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Abstract

Since the global financial crisis of 2008-2009, public debt in advanced economies has increased substantially. In all 22 OECD countries that have public debt, the excess liabilities (i.e. negative financial net worth) of the non-financial corporations are less than the excess financial assets (i.e. positive financial net worth) of the households. In these countries, non-financial corporations are reluctant to invest so that the private sector in total has excess financial assets. They are investing surplus funds abroad but the government has no choice but to absorb the remaining surplus. That means, in the national accounting perspective, the real problem is not the public debt itself but the dearth of investment and the saving glut in the private sector; it is apparent that the public sector alone cannot solve the problem.

JEL: C82, E01, H62

Keywords: National Balance Sheet, Financial Net Worth, Saving-Investment Imbalance

1. Introduction

Since the global financial crisis of 2008-2009, public debt in advanced economies has increased substantially. High levels of debt in mature economies are a relatively new global concern, after decades of attention on debt levels in developing and emerging markets. Four Eurozone countries, Cyprus, Greece, Ireland, and Portugal, have turned to IMF and other European governments for financial assistance in order to avoid defaulting on their loans. There are also concerns about the sustainability of public debt in Japan and the US, and more recently, also in the major European countries. To date, many advanced-economy governments have embarked on fiscal austerity programs, such as cutting spending and/or increasing taxes, to address historically high levels of debt¹.

According to the *IMF World Economic Outlook*, at the end of 2013, Japan is estimated to have the highest ratio of gross general government debt relative to GDP, at 224% of GDP. The second highest was Greece, at 186% of GDP. Estonia had the lowest level, at only 13% of GDP. The US ranked seventh among advanced economies, just after Belgium and before Spain, with an estimated gross general government debt of 104% of GDP. A government may lower high levels of public debt through austerity or fiscal consolidation, which generally refers to policies that reduce the government budget deficit. These include tax increases, spending cuts, or some combination of the two. Some argue that austerity programs are effective at reducing the debt by directly targeting the cause of high debt levels: government spending that is too high or tax revenue that is too low.

Fisher and Easterly (1990) was one of the first authors who approached the public debt problem from the macroeconomic perspective. They clarified the logical relationship

¹ See Nelson (2013) for the overview.

between the public debt and the net external debt using macroeconomic identities. Ruggles and Ruggles (1992) and Ruggles (1993) were the pioneers of the empirical study in this field; they pointed out that the public debt problem was best approached from the viewpoint of private-sector saving-investment imbalances. According to their study, in the perspective of national accounting, the real problem is the dearth of investment and the saving glut in the private sector; it is apparent that the public sector alone cannot solve the problem. Bernanke (2005) argues that one source of the saving glut is the strong saving motive of rich countries with aging populations, which must make provision for a impending sharp increase in the number of retirees relative to the number of workers. With slowly growing or declining workforces, as well as high capital-labor ratios, many advanced economies also face an apparent dearth of domestic investment opportunities.

In the system of national accounts, the public debt is primarily recorded in the balance sheet of the general government. A balance sheet is a statement, drawn up at a particular point in time, of assets owned and of liabilities outstanding. Although not all the countries have balance sheet in their system of national accounts, almost all the OECD countries submit so called financial balance sheets to the publication known as *National Accounts of OECD Countries*. The financial balance sheet of an institutional sector or the rest of the world (ROW) include only financial assets and liabilities. The balancing item of the financial balance sheet is referred to as financial net worth, which is obtainable by subtracting the total liabilities from the total financial assets of the sector. If the financial net worth is positive, the sector is a net creditor; if it is negative, the sector is a net debtor; the sum of financial net worth across sectors including ROW is zero in the framework of the current SNA. Therefore, the distribution of financial net worth among the sectors will give us new perspective to the public debt problem.

