 years on a disposable income basis. Although the middle-class share in Japan is always larger than the average of OECD countries, a decreasing trend of the middle class in Japan is the same as the average of OECD countries. In this trend, taxes and social insurance premiums enhanced the middle-class share. Even so, this contribution to enhancing the middle-class share is always because of the non-system reform effect, equivalent to the built-in stabilizer function in the tax systems. However, the system reforms since 1989 decreased the middle-class share. Further, examining this effect every five years reveals that recent system reforms did not contribute to a change in the middle-class share. Therefore, it is necessary to fundamentally reform the tax systems to allow for a greater effect in enhancing the size of the middle class.

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Table 1. Income tax and residence tax systems

(a) Income tax

	1989	1994	1999
Tax Rate	5 brackets (10%, 20%, 30%, 40%, 50%) Tax exemption limit: 3 million yen	(Same as on the left)	4 brackets (10%, 20%, 30%, 37%) Tax exemption limit: 3.3 million yen
Deduction for Salaries	Fixed-rate deduction Minimum deduction: 650 thousand yen	(Same as on the left)	(Same as on the left) (Reform of income brackets)
Deduction for Public Pensions	Sum of fixed-amount and fixed-rate deductions Fixed-amount deduction General: 800 thousand yen 64 years old or under: 400 thousand yen Minimum deduction 65 years old or over: 1.2 million yen 64 years old or under: 600 thousand yen	Sum of fixed-amount and fixed-rate deductions Fixed-amount deduction General: one million yen 64 years old or under: 500 thousand yen Minimum deduction 65 years old or over: 1.4 million yen 64 years old or under: 700 thousand yen	(Same as on the left)
Basic Deduction	350 thousand yen	(Same as on the left)	380 thousand yen
Deduction for Spouses	General: 350 thousand yen 70 years old or over: 450 thousand yen	(Same as on the left)	General: 380 thousand yen 70 years old or over: 480 thousand yen
Special Deduction for Spouses	Maximum deduction: 350 thousand yen (Existence of additional application)	(Same as on the left)	Maximum deduction: 380 thousand yen (Existence of additional application)
Deduction for Dependents	General: 350 thousand yen 16-22 years old: 450 thousand yen 70 years old or over: 450 thousand yen Those who live together: 550 thousand yen	General: 350 thousand yen 16-22 years old: 500 thousand yen 70 years old or over: 450 thousand yen Those who live together: 550 thousand yen	General: 380 thousand yen 15 years old or under: 480 thousand yen 16-22 years old: 630 thousand yen 70 years old or over: 480 thousand yen Those who live together: 580 thousand yen
Social Insurance Premium Deduction	Same as social insurance premiums	(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)
Temporary Tax Cut	(None)	Tax cut of 20% up to 2 million yen	Tax cut up of 20% up to 250 thousand yen

(a) Income tax (continued)

	2004	2009	2014
Tax Rate	4 brackets (10%, 20%, 30%, 37%) Tax exemption limit: 3.3 million yen	Six brackets (5%, 10%, 20%, 23%, 33%, 40%) Tax exemption limit: 1.95 million yen	(Same as on the left)
Deduction for Salaries	Fixed-rate deduction Minimum deduction: 650 thousand yen	(Same as on the left)	(Same as on the left) (Reform of income brackets)
Deduction for Public Pensions	Sum of fixed-amount and fixed-rate deductions Fixed-amount deduction General: one million yen 64 years old or under: 500 thousand yen Minimum deduction 65 years old or over: 1.4 million yen 64 years old or under: 700 thousand yen	Sum of fixed-amount and fixed-rate deductions Fixed-amount deduction: 500 thousand yen Minimum deduction 65 years old or over: 1.2 million yen 64 years old or under: 700 thousand yen	(Same as on the left)
Basic Deduction	380 thousand yen	(Same as on the left)	(Same as on the left)
Deduction for Spouses	General: 380 thousand yen 70 years old or over: 480 thousand yen	(Same as on the left)	(Same as on the left)
Special Deduction for Spouses	Maximum deduction: 380 thousand yen (No additional application)	(Same as on the left)	(Same as on the left)
Deduction for Dependents	General: 380 thousand yen 16-22 years old: 630 thousand yen 70 years old or over: 480 thousand yen Those who live together: 580 thousand yen	(Same as on the left)	General (16 years old or over): 380 thousand yen 19-22 years old: 630 thousand yen 70 years old or over: 480 thousand yen Those who live together: 580 thousand yen
Social Insurance Premium Deduction	Same as social insurance premiums	(Same as on the left)	(Same as on the left)
Deduction for the Elderly	500 thousand yen	(None)	(None)
Temporary Tax Cut	Tax cut up of 20% up to 250 thousand yen	(None)	(None)

