Estimating Japan's Gross Domestic Income Based on Taxation Data

Hiroyuki Fujiwara[*]
hiroyuki.fujiwara@boj.or.jp

Yasutaka Ogawa[**]
yasutaka.ogawa@boj.or.jp

[*] Research and Statistics Department
[**] Research and Statistics Department (currently Personnel and Corporate Affairs Department)

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Hiroyuki Fujiwara[†] and Yasutaka Ogawa[‡]

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Abstract

In this paper, we develop a novel approach to estimate Japan's Gross Domestic Income (GDI) based on comprehensive taxation data. In the current National Accounts statistics in Japan, GDI is calculated so that its level is equal to that of Gross Domestic Product (GDP) by adjusting operating surplus and mixed income as a balancing item. The national accounting identity dictates that GDI should be equal to GDP and also Gross Domestic Expenditure (GDE). However, in reality, as in the case of the United States where GDI is estimated using taxation data, this identity may not hold because of differences in data sources, timing, and estimation methods. Our estimate of GDI also deviates from GDP: it exceeds the officially published GDP significantly as it does GDE. Though we have been unable to fully explain where this discrepancy emerges and admittedly there is ample room for further improvements in our approach, the results seem to suggest that there is a certain merit to estimating GDI based on taxation data in order to shed further light on what is going on in Japan's economy.

1. Introduction

In this paper, we develop a novel approach to estimate Japan's Gross Domestic Income (GDI) based on comprehensive taxation data.

The current National Accounts statistics in Japan[1] calculate GDI so that its level is equal to Gross Domestic Product (GDP) by adjusting operating surplus and mixed income as a balancing item. In contrast, Gross Domestic Expenditure (GDE) is estimated independently to GDP through a wide variety of statistical surveys, including the *Census of Manufacture*, *Census of Commerce*, and *Survey of Selected Service Industries* conducted by the Ministry of Economy, Trade and Industry and others.

The national accounting identity dictates that the three aggregates of GDE, GDP and GDI, should be equal. However, in reality, as in the case of the United States where GDI is estimated using taxation data, this identity may not hold because of differences in data sources, timing, and estimation methods. Even in Japan, there is a discrepancy between GDE and GDP.

In this paper, we try to estimate GDI utilizing taxation data and using the case of the United States as our reference. In particular, we utilize data of (i) individual inhabitant tax to estimate wages and salaries in compensation of employees, (ii) corporate tax revenue to estimate operating surplus, and (iii) self-assessment income tax to estimate mixed income. We then estimate GDI by substituting these components for those in the National Accounts. To the best of our knowledge, this paper is the first attempt in Japan to estimate GDI independently from GDP.

Generally speaking, it is hard to imagine economic entities would declare income and tax payable in excess of the actual amounts. For this reason, we tend to believe that our estimate of GDI forms the lower bound of the true value.

This paper is divided into seven sections, the first being this introduction. Section 2 describes how GDE, GDP and GDI are calculated in the current National Accounts in Japan. Sections 3 to 5 estimate wages and salaries in compensation of employees, operating surplus and mixed income using taxation data respectively, and compare them with the official series. Section 6 estimates the total GDI by adding the estimates of the components from the previous sections. Section 7 draws some conclusions.

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[1] In this paper, description of the official National Accounts statistics is based on the SNA1993 standard, which was used when this paper was written. Introduction of the SNA2008 standard scheduled in December 2016 is expected to bring some changes in detail of the description.

2. How the Official Series Compile GDE, GDP and GDI in Japan

In the National Accounts statistics in Japan, GDE is positioned as the principal series of its system. For instance, in the quarterly estimates, only GDE and its components are compiled and published. Compensation of employees is also available in the quarterly estimates, but this is just one part of GDI. It is only in the annual reports that GDP and GDI are compiled and published in addition to GDE. As mentioned above, GDE and GDP are estimated independently, and the difference between them is defined as the "statistical discrepancy," which is reported as a component of GDP. On the other hand, GDI is not estimated independently, but calculated so that it is equal to that of GDP by adjusting the operating surplus and mixed income as a balancing item.

(GDE and GDP)

To give some further detail, in annual reports, GDE is estimated by calculating aggregate supply (gross output and imports) and demand of approximately 2,000 goods and services using a wide variety of statistical surveys, including the *Census of Manufacture*, *Census of Commerce*, *Survey of Selected Service Industries*, and others (commodity flow approach). Based on the distribution channels, aggregate supply of these goods and services is allocated to each GDE component mainly in accordance with the *Input-Output table* by the Ministry of Internal Affairs and Communications.[2] That is, the approximately 2,000 goods and services are allocated to "domestic final consumption expenditure of households"; "gross fixed capital formation"; "changes in inventories"; "final consumption expenditure of private non-profit institutions serving households"; "government final consumption expenditure"; "exports of goods and services"; and (less) "imports of goods and services" (Ministry of Finance and the Bank of Japan's *Balance of Payments*). GDE is then estimated by adding together these individual components (Table 1(1)).

GDP is estimated based on the value added of industries that produce the above goods and services. The value added of industries is derived by subtracting intermediate input (from the "U Matrix") from gross output (from the "V Matrix") of industries.[3] GDP is estimated by adding the value added of industries, producers of government services,

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[2] "Final consumption expenditure of private non-profit institutions serving households" and "government final consumption expenditure" are estimated separately as they produce non-market services.

[3] The value added by "producers of government services" and "producers of private non-profit services to households" are estimated separately as they produce non-market services.

and producers of private non-profit services to households (Table 1(2)).

Output in aggregate supply for GDE should be equal to output of industries for GDP, if measured precisely, and those outputs serve as control totals in both estimations. This indicates how important it is to obtain precise estimates of these outputs for the sake of the accuracy and consistency of the National Accounts.

However, it is getting more and more difficult to obtain such output data. For example, it is often reported that households and enterprises have become more reluctant to respond to recent statistical surveys.[4] In fact, when we compare the number of corporations in the *Economic Census* (conducted by the Ministry of Internal Affairs and Communications and the Ministry of Economy, Trade and Industry) with the number of the corporations that filed returns in the *Company Sample Survey* (conducted by the National Tax Agency), the former (1.75 million) is significantly less than the latter (2.62 million) with a gap of more than 800,000 in 2014 (Figure 1). Although we do not know the specific reasons for this gap, we suspect that the coverage of the *Economic Census* (formerly the *Establishment and Enterprise Census*) is deteriorating because of an increasing number of corporations that do not respond to and hence are not captured by the *Economic Census*. This undermines the precision of output data, as the current National Accounts statistics rely heavily on the *Economic Census,* and other surveys based on population information drawn from the *Economic Census*.

(GDI)

As shown in Figure 2, GDI comprises five components, "compensation of employees," "operating surplus and mixed income," "consumption of fixed capital," "taxes on production and imports" and "(less) subsidies."[5] Among these, as stated, operating surplus and mixed income are not estimated directly using enterprise profit data, but used as a balancing item in order to match GDI with GDP.

The other components of GDI are estimated directly using a variety of source data. Among these, "taxes on production and imports" and "subsidies" are estimated from the

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[4] The *Master Plan Concerning the Development of Official Statistics* endorsed by the Cabinet in 2014 describes the situation as follows: "while the environment surrounding statistical surveys is becoming more severe due to the increasing difficulty in gaining the cooperation of people and enterprises for statistical surveys, the use of administrative record information, etc. is becoming much more important not only from the perspective of alleviating the burden on respondents and efficient production of statistics, but also from the perspective of accurate production of statistics."

[5] The official data utilized in this paper are those of the National Accounts for 2014FY released by the Cabinet Office in December 2015 and January 2016.

accounting data of central and local governments including taxation data: this approach is relatively straight forward and there appears to be no better alternative. "Compensation of employees" is estimated from various statistical surveys including the *Monthly Labor Survey* (conducted by the Ministry of Health Labor and Welfare) and the *Population Census*, *Labor Force Survey*, and *Employment Status Survey* (conducted by the Ministry of Internal Affairs and Communications), among others.

As mentioned above, in the United States, GDI is estimated independently based on administrative records including taxation data.[6] Thus, estimated GDI is used to crosscheck the accuracy of GDE. In fact, some market participants use it to foresee the direction and the size of future revisions in the preliminary estimation of GDE.

In this paper, using the case of the United States as our reference, we attempt to estimate GDI independently utilizing taxation data. First, we estimate wages and salaries in compensation of employees using data of individual inhabitant tax (Section 3). Then, we tackle the operating surplus based on corporate profits drawn from the *Financial Statements Statistics of Corporations by Industry* (conducted by the Ministry of Finance) and corporate tax revenue data (Section 4). Furthermore, we derive mixed income from data on self-assessment income tax (Section 5). Finally, we obtain our estimate of GDI by adding these three components and the other components of GDI, assuming that the latter is the same as the official series (Section 6).

3. Compensation of Employees

3.1 Official series

Compensation of employees consists of "wages and salaries" and "employers' social contributions." We do not have any reservation for the latter, which is compiled from the annual reports of social security funds. We attempt to estimate wages and salaries, which account for more than 80% of the compensation of employees, from comprehensive taxation data.

In the current National Accounts statistics, the wages and salaries of "industries other than agriculture, forestry and fishery and public administration" account for the largest proportion of wages and salaries. This is estimated by multiplying cash earnings per employee (nominal wages, from the *Monthly Labor Survey*) by the number of employees (from the *Population Census*, *Labor Force Survey*, and *Employment Status*

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[6] See BEA (2015) and Holdren (2014) for details.

Survey) on an industry by industry basis. Moreover, wages and salaries in kind, which are not included in the total cash earnings, are estimated separately and added to the above estimate.

If we divide these wages and salaries by the number of employees, the obtained series closely tracks the total cash earnings per employee of the *Monthly Labor Survey* for all-industry. Given the above calculation, it is no surprise to see this close correlation between the two series.

The number of employees of base years (where the lower digit is 0 or 5) is directly obtained from the *Population Census*. Those for years between the base years are estimated by interpolating those for the base years with the number of employees from the *Labor Force Survey*. In the National Accounts statistics, if an employee works for two firms, the employee is counted twice, as if there are two employees with one job each. In contrast, in the *Population Census* and *Labor Force Survey,* even though a person might have multiple jobs they are counted as only one employee. In practice, the total number of employees in the National Accounts is derived by adding together the number of employees who have a second job. This adjustment is made by using the proportion of second jobholders drawn from the *Employment Status Survey*.

3.2 Estimation based on taxation data

(Some statistical background)

In order to estimate wages and salaries, instead of the above mentioned statistical surveys, we will utilize comprehensive taxation data from surveys including "*Shichosonzei kazeizyokyotou no shirabe (Complete Survey of Current Taxation of Municipal Tax,* hereafter *Municipal Tax Survey)*" conducted by the Ministry of Internal Affairs and Communications and the *Statistical Survey of Actual Status for Salary in the Private Sector* (hereafter *Private Sector Salary Survey*) conducted by the National Tax Agency as the principal source data. We have done so through the following three steps. First, we obtain the employment income of employees who pay individual inhabitant tax using the *Municipal Tax Survey* data. Second, we estimate employment income of employees who do not pay individual inhabitant tax using the *Private Sector Salary Survey* and the *Labor Force Survey* data. Finally, we estimate the employment income of all employees by adding up both after adjusting for minor differences in definition and coverage.

Before explaining our estimation procedure in detail, it is worthwhile elaborating on the

coverage of these two sources. First, the *Municipal Tax Survey* records wages and salaries of all taxpayers who pay individual inhabitant tax. Individual inhabitant tax is levied on salaried employees according to their previous year's individual income by municipal governments. Every payroll document is submitted by employers to the relevant municipal government according to the salaried employee's place of residence. All payroll information regarding taxpayers of individual inhabitant tax is tallied by municipal governments and submitted to the Local Tax Bureau of the Ministry of Internal Affairs and Communications. The *Municipal Tax Survey* publishes the tallied data in aggregate.

Second, the *Private Sector Salary Survey* covers the salaries of all private employees. Though it does not report the breakdown between taxpayers and non-taxpayers of individual inhabitant tax, it does report that of income tax.

Individual inhabitant tax (local tax) and income tax (national tax) are both levied on household income — hereafter "local income tax" and "national income tax" — but threshold income for income deductions and tax deductions of these two taxes are different, and hence the definition of taxpayer and non-taxpayer differs between the two statistics. For instance, for tax exemption, the threshold income for local income tax (1 million yen) is lower than that for national income tax (1.03 million yen). In general, national income tax is more generous than local income tax in terms of taxation. As a consequence, we can safely assume that all those who are exempt from local income tax are also exempt from national income tax. That means:

> (those who do not pay national income tax)
> = (those who do not pay national income tax but pay local income tax)
> +(those who do not pay local income tax).

Figure 3 compares wages and salaries and the number of employees between the *Municipal Tax Survey* and Japan's National Accounts statistics. As for wages and salaries, the difference between the two series has diminished to almost nil, whereas the number of employees of the National Accounts has continued to exceed that of the *Municipal Tax Survey* by about 20% throughout the sample period.

Although the difference in wages and salaries has disappeared, we should note that the *Municipal Tax Survey* does not cover the income of employees who do not pay local income tax. This implies that wages and salaries obtained from the *Municipal Tax Survey* would exceed those of the National Accounts, if we added that component in accordance with the definition of the National Accounts. This adjustment will be made

below.

Furthermore, as far as taxpayers are concerned, even though the definition and coverage of wages and salaries of the two series are almost identical — for instance, wages and salaries in kind are included in both — minor differences do exist. For instance, bonuses for directors are not included in wages and salaries for the National Accounts statistics, which itemize them as property income. Therefore, we need to exclude these from the *Municipal Tax Survey* to bring the definition into line with that of the National Accounts statistics.

(Outline of estimation procedure)

Bearing these differences in coverage and definition in mind, we come up with our estimates of wages and salaries in compensation of employees using the following three steps, which use the data in 2014CY as a numerical example (Table 2). Appendix 1 documents the full details of the procedure.

Step 1

We obtain the employment income of employees who pay local income tax ($a+b =$ 211.9 trillion yen in Table 2) directly from the *Municipal Tax Survey*. From the same survey statistics, we also obtain the number of employees who pay local income tax and its decomposition regarding whether or not they pay national income tax. Using this information, we divide the above $a + b$ into employment income of employees who pay national income tax ($a = 202.8$ trillion yen) and that of employees who do not pay ($b = 9.1$ trillion yen). See Appendix 1 for further detail.

Step 2

We calculate employment income of employees who do not pay local income tax (c in Table 2) by subtracting employment income of employees who do not pay national income tax but do pay local income tax (b) from employment income of employees who do not pay national income tax (which is $b+c$).

More specifically, the income of employees who do not pay national income tax is estimated by:

(income per peson for employees who do not pay national income tax) × (the number of these employees).

The first term, income per person of non-taxpaying employees, is obtained from the

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Private Sector Salary Survey, which surveys employment income of taxpayers and non-taxpayers of national income tax.

The second term, the number of employees who do not pay national income tax cannot be derived from the *Private Sector Salary Survey*, because the survey does not cover the public sector. Instead, first, the number of employees who do not pay local income tax is estimated by subtracting that of employees who pay local income tax (from the *Municipal Tax Survey*) from that of total employees (from the *Labor Force Survey*). Next, the number of employees who do not pay national income tax but pay local income tax is obtained from the *Municipal Tax Survey*. Finally, the number of employees who do not pay national income tax is derived by adding the number of employees who do not pay local income tax to the number of employees who do not pay national income tax but do pay local income tax.

As explained in Appendix 1, we make several adjustments when we carry out the above calculation. For instance, we adjust for differences in the method of counting the number of employees. The *Private Sector Salary Survey* counts the number of employees as of December each year, the *Labor Force Survey* counts its monthly average, while the *Municipal Tax Survey* counts its gross number for the entire year.[7] Furthermore, in order to increase the accuracy of our estimation, we further calculate employees who work for one-or-more years and those who work for less than one year separately.

By multiplying income per person of employees who do not pay national income tax by the number of those employees, we have 22.4 trillion yen as their income (*b+c* in Table 2). As the income of employees who do not pay national income tax but pay local income tax is 9.1 trillion yen (*b*), we estimate that the income of employees who do not pay local income tax amounts to be 13.3 trillion yen (*c*).

Step 3

As a further adjustment, we need to subtract bonuses for directors and add the employment income of day laborers (*d* in Table 2). Bonuses for directors are obtained from the *Private Sector Salary Survey*. Employment income of day laborers is estimated using the number of day laborers from the *Labor Force Survey* and the employment

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[7] The difference is demonstrated by the following example: if 45 million employees work through an entire year, 20 million from January to June, and 10 million from July to December, the number of employees counted is 55 million for the *Private Sector Salary Survey*, 60 million for the *Labor Force Survey* and 75 million for the *Municipal Tax Survey*.

income per person of employees who do not pay local income tax, which comes from *Step 2* above.

Finally, we obtain our estimate of wages and salaries in 2014CY as 224.7 trillion yen ($a+b+c+d$), which is 14.2 trillion yen more than the current National Accounts statistics. See Appendix 2 for a check of the robustness of our estimation.

(Properties of estimated series)

Figure 4 shows our estimate of wages and salaries from 1994CY to 2014CY. There are several ups and downs broadly in line with business cycles. After the recent peak of 2008, the series dropped sharply. Since then, it has raised its level as it continues towards 2014. This fluctuation is largely due to that of taxpayers. The wages and salaries of non-taxpayers are almost constant around 10 to 20 trillion yen.

As further decomposition of our estimate of wages and salaries, Figures 5 and 6 depict the wages and salaries per person and the number of employees, respectively. There is a downward trend in income per person, especially that of taxpayers. In contrast, an upward trend is visible for the number of employees with some fluctuations in a business cycle frequency.

Figure 7 compares our estimate of wages and salaries with those of the current National Accounts statistics. The two series are almost at the same level in 1994, but as time goes by, the divergence between them has grown steadily. That means our estimate has become much larger compared with the current official series. If we transform them into annual change, these two series have moved more or less in tandem. However, our estimate tends to grow faster (or decline less) than the current official series.

Figure 8 decomposes these two series to changes in per-head wages and salaries and those in the number of employees. As far as changes in the number of employees are concerned, there is no large difference between them. In fact, the average growth rates are the same (0.3%) for these two series. Divergence is more visible in changes in wages and salaries per person. On average, our estimates contract less (-0.4%) than the current official series (-0.7%).

However, similarities in the number of employees can be spurious. As mentioned above, the National Accounts statistics count two employees if he/she works for two firms. We have not made that adjustment in counting the number of employees, however, if we did take this element into account, our estimates of per-head wages and salaries would be reduced. Because of this complication, it is rather difficult to conclude which factor

(wages and salaries per employees or the number of employees) is more responsible for the divergence between our estimate and the current official series.

4. Operating Surplus

This section documents our estimation of operating surplus of non-financial corporations, which is followed by mixed income of households in the next section. Regarding the other components of operating surplus, which include financial corporations' operating surplus and imputed service of owner-occupied dwellings, we use those of the official series. This is because these components are in relatively small amounts or there appears no easy alternative.

In essence, we estimate "gross" operating surplus, which is the sum of the net operating surplus and the consumption of fixed capital, using both operating profits and depreciation (from the *Financial Statements Statistics of Corporations by Industry,* hereafter *Financial Statements of Corporations*). In so doing, first, we must make suitable adjustments. Although the operating profits and the depreciation of the *Financial Statements of Corporations* are broadly equivalent to the net operating surplus and the consumption of fixed capital in the National Accounts statistics respectively, there are some differences in their definitions. Second, we correct sampling errors associated with the *Financial Statements of Corporations* by using comprehensive corporate tax revenue data.

In the estimation of wages and salaries, we can use employment income from the taxation data of local income tax, as it is almost the same definition with those in the official National Accounts statistics. However, it turns out to be much more difficult to use taxation data of corporate tax in a similar way; the income captured by corporate tax is quite different from the operating surplus in the National Accounts statistics in terms of, for instance, tax loss carried forward, receipt and payment of interest, expense accounts and donations expenses. Instead of going through all these cumbersome adjustments, we have opted to use the operating profits drawn from the *Financial Statements of Corporations,* whose definition is much closer to the National Accounts.