2. The Data

In SNA 2008, net lending or net borrowing, the balancing item of the capital account, is defined as the difference between changes in net worth due to saving and capital transfers and net acquisitions of non-financial assets. If the amount is positive, it is referred to as net lending; if negative, it is referred to as net borrowing (§10.28). The balancing item of the financial account is again net lending or net borrowing, however, it is customarily referred to as net financial transaction to distinguish it from the former. In principle, net lending or net borrowing is measured identically in both the capital and financial accounts. In practice, achieving this identity is one of the most difficult tasks in compiling national accounts (§2.113). According to the data published in *National Accounts of OECD Countries*, in some countries, net lending or net borrowing and net financial transactions are measured identically, but in other countries, they are measured differently. Moreover, in some countries, the macroeconomic total (i.e. total economy plus rest of the world) of net lending or net borrowing and/or net financial transactions is zero, but in other countries the macroeconomic total is non-zero. We will investigate into the problem from the viewpoint of double entry, quadruple entry and the balance sheet.

Let us suppose that the balance sheet consists of only three items: financial assets (F), liabilities (L) and non-financial assets (N). The assets are recorded on the left-hand side while the liabilities are listed on the right hand side of the T-shaped balance sheet. We define net worth (W) and financial net worth (V) as follows:

$$(1) \quad W \equiv F + N - L \quad ;$$

$$(2) \quad V \equiv F - L \quad .$$

We further define, any factor that results in either increase or decrease of net worth as resources (R) and uses (U) respectively. We define an economic event as an event that

accompanies changes in any of the balance sheets of the institutional units. There are eight factors of changes in the balance sheet: δF^+ , δF^- , δL^+ , δL^- , δN^+ , δN^- , δR and δU , which are supposed to be positive. The superscripts $+$ and $-$ indicate the increasing and decreasing factor of each asset or liability; that means each economic event is described as a combination of any of the above eight factors. The economic events are supposedly recorded in a journal — an imaginative account — of each institutional unit in the order of occurrence. The uses, the increase in assets, and the decrease in liabilities are recorded on the left-hand side; and the resources, the decrease in assets, and the increase in liabilities are entered on the right-hand side of the journal respectively. The left-hand side of the journal is usually referred to as debit while the right-hand side is as credit. Economic events are broadly classified into seven categories as listed in Table 1; since six among the seven categories are economic transactions between two institutional units, the units can take either role in such a transaction.

Double entry system is an accounting practice to record each economic event as a pair of debit and credit at the same amount in the journal of an institutional unit. As we mentioned above, some economic events involve two participants; we will refer such an event as a bilateral economic event or economic transaction. Other economic events, namely disposal (i.e. scrapping) of non-financial assets are unilateral events; in the current SNA, consumption of fixed capital belongs to this category. In a bilateral event, there are two participants so that the event must be recorded in the journal of both participants. The aforementioned double entry in the journal of an institutional unit is specifically referred to as vertical double entry in national accounting while the simultaneous entries at the same amount in the two participants' journal is referred to as horizontal double entry; that makes quadruple entry system.

Let us suppose a national accounting system that consists of four accounts: income and outlay account, capital account, financial account and the balance sheet. The economic event categories listed in Table 1 are recorded in either of the first three accounts. Resources and uses are entered in the income and outlay accounts; the changes in non-financial assets are recorded in the capital accounts while that of financial assets and liabilities are listed in the financial accounts. Net lending or net borrowing (NLB) and net financial transactions (NFT) are written in the following manner using the above defined variables. Let the variables with Δ be the total amount of the variables with δ that has taken place during an accounting period; R and U are not stock variables so that we omit the symbol.

$$(3) \quad NLB \equiv (R - U) - (\Delta N^+ - \Delta N^-) ;$$

$$(4) \quad NFT \equiv (\Delta F^+ - \Delta F^-) - (\Delta L^+ - \Delta L^-) .$$

According to Table 1, the above equations could be decomposed as follows; for the first institutional unit 'a':

$$(5) \quad NLB^a = (R_{1*}^a + R_{2*}^a + R_{3*}^a + R_{6*}^a) - (U_1^a + U_7^a) \\ - (\Delta N_2^{a+} + \Delta N_3^{a+} - \Delta N_{3*}^{a-} - \Delta N_7^{a-}) \\ = (R_{1*}^a + R_{2*}^a + R_{3*}^a + R_{6*}^a) - U_1^a - (\Delta N_2^{a+} + \Delta N_3^{a+} - \Delta N_{3*}^{a-}) ;$$