(b) Residence tax

	1989	1994	1999
Tax Rate	Sum of per income basis and per capita basis Taxation on per income basis Municipal residence tax 3 brackets (3%, 8%, 11%) Prefectural residence tax 2 brackets (2%, 4%) Taxation on per capita basis Municipal residence tax 2 thousand yen (50-500 thousand persons) Prefectural residence tax 700 yen	Sum of per income basis and per capita basis (Reform of income brackets) Taxation on per income basis Municipal residence tax 3 brackets (3%, 8%, 11%) Prefectural residence tax 2 brackets (2%, 4%) Taxation on per capita basis Municipal residence tax 2 thousand yen (50-500 thousand persons) Prefectural residence tax 700 yen	Sum of per income basis and per capita basis Taxation on per income basis Municipal residence tax 3 brackets (3%, 8%, 10%) Prefectural residence tax 2 brackets (2%, 3%) Taxation on per capita basis Municipal residence tax 2.5 thousand yen (50-500 thousand persons) Prefectural residence tax One thousand yen
Deduction for Salaries	Fixed rate deduction Minimum deduction: 570 thousand yen	Fixed rate deduction Minimum deduction: 650 thousand yen	(Same as on the left) (Reform of income brackets)
Deduction for Public Pensions	Sum of fixed amount and fixed rate deductions Fixed amount deduction General: 800 thousand yen 64 years old or under: 400 thousand yen Minimum deduction 65 years old or over: 1.2 million yen 64 years old or under: 600 thousand yen	Sum of fixed amount and fixed rate deductions Fixed amount deduction General: one million yen 64 years old or under: 500 thousand yen Minimum deduction 65 years old or over: 1.4 million yen 64 years old or under: 700 thousand yen	(Same as on the left)
Basic Deduction	280 thousand yen	310 thousand yen	330 thousand yen
Deduction for Spouses	General: 280 thousand yen 70 years old or over: 290 thousand yen	General: 310 thousand yen 70 years old or over: 360 thousand yen	General: 330 thousand yen 70 years old or over: 380 thousand yen
Special Deduction for Spouses	Maximum deduction: 140 thousand yen (Existence of additional application)	Maximum deduction: 310 thousand yen (Existence of additional application)	Maximum deduction: 330 thousand yen (Existence of additional application)
Deduction for Dependents	General: 280 thousand yen 70 years old or over: 290 thousand yen Those who live together: 330 thousand yen	General: 310 thousand yen 70 years old or over: 360 thousand yen Those who live together: 430 thousand yen	General: 330 thousand yen 16-22 years old: 430 thousand yen 70 years old or over: 380 thousand yen Those who live together: 450 thousand yen
Social Insurance Premium Deduction	Same as social insurance premiums	(Same as on the left)	(Same as on the left)
Deduction for the Elderly	480 thousand yen	(Same as on the left)	(Same as on the left)
Temporary Tax Cut	(None)	Tax cut of 20% up to 200 thousand yen	Tax cut of 15% up to 40 thousand yen

(b) Residence tax (continued)