4.1 National Accounts and *Financial Statements of Corporations*

(Gross fixed capital formation versus capital investment)

Figure 9 compares the net operating surplus and the consumption of fixed capital in the current National Accounts statistics, with the operating profits and the depreciation of

the *Financial Statements of Corporations,* respectively. As far as the operating surplus/profits are concerned, the gap between them is relatively small, although the operating surplus exceeds the operating profits over most of the period. In contrast, the consumption of fixed capital exceeds the depreciation by a great deal.

Figure 10, then, compares gross fixed capital formation in the current National Accounts statistics, with capital investment of the *Financial Statements of Corporations.* Gross fixed capital formation exceeds capital investment by a wide margin. This difference in investment flows leads to the gap in non-financial assets between the two series.

Table 3 is a simple illustrative example to demonstrate how specific figures are treated differently by the National Accounts statistics and the *Financial Statements of Corporations*. This example assumes that corporations' revenue (output) is 100 and purchase expense is 50 in both periods 1 and 2. Furthermore, it supposes that the allocation of the purchase expense is different in the two sets of statistics. In the National Accounts statistics, intermediate input is 30 and gross fixed capital formation is 20. In the *Financial Statements of Corporations*, current expenses are 40 and capital investment is 10. In other words, the National Accounts statistics assume some of the current expenses (10 in the example) as the gross fixed capital formation for particular accounting reasons.

In this example, in period 1, the net operating surplus of the National Accounts exceeds the operating profits of the *Financial Statements of Corporations* by as much as the intermediate input falls short of the current expenses.

In period 2, the same force works to render the net operation surplus larger than the operating profits. However, as a reflection of the difference in fixed assets in period 1, the consumption of fixed capital exceeds the depreciation. As a result, even though the net operating surplus continues to exceed the operating profits, the gap becomes smaller than in period 1. This fits the above observations in Figures 9 and 10: a relatively small gap between the net operation surplus and the operating profits; a large gap between consumption of fixed capital and depreciation; and a large gap between gross fixed capital formation and capital investment. Further note that, when we compare the sum of the net operating surplus and the consumption of fixed capital, which is called gross operating surplus, with the sum of the operating profits and the depreciation, the gap (10 in the example) remains unchanged in both periods 1 and 2. This gap is equal to the amount by which the gross fixed capital formation exceeds the capital investment.

The accounting difference between the gross fixed capital formation of the National Accounts statistics and the capital investment of the *Financial Statements of Corporations* is as follows: purchase expenses on fixed assets whose useful life is more than one year are generally recorded as the fixed capital formation in the National Accounts statistics. The corporate accounting, on which the *Financial Statements of Corporations* is based, applies a stricter rule in order to prevent firms from inflating their profits. For example, fixed capital formation of intangible fixed assets (mainly software) in the National Accounts statistics, which is estimated by revenue data of the "information and communications" industry, is included in the current expenses under corporate accounting. According to the "*Software no kigyokaikei ni kansuru shishin* (guidelines on corporate accounting regarding software)," purchase expenses on intangible fixed assets are recorded as a capital investment only "when the purchase expense is certain to produce income or reduce expenses for the future," which is a somewhat stricter standard compared to the National Accounts statistics. A similar accounting difference can also be observed for tangible fixed assets.

(Net operating surplus versus operating profits)

Although there is little difference in the definition of the net operating surplus in the National Accounts and the operating profits in the *Financial Statements of Corporations,* the following four points need to be taken into account for comparison. First, Financial Intermediation Services Indirectly Measured (FISIM) is subtracted from the net operating surplus as intermediate consumption. In contrast, payment of interest (including the FISIM) by non-financial corporations is included in the operating profits because it is treated as a non-operating expense. Second, valuation adjustment of inventories is not included in the net operating surplus, but is included in the operating profits. Third, profits of holding companies are not included in the net operating surplus (because most of these are dividends from their subsidiaries), but included in the operating profits. Fourth, profits from foreign branches are not included in the net operating surplus, but are included in the operating profits (see Figure 11 and Table 4 for an illustrative example).

To adjust for these four points, we add the FISIM and the valuation adjustment of inventories to the net operating surplus (blue line in Figure 11 (2)), and subtract the operating profits of holding companies and those from foreign branches from the operating profits as a whole (red line in the Figure 11 (2)). For these adjustments, data on the FISIM and the valuation adjustment of inventories comes from the National Accounts statistics, whereas that on the operating profits of holding companies comes

from the *Financial Statements of Corporations*. Data on the operating profits from foreign branches is estimated as the total operating profits multiplied by the ratio of "foreign tax deduction" to "calculated tax amount" (from the *Company Sample Survey*). Upon these adjustments, diversion between the two series in fact becomes larger (Figure 11 (2)).

(Consumption of fixed capital versus depreciation)

There are also subtle differences in the definitions of the consumption of fixed capital and the depreciation. For instance, the anticipated destruction of fixed assets is included in the consumption of fixed capital, but not in the depreciation. In fact, the coverage of the depreciation is narrower than the consumption of fixed capital owing to accounting differences including the introduction of impairment accounting.

As we will see in the next subsection, when estimating the net operating surplus based on the *Financial Statements of Corporations*, we need to take into account all of the differences mentioned above.

4.2 Estimation based on the *Financial Statements of Corporations* with corporate tax revenue data

(*Financial Statements of Corporations*)

As we have seen above, the difference between the gross fixed capital formation and the capital investment in the respective statistics brings about the gap between "gross" operating surplus, which is defined as sum of the net operating surplus and the consumption of fixed capital, or sum of the operating profits and the depreciation. Based on this relationship, we estimate the operating surplus in the National Accounts statistics from the *Financial Statements of Corporations* as follows.[8]

$$\text{GOS} = \pi^F + \delta^F + \text{I}^S - \text{I}^F, \tag{1}$$

$$\text{NOS} = \text{GOS} - \delta^S, \tag{2}$$

Where GOS is the gross operating surplus, NOS is the net operating surplus, π^F is the operating profits, δ^F is the depreciation, δ^S is the consumption of fixed capital, I^S is the gross fixed capital formation and I^F is the capital investment. Superscript F

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[8] The *Financial Statements of Corporations* is compiled in quarterly and annual frequencies. We use the annual sum of quarterly series unless otherwise stated. This is because only the quarterly series surveys "newly listed fixed assets" which correspond to the gross fixed capital formation in the National Accounts statistics.

indicates the data coming from the *Financial Statements of Corporations* and S from the National Accounts statistics.

The first and the second terms on the right-hand-side of equation (1) formulate the gross operating surplus in accordance with the *Financial Statements of Corporations*. The difference between the third and the fourth terms is the amount of purchase expense which is allocated into the current expenses in the *Financial Statements of Corporations,* but should be allocated into the gross fixed capital formation in the National Accounts. Here, the operating profits of the first term are adjusted for those of holding companies and those from foreign branches. Then, equation (2) states that the net operating surplus can be derived by subtracting the consumption of fixed capital of the National Accounts statistics from the estimated gross operating surplus in equation (1).[9]

Figure 12 shows our estimates of the gross and net operating surplus from 1994 to 2014. Figure 13 compares our estimates of the net operating surplus with those of the current National Accounts statistics. The FISIM and the valuation adjustment of inventories are added to the latter. As shown in the figure, on average, the net operating surplus of both series track each other closely. The average difference between 1994 and 2014 is as small as -1.2 trillion yen (or -2.4% if divided by the net operating surplus). However, there are several years when a divergence becomes noticeable. They include 2014, when our estimate of the net operating surplus is 7.4 trillion yen larger than that of the current National Accounts statistics.

(Corporate tax revenue)

As our next step, we correct the above estimated net operating surplus using corporate tax revenue data. As the *Financial Statements of Corporations* is a sample survey, figures derived from this set of statistics are subject to sampling errors. We intend to eliminate these errors by using comprehensive taxation data.

In this subsection, we use the annual survey of the *Financial Statements of Corporations*, because its quarterly version does not report "corporate, inhabitant and enterprise tax," which we use for a scaling parameter as explained below. As indicated by Figure 14 (1), the operating profits of the annual survey do not deviate much from

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[9] In the following calculation, we assume that the estimated gross operating surplus in 1994, which comes from equation (1), is the same level as that of the current National Accounts statistics. This implies that we add the difference between the two series in 1994 (11.5 trillion yen) to our estimates of the gross operating surplus in the following years. We ascribe this small difference in the initial year to any remaining difference in the coverage and the definition between the two statistics left after various adjustments.

those of the quarterly survey. In Figure 14 (2), "corporate, inhabitant and enterprise tax" from the annual survey broadly tracks that of actual tax revenue.

We correct the operating profits using the following equation (3), assuming that the deviation seen in Figure 15 (1) is largely due to the sampling error of the *Financial Statements of Corporations* and that the error is proportional to the sampling error of the tax. We do not apply this correction during the period from 1998 to 2003, because changes in accounting standards prevent us from directly comparing these two tax data.

$$\pi = \pi^F \times {}^\tau\!/_{\tau^F}, \tag{3}$$

where π is the adjusted operating profits, τ is actual tax revenue of the corporate tax and τ^F is that from the *Financial Statements of Corporations*. We substitute π to π^F in equation (1).[10]

Figure 15 (2) shows the result of our estimation.[11] In fact, the obtained series do not differ much from the corresponding series of the current National Accounts statistics: the average divergence between these two series for the entire sample period is as small as -0.5 trillion yen or -1.2% if divided by the net operating surplus. However, 2014 observes a significantly wider gap: our estimate of the net operating surplus is 12.6 trillion yen larger than that of the current National Accounts statistics.

As a robustness check, instead of using equation (3), we calculate the net operating surplus by assuming that the operating profits grew by year-on-year changes in the actual corporate tax revenue. This alternative estimation does not change the result materially (Figure 16).

5. Mixed Income

We estimate mixed income of households using self-assessment income taxation data of private unincorporated enterprises from the National Tax Agency. More specifically, from the self-assessment income taxation data, we subtract any rent from land that households receive and add the amount of an income deduction for income earners

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[10] We do not adjust the sampling errors of the capital investment and the deprecation in the same equation.

[11] As is the case in footnote 9, we add the difference between GOS and that of the National Accounts statistics in 1994 (12.6 trillion yen) to our estimates of the gross operating surplus in the following years.

filing "*Aoiro Shinkoku* (Blue Returns)."[12] [13] The amount of rent is drawn from property income in the National Accounts statistics. The amount of income deduction is assumed to be 300,000 yen per enterprise.

Thus estimated mixed income does not differ much from that of the National Accounts statistics (Figure 17). The difference is so small that we decide to use the mixed income of the National Accounts statistics in the following section.

6. Gross Domestic Income

As stated, GDI is comprised of compensation of employees, net operating surplus and mixed income, consumption of fixed capital, taxes on production and imports and (less) subsidies. We plug in our estimates of compensation of employees — more precisely, our estimates of wages and salaries of this component — from Section 3 and net operating surplus from Section 4.[14] Otherwise, we use the corresponding series of the current National Accounts statistics as explained in previous sections or have implicitly assumed that is the case. For instance, in the calculation of the net operating surplus of non-financial corporations, we have used the consumption of fixed capital drawn directly from the National Accounts statistics.[15]

Throughout the period, our estimate of GDI is consistently larger than that of the current National Accounts statistics, which is nothing more than GDP (Figure 18 (1)). The divergence was almost insignificant in 1994 but then gradually expanded to reach 14 trillion yen in 1999 and about 16 trillion yen in 2006 and 2007. Although this divergence was temporarily resolved in 2009, it surged to its maximum of about 27 trillion yen (about 6% of nominal GDP) in 2014.

The divergence between these two series is mainly owing to the compensation of

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[12] Blue Returns require taxpayers to report details of their revenue and expense in return for some benefits such as an income deduction.

[13] There are some more subtle differences in definition between the mixed income and the self-assessment income, but we leave them unadjusted, as their effects are supposed to be very minor.

[14] The data in Section 3 is on a calendar year basis whereas that in the following sections (including this section) is on a fiscal year basis. We convert wages and salaries on a calendar year basis to those on a fiscal year basis using each year's quarterly allocation of wages and salaries of the current National Accounts.

[15] The amount of consumption of fixed capital of financial corporations, households — including private unincorporated enterprises (excluding imputed service of owner-occupied dwellings) and private non-profit institutions serving households — is relatively small and does not affect the overall result of estimation.

employees (Figure 18 (2)). The discrepancy in the net operating surplus is more or less evenly distributed and relatively small except for 2009 and 2014.

Comparison between our estimate of GDI and GDE of the current National Accounts statistics does not make a material difference (Figure 19). This is because the divergence between GDP and GDE is not so large in the National Accounts. In 2014, our estimate of GDI exceeded GDE by 29.5 trillion yen, a slightly larger gap than that seen above (27 trillion yen).

Figure 20 shows "real" GDI from our estimate using the GDE deflator of the current National Accounts statistics — admittedly a very crude shortcut. Its reading of 2014 exceeded the previous peak of 2007 by a wide margin, whereas real GDE of the National Accounts did not surpass the 2007 peak. Real GDI grew by 2.4% in 2014 in our calculation, which is sharp contrast to a contraction by -1.0% in GDE. The average growth rate of real GDI since 2004 is 1.2%, which is 0.6 percentage points larger than that of GDE (0.6%).[16]

At the moment, we cannot fully explain what brought about these divergences and we acknowledge that more work needs to be done to pin down the possible causes, but we suspect that the following two points could form part of the story.

First, as discussed in Section 2, the narrower coverage of the *Economic Census,* which the National Accounts statistics heavily relies on for population information, might result in significant leakage of activities captured by those statistics. On that score, the taxation data we utilize in our estimation covers by far a larger number of companies than those indicated in the *Economic Census*.

Second, mistreatment of the consumption tax hike in 2014 might explain the sudden increase in discrepancy for that year. In principle, in the source surveys of the National Accounts, such as the *Census of Manufacture*, *Census of Commerce*, *Survey of Selected Service Industries*, and others, companies are supposed to report their nominal values with consumption tax included and the National Accounts statistics are then compiled as such. However, if a certain number of those companies had excluded consumption tax when reporting, there could have been a disruption in the series when the consumption tax rate was raised from 5% to 8% in 2014. This would have resulted in the growth rate of the corresponding year appearing lower than the actual growth rate.

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[16] Figure 21 shows the alternative estimate of GDI of which operating surplus is calculated using year-on-year changes of corporate tax revenue as mentioned in Section 4 (Figure 16). The results are almost the same as those of Figures 19 and 20.

7. Concluding Remarks

In this paper, using three different sets of taxation data, (i) individual inhabitant tax (for wages and salaries in compensation of employees), (ii) corporate tax (for net operating surplus) and (iii) self-assessment income tax (for mixed income), we estimate GDI independently and compare it with that of the National Accounts. We find: first, our estimate of wages and salaries has become increasingly larger than that of the National Accounts over the last 20 years, although they did not differ much in the initial year of 1994. Second, the estimated net operating surplus has tracked that of the current National Accounts statistics closely, except for a couple of years including 2014 when our estimate exceeded the National Accounts by a wide margin. Third, as far as mixed income is concerned, there is no remarkable difference between our estimate and the National Accounts.

We then substitute our estimates of the wages and salaries and the net operating surplus for the corresponding components of the National Accounts statistics. Thus obtained GDI exceeds the current GDI throughout the period, and the divergence shows the general trend of expansion until 2014. 2014 observes the largest-ever divergence, as not only the wages and salaries but also the net operating surplus of our estimate become significantly larger than those of the current National Accounts.

Admittedly we have not been able to fully explain where this discrepancy emerges and we acknowledge our approach has ample room for further improvements, but the results seem to suggest that there is a certain merit to estimating GDI based on taxation data in order to shed further light on what is going on in Japan's economy.

Further development of our GDI estimation will require the following two practical issues to be resolved.

First, the long time lag in the availability of taxation data needs to be overcome. Currently, taxation data used in this paper are published a little over a year after the corresponding year. This means that these taxation data cannot be used for the annual report of Japanese National Accounts, which is usually published in December of the following year. Our attempts to estimate the latest reading of the taxation data from alternative information sources have not been able to limit estimation errors to a satisfactory level. For this reason, it would be quite helpful if these taxation data could be accessed earlier.

Second, we need to explore how to estimate GDI on a quarterly basis. One possible way

is interpolating our annual estimate into a quarterly series using the quarterly allocation of the current National Account statistics. Another way could be to contrive a new estimation using high frequency data such as monthly taxation statistics.

(Appendix 1) Detailed Account of Wages and Salaries Estimation

In this appendix, we will explain in more detail the estimations outlined in *Steps 1* and *2* in Section 3 of the main text. First, for *Step 1*, we will show how to calculate the employment income of employees who pay local income tax but do not pay national income tax from the *Municipal Tax Survey*. Second, for *Step 2*, we will show how we further divide the number of employees who do not pay national income tax by whether or not they work for one-or-more years.

A1.1 Employment income of employees who pay local income tax but do not pay national income tax

The *Municipal Tax Survey* documents employment income and the number of employees[17] who pay local income tax by range of employment income per person (Table A1). The survey also indicates the breakdown of the number of employees by whether or not they pay national income tax. Multiplying income per person and the corresponding number of employees for each range, we estimate employment income of employees who pay local income tax but do not pay national income tax to amount to 9.1 trillion yen (as indicated by the sum of column G in Table A1).

A1.2 Number of employees who do not pay national income tax

In *Step 2* of the main text, we use the number of employees who do not pay national income tax by period of employment (one-or-more years and less than one year). This requires some careful calculation; the process is summarized in the outline below, and this is followed by a step-by-step exposition.

(Outline)

First, we obtain the number of employees who pay local income tax and its decomposition on whether or not they pay national income tax (*X, Y* and *Z* in Table A2) from the *Municipal Tax Survey*. We also obtain the number of total employees (*V* in Table A2) from the *Labor Force Survey*. Then, we divide the number of employees by whether they draw their employment income as their main job or their second job from

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[17] In addition, the *Municipal Tax Survey* surveys both the number of employees who select employment income as their main job and that of those who select self-employment income as their main job and employment income as a second job. As mentioned in the main text, even though a person has multiple jobs, only one employee is counted.

the *Municipal Tax Survey* and further divide them by whether or not they work for one-or-more years using the corresponding ratios of the *Private Sector Salary Survey*. Finally, we estimate the number of employees who do not pay national income tax as $a+b+e+f$ in Table A2 for those working for one-or-more years and $c+d+g+h$ for those working less than one year.

(Algorithm)

1. We divide the number of employees who pay local income tax by whether they select their employment income as their main job or their second job from the *Municipal Tax Survey* (Table A2-1). We then add the number of employees who select employment income but show their main income comes from the public pension in addition to the former category (i.e. employment income comes from main job).

2. We apply the proportion of the main versus the second job obtained in the previous step to the number of employees who pay both local and national income tax to obtain its breakdown (Table A2-2). We repeat the same procedure for the number of employees who pay local income tax but do not pay national income tax.

3. We further divide the numbers obtained above by whether or not these employees work for one-or-more years using the ratio derived from the *Private Sector Salary Survey* (Table A2-3). In calculating the ratio, the number of employees working for less than one year is doubled from that in the *Private Sector Salary Survey*, which is surveyed in December of each year. This implies that we are assuming that employees working for less than one year work for six months on average.[18]

4. We use the number of employees obtained from the *Labor Force Survey* as the total of main job workers (Table A2-4). As the *Labor Force Survey* is indicated on a monthly average basis, we need to transform the data obtained in the above steps on the same basis. Specifically, we halve the number of employees who work for less than one year.

5. Among employees who select their employment income as their main job, we obtain the number of employees who do not pay local income tax as 1,303 by subtracting those who pay local income tax (4,245) from the total number of employees (5,549) (Table A2-5).