$$(6) \quad NFT^a = (\Delta F_{1*}^{a+} + \Delta F_{2*}^{a+} + \Delta F_{3*}^{a+} + \Delta F_4^{a+} + \Delta F_{4*}^{a+} + \Delta F_{5*}^{a+} + \Delta F_6^{a+} + \Delta F_{6*}^{a+} \\ - \Delta F_1^{a-} - \Delta F_2^{a-} - \Delta F_3^{a-} - \Delta F_4^{a-} - \Delta F_5^{a-} - \Delta F_{5*}^{a-} - \Delta F_6^{a-} - \Delta F_{6*}^{a-}) \\ - (\Delta L_{4*}^{a+} - \Delta L_5^{a-}) \\ = \Delta F_{1*}^{a+} + \Delta F_{2*}^{a+} + \Delta F_{3*}^{a+} + \Delta F_{6*}^{a+} - \Delta F_1^{a-} - \Delta F_2^{a-} - \Delta F_3^{a-} - \Delta F_{6*}^{a-} .$$

Note that the above rewriting of the equations was possible because of the vertical double entry rule. From equations (5) and (6), and the double entry accounting rule, the net lending or net borrowing is equivalent to the net financial transaction:

$$\begin{aligned}
 (7) \quad NLB^a - NFT^a &= (-U_1^a + \Delta F_1^{a-}) + (R_{1*}^a - \Delta F_{1*}^{a+}) + (-\Delta N_2^{a+} + \Delta F_2^{a-}) \\
 &\quad + (R_{2*}^a - \Delta F_{2*}^{a+}) + (-\Delta N_3^{a+} + \Delta F_3^{a-}) + (R_{3*}^a + \Delta N_{3*}^{a-} - \Delta F_{3*}^{a+}) \\
 &\quad + (R_{6*}^a - \Delta F_{6*}^{a+} + \Delta F_{6*}^{a-}) \\
 &= 0 .
 \end{aligned}$$

Likewise, for the second institutional unit ‘b’, which is the transaction partner of ‘a’:

$$\begin{aligned}
 (8) \quad NLB^b &= (R_1^b + R_2^b + R_3^b + R_6^b) - (U_{1*}^b + U_{7*}^b) \\
 &\quad - (\Delta N_{2*}^{b+} + \Delta N_{3*}^{b+} - \Delta N_3^{b-} - \Delta N_{7*}^{b-}) \\
 &= (R_1^b + R_2^b + R_3^b + R_6^b) - U_{1*}^b - (\Delta N_{2*}^{b+} + \Delta N_{3*}^{b+} - \Delta N_3^{b-}) ; \\
 (9) \quad NFT^b &= (\Delta F_1^{b+} + \Delta F_2^{b+} + \Delta F_3^{b+} + \Delta F_4^{b+} + \Delta F_{4*}^{b+} + \Delta F_5^{b+} + \Delta F_6^{b+} + \Delta F_{6*}^{b+} \\
 &\quad - \Delta F_{1*}^{b-} - \Delta F_{2*}^{b-} - \Delta F_{3*}^{b-} - \Delta F_{4*}^{b-} - \Delta F_5^{b-} - \Delta F_{5*}^{b-} - \Delta F_6^{b-} - \Delta F_{6*}^{b-}) \\
 &\quad - (\Delta L_4^{b+} - \Delta L_{5*}^{b-}) \\
 &= \Delta F_1^{b+} + \Delta F_2^{b+} + \Delta F_3^{b+} + \Delta F_6^{b+} - \Delta F_{1*}^{b-} - \Delta F_{2*}^{b-} - \Delta F_{3*}^{b-} - \Delta F_6^{b-} .
 \end{aligned}$$