	2004	2009	2014
Tax Rate	Sum of per income basis and per capita basis Taxation on per income basis Municipal residence tax 3 brackets (3%, 8%, 10%) Prefectural residence tax 2 brackets (2%, 3%) Taxation on per capita basis Municipal residence tax 3 thousand yen Prefectural residence tax One thousand yen	Sum of per income basis and per capita basis Taxation on per income basis Municipal residence tax Fixed rate (6%) Prefectural residence tax Fixed rate (4%) Taxation on per capita basis Municipal residence tax 3 thousand yen Prefectural residence tax One thousand yen	Sum of per income basis and per capita basis Taxation on per income basis Municipal residence tax Fixed rate (6%) Prefectural residence tax Fixed rate (4%) Taxation on per capita basis Municipal residence tax 3.5 thousand yen Prefectural residence tax 1.5 thousand yen
Deduction for Salaries	Fixed rate deduction Minimum deduction: 650 thousand yen	(Same as on the left)	(Same as on the left) (Reform of income brackets)
Deduction for Public Pensions	Sum of fixed amount and fixed rate deductions Fixed amount deduction General: one million yen 64 years old or under: 500 thousand yen Minimum deduction 65 years old or over: 1.4 million yen 64 years old or under: 700 thousand yen	Sum of fixed amount and fixed rate deductions Fixed amount deduction: 500 thousand yen Minimum deduction 65 years old or over: 1.2 million yen 64 years old or under: 700 thousand yen	(Same as on the left)
Basic Deduction	330 thousand yen	(Same as on the left)	(Same as on the left)
Deduction for Spouses	General: 330 thousand yen 70 years old or over: 380 thousand yen	(Same as on the left)	(Same as on the left)
Special Deduction for Spouses	Maximum deduction: 330 thousand yen (Existence of additional application)	Maximum deduction: 330 thousand yen (No additional application)	(Same as on the left)
Deduction for Dependents	General: 330 thousand yen 16-22 years old: 450 thousand yen 70 years old or over: 380 thousand yen Those who live together: 450 thousand yen	(Same as on the left)	General (16 y/o or over): 330 thousand yen 19-22 years old: 450 thousand yen 70 years old or over: 380 thousand yen Those who live together: 450 thousand yen
Social Insurance Premium Deduction	Same as social insurance premiums	(Same as on the left)	(Same as on the left)
Deduction for the Elderly	480 thousand yen	(None)	(None)
Temporary Tax Cut	Tax cut of 15% up to 40 thousand yen	(None)	(None)

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

Table 2. Share of income classes

(a) Difference between initial and gross income bases

	1989	1994	1999	2004	2009	2014
Upper Class	1.2%	1.2%	1.3%	1.5%	1.6%	1.6%
Middle Class	5.6%	6.0%	8.2%	10.6%	12.4%	13.8%
Upper-Middle	1.6%	1.6%	1.9%	1.9%	2.1%	2.3%
Mid-Middle	3.3%	3.2%	3.6%	4.8%	5.5%	5.8%
Lower-Middle	0.8%	1.3%	2.6%	3.9%	4.8%	5.7%
Lower Class	0.0%	0.6%	1.8%	3.0%	2.9%	3.5%
Poor Class	−6.8%	−7.9%	−11.3%	−15.1%	−16.9%	−18.9%

(b) Difference between gross and disposable income bases

	1989	1994	1999	2004	2009	2014
Upper Class	−2.0%	−1.8%	−1.9%	−2.4%	−2.4%	−2.9%
Middle Class	3.6%	3.1%	3.1%	3.2%	3.7%	4.1%
Upper-Middle	0.0%	0.4%	−0.2%	−0.3%	−0.1%	−0.5%
Mid-Middle	2.1%	1.0%	1.6%	2.2%	2.0%	2.0%
Lower-Middle	1.5%	1.7%	1.6%	1.3%	1.8%	2.6%
Lower Class	−0.4%	−0.4%	−0.4%	0.0%	−0.2%	−0.1%
Poor Class	−1.1%	−1.0%	−0.8%	−0.8%	−1.1%	−1.1%

(c) Share of income classes on the disposable income basis

	1989	1994	1999	2004	2009	2014	1989→2014
Upper Class	6.4%	7.0%	7.0%	7.4%	8.1%	8.2%	1.8%
Middle Class	69.6%	65.7%	66.7%	66.3%	66.0%	66.3%	−3.4%
Upper−Middle	12.9%	13.0%	12.8%	12.9%	12.8%	13.1%	0.2%
Mid−Middle	32.3%	30.6%	30.6%	31.0%	30.5%	30.4%	−1.9%
Lower−Middle	24.5%	22.1%	23.4%	22.4%	22.7%	22.8%	−1.7%
Lower Class	17.7%	16.3%	18.2%	18.1%	17.6%	17.3%	−0.4%
Poor Class	6.3%	11.0%	8.1%	8.2%	8.3%	8.3%	2.0%