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[18] According to the *Annual Report on the Labor Force Survey 2013, 2014*, the average working period of employees who work for less than one year can be calculated as about six months.

6. We divide the number obtained above by whether or not these employees work for one-or-more years, using the proportion in the *Private Sector Salary Survey* (Table A2-6).

7. We reconvert the data to a gross annual basis by doubling the number of employees who work for less than one year (Table A2-7).

8. Among employees who do not pay local income tax, we come up with the number of employees who select their employment income as second jobs, using the ratio obtained in the first step above (Table A2-8).

9. We divide the number obtained above by whether or not these employees work for one-or-more years, using the proportion in the *Private Sector Salary Survey* (Table A2-9).

10. Finally, we estimate the number of employees who do not pay income tax as $a+b+e+f$ in Table A2-9 for those who work for one-or-more years (9.65 million) and $c+d+g+h$ for less than one year (11.46 million).

(Appendix 2) Robustness of Wages and Salaries Estimation

Our estimation of wages and salaries should be quite robust. In fact, most of the wages and salaries in our estimation are not subject to "estimation," but are drawn directly from the actual income of employees who pay local income tax. This data is very comprehensive as it is collected by all municipal governments. What we have estimated is the income of employees who do not pay national income tax. The error associated with this estimation should be well contained. This is because the component makes up only 10% of wages and salaries in 2014 and the scale of the surveys used for the estimation — such as the *Labor Force Survey* and the *Private Sector Salary Survey* — appear large enough.[19]

Below, we conduct some robustness checks of our estimation by imposing alternative assumptions.

(Alternative assumption on working periods)

For the number of employees who work less than one year, instead of the estimate derived from the *Private Sector Salary Survey*, we can use that of the *Labor Force Survey (Detailed Tabulation),* which began to compile the corresponding data from 2013.[20] As we do not change the total number of employees, we need to adjust the number of employees who work for one-or-more years accordingly (Table A3). The impact on wages and salaries in 2014 is just a 0.8 trillion yen decline, or 0.4% of the total.

(Alternative assumption on second jobholders)

In *Step 2* of Section 3, there is an issue of how to capture employment income of second jobholders for those who are exempt from national income tax. Suppose that Worker A

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[19] Wages and salaries in the current National Accounts statistics include travel allowances for commuting. We do not include this in our estimate, as we believe that, like expenses for business trips, it should not be included in wages and salaries — these items should be counted as intermediate input in GDP and hence should not raise the level of GDI in order to keep consistency between GDI and GDP. That said, even if we include this in our estimate of wages and salaries, the impact is likely to be very small because the allowances amounted only to 1.4 trillion yen in 2013FY.

[20] There are many reasons why the number of employees working for less than one year in the *Labor Force Survey (Detailed Tabulation)* is different from that in the *Private Sector Salary Survey.* These surveys draw different samples in nature. For instance, the former collects samples from households (employees), while the latter surveys enterprises (employers). In addition, the former counts only the number of employees as main job, while the latter includes that of second jobholders.

has two jobs and earns 100 from Company X and 10 from Company Y. The *Municipal Tax Survey*, which is used in ***Step 1***, records him as one employee and his employment income as 110. The *Private Sector Salary Survey*, from which per-person income is derived in ***Step 2***, treats these two jobs separately and, as a consequence, counts him as two employees and his per-person income as 55. Because the number of employees is derived from the *Municipal Tax Survey* (and the *Labor Force Survey*) in ***Step 2***, i.e., he is counted as one employee, his income becomes 55 instead of 110, if he is exempt from national income tax.

We ignore this issue in the main text on the grounds that second jobholders are likely to earn a significant income and hence are less likely to be exempt from national income tax. Even if we assume that a proportion of those who do not pay national income tax have a second job and adjust the number of employees accordingly (count the second jobholders as two employees instead of one), wages and salaries increase only by 1.5 trillion yen, or just 0.7% of the total.[21]

(*Population Census*)

For the total number of employees, if we use the *Population Census* instead of the *Labor Force Survey*, the amount of wages and salaries in 2014 decreases only by 1.0 trillion yen.

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[21] The proportion R is obtained by solving the following equation.

$$W^S \cdot \hat{L} \cdot (1 + R) = \hat{Ia} + \hat{Ib} \cdot (1 + R)$$

where W^S is per-head wages and salaries of the current National Accounts statistics, $\hat{L}$ is the number of employees of our estimate. $\hat{Ia}$ and $\hat{Ib}$ are income of employees who pay national income tax and income of employees who do not pay that tax, respectively. The formula assumes that i) W^S and $\hat{Ia}$ correctly reflect the second jobholders' income and ii) the number of employees who do not pay national income tax should be increased by that of second jobholders.

(Appendix 3) Net Lending/Borrowing for Households and Corporations

In this appendix, using the results from Section 3, we check the consistency of net lending/ borrowing for households and corporations between non-financial and financial transactions accounts.

(Net lending/borrowing based on wages and salaries in Section 3)

Figure A1 shows net lending/borrowing for households and corporations in the current National Accounts statistics. Conceptually they should be the same between non-financial and financial transactions accounts, but in reality they are not. In 2013FY, the non-financial transactions account records that the household savings rate declined to negative territory for the first time since 1994FY (-1.3 percent), while currency and deposits of households increased by 17 trillion yen in the financial transactions accounts. This could happen if households sold other financial assets to increase currency and deposits, but the discrepancy between non-financial and financial transactions accounts might also matter.

The figure also indicates the net lending/borrowing for households based on our estimate of wages and salaries in Section 3 ("modified non-financial transactions" in the figure). It results in considerably larger net lending and the discrepancy from that of the financial transactions accounts declines at least in recent years.

At the same time, the figure reveals that the net lending/borrowing for corporations would become smaller than that of the current National Accounts statistics. This is because the larger wages and salaries mean larger expenditure for corporations. Again, the discrepancy between non-financial and financial transactions accounts declines at least in recent years.

(Additional adjustments)

On top of wages and salaries seen above, we make two other adjustments in order to decrease the remaining discrepancy between the two transactions accounts.

First, we assume that the net lending/borrowing for securities investment trusts and pension funds in the financial transactions accounts is zero. Accordingly, we also assume that the corresponding net lending/borrowing for households in the financial transactions accounts is zero. In the current National Accounts statistics, the non-financial transactions accounts register that the net lending/borrowing for securities

investment trusts and pension funds is nil, whereas in the financial transactions accounts record this is not the case (Figure A2 (1)).[22] We eliminate this discrepancy by assuming zero net lending/borrowing in the financial transactions accounts.

Second, we assume that net purchase of land for households in the non-financial transactions accounts is zero. Accordingly, we also adjust the net lending/borrowing for corporations in the non-financial transactions accounts, assuming households would have sold that amount of land property to corporations. In the current National Accounts statistics, since 1994, households have continued to sell much more land than they have purchased (Figure A2 (2)), but this is not supported by other statistical sources. For instance, according to the *Koteishisan no kakakutono gaiyouchosho (Survey of Value of Fixed Properties)* conducted by the Ministry of Internal Affairs and Communications, areas of land held by households remain basically unchanged from 1995 to 2014 (-0.6%). In fact, areas of residential land held by households, which makes up most their property valuation, increased by 16.9% during the same period. The Ministry of Land, Infrastructure, Transport and Tourism (2014) reports that, since 2001CY, households have sold land much less than previously.

The results of the above adjustments are shown in Figure A3, where "modified non-financial transactions" is the series adjusted for net land purchase as well as compensation of employees, and "modified financial transactions" is one adjusted for net lending/borrowing of securities investment trusts and pension funds. The discrepancy in the net lending/borrowing for both households and corporations is significantly reduced. Together with the two adjustments, this may indicate the importance of using our estimate of wages and salaries to have a consistent net lending/borrowing.

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[22] See Fujiwara (2014) for additional discussion.

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Table 1 Methodologies of Official GDE, GDP and GDI

(1) Commodity flow approach: GDE

Estimate domestic aggregate supply of goods and services and allocate them to components using allocation rates in the *Input-Output table*, etc.

Imports and Exports are replaced by *Balance of Payments*.

(2005CY, billion yen)

Items/ Goods and services	Supply				Demand				
	Gross output	Imports		Trade and transport margins	Total supply or disposition	Intermediate consumption	Domestic actual final expenditure of households	Gross fixed capital formation	Exports (F.O.B. prices)
		C.I.F. prices	Taxes and duties on imports						
1. Industries	749,494.2	64,788.7	4,769.7	119,598.2	938,650.8	445,571.2	271,951.0	115,407.1	72,917.0
(1) Agriculture, forestry and fishery	12,382.2	2,090.0	149.3	5,512.3	20,133.7	13,686.0	6,151.5	197.9	82.6
(3) Manufacturing	302,663.5	40,160.6	3,281.4	108,525.2	454,630.8	243,139.4	100,411.8	47,784.2	62,480.4
(6) Wholesale and retail trade	1,744.5	704.6	0.0	0.0	2,449.1	704.6	861.2	249.2	634.1
Total	826,051.4	64,788.7	4,769.7	119,598.2	1,015,208.0	447,879.4	282,947.5	112,573.9	72,917.0

As for "industries," the sum of the above "gross output" and "trade and transport margins" is equal to "gross output" shown below.[1]

(2) Value-added approach: GDP

(2005CY, billion yen)

Output Matrix (V)

Economic Activities/ Goods and services	1. Industries	(1) Agriculture, forestry and fishery	(3) Manufacturing	(6) Wholesale and retail trade	Total
1. Industries	869,092.5	12,423.4	301,964.3	115,294.7	869,092.5
(1) Agriculture, forestry and fishery	12,382.2	12,329.5	13.7	7.0	12,382.2
(3) Manufacturing	302,663.5	46.6	299,523.0	2,358.2	302,663.5
(6) Wholesale and retail trade	106,708.8	3.7	3.6	106,382.6	106,708.8
Total	869,092.5	12,423.4	301,964.3	115,294.7	948,509.7

Input Matrix (U)

Economic Activities/ Goods and services	1. Industries	(1) Agriculture, forestry and fishery	(3) Manufacturing	(6) Wholesale and retail trade	Total
1. Industries	420,574.1	6,300.9	202,048.8	40,225.2	444,874.7
(1) Agriculture, forestry and fishery	13,293.6	1,717.8	7,969.7	1,535.8	13,516.1
(3) Manufacturing	226,324.7	3,431.5	148,279.4	9,046.6	232,945.6
(6) Wholesale and retail trade	788.3	0.0	0.0	786.8	788.3
Total	423,430.1	6,315.8	202,265.7	40,480.3	447,902.1
GDP classified by Economic Activities [2]	445,662.3	6,107.7	99,698.6	74,814.4	500,607.6

Value added of industries are derived from subtracting intermediate input from gross output.

Notes: 1. In general, the gross output of goods and services is the same for both the commodity flow approach and the value added approach except for "wholesale and retail trade" and "trade and transport margins."

2. Prior to adding "taxes and duties on imports" and subtracting "consumption taxes for gross capital formation."

Table 2 Estimated Wages and Salaries (Total)

(2014CY, trillion yen)

Taxpayer of local income tax	211.9	(a+b)
Taxpayer of national income tax	202.8	(a)
Non-taxpayer of national income tax	9.1	(b) ← **Step 1**
Non-taxpayer of local income tax	13.3	(c) ← **Step 2**
Adjusting small differences such as bonuses for directors	-0.4	(d) ← **Step 3**
Estimated total value (A)	224.7	(a+b+c+d)
Official total value (B)	210.6	
Divergence (A-B)	14.2	

Table 3 Difference of SNA Account and Corporate Account

(2 period example)

Assumption 1: Gross output and corporates' revenue are 100 in both the accounts.
Assumption 2: Purchase expenses are 50 in both the accounts.
Assumption 3: Depreciation rates are 50% in both the accounts.
Assumption 4: The allocation of purchase expense is different between the accounts.

GDP statistics (SNA account)		Period 1	Period 2
Gross output	(a1)	100	100
Intermediate input	(a2)	30	30
Consumption of fixed capital	(a3)	0	10
Net operating surplus	(a4 = a1 -a2 -a3)	70	60
Gross fixed capital formation		20	20
Fixed assets (end of the period)		20	30
Gross operating surplus	(a5 = a3 +a4)	70	70
Corporate Account			
Revenue	(b1)	100	100
Current expense	(b2)	40	40
Depreciation	(b3)	0	5
Operating profits	(b4 = b1 -b2 -b3)	60	55
Capital investment		10	10
Fixed assets (end of the period)		10	15
Operating profits + Depreciation	(b5 = b3 +b4)	60	60

Table 4 FISIM and Valuation Adjustment of Inventories

GDP statistics (SNA account)			Corporate Account		
Gross output	(a1)	100	Revenue	(b1)	100
Intermediate input (excluding FISIM)	(a2)	50	Current expense	(b2)	50
FISIM	(a3)	5	Valuation adjustment of inventories	(b3)	-10
Net operating surplus	(a4 = a1 -a2 -a3)	45	Operating profits	(b4 = b1 -b2 +b3)	40
Property income (payment)		5	Debt interest payment	(b5)	10
			Ordinary profits	(b6 = b4 -b5)	30
Valuation adjustment of inventories		-10			

Table A1 Number of Employees and Employment Income (Taxpayers of Local Income Tax)

Range of employment income per person	Number of employees			Employment income Total (1,000 yen)	Employment income per person (1,000 yen)	Employment income	
	Taxpayer of national income tax A	Non-taxpayer of national income tax B	Total C(=A+B)	D	E(=D÷C)	Taxpayer of national income tax (1,000 yen) F(=E×A)	Non-taxpayer of national income tax (1,000 yen) G(=E×B)
1 million yen or less	1,245,537	156,745	1,402,282	587,542,453	419	521,867,830	65,674,623
Between 1.0 million and 1.1 million yen	383,170	669,624	1,052,794	1,095,266,786	1,040	398,628,197	696,638,589
Between 1.1 million and 1.2 million yen	793,043	123,632	916,675	1,065,272,419	1,162	921,599,078	143,673,341
Between 1.2 million and 1.3 million yen	795,585	90,735	886,320	1,110,999,406	1,253	997,263,361	113,736,045
Between 1.3 million and 1.4 million yen	568,287	34,366	602,653	814,041,346	1,351	767,621,026	46,420,320
Between 1.4 million and 1.5 million yen	622,104	20,335	642,439	932,447,361	1,451	902,932,781	29,514,580
Between 1.5 million and 2.0 million yen	3,718,211	121,171	3,839,382	6,770,556,658	1,763	6,556,877,706	213,678,952
Between 2.0 million and 3.0 million yen	8,507,931	337,851	8,845,782	22,152,253,962	2,504	21,306,182,789	846,071,173
Between 3.0 million and 5.0 million yen	13,644,302	904,269	14,548,571	57,131,355,322	3,927	53,580,345,842	3,551,009,480
Between 5.0 million and 7.0 million yen	7,249,978	504,323	7,754,301	45,717,720,439	5,896	42,744,338,580	2,973,381,859
Between 7.0 million and 10 million yen	4,981,664	48,862	5,030,526	40,970,378,235	8,144	40,572,428,871	397,949,364
Between 10 million and 20 million yen	1,884,125	849	1,884,974	24,043,665,581	12,755	24,032,836,216	10,829,365
More than 20 million yen	279,341	52	279,393	9,474,170,859	33,910	9,472,407,548	1,763,311
Total	44,673,278	3,012,814	47,686,092	211,865,670,827		202,775,329,825	9,090,341,002

Table A2 Number of employees

(10,000 persons, 2014CY)

	Total	Taxpaying employees of local income tax (gross annual)			Non-taxpaying employees of local income tax	(monthly average) Total of employees
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax		
Total		4,769 *X*	4,467 *Y*	301 *Z*		
Employees selecting emloyment income as main job						5,549 *V*
of which work one-or-more years				*a*	*b*	
of which work less than one year				*c*	*d*	
Employees selecting emloyment income as second job						
of which work one-or-more years				*e*	*f*	
of which work less than one year				*g*	*h*	

Table A2-1 Number of employees

(10,000 persons, 2014CY)

	Total	Taxpaying employees of local income tax (gross annual)			Non-taxpaying employees of local income tax
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total		4,769	4,467	301	
Employees selecting emloyment income as main job		4,713			
of which work one-or-more years					
of which work less than one year					
Employees selecting emloyment income as second job		55			
of which work one-or-more years					
of which work less than one year					

Table A2-2 Number of employees

(10,000 persons, 2014CY)

	Total	Taxpaying employees of local income tax (gross annual)			Non-taxpaying employees of local income tax
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total		4,769	4,467	301	
Employees selecting emloyment income as main job		4,713	4,415	298	
of which work one-or-more years					
of which work less than one year					
Employees selecting emloyment income as second job		55	52	4	
of which work one-or-more years					
of which work less than one year					

32

Table A2-3 Number of employees

(10,000 persons, 2014CY)

| | Total | Taxpaying employees of local income tax | | | Non-taxpaying employees of local income tax |
| | | (gross annual) | | | |
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total		4,769	4,467	301	
Employees selecting emloyment income as main job		4,713	4,415	298	
of which work one-or-more years		3,778	3,642	136	
of which work less than one year		935	774	162	
Employees selecting emloyment income as second job		55	52	4	
of which work one-or-more years		44	43	2	
of which work less than one year		11	9	2	

The following ratios of number of employees by period of employment are used.

( ); 10,000 persons, 2014CY

1) **monthly average**; corresponding to the raw data on December 2014

	Taxpayer	Non-taxpayer
Employees working one-or-more years	90.4 % (4,026)	62.7% (730)
Employees working less than one year	9.6% (428)	37.3% (434)

Number of employees working less than one year are counted twice.