From equations (8) and (9), and the double entry accounting rule, the net lending or net borrowing is equivalent to the net financial transaction:

$$\begin{aligned}
 (10) \quad NLB^b - NFT^b &= (R_1^b - \Delta F_1^{b+}) + (-U_{1*}^b + \Delta F_{1*}^{b-}) + (R_2^b - \Delta F_2^{b+}) \\
 &\quad + (-\Delta N_{2*}^{b+} + \Delta F_{2*}^{b-}) + (R_3^b + \Delta N_{3*}^{b-} - \Delta F_3^{b+}) \\
 &\quad + (-\Delta N_{3*}^{b+} + \Delta F_{3*}^{b-}) + (R_6^b - \Delta F_6^{b+} + \Delta F_{6*}^{b-})
 \end{aligned}$$

$$=0 \quad .$$

It means that the double entry assures the equivalence between net lending or net borrowing and net financial transactions; if there are discrepancies between the two entries, there is a difference between the two balancing items. By summing up equations (5) and (8), we have:

$$\begin{aligned}
 (11) \quad NLB^a + NLB^b &= (-U_1^a + R_1^b) + (R_{1*}^a - U_{1*}^b) + (-\Delta N_2^{a+} + R_2^b) + (R_{2*}^{a+} - \Delta N_{2*}^{b+}) \\
 &\quad + (-\Delta N_3^{a+} + R_3^b + \Delta N_3^{b-}) + (R_{3*}^a + \Delta N_{3*}^{a-} - \Delta N_{3*}^{b+}) + R_6^b + R_{6*}^a \\
 &= R_6^b + R_{6*}^a \quad .
 \end{aligned}$$

Note that the above rewriting of the equations was possible because of the quadruple entry rule. Likewise, by summing up equations (6) and (9), we have:

$$\begin{aligned}
 (12) \quad NFT^a + NFT^b &= (-\Delta F_1^{a-} + \Delta F_1^{b+}) + (\Delta F_{1*}^{a+} - \Delta F_{1*}^{b-}) + (-\Delta F_2^{a-} + \Delta F_2^{b+}) \\
 &\quad + (\Delta F_{2*}^{a+} - \Delta F_{2*}^{b-}) + (-\Delta F_3^{a-} + \Delta F_3^{b+}) + (\Delta F_{3*}^{a+} - \Delta F_{3*}^{b-}) \\
 &\quad + (\Delta F_6^{b+} - \Delta F_6^{b-}) + (\Delta F_{6*}^{a+} - \Delta F_{6*}^{a-}) \\
 &= (\Delta F_6^{b+} - \Delta F_6^{b-}) + (\Delta F_{6*}^{a+} - \Delta F_{6*}^{a-}) \quad .
 \end{aligned}$$

The above equations tell us that neither the macroeconomic total of net lending or borrowing nor net financial transactions is zero because Category 6 transactions do not cancel out each other. That is to say, if debit is recorded in the financial account and credit is entered in other account or vice versa, the double entry might not cancel out each other.

Furthermore, by subtracting equation (12) from (11), we have the following equation:

$$\begin{aligned}
 (13) \quad & (NLB^a + NLB^b) - (NFT^a + NFT^b) \\
 &= (R_6^b - \Delta F_6^{b+} + \Delta F_6^{b-}) + (R_{6*}^a - \Delta F_{6*}^{a+} + \Delta F_{6*}^{a-})
 \end{aligned}$$

$$=0 \text{ .}$$

It means that the quadruple entry assures that the macroeconomic total of net lending or net borrowing is equivalent to the macroeconomic total of net financial transactions.

Equations (7) and (10) show that net lending or net borrowing is identical to net financial transactions for each institutional unit; thus we can define new variable $\Delta V = NFT = NLB$. Since institutional sector is merely a group of institutional units, the following equation can be derived for institutional sector μ for accounting period τ using equations (3) and (4):

$$\begin{aligned} (14) \quad \Delta V_{\tau\mu} &= (\Delta F_{\tau\mu}^+ - \Delta F_{\tau\mu}^-) - (\Delta L_{\tau\mu}^+ - \Delta L_{\tau\mu}^-) \\ &= (R_{\tau\mu} - U_{\tau\mu}) - (\Delta N_{\tau\mu}^+ - \Delta N_{\tau\mu}^-) \text{ .} \end{aligned}$$