Table 3. Shifts among income classes from initial to gross income bases

(a) 1989

	Gross Income							
	Upper	Middle				Lower	Poor	Total
			Upper–Middle	Mid–Middle	Lower–Middle			
Initial Income	(a) = ratio to (h)	(b) = ratio to (h)	(c) = ratio to (h)	(d) = ratio to (h)	(e) = ratio to (h)	(f) = ratio to (h)	(g) = ratio to (h)	(h)
Upper Class	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Middle Class	1.9%	98.1%				0.0%	0.0%	100.0%
Upper–Middle	8.3%	91.7%	91.7%	0.0%	0.0%	0.0%	0.0%	100.0%
Mid–Middle	0.6%	99.4%	7.7%	91.7%	0.0%	0.0%	0.0%	100.0%
Lower–Middle	0.2%	99.8%	1.1%	15.3%	83.4%	0.0%	0.0%	100.0%
Lower Class	0.1%	21.2%	0.6%	6.3%	14.4%	78.7%	0.0%	100.0%
Poor Class	0.3%	20.6%	0.8%	6.7%	13.0%	26.8%	52.3%	100.0%

(b) 2014

	Gross Income							
	Upper	Middle				Lower	Poor	Total
			Upper–Middle	Mid–Middle	Lower–Middle			
Initial Income	(a) = ratio to (h)	(b) = ratio to (h)	(c) = ratio to (h)	(d) = ratio to (h)	(e) = ratio to (h)	(f) = ratio to (h)	(g) = ratio to (h)	(h)
Upper Class	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Middle Class	3.4%	96.6%				0.0%	0.0%	100.0%
Upper–Middle	11.5%	88.5%	88.5%	0.0%	0.0%	0.0%	0.0%	100.0%
Mid–Middle	1.4%	98.6%	12.3%	86.4%	0.0%	0.0%	0.0%	100.0%
Lower–Middle	0.2%	99.8%	3.8%	23.8%	72.2%	0.0%	0.0%	100.0%
Lower Class	0.1%	38.7%	1.2%	17.4%	20.1%	61.2%	0.0%	100.0%
Poor Class	0.0%	35.4%	0.4%	10.6%	24.3%	31.4%	33.1%	100.0%

Table 4. Shifts among income classes from gross to disposable income basis

(a) 1989

	Disposable Income							
	Upper	Middle				Lower	Poor	Total
			Upper–Middle	Mid–Middle	Lower–Middle			
Gross Income	(a) = ratio to (h)	(b) = ratio to (h)	(c) = ratio to (h)	(d) = ratio to (h)	(e) = ratio to (h)	(f) = ratio to (h)	(g) = ratio to (h)	(h)
Upper Class	75.0%	25.0%	25.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Middle Class	0.2%	99.3%				0.6%	0.0%	100.0%
Upper–Middle	0.8%	99.2%	80.1%	19.1%	0.0%	0.0%	0.0%	100.0%
Mid–Middle	0.0%	100.0%	1.5%	93.6%	4.9%	0.0%	0.0%	100.0%
Lower–Middle	0.0%	98.3%	0.0%	6.7%	91.7%	1.7%	0.0%	100.0%
Lower Class	0.0%	10.9%	0.0%	0.0%	10.9%	88.5%	0.6%	100.0%
Poor Class	0.0%	0.0%	0.0%	0.0%	0.0%	16.8%	83.2%	100.0%

(b) 2014

	Disposable Income							
	Upper	Middle				Lower	Poor	Total
			Upper–Middle	Mid–Middle	Lower–Middle			
Gross Income	(a) = ratio to (h)	(b) = ratio to (h)	(c) = ratio to (h)	(d) = ratio to (h)	(e) = ratio to (h)	(f) = ratio to (h)	(g) = ratio to (h)	(h)
Upper Class	72.9%	27.1%	27.1%	0.0%	0.0%	0.0%	0.0%	100.0%
Middle Class	0.1%	98.1%				1.7%	0.0%	100.0%
Upper–Middle	0.7%	99.3%	72.2%	27.1%	0.0%	0.0%	0.0%	100.0%
Mid–Middle	0.0%	100.0%	1.0%	89.0%	10.0%	0.0%	0.0%	100.0%
Lower–Middle	0.0%	94.6%	0.0%	7.1%	87.5%	5.4%	0.0%	100.0%
Lower Class	0.0%	13.3%	0.0%	0.0%	13.3%	84.5%	2.2%	100.0%
Poor Class	0.0%	0.0%	0.0%	0.0%	0.0%	15.8%	84.2%	100.0%