2) Adjusted **gross annual** data in 2014

	Taxpayer	Non-taxpayer
Employees working one-or-more years	82.5% (4,026)	45.7% (730)
Employees working less than one year	17.5% (855)	54.3% (868)

Table A2-4 Number of employees

(10,000 persons, 2014CY)

| | Total | Taxpaying employees of local income tax | | | Non-taxpaying employees of local income tax |
| | | (monthly average) | | | |
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total		4,295	4,076	219	
Employees selecting emloyment income as main job	5,549	4,245	4,028	217	
of which work one-or-more years		3,778	3,642	136	
of which work less than one year		468	387	81	
Employees selecting emloyment income as second job		50	47	3	
of which work one-or-more years		44	43	2	
of which work less than one year		6	5	1	

Table A2-5 Number of employees
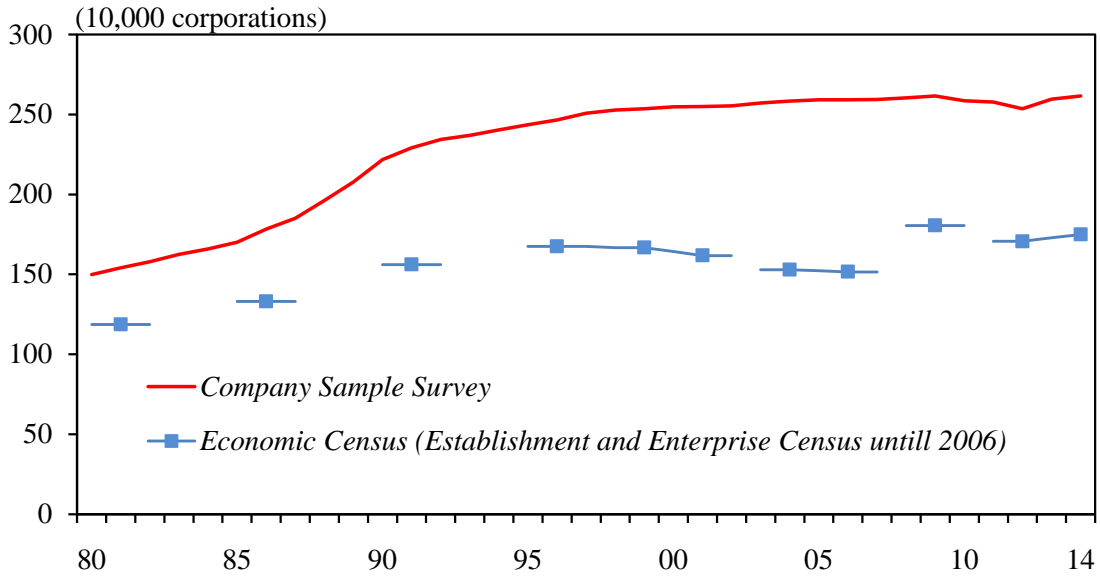
(monthly average)

| | | Total | Taxpaying employees of local income tax | | | Non-taxpaying employees of local income tax |
			Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total			4,295	4,076	219	
	Employees selecting emloyment income as main job	5,549	4,245	4,028	217	1,303
		of which work one-or-more years	3,778	3,642	136	
		of which work less than one year	468	387	81	
	Employees selecting emloyment income as second job		50	47	3	
		of which work one-or-more years	44	43	2	
		of which work less than one year	6	5	1	

Table A2-6 Number of employees

(monthly average)

| | | Total | Taxpaying employees of local income tax | | | Non-taxpaying employees of local income tax |
			Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total			4,295	4,076	219	
	Employees selecting emloyment income as main job	5,549	4,245	4,028	217	1,303
		of which work one-or-more years	4,595	3,778	3,642	136	818
		of which work less than one year	953	468	387	81	486
	Employees selecting emloyment income as second job		50	47	3	
		of which work one-or-more years	44	43	2	
		of which work less than one year	6	5	1	

Table A2-7 Number of employees

(gross annual)

| | | Total | Taxpaying employees of local income tax | | | Non-taxpaying employees of local income tax |
			Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total			4,769	4,467	301	
	Employees selecting emloyment income as main job	6,502	4,713	4,415	298	1,789
		of which work one-or-more years	4,595	3,778	3,642	136	818
		of which work less than one year	1,907	935	774	162	971
	Employees selecting emloyment income as second job		55	52	4	
		of which work one-or-more years	44	43	2	
		of which work less than one year	11	9	2	

Table A2-8 Number of employees

(10,000 persons, 2014CY)

(gross annual)

	Total	Taxpaying employees of local income tax			Non-taxpaying employees of local income tax
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total	6,579	4,769	4,467	301	1,810
Employees selecting emloyment income as main job	6,502	4,713	4,415	298	1,789
of which work one-or-more years	4,595	3,778	3,642	136	818
of which work less than one year	1,907	935	774	162	971
Employees selecting emloyment income as second job	77	55	52	4	21
of which work one-or-more years		44	43	2	
of which work less than one year		11	9	2	

Table A2-9 Number of employees

(10,000 persons, 2014CY)

(gross annual)

	Total	Taxpaying employees of local income tax			Non-taxpaying employees of local income tax
		Total	of which taxpayer of national income tax	of which non-taxpayer of national income tax	
Total	6,579	4,769	4,467	301	1,810
Employees selecting emloyment income as main job	6,502	4,713	4,415	298	1,789
of which work one-or-more years	4,595	3,778	3,642	136 *a*	818 *b*
of which work less than one year	1,907	935	774	162 *c*	971 *d*
Employees selecting emloyment income as second job	77	55	52	4	21
of which work one-or-more years	54	44	43	2 *e*	10 *f*
of which work less than one year	22	11	9	2 *g*	11 *h*

Table A3 Estimated number of non-taxpaying employees of national income tax

(gross annual, 10,000 persons, 2014CY)

	Estimation in the main text	Estimation in this Appendix 2
Employees who work one-or-more years	965	1,034
Employees who work less than one year	1,146	712

35

Figure 1: Number of Corporations

(10,000 corporations)

Company Sample Survey

Economic Census (Establishment and Enterprise Census untill 2006)

Sources: Ministry of Internal Affairs and Communications; Ministry of Economy, Trade and Industry; National Tax Agency.

Figure 2: Breakdown of GDE, GDP and GDI

(CY2014)

Domestic final consumption expenditure of households (288 trillion yen)	Industries (428 trillion yen) ⋮ Manufacturing (90 trillion yen) ⋮ Wholesale and retail trade (69 trillion yen) ⋮ Service activities (95 trillion yen)	Compensation of employees (251 trillion yen)
Gross fixed capital formation of non-resi. investment by private sectors (68 trillion yen)		Taxes on production and imports (44 trillion yen) (less)Subsidies (3 trillion yen)
		Consumption of fixed capital (104 trillion yen)
Others (130 trillion yen)	Others (60 trillion yen)	Operating surplus and mixed income (91 trillion yen)

Estimated

A balancing item

Total of GDI matches GDP .

GDE (486.9 trillion yen)　　GDP (487.4 trillion yen)　　GDI (487.4 trillion yen)

Source: Cabinet Office.

Figure 3: *Municipal Tax Survey* Versus National Accounts

(1) Wages and salaries
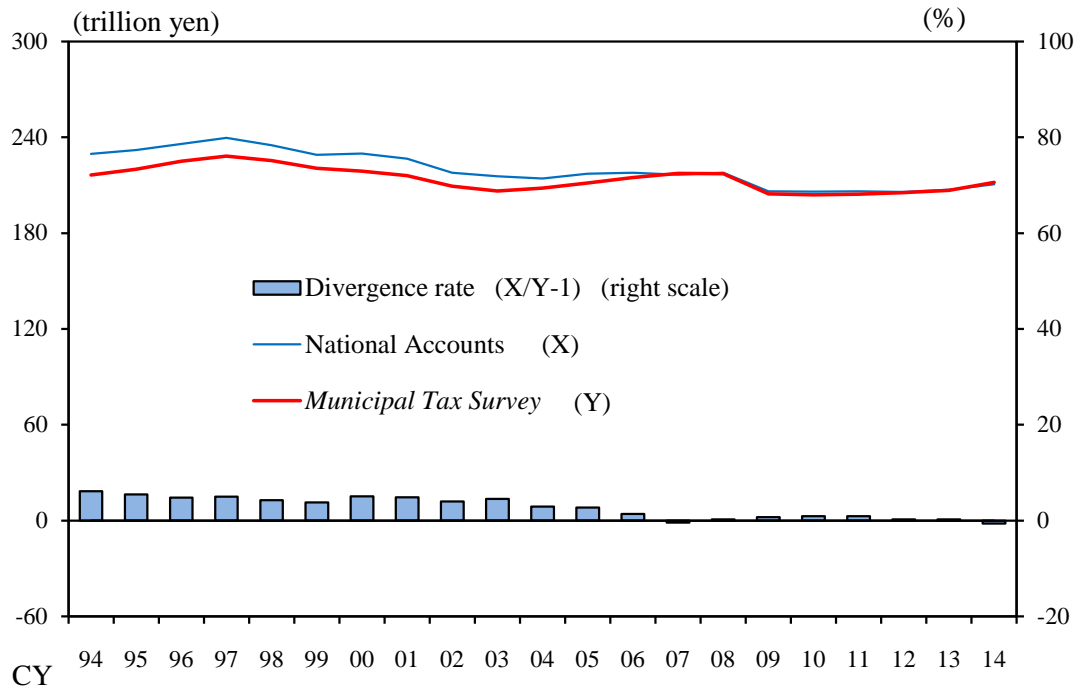
(2) Number of employees
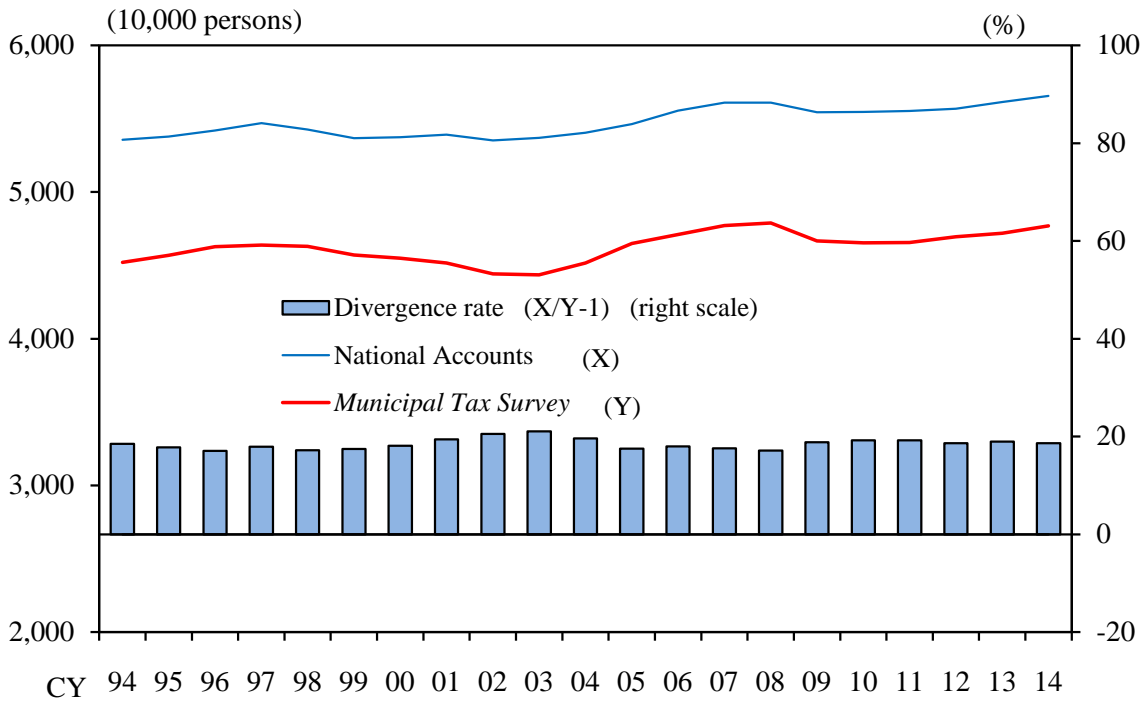
Sources: Cabinet Office; Ministry of Internal Affairs and Communications.

Figure 4: Estimated Wages and Salaries
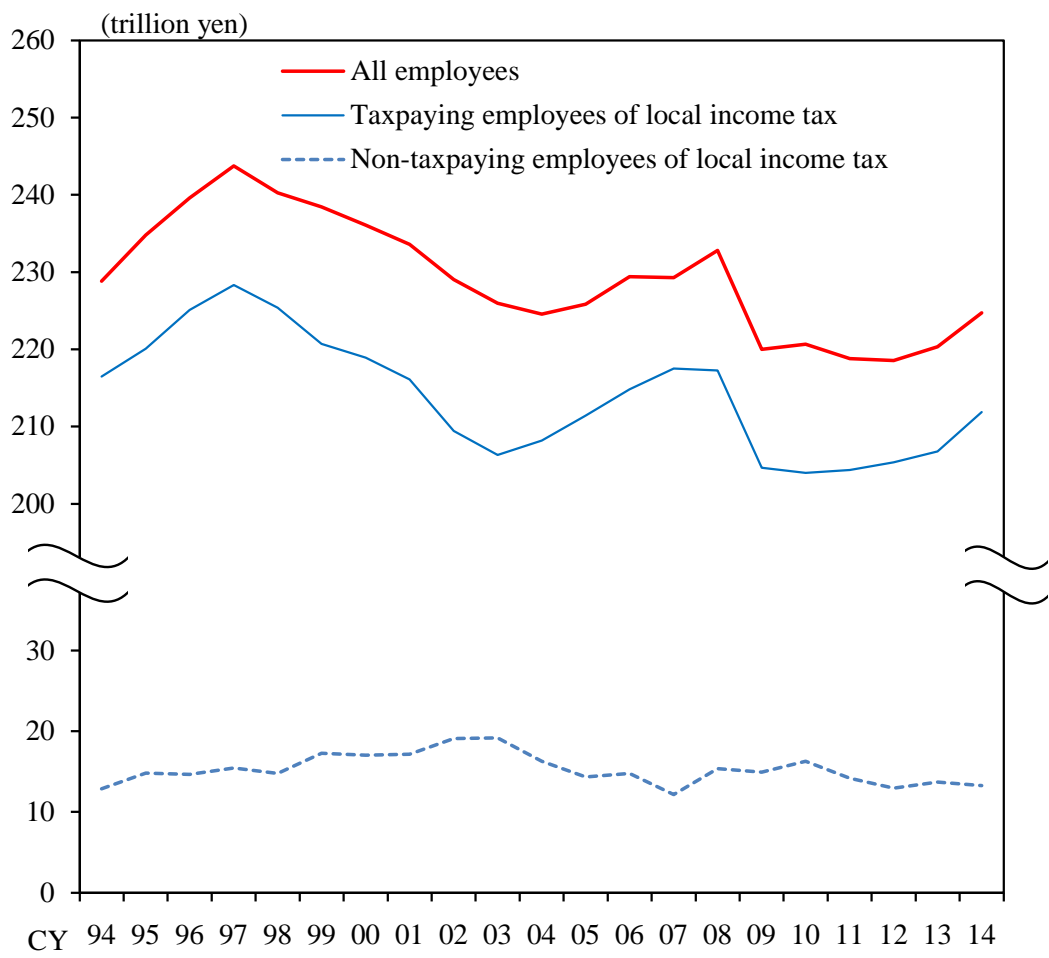
Figure 5: Estimated Wages and Salaries per Person

(10,000 yen)

- All employees
- Taxpaying employees of local income tax
- Non-taxpaying employees of local income tax

CY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
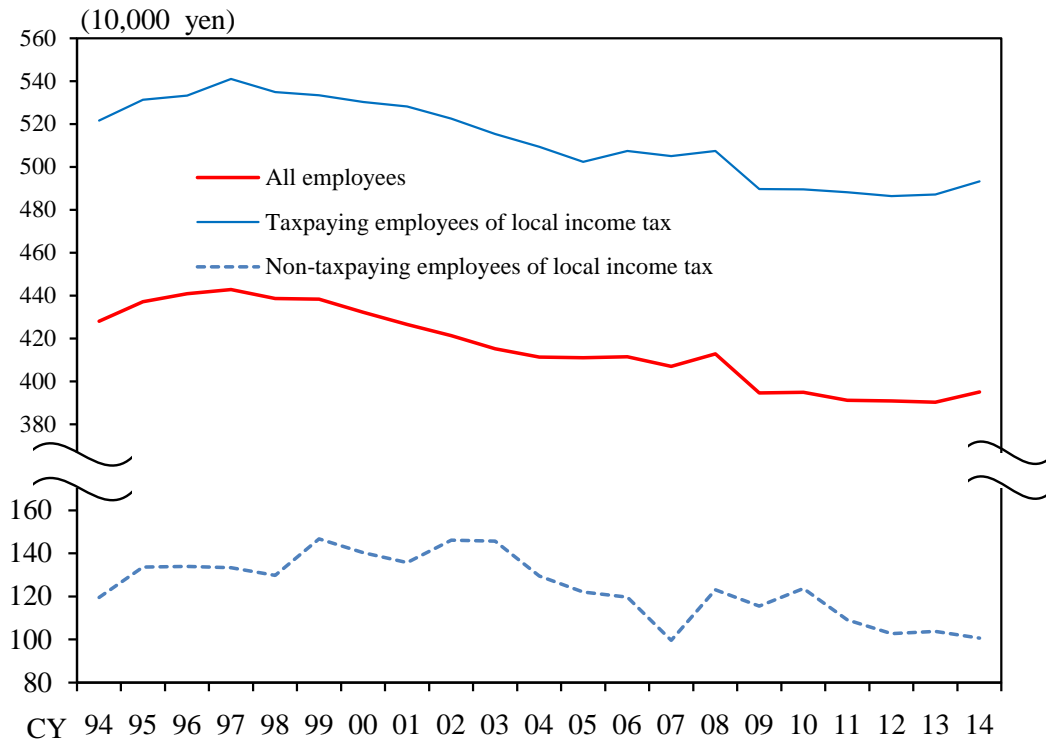
Figure 6: Estimated Number of Employees

(monthly average, 10,000 persons)

- All employees
- Taxpaying employees of local income tax
- Non-taxpaying employees of local income tax

CY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
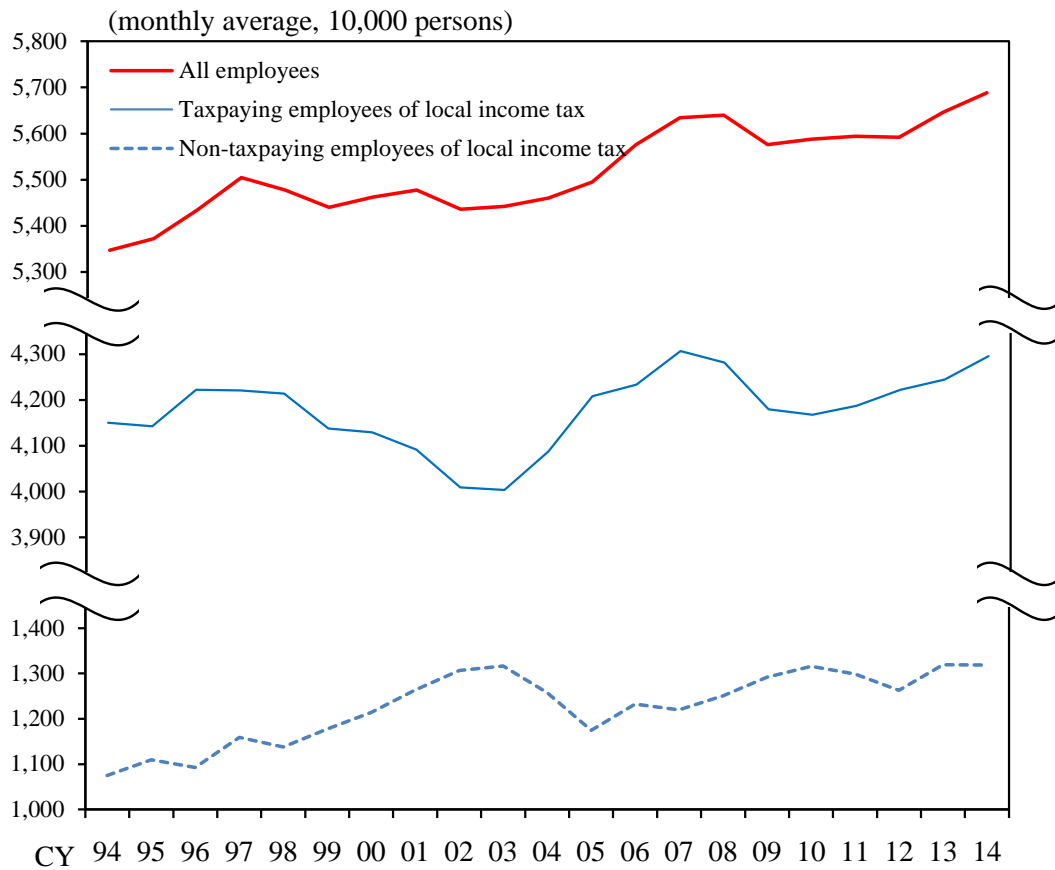
Figure 7: Estimated and Official Wages and Salaries (1)