The economic meaning is that the changes in financial net worth is equivalent to the sum of the balance of both income and outlay account and capital account. The former is usually referred to as saving while the latter is as capital formation or investment:

$$(15) \quad S_{\tau\mu} \equiv R_{\tau\mu} - U_{\tau\mu} \text{ ;}$$

$$(16) \quad I_{\tau\mu} \equiv \Delta N_{\tau\mu}^+ - \Delta N_{\tau\mu}^- \text{ ;}$$

$$(17) \quad \Delta V_{\tau\mu} = S_{\tau\mu} - I_{\tau\mu} \text{ .}$$

That is to say, the changes in financial net worth of an institutional sector is equivalent to the saving-investment balance or rather imbalance of the sector. Furthermore, from equations (14) and (17), the macroeconomic total of the changes in financial net worth is written in the following manner:

$$\begin{aligned} (18) \quad \sum_{m=1}^{\mathcal{M}} \Delta V_{\tau m} &= \sum_{m=1}^{\mathcal{M}} \{ (\Delta F_{\tau m}^+ - \Delta F_{\tau m}^-) - (\Delta L_{\tau m}^+ - \Delta L_{\tau m}^-) \} \\ &= \sum_{m=1}^{\mathcal{M}} (S_{\tau m} - I_{\tau m}) \text{ ;} \end{aligned}$$

$\mathcal{M}$ is the total number of institutional sectors including the rest of the world as a dummy sector. If each horizontal double entry is concluded in either of the three accounts — income and outlay accounts, capital accounts or financial accounts — equation (18) equals zero; otherwise, it is non-zero. For example, in Table 1, Category 6 transactions might include some realized capital gain arising from financial-asset secondary-market transactions. Since realized capital gain is the difference between the acquisition cost (i.e. book value) and the sales value, business accountants customarily record it in the income and outlay account rather than in capital or financial account; this results in the non-zero macroeconomic financial net worth as demonstrated in the last terms of equations (11) and (12). By summing up equation (18) from the first to the current period, we have the following equation:

$$\begin{aligned}
 (19) \quad V_{\tau m} &= \sum_{\zeta=1}^{\tau} \sum_{m=1}^{\mathcal{M}} \Delta V_{\zeta m} = \sum_{\zeta=1}^{\tau} \sum_{m=1}^{\mathcal{M}} \left\{ \left(\Delta F_{\zeta m}^+ - \Delta F_{\zeta m}^- \right) - \left(\Delta L_{\zeta m}^+ - \Delta L_{\zeta m}^- \right) \right\} \\
 &= \sum_{\zeta=1}^{\tau} \sum_{m=1}^{\mathcal{M}} \left(S_{\zeta m} - I_{\zeta m} \right) .
 \end{aligned}$$

As the same reason as in equation (18), equation (19) that represents the financial net worth obtainable in the (financial) balance sheet could be either zero or non-zero depending on the original source of data.

3. The Observations

Fortunately, the aforementioned *National Accounts of OECD Countries* contains the data on financial net worth of the each sector of the member countries. The sector classifications are as follows:

Households (including nonprofit institutions serving households (NPISH));

Non-financial corporations;

Financial corporations;

General government;

Rest of the world, as a dummy sector.

Although *National Accounts of OECD Countries* covers many subjects, two tables are most relevant to our study: Financial Accounts and Financial Balance Sheets. One of the advantages of the former is that the table provides figures on the net financial transactions, which is equivalent to the year-to-year changes in the financial net worth of the economic sectors. These indicators give us crucial information on the saving-investment imbalance of the each sector. However, sometimes the statistics on the changes in financial net worth is misleading because they fluctuate significantly from one year to another.