Table 5: Burden ratios of taxes and social insurance premiums

(a) 1989

	Tax es and Premiums	Taxes			Social Ins. Premiums				
			Income Tax	Residence Tax		Public Pension Ins. Premium	Health Ins. Premium	Long-term Care Ins. Premium	Employment Ins. Premium
Upper Class	25.2%	18.2%	11.7%	6.6%	7.0%	3.6%	3.1%	0.0%	0.3%
Middle Class	15.8%	6.8%	3.8%	3.0%	9.1%	4.8%	4.0%	0.0%	0.3%
Upper-Middle	18.2%	9.3%	5.3%	4.0%	8.9%	4.8%	3.8%	0.0%	0.3%
Mid-Middle	15.7%	6.5%	3.6%	2.9%	9.2%	4.9%	4.0%	0.0%	0.3%
Lower-Middle	13.3%	4.3%	2.4%	1.9%	9.0%	4.5%	4.2%	0.0%	0.3%
Lower Class	10.6%	2.4%	1.2%	1.1%	8.2%	3.7%	4.3%	0.0%	0.3%
Poor Class	7.1%	0.8%	0.4%	0.4%	6.3%	1.9%	4.2%	0.0%	0.2%
Total	17.0%	8.5%	5.1%	3.5%	8.5%	4.3%	3.8%	0.0%	0.3%

(b) 2014

	Tax es and Premiums	Taxes			Social Ins. Premiums				
			Income Tax	Residence Tax		Public Pension Ins. Premium	Health Ins. Premium	Long-term Care Ins. Premium	Employment Ins. Premium
Upper Class	25.4%	14.1%	8.3%	5.8%	11.3%	5.8%	4.4%	0.8%	0.3%
Middle Class	17.3%	5.8%	2.2%	3.6%	11.5%	5.2%	4.8%	1.3%	0.2%
Upper-Middle	20.1%	7.7%	3.2%	4.5%	12.4%	6.4%	4.8%	0.9%	0.3%
Mid-Middle	17.2%	5.7%	2.0%	3.7%	11.6%	5.4%	4.8%	1.2%	0.3%
Lower-Middle	14.0%	3.7%	1.2%	2.5%	10.3%	3.5%	4.7%	1.8%	0.2%
Lower Class	10.9%	2.1%	0.6%	1.5%	8.8%	2.4%	4.1%	2.1%	0.1%
Poor Class	6.7%	0.6%	0.2%	0.4%	6.0%	0.8%	3.0%	2.2%	0.1%
Total	18.4%	7.5%	3.6%	3.9%	11.0%	4.9%	4.5%	1.2%	0.2%

Table 6: Decomposition of change in class share on the disposable income basis

(a) System and non-system reform effects by cases

	Case 1		Case 2		Case 3	
	System Reform Effect	Non-system Reform Effect	System Reform Effect	Non-system Reform Effect	System Reform Effect	Non-system Reform Effect
	(1)	(2)	(3)	(4)	(5)	(6)
1989→2014						
Upper Class	0.7%	−1.6%	0.6%	−1.5%	0.7%	−1.6%
Middle Class	−0.9%	1.5%	−1.8%	2.3%	−1.4%	1.9%
Upper-Middle	0.2%	−0.6%	−0.1%	−0.3%	0.0%	−0.5%
Mid-Middle	−0.7%	0.6%	−1.0%	0.9%	−0.8%	0.8%
Lower-Middle	−0.4%	1.5%	−0.7%	1.8%	−0.5%	1.6%
Lower Class	0.6%	−0.3%	0.9%	−0.5%	0.7%	−0.4%
Poor Class	−0.4%	0.4%	0.3%	−0.3%	0.0%	0.1%

(b) Decomposition

		Decomposition (Case 3)			
	Change in Share (Disposable Income)	Change in Share (Gross Income)	System Reform Effect	Non-system Reform Effect	Change in TPE
	(1)	(2)	(3)	(4)	(5)=(3)+(4)
1989→2014					
Upper Class	1.8%	2.7%	0.7%	−1.6%	−0.9%
Middle Class	−3.4%	−3.9%	−1.4%	1.9%	0.6%
Upper-Middle	0.2%	0.7%	0.0%	−0.5%	−0.5%
Mid-Middle	−1.9%	−1.8%	−0.8%	0.8%	−0.1%
Lower-Middle	−1.7%	−2.8%	−0.5%	1.6%	1.1%
Lower Class	−0.4%	−0.7%	0.7%	−0.4%	0.3%
Poor Class	2.0%	1.9%	0.0%	0.1%	0.0%