(1) Level
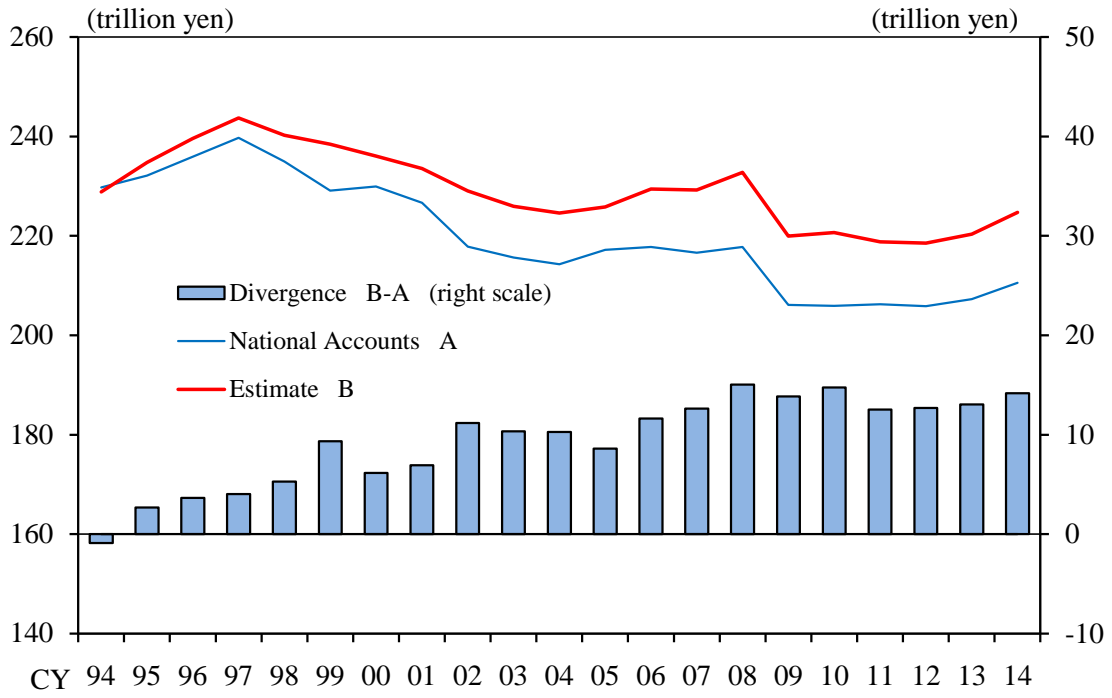
(2) Year-on-year change
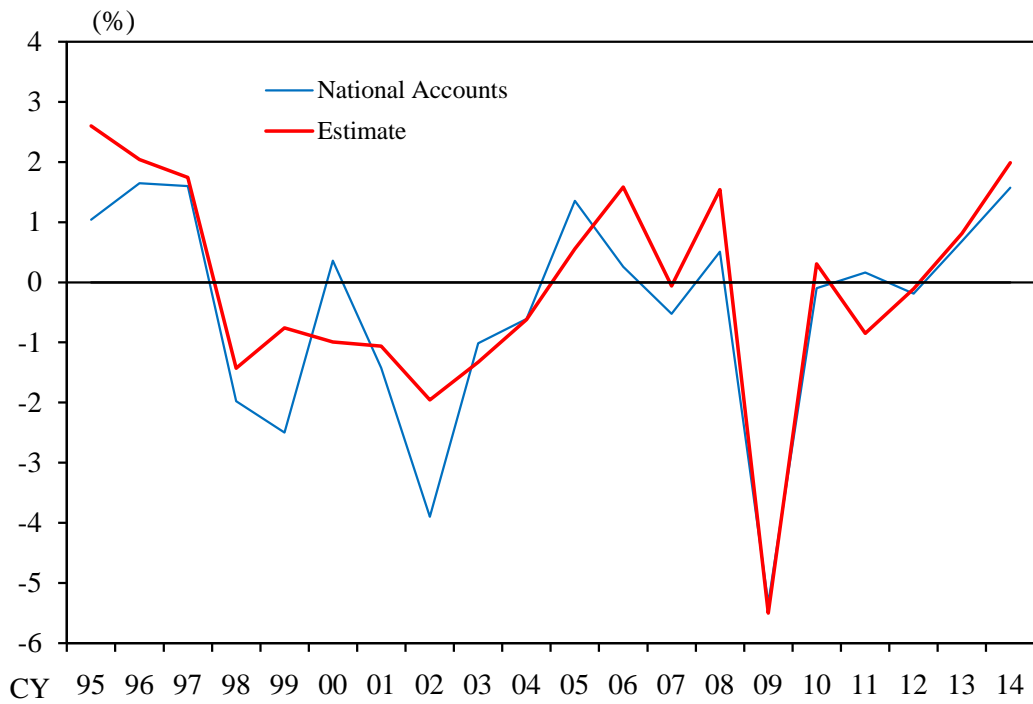
Figure 8: Estimated and Official Wages and Salaries (2)

(1) Wages and salaries per person
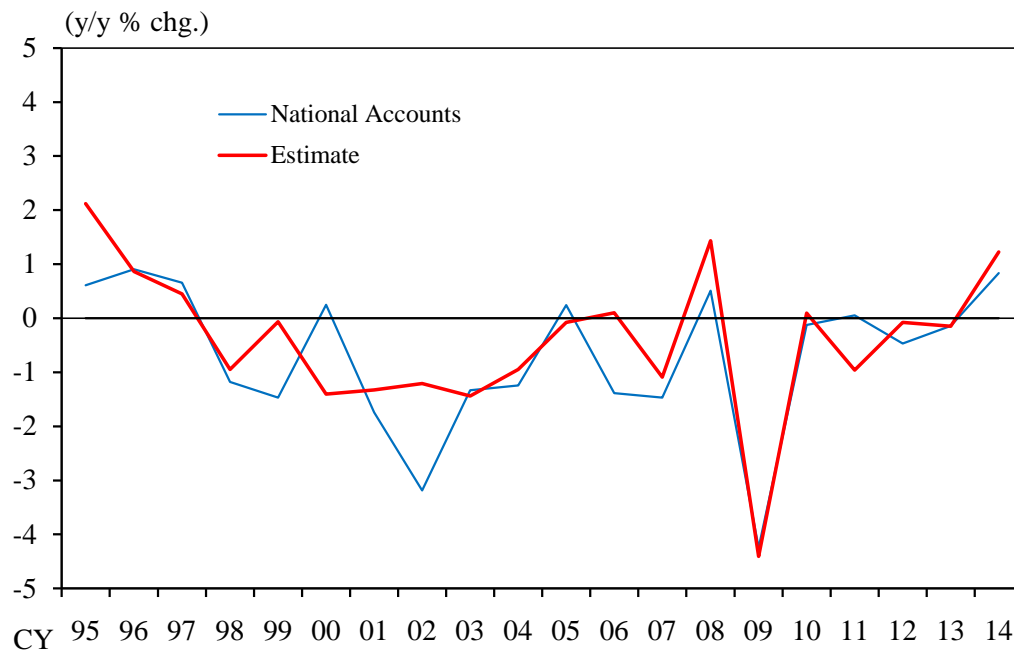
(2) Number of employees (monthly average)
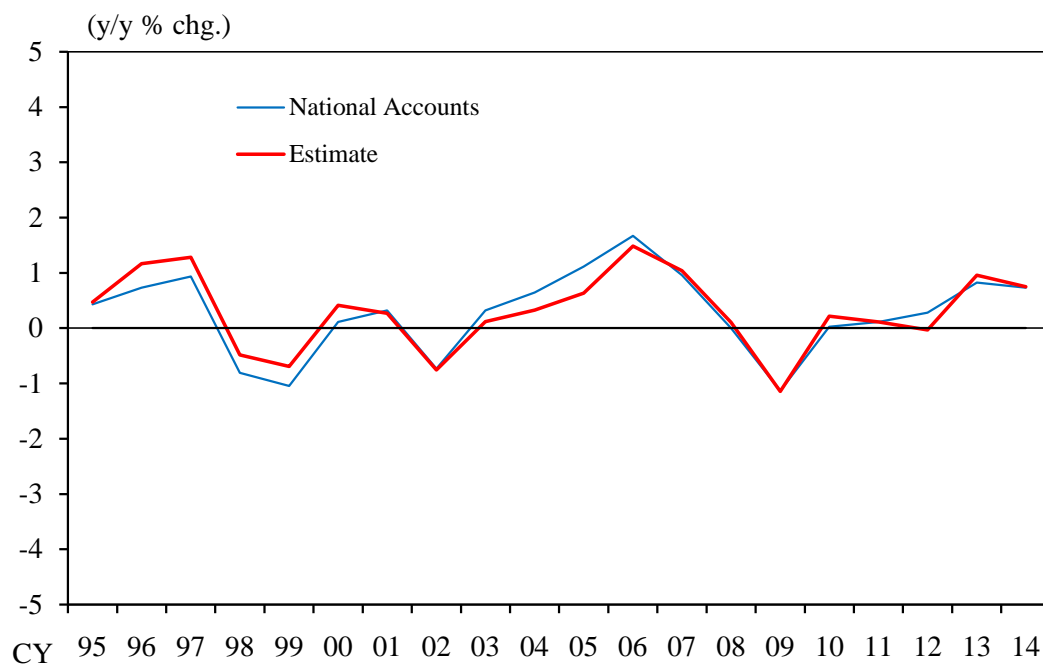
Figure 9: National Accounts Versus *Financial Statements of Corporations* (1)
(Non-Financial Corporations)

(1) Net operating surplus and operating profits
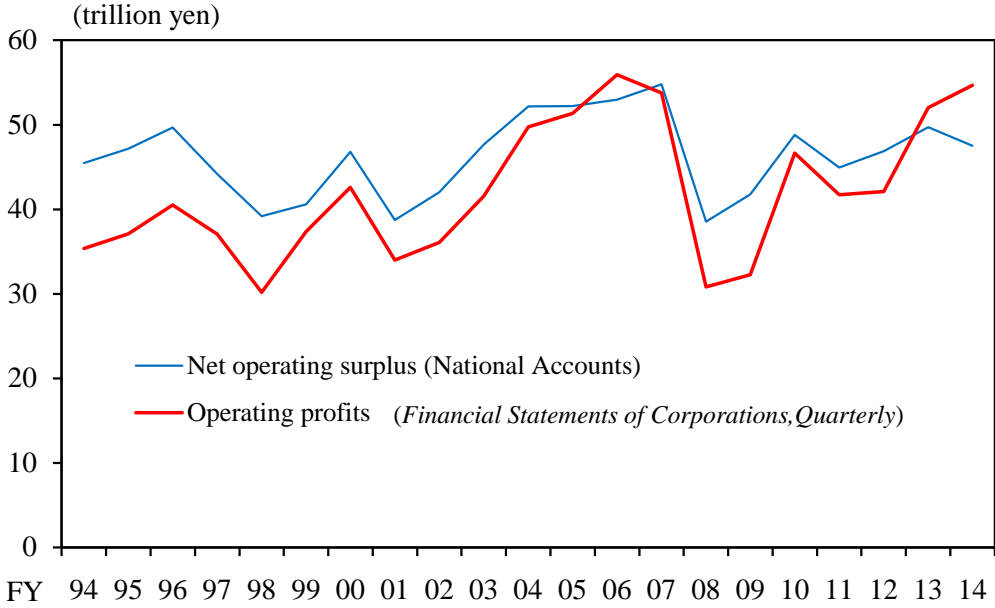
(2) Consumption of fixed capital and depreciation
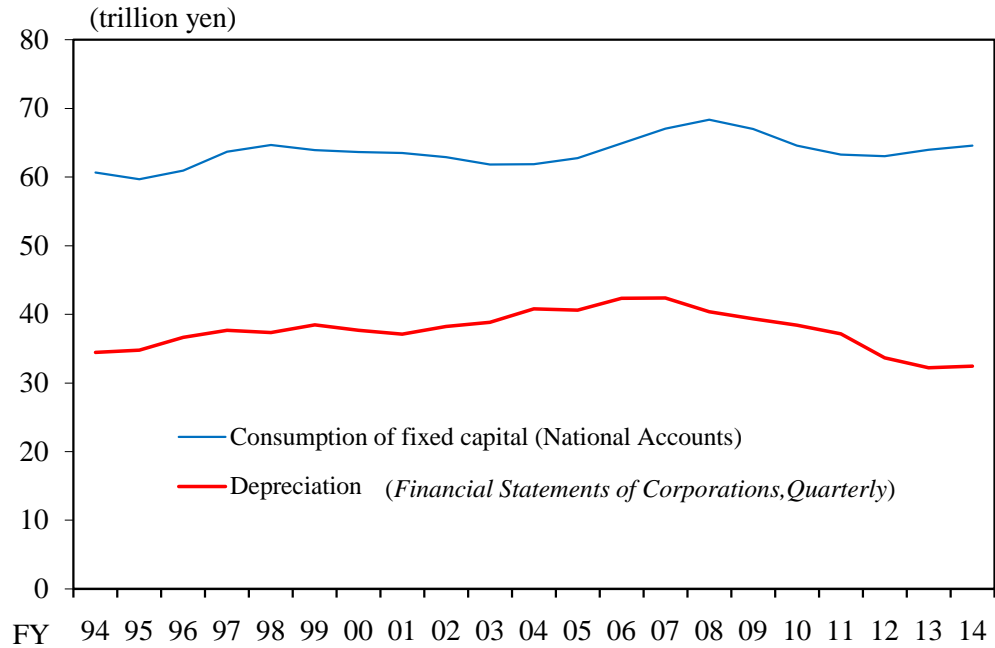
Sources: Cabinet Office; Ministry of Finance

Figure 10: National Accounts Versus *Financial Statements of Corporations* (2) (Non-Financial Corporations)

(1) Gross fixed capital formation and capital investment
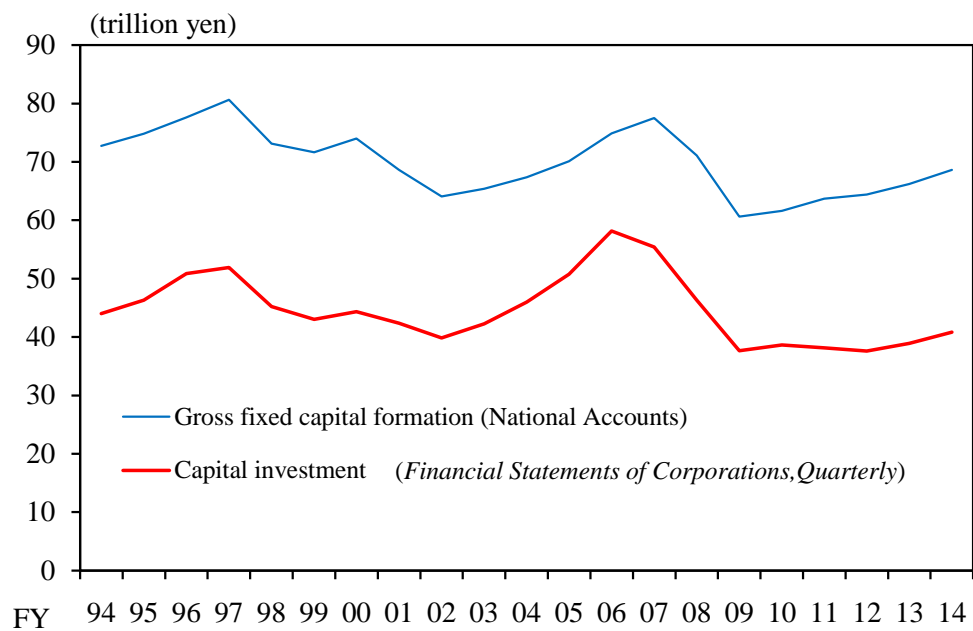
(2) Non-financial assets excluding land
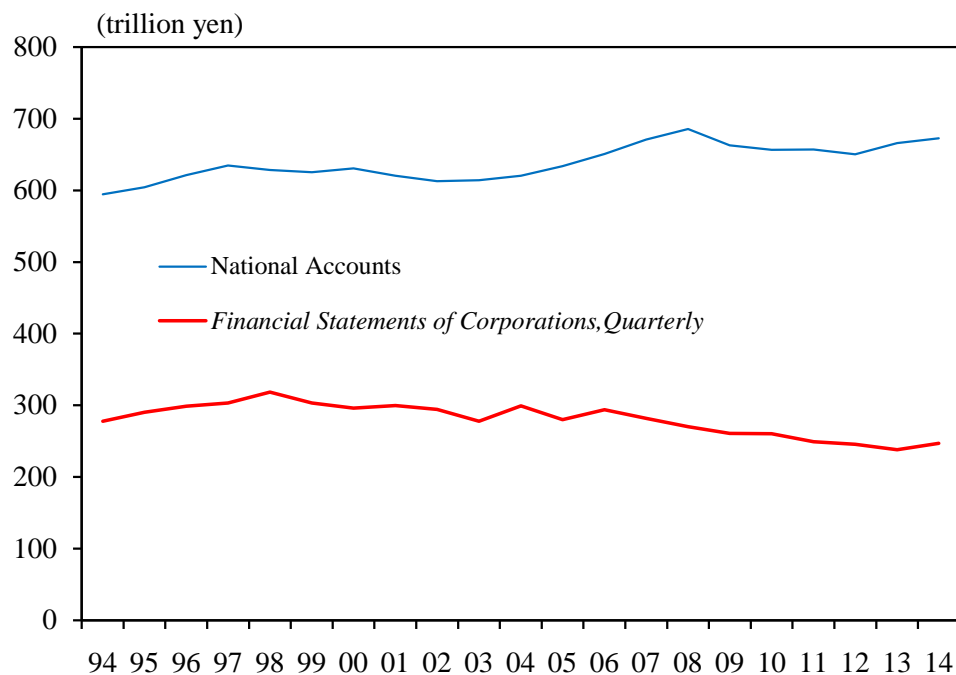
Sources: Cabinet Office; Ministry of Finance

Figure 11: Adjusted Net Operating Surplus and Operating Profits

(1) FISIM and valuation adjustment of inventories

(trillion yen)
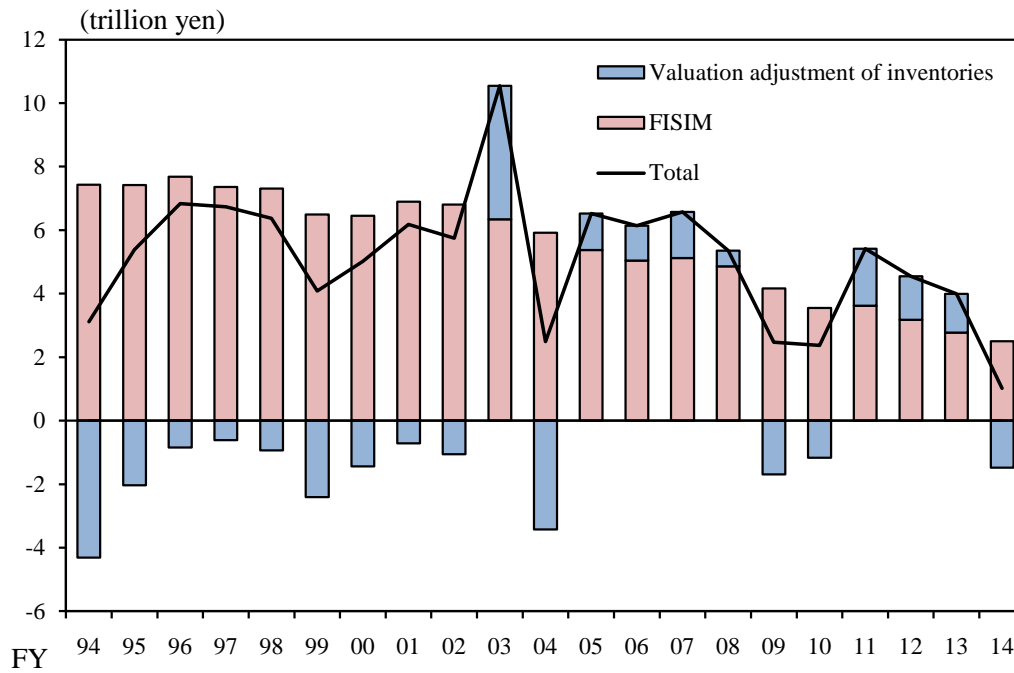
(2) Net operating surplus and operating profits