Although the data on the outstanding financial net worth that is found in the Financial Balance Sheets tables includes valuation changes as well as the other changes in the volume of assets (OCVA), it could be roughly interpreted as an accumulation of the saving-investment imbalances of the past; the outstanding data is far more stable than the data on changes so that it is convenient to grasp the general situation of the economy. For example, households are the primary source of savings so that the financial net worth of the sector is positive in any country; it is an indispensable benchmark for an overview. On the other hand, non-financial corporations are primary investors so that the financial net worth of the sector is negative in the usual case. The financial net worth of the other prominent sectors, including general government and the rest of the world, could be either positive or negative depending on the current situation of the economy. The financial net worth of financial corporations does not significantly diverge from zero because they are merely financial intermediaries. As we have discussed in the previous section, in some

countries, there are discrepancies between the net lending or net borrowing obtained in capital accounts, and the net financial transactions obtained in financial accounts. Or, in some countries, the macroeconomic total of either of the two indicators does not sum up to zero. However, as depicted in Table 2, the discrepancies are negligible in most of the countries.

Figure 1 depicts the overall distribution of financial net worth among the sectors for each OECD member country. We excluded monetary gold and SDRs from the financial net worth because they are assets with no corresponding liabilities. The data is normalized by the financial net worth of the households so that the ratio is free from currency unit or exchange rate fluctuations. Since, in the current SNA², the liabilities are valued at the market value of the corresponding assets:

$$(20) \quad F_{\tau} = L_{\tau} \quad .$$

We can decompose both sides of the above equation into the domestic economy (D) and the rest of the world (R):

$$(21) \quad F_{\tau D} + F_{\tau R} = L_{\tau D} + L_{\tau R} \quad .$$

Besides, from the definition of financial net worth,

$$(22) \quad V_{\tau D} = F_{\tau D} - L_{\tau D} \quad ,$$

$$(23) \quad V_{\tau R} = F_{\tau R} - L_{\tau R} \quad ;$$

so that

$$(24) \quad V_{\tau D} = -V_{\tau R} \quad .$$

We can further decompose the domestic economy according to the sector classification

² See SNA2008, § 2.58 and §2.60.

of the OECD national accounts data:

$$(25) \quad V_{\tau D} = V_{\tau H} + V_{\tau N} + V_{\tau F} + V_{\tau G} \quad ;$$

where

$V_{\tau H}$: Financial net worth of the households and NPISH;

$V_{\tau N}$: Financial net worth of the non-financial corporations;

$V_{\tau F}$: Financial net worth of the financial corporations;

$V_{\tau G}$: Financial net worth of the general government.

From equations (24) and (25), it is apparent that

$$(26) \quad V_{\tau H} + V_{\tau N} + V_{\tau F} + V_{\tau G} + V_{\tau R} = 0 \quad .$$

In other words, in Figure 1, each bar that represent the above equation is symmetric around zero. The only exception is the United States; there must be some divergence from the SNA accounting rule.

As we have mentioned earlier, a glance at the figure reveals that the financial net worth of the households (blue bars) is positive in all the countries listed there. You will also notice that the financial net worth of the non-financial corporations (green bars) is negative without exception. In most countries the financial net worth of the financial corporations are negligibly small because of their intermediary nature. The financial net worth of the rest of the world (red bars) is positive in most of the countries except for Belgium, Denmark, Finland, Germany, Israel, Japan and the Netherlands; it means that only the above mentioned countries have net external assets while others have net external liabilities. In most countries, the general government has negative financial net worth (yellow bars), but the financial net worth is positive in Estonia, Finland, Korea, Luxembourg and Sweden. That means 22 out of 27 countries have public debt; it certainly

is a common problem of the matured economies. An observant reader might notice that, in all these 22 countries that have public debt, the excess liabilities (i.e. negative financial net worth) of the non-financial corporations are less than the excess financial assets (i.e. positive financial net worth) of the households; the green bars do not reach -1 . In other words, as Bernanke (2005) pointed out, those countries are suffering from dearth of private investment and the domestic saving glut. However, the 22 countries with public debt are not necessarily homogeneous because some countries have net external assets while others have net external liabilities.

According to the above observations, we can group the countries on three criteria:

- (a) If the excess liabilities of non-financial corporations is greater than the excess financial assets of households;
- (b) If the financial net worth of the general government is positive;
- (c) If the financial net worth of the rest of the world is positive.