(c) System and non-system reform effects of either taxes or social insurance premiums

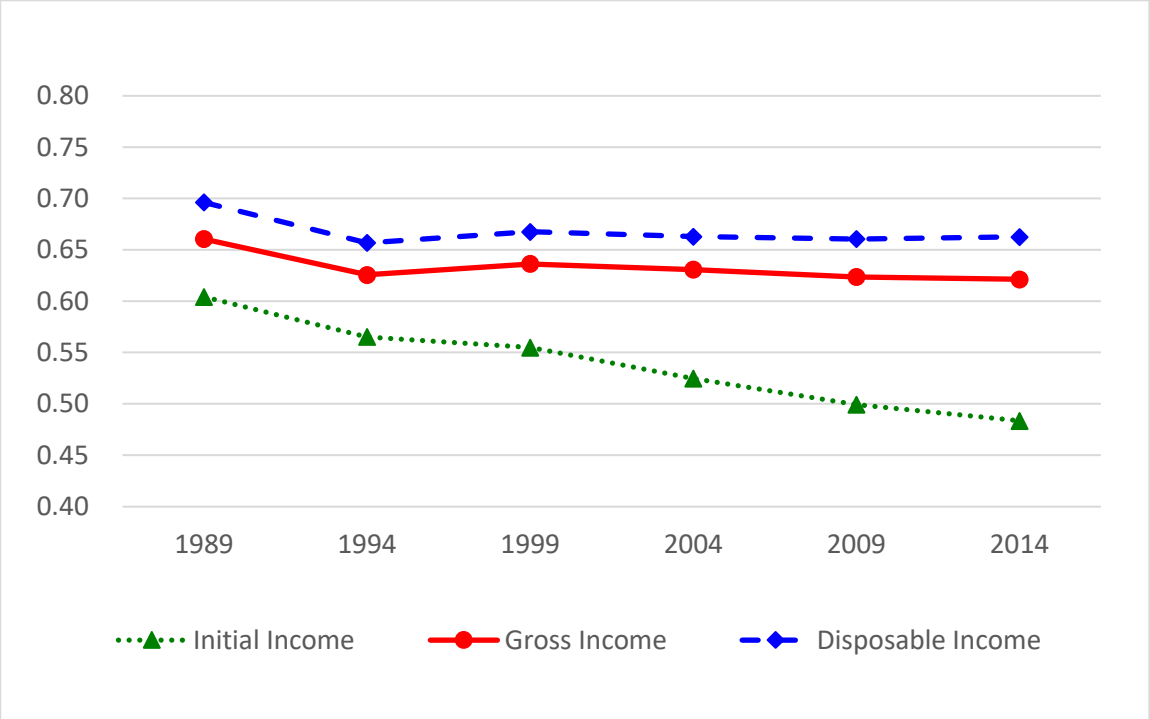
	Taxes and SIPs (Case 3)		Taxes (Case 3)		Social Insurance Premiums (Case 3)	
	System Reform Effect	Non-system Reform Effect	System Reform Effect	Non-system Reform Effect	System Reform Effect	Non-system Reform Effect
	(1)	(2)	(3)	(4)	(5)	(6)
1989→2014						
Upper Class	0.7%	−1.6%	0.9%	−0.7%	−0.1%	−0.8%
Middle Class	−1.4%	1.9%	−1.4%	0.9%	−0.1%	1.4%
Upper-Middle	0.0%	−0.5%	−0.1%	0.4%	0.1%	−0.2%
Mid-Middle	−0.8%	0.8%	−0.8%	−0.4%	0.1%	0.3%
Lower-Middle	−0.5%	1.6%	−0.4%	0.9%	−0.3%	1.3%
Lower Class	0.7%	−0.4%	0.4%	−0.4%	0.3%	−0.5%
Poor Class	0.0%	0.1%	0.1%	0.2%	−0.1%	−0.1%