(trillion yen)
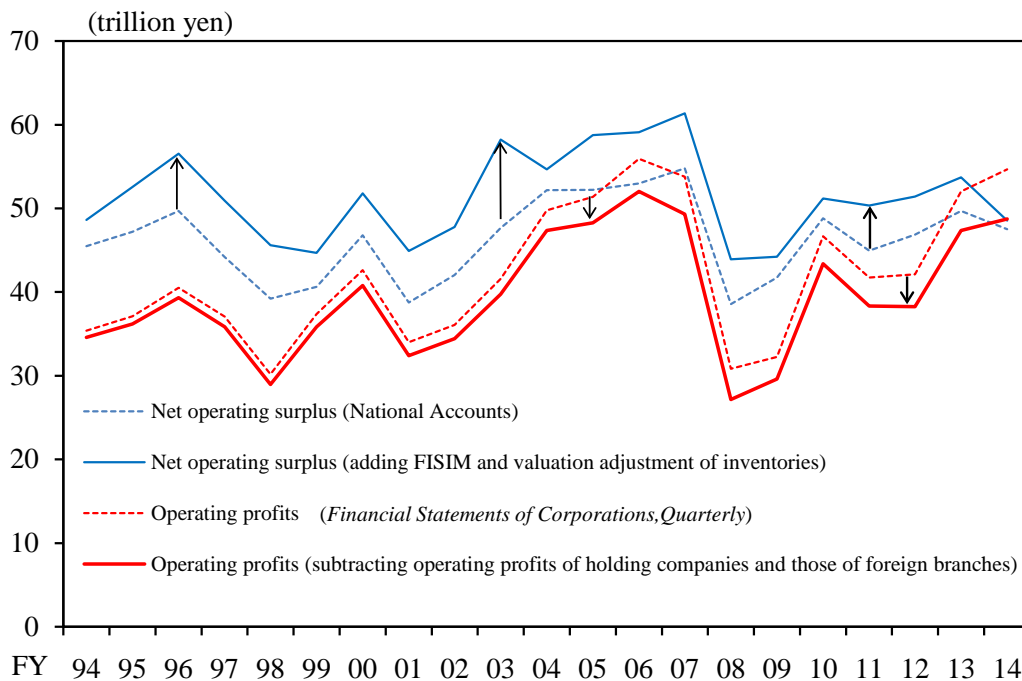
Figure 12: Estimated Gross and Net Operating Surplus

(1) Estimated gross operating surplus
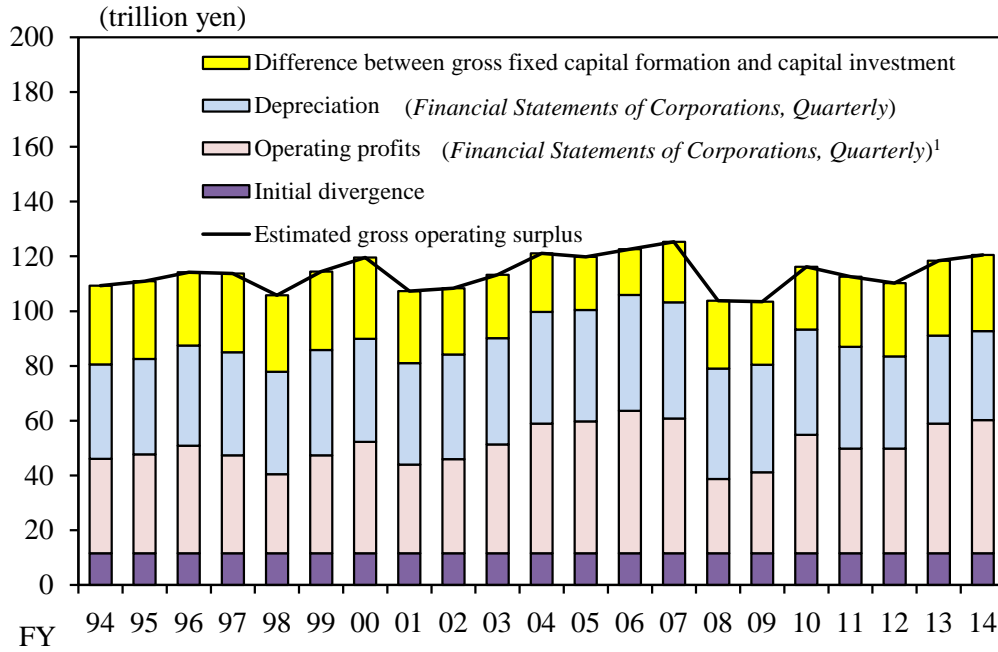
Note 1. Subtracting operating profits of holding companies and those of foreign branches.

(2) Estimated net operating surplus
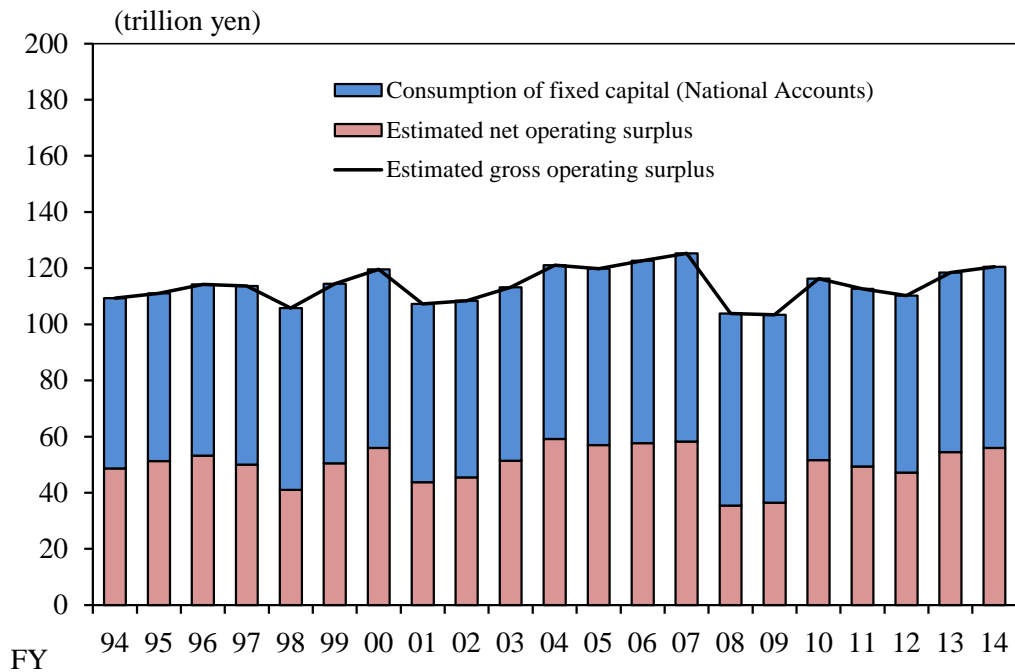
Figure 13: Estimated and Official Net Operating Surplus
(prior to corporate tax adjustment)

(trillion yen)

National Accounts A[1]

Estimate B [2]

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(trillion yen)   Difference

B-A

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
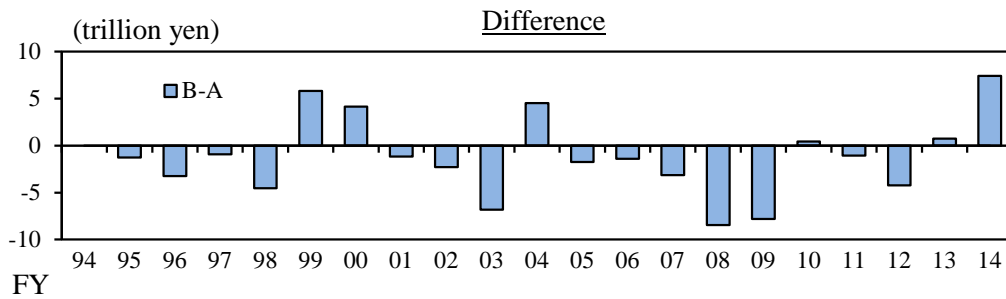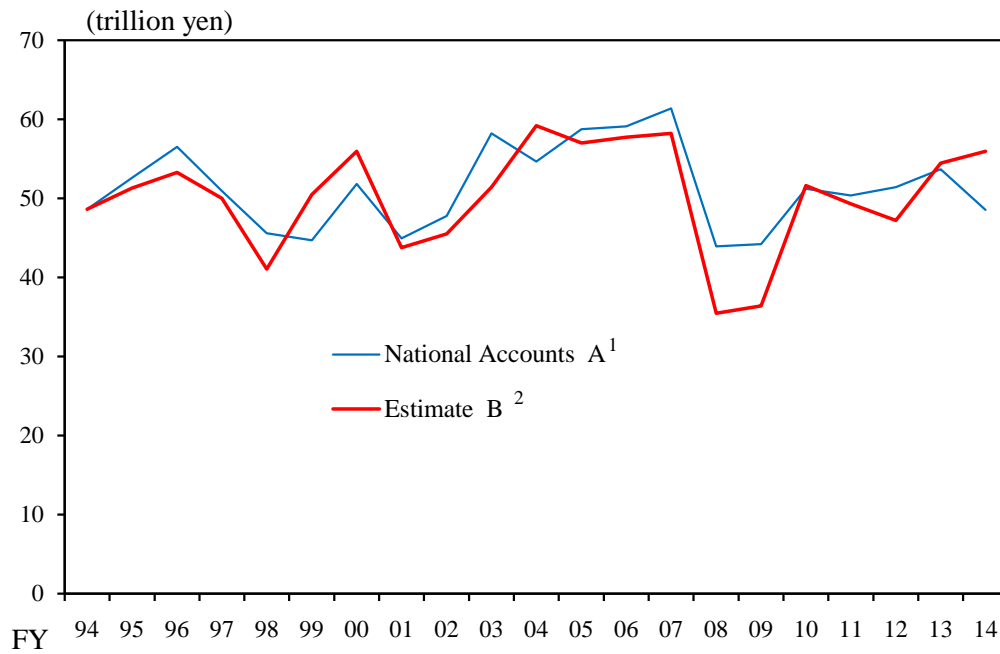
Notes 1. Adding FISIM and valuation adjustment of inventories to the National Accounts.
    2. Figures for estimate correspond to the net operating surplus in Figure 12(2).

Figure 14: Operating Profits and
Corporate, Inhabitant and Enterprise Tax

(1) Operating profits
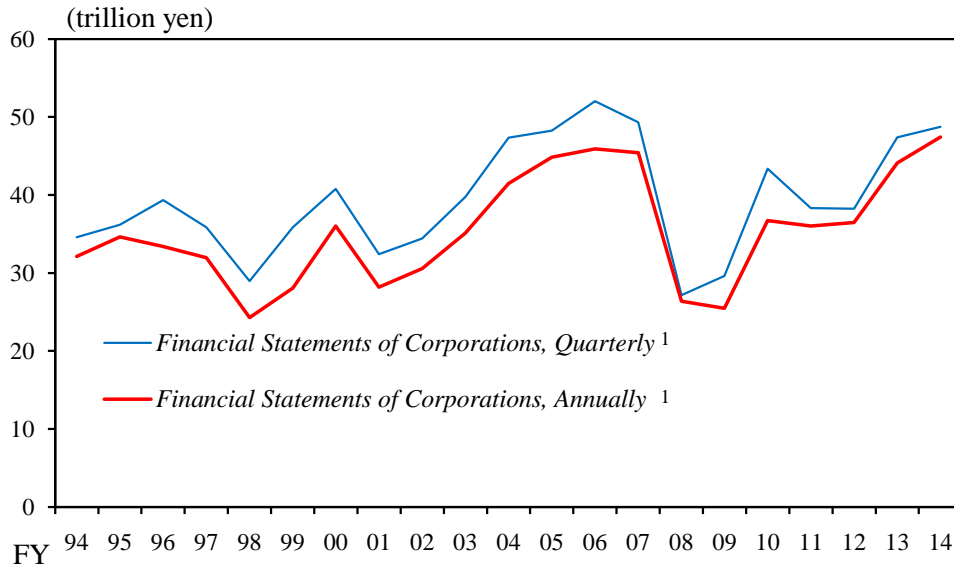
(trillion yen)

— Financial Statements of Corporations, Quarterly [1]

— Financial Statements of Corporations, Annually [1]

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

Note 1. Subtracting operating profits of holding companies and those of foreign branches.

(2) Corporate, inhabitant and enterprise tax

(trillion yen)

Excluding enterprise tax

[2]

Including enterprise tax

— Financial Statements of Corporations, Annually

— Actual corporation tax revenue excluding "finance and insurance"

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
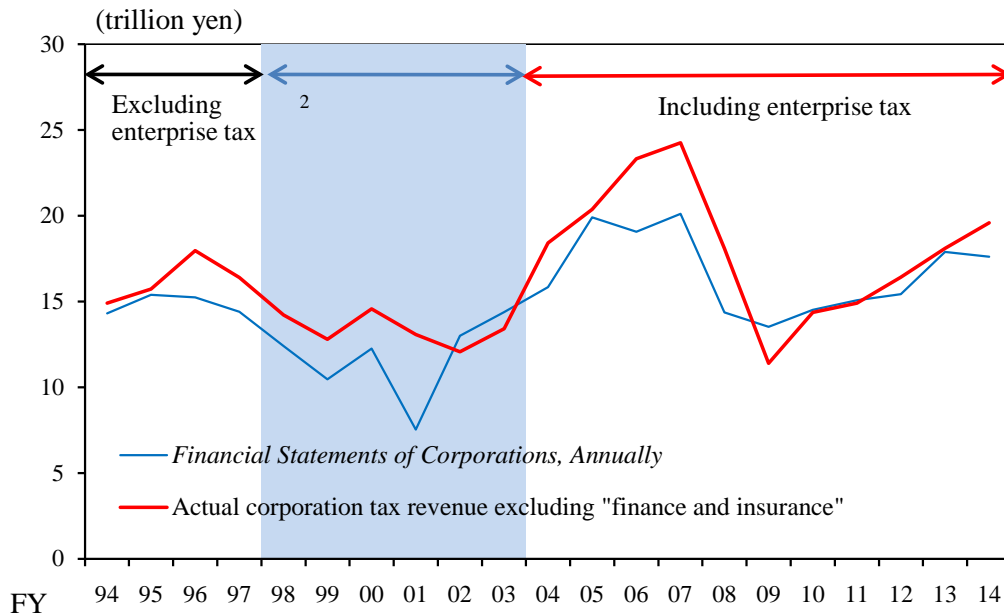
Note 2. Data are incompatible during the shaded period due to amendments to the accounting standards.

Figure 15: Estimated and Official Net Operating Surplus
(after corporate tax adjustment)

(1) Operating profits
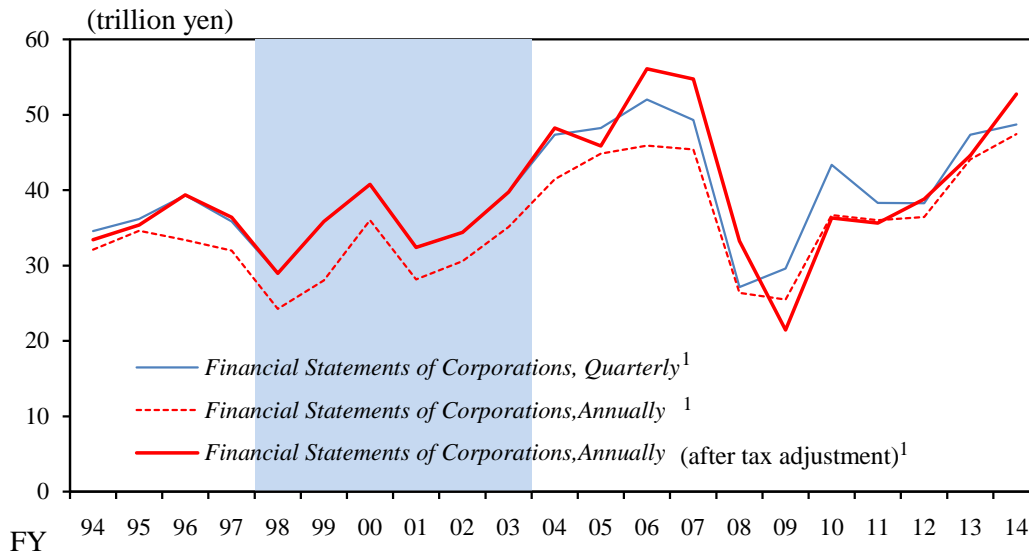
(trillion yen)

FY

Financial Statements of Corporations, Quarterly[1]

Financial Statements of Corporations,Annually [1]

Financial Statements of Corporations,Annually (after tax adjustment)[1]

Note 1. Subtracting operating profits of holding companies and those of foreign branches.
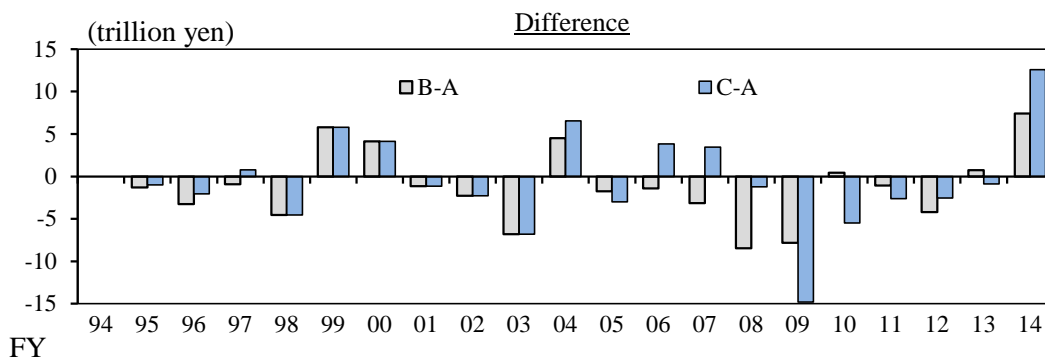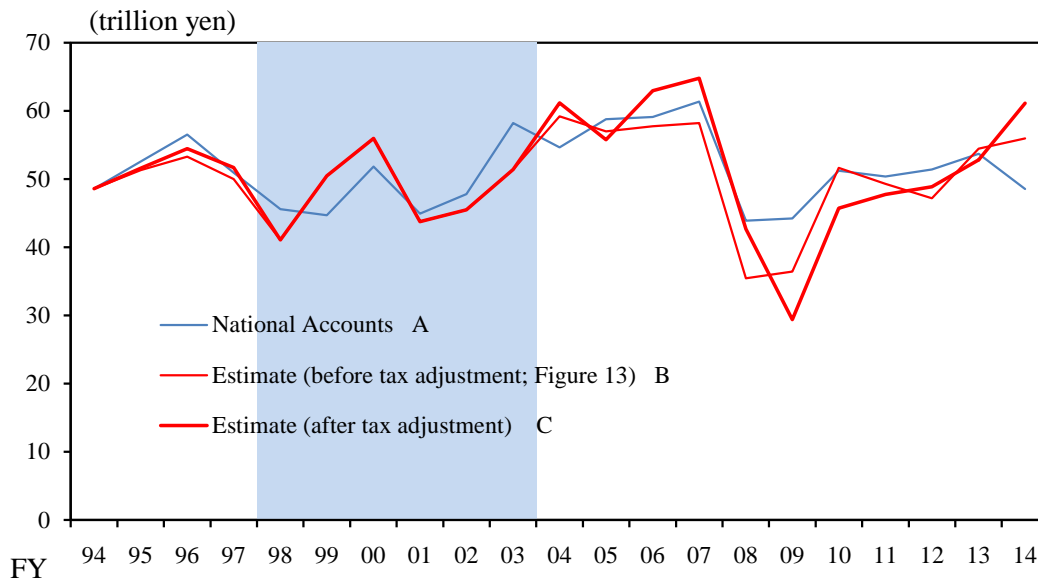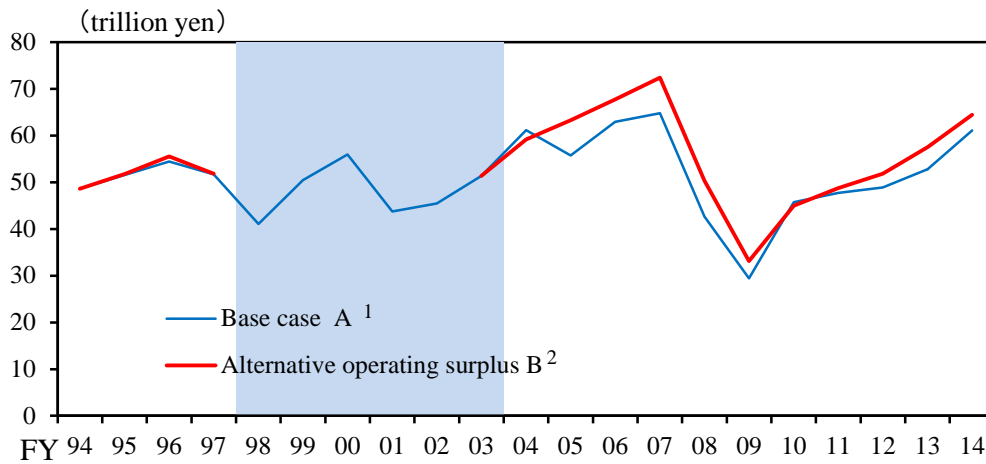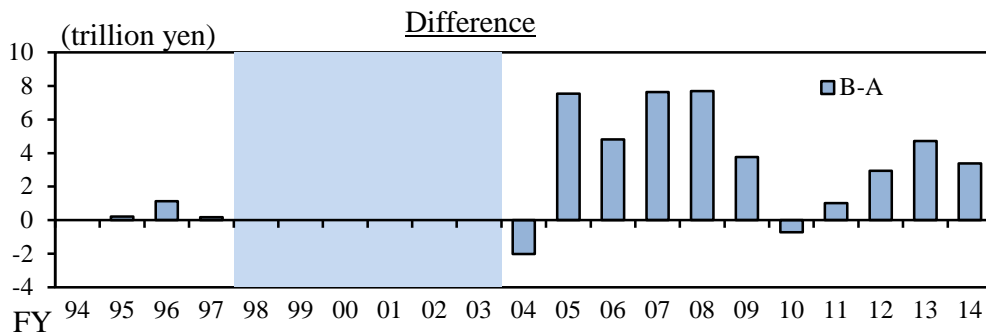
(2) Operating surplus

(trillion yen)

National Accounts　A

Estimate (before tax adjustment; Figure 13)　B

Estimate (after tax adjustment)　C

FY

Difference

(trillion yen)

□B-A　　　　□C-A

FY

Figure 16: Alternative Estimate of Operating Surplus

(1) Level

（trillion yen）

Notes 1. Figures for basic case correspond to tax adjusted net operating surplus in Figure 15(2).
      2. Alternative estimate uses year-on-year changes in the actual tax revenue instead of equation (3) in the text.