Based on the above criteria, there are six possible combinations:

[Class I]

$$C_I = \left\{ (-V_{N\tau} \geq V_{H\tau}) \text{ and } (V_{G\tau} < 0) \text{ and } (V_{R\tau} > 0) \right\} .$$

In 2012, Czech Republic, Greece, Hungary, Ireland, Poland, Portugal, Slovak Republic, Slovenia and Spain belonged to this class. In these countries, in addition to the private sector, the government has excess liabilities so that they are raising funds from abroad. The financial inflow most probably means current account deficit. The combination of current account deficit and government deficit is commonly referred to as 'twin deficit'. Sometimes it is admissible to have public debt in this type of countries if the government is rectifying the lack of social infrastructure, which is hindering the exports.

[Class II]

$$C_{II} = \left\{ (-V_{N\tau} \geq V_{H\tau}) \text{ and } (V_{G\tau} \geq 0) \text{ and } (V_{R\tau} \leq 0) \right\} .$$

In 2012, only Finland belonged to this class among the countries listed in Figure 6-1; however, Norway, which is missing in the diagram also belonged to the group. In this type of countries, the government is wealthy enough not only to cover the excess liabilities of the private sector, but also to invest surplus funds abroad.

[Class III]

$$C_{III} = \left\{ (-V_{N\tau} \geq V_{H\tau}) \text{ and } (V_{G\tau} \geq 0) \text{ and } (V_{R\tau} > 0) \right\} .$$

In 2012, Chile, Estonia, Korea, Luxembourg and Sweden belonged to this class. The governments have excess financial assets, but it is not enough to cover the excess liabilities of the private sector; the remainder is coming from abroad.

[Class IV]

$$C_{IV} = \left\{ (-V_{N\tau} < V_{H\tau}) \text{ and } (V_{G\tau} < 0) \text{ and } (V_{R\tau} < 0) \right\} .$$

In 2012, Belgium, Denmark, Germany, Israel, Japan and the Netherlands belonged to this class. In these countries, non-financial corporations are reluctant to invest so that the private sector in total has excess financial assets. They are investing surplus funds abroad but the government has no choice but to absorb the remaining surplus — a typical case of dearth of private investment and saving glut. To reduce public debt, it is necessary to promote investment in the private sector.

[Class V]

$$C_V = \left\{ (-V_{N\tau} < V_{H\tau}) \text{ and } (V_{G\tau} < 0) \text{ and } (V_{R\tau} \geq 0) \right\} .$$

In 2012, Austria, Canada, France, Italy, the United Kingdom and the United States belonged to this class. In these countries, non-financial corporations are reluctant to invest; as a result, they have lost export competitiveness; and the trade deficit has accumulated. The government has no option but to absorb the excess saving of the private sector, which results in the public debt – a typical case of ‘twin deficit’ or ‘twin debt’.

[Class VI]

$$C_{VI} = \left\{ (-V_{N\tau} < V_{H\tau}) \text{ and } (V_{G\tau} \geq 0) \text{ and } (V_{R\tau} < 0) \right\} .$$

In 2012, no country belonged to this class; to our knowledge, in 2010, Denmark belonged to this category. Not only the private sector but also the government has excess financial assets; the surplus funds are invested abroad.

Table 3 displays the changes between classes to which each country belonged in a particular year. Although, most of the countries changed from one class to another from time to time, some countries remained in a class for more than 15 years between 1995 and 2012. The United States alongside with Austria, Canada and Italy stayed in Class V during the period while Japan remained in Class IV. Figures 2 and 3 depict the historical changes in financial net worth for both the United States and Japan. The economic structure reflected in the distribution of financial net worth among sectors did not change much in the United States since 1950s. The financial net worth of the government as well as of the non-financial corporations stayed negative during the period. The former is a

rough mirror image of the latter. The financial net worth of the rest of the world turned from negative to positive in the mid of 1980s, when the Plaza Accord artificially depreciated the U.S. dollar, creating the “twin debt” — a combination of public and net external debt. The Japanese government also had public debt since 1980; the financial net worth of the sector is more or less a mirror image of that of non-financial corporations. As the non-financial corporations getting cautious about investment after the collapse of the real estate bubble, the public debt swelled after 1990; the government became the largest borrower after the global financial crisis of 2008 that severely hit Japanese exports.