Table 7. Decomposition in five years by income classes

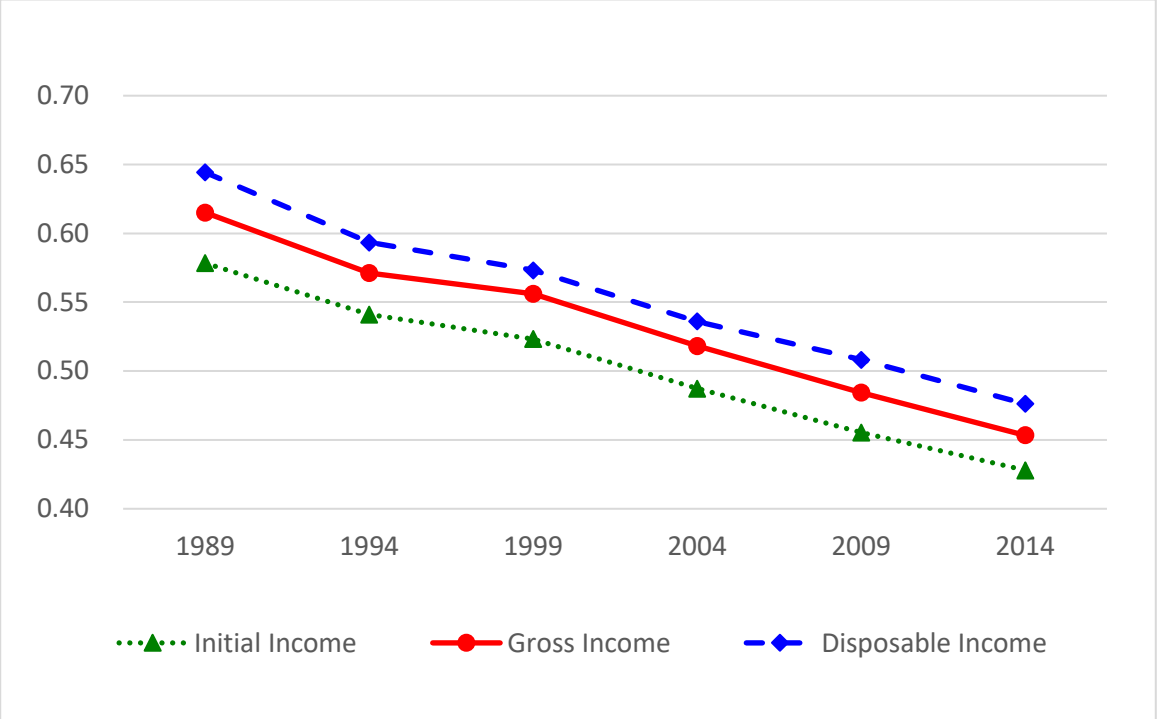
		Decomposition (Case 3)			
	Change in Share (Disposable Income)	Change in Share (Gross Income)	System Reform Effect	Non-system Reform Effect	Change in TPE
	(1)	(2)	(3)	(4)	(5)=(3)+(4)
Upper					
1989→1994	0.7%	0.4%	0.5%	−0.2%	0.2%
1994→1999	−0.1%	0.1%	0.2%	−0.3%	−0.2%
1999→2004	0.5%	1.0%	0.0%	−0.5%	−0.5%
2004→2009	0.6%	0.7%	0.0%	0.0%	0.0%
2009→2014	0.1%	0.5%	0.0%	−0.5%	−0.5%
Middle					
1989→1994	−4.0%	−3.5%	−1.0%	0.6%	−0.5%
1994→1999	1.1%	1.1%	−0.2%	0.2%	0.0%
1999→2004	−0.5%	−0.6%	−0.1%	0.2%	0.1%
2004→2009	−0.2%	−0.7%	0.3%	0.2%	0.5%
2009→2014	0.2%	−0.2%	−0.2%	0.6%	0.4%
Lower					
1989→1994	−1.3%	−1.4%	0.3%	−0.3%	0.1%
1994→1999	1.9%	2.0%	0.0%	0.0%	0.0%
1999→2004	−0.1%	−0.5%	0.1%	0.2%	0.4%
2004→2009	−0.6%	−0.4%	0.1%	−0.2%	−0.1%
2009→2014	−0.3%	−0.3%	0.2%	−0.2%	0.0%
Poor					
1989→1994	4.6%	4.5%	0.2%	−0.1%	0.1%
1994→1999	−2.9%	−3.1%	0.1%	0.1%	0.2%
1999→2004	0.1%	0.1%	0.0%	0.0%	0.0%
2004→2009	0.2%	0.5%	−0.3%	0.0%	−0.3%
2009→2014	0.0%	0.0%	0.0%	0.0%	0.0%

Fig. 1. Changes in the middle-class share

(a) Full sample



(b) Breakdown: Households with heads aged under 65



(c) Breakdown: Households with heads aged 65 or over