(trillion yen)

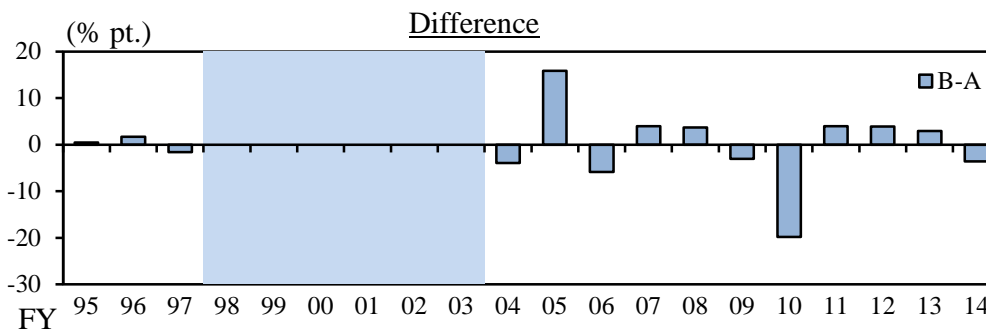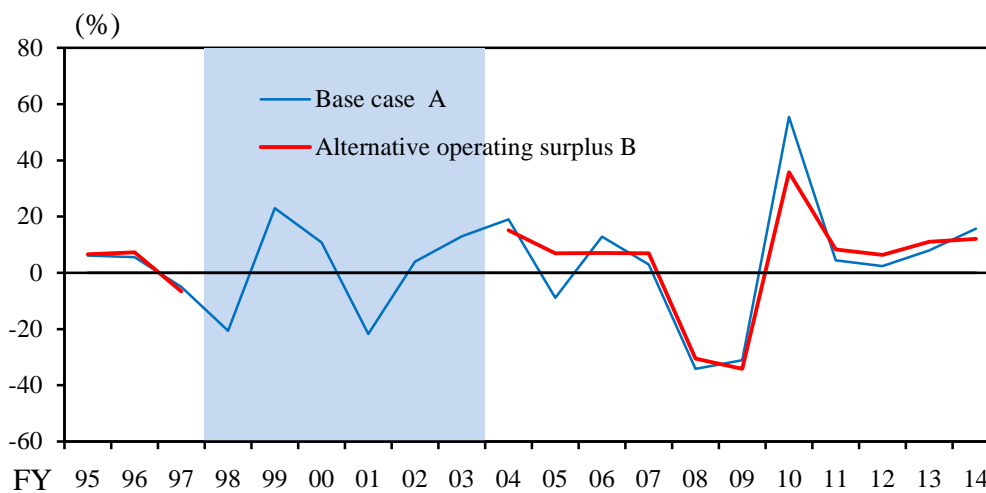Difference

(2) Year-on-year change

(%)

(% pt.)

Difference

Figure 17: Estimated and Official Mixed Income of Households

(trillion yen)

National Accounts

Self-assessment income taxation data (before adjustment)
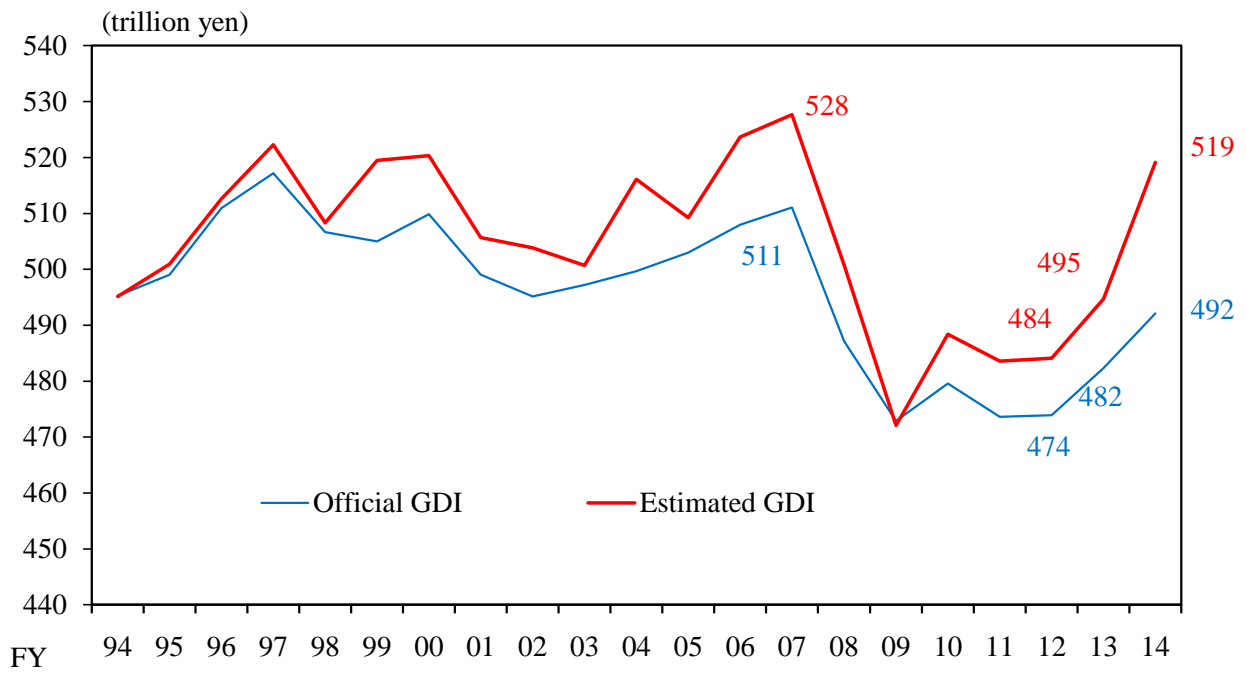
Self-assessment income taxation data (after adjustment)

CY
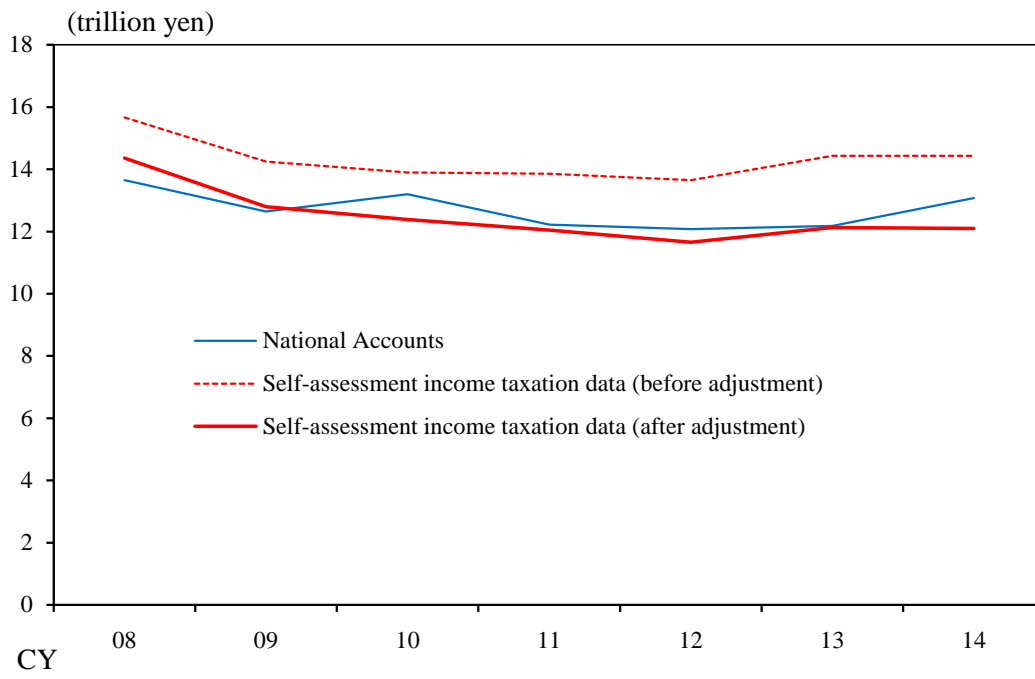
Figure 18: Estimated and Official GDI

(1) Level

(trillion yen)

Official GDI   Estimated GDI

FY   94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(2) Difference between estimated and official GDI

(trillion yen)

Operating surplus   Compensation of employees   Total

FY   94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
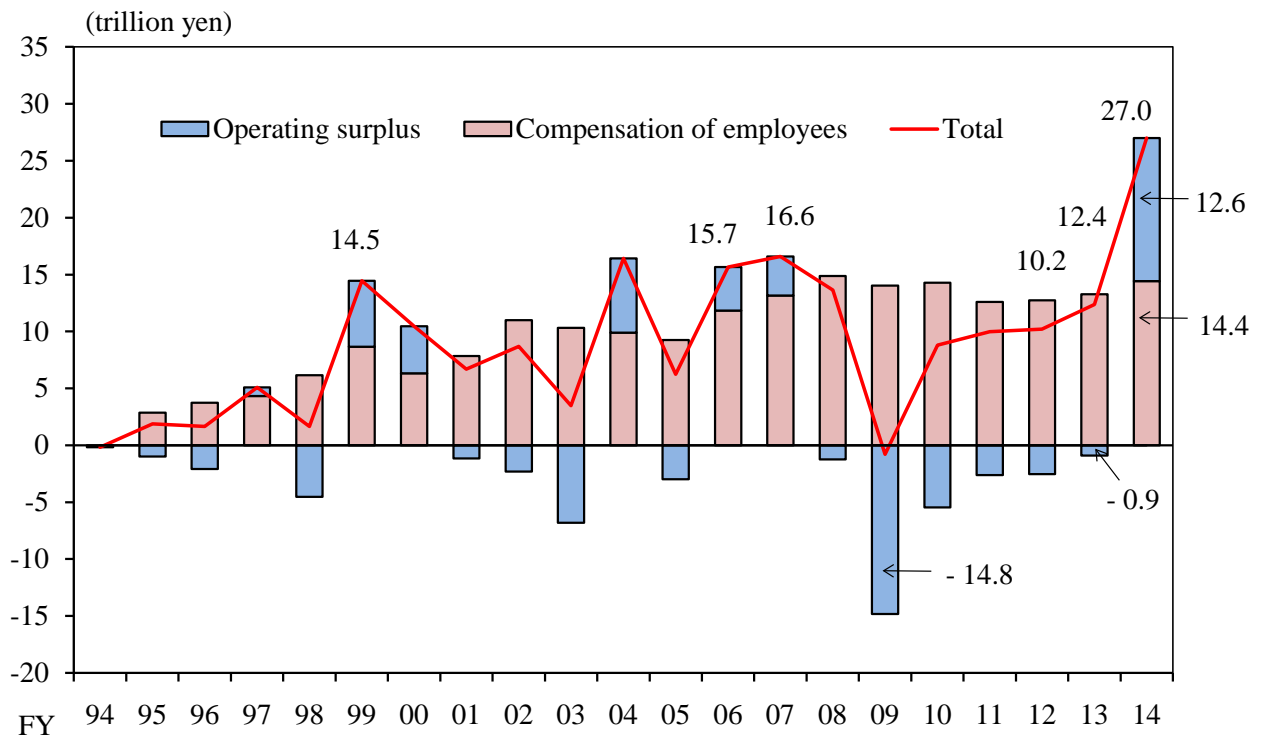
Figure 19: Estimated GDI and Official GDE

(1) Level

(trillion yen)

Official GDE   Estimated GDI

528

519

513

495

490

484

482

474

FY   94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
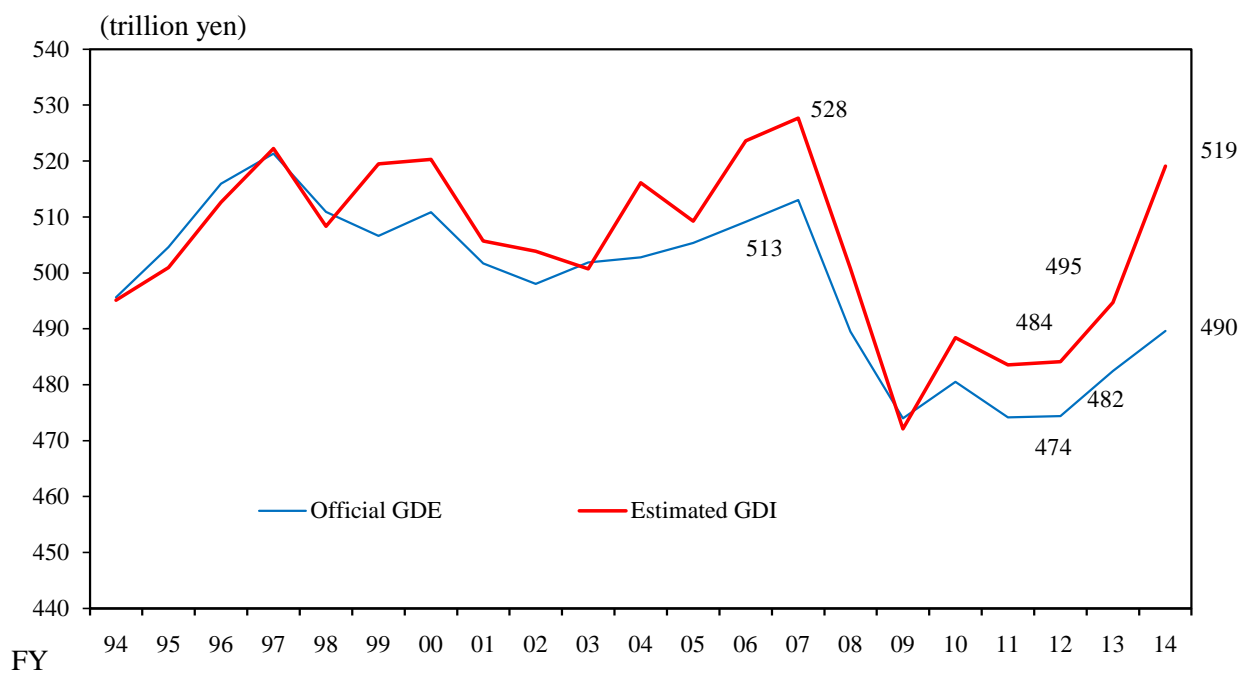
(2) Difference between estimated GDI and official GDE

(trillion yen)

Operating surplus   Compensation of employees

Statistical discrepancy   Total
(discrepancy between GDE and GDP)

29.5

12.9

14.5   14.6

12.3

9.7

12.6

14.4

2.5

- 0.9

- 14.8

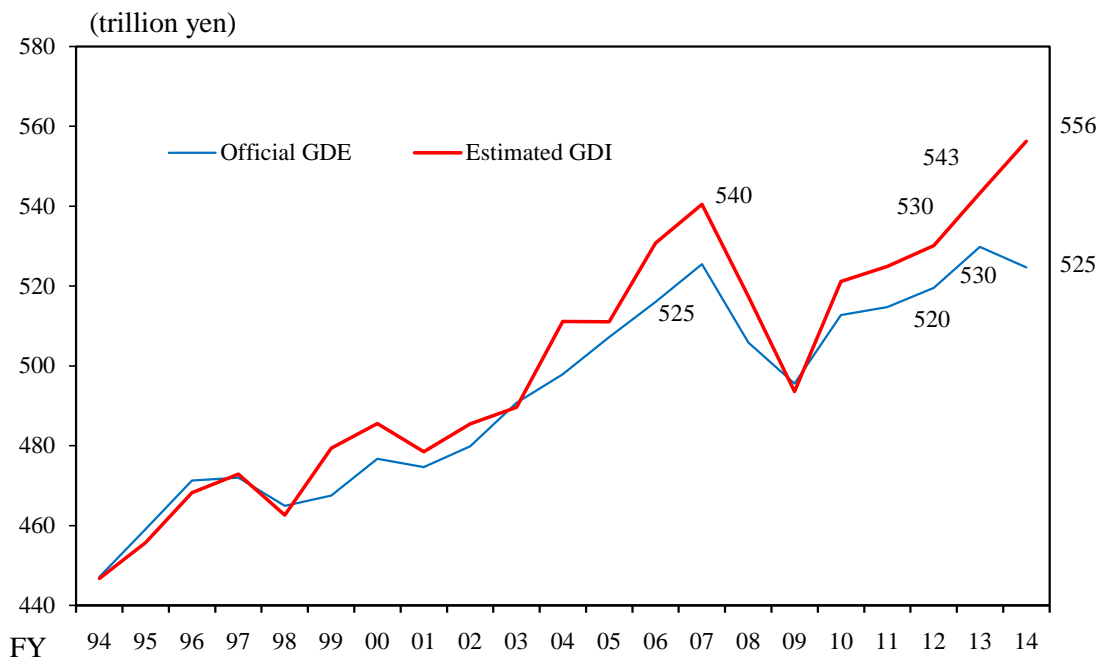FY   94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
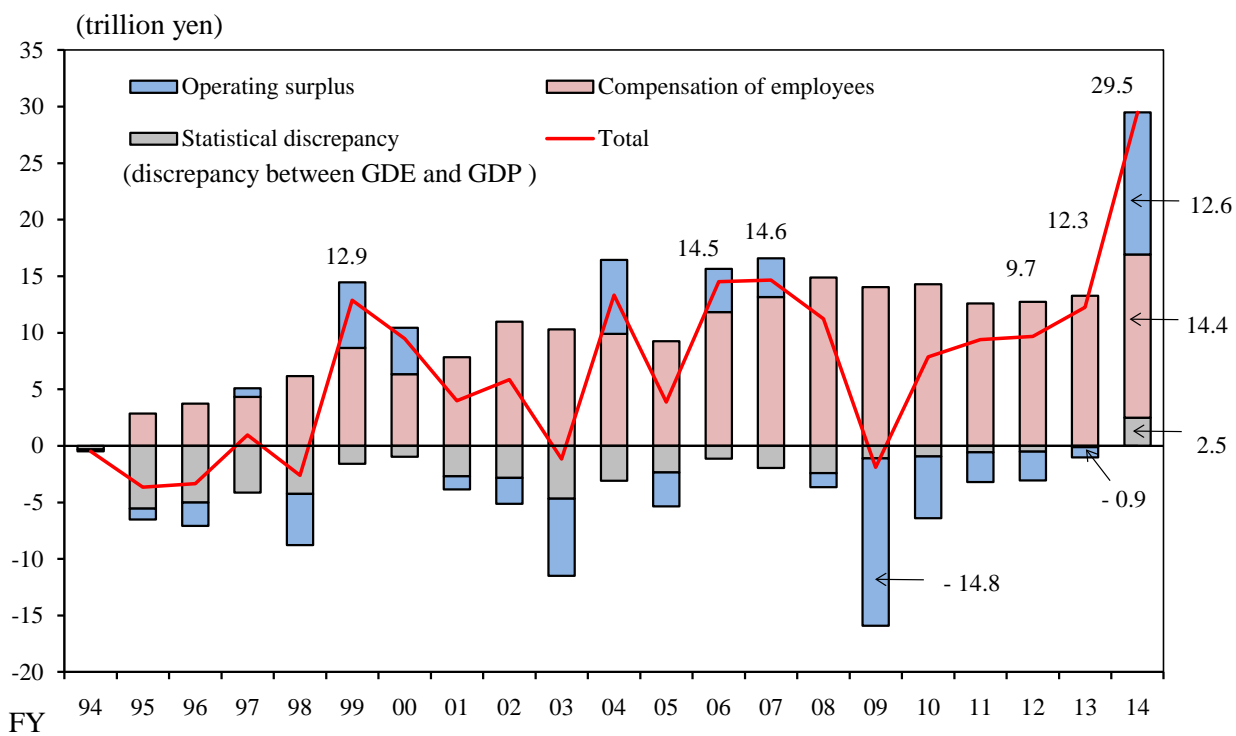
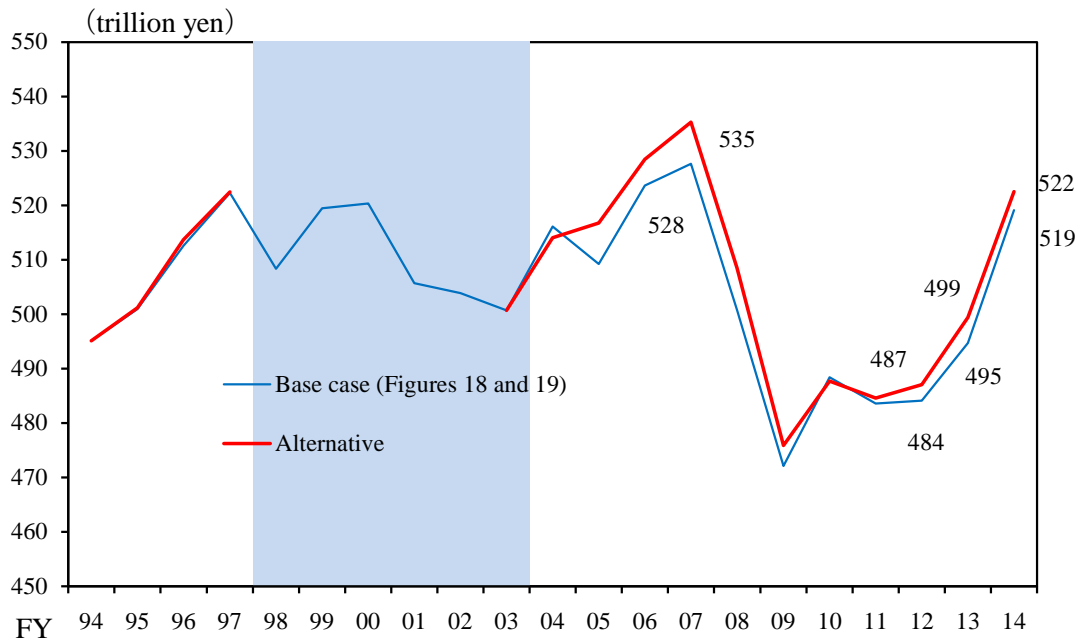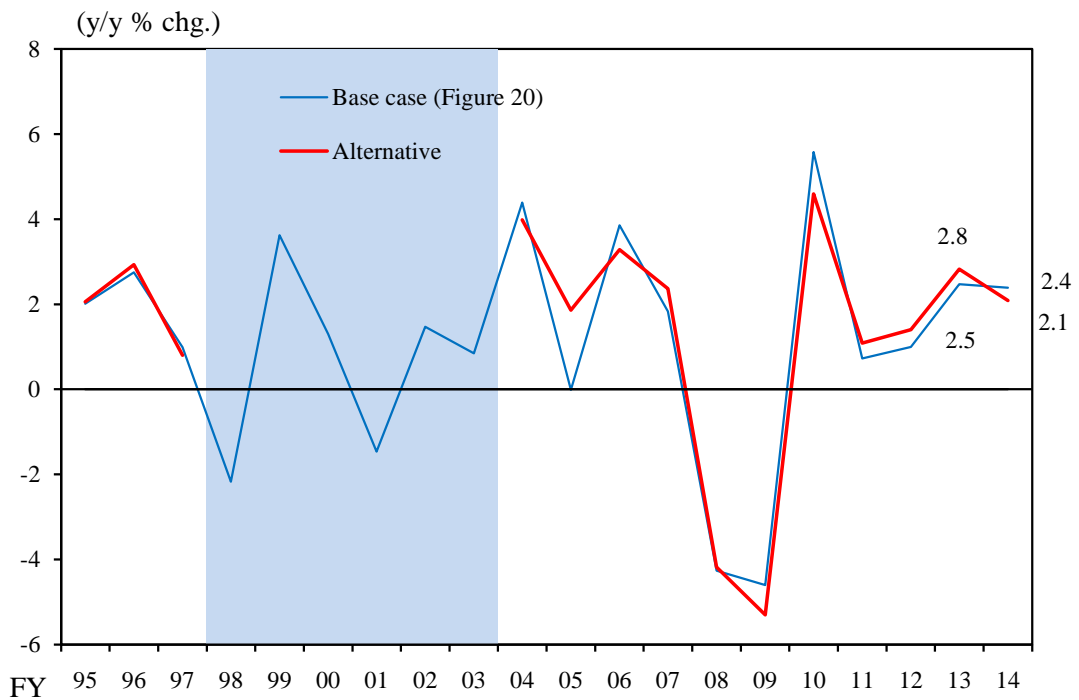# Figure 20: Estimated Real GDI and Official Real GDE

(1) Level

(trillion yen)

Official GDE ——— Estimated GDI ———

556

543

540

530

530

525

525

520

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(2) Growth rate

(y/y % chg.)

Official GDE ——— Estimated GDI ———

2.5

2.4

2.0

-1.0

FY 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
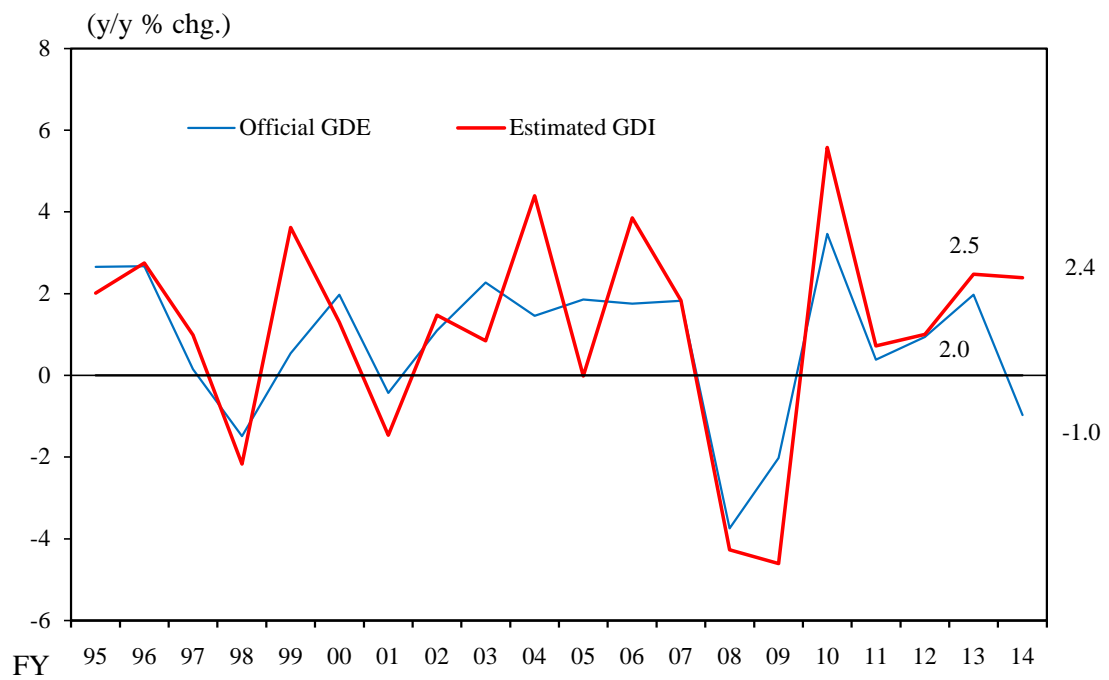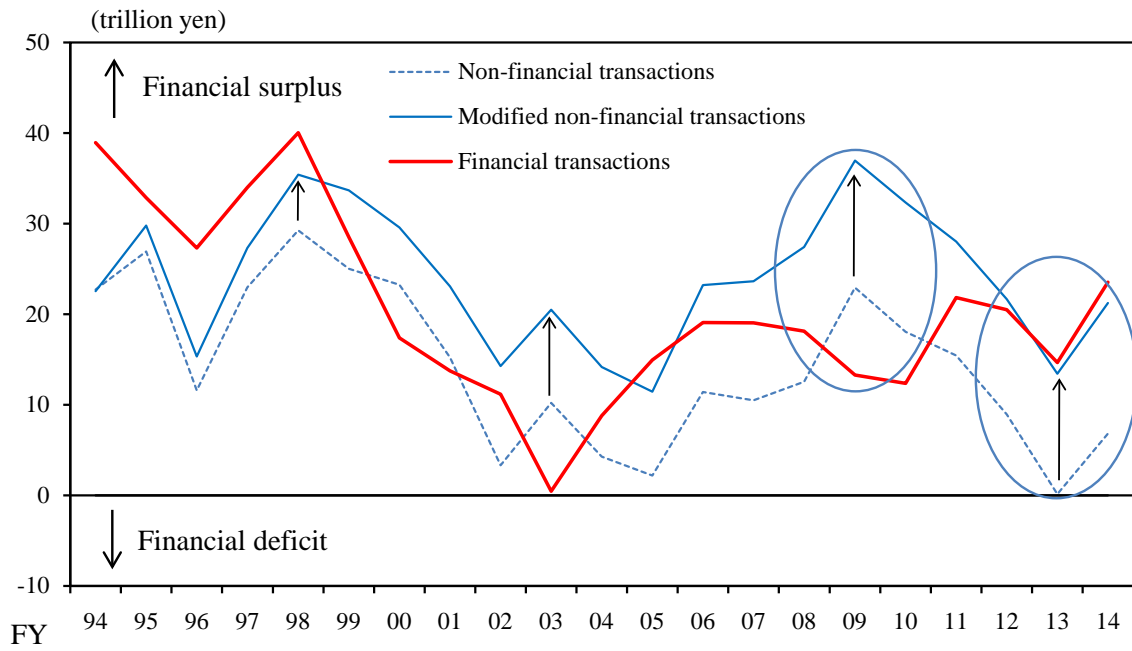
Figure 21 : Alternative Estimate of GDI

(1) Level (nominal)

（trillion yen）

- Base case (Figures 18 and 19)
- Alternative

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(2) Growth rate (real)

(y/y % chg.)

- Base case (Figure 20)
- Alternative

FY 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

Note ; Alternative estimate uses year-on-year changes in the actual tax revenue instead of equation (3) in the text.

Figure A1: Net Lending/Borrowing

(1) Net lending/borrowing for households

(trillion yen)

Financial surplus

Financial deficit

- Non-financial transactions
- Modified non-financial transactions
- Financial transactions

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(2) Net lending/borrowing for corporations (including financial corporations)

(trillion yen)

Financial surplus

Financial deficit

- Non-financial transactions
- Modified non-financial transactions
- Financial transactions

FY 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
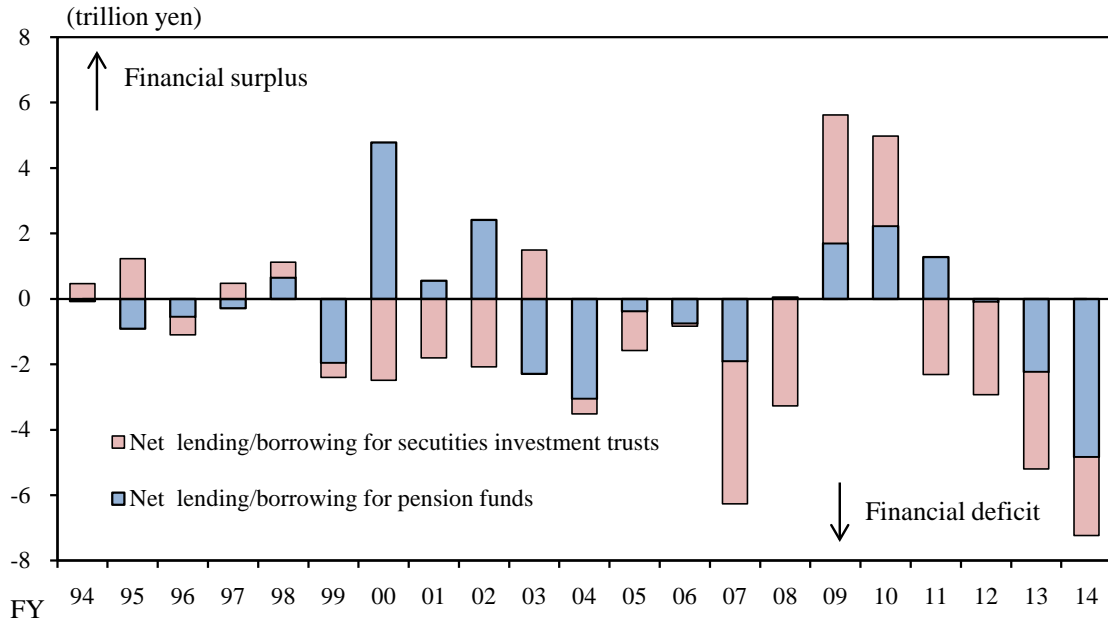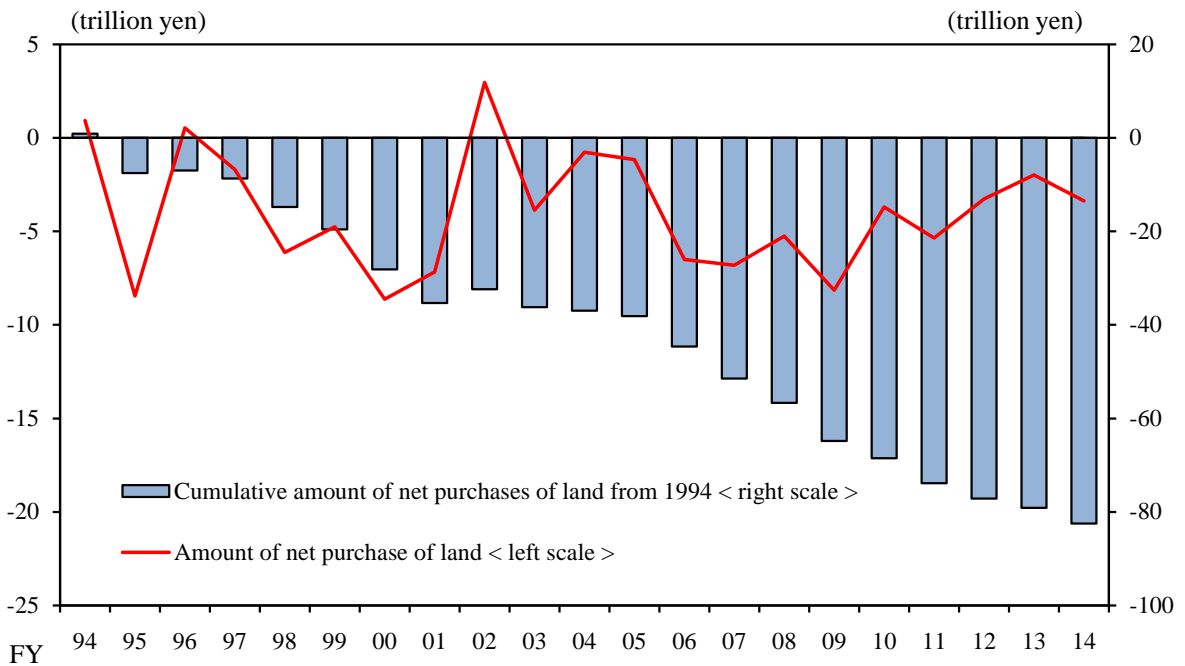
Figure A2: Net Lending/Borrowing for Securities Investment Trusts and Pension Funds and Net Purchases of Land by Households

(1) Net lending/borrowing of securities investment trusts and pension funds
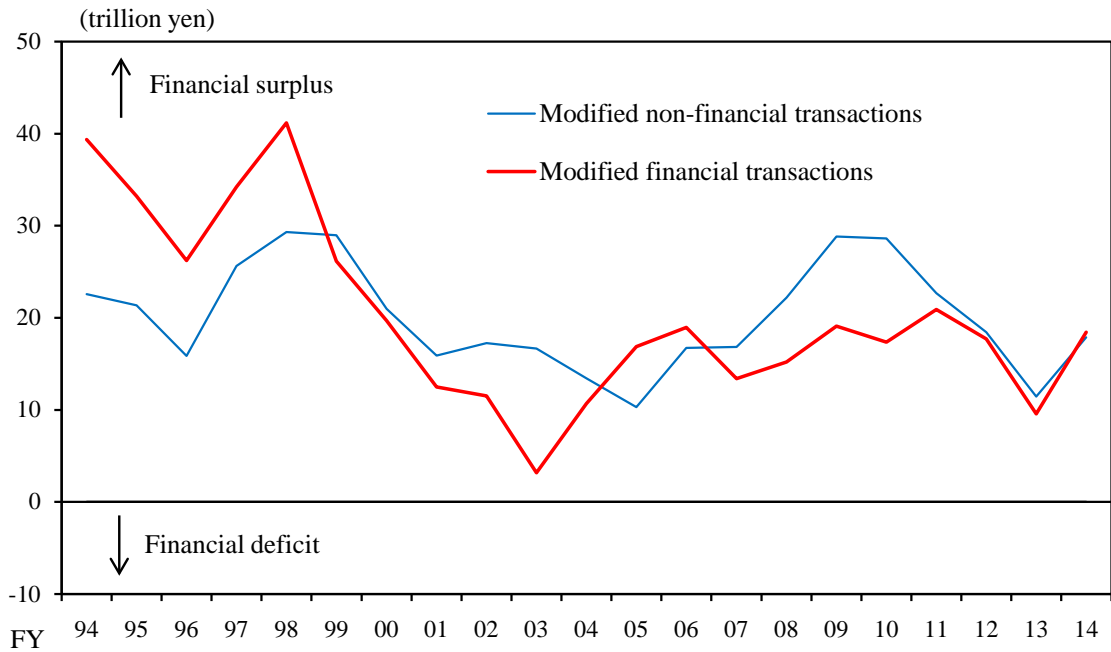

(2) Net purchases of land by households

Source: Cabinet Office.

Figure A3 : Net Lending/Borrowing
(additional adjustments)

(1) Net lending/borrowing for Households

(2) Net lending/borrowing for corporations (including financial corporations)