Figures 4 and 5 depict the year-to-year changes in the financial net worth for both of the countries. In the United States, the year-to-year change for the households is positive in most of the years, but it becomes negative from time to time. It means that the U.S. households as a total had excess savings in usual years, but had excess investments in the years of 2000, 2002, 2005 and 2006 during the residential boom. After the boom was over, the sector started to save aggressively. As the boom collapsed, the non-financial corporations were more cautious about investment, and the sector as a whole made excess saving rather than excess investment. This derived the government into sharp deficit, however the pattern of year-to-year changes in financial net worth of the government sector is a mirror image of that of the household, rather than that of the non-financial corporations. The economic situation is more problematic in Japan than in the United States. In Japan, the year-to-year changes in the financial net worth of the non-financial corporations turned into positive in 1998 and remained so since then. In most years during the past twenty years, the government was the largest borrower among the sectors. In more recent years, the financial outflow of the country is decreasing, and as a result, the government is forced to absorb the redundant funds. This is at least partially because the

Japanese business is losing export competitiveness as a consequence of reduced investment; the production facilities are rapidly ageing. The trade and service account turned from surplus to deficit in 2011 and the country registered its first net financial inflow in 2013.

4. Concluding Remarks

The above analysis suggests that dearth of private-sector investment and the saving glut is the fundamental problem behind the swelling public debt. The people usually save to prepare for retirement; they are expecting to get goods such as foods, and services such as nursing, later after retirement. They accumulate funds just because the nature of the goods and services does not allow them to store them. They usually invest in production facilities instead, expecting that the facilities will satisfy their future needs. Therefore, if there is a dearth of private investment, one option is that the government use the redundant funds to boost the future productivity. The investment in infrastructure may not directly provide bread and butter but at least it will contribute positively to boost the productivity. Maybe it is not a good substitute for private-sector production facilities, but improved social infrastructure is better than nothing.

Figures 6 and 7 illustrate the saving-investment balance of the U.S. and Japanese general government sector. Although, in the United States, the investment surpasses saving in all the years except for 1998, 1999 and 2000, the gross saving is negative in the recent years, especially after the financial market collapsed in 2008. In other words, the government sector is eating up the funds, which the private sector accumulated; it means that the nation as a whole saved less than what the private sector did. The only good news is that the U.S. is investing in fixed capital rapidly after Hurricane Katrina hit the southern

states in 2005. The situation is no better in Japan. Although there has been excess investment in the government sector, the gross saving was hovering in the negative domain between 2002 and 2005 and again after 2009. The government investment decreased dramatically until reaching bottom in 2006, and did not recover much after a huge earthquake severely damaged the northern half of the country.

Figures 8 and 9 compare the amount of net government security issue and the gross fixed capital formation. In the United States, until the year of 2008, most of the funds raised through security issuance was used for infrastructure investments. However, after the financial market collapsed in 2008, the raised funds was spent for some other purposes. The Japanese government does not spend too much on infrastructure; they spent good portion of raised funds for social security expenses etc. so that they are eating up much of the savings the private sector has accumulated. The conclusion of the paper is that it is useless to argue if the public debt is an evil or not; it is high time to discuss how to make the best use of the current redundant funds in order to feed and nurse the retirees of the future.

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Table 1 Economic Event Categories

Category	Description of the role of unit ‘a’	Unit ‘a’		Unit ‘b’	
		Debit	Credit	Debit	Credit
Bilateral economic events					
1	Purchase of goods and services	U_1^a	δF_1^{a-}	δF_1^{b+}	R_1^b
1*	Sale of goods and services	δF_{1*}^{a+}	R_{1*}^a	U_{1*}^b	δF_{1*}^{b-}
2	Purchase of non-financial assets (primary market)	δN_2^{a+}	δF_2^{a-}	δF_2^{b+}	R_2^b
2*	Sale of non-financial assets (primary market)	δF_{2*}^{a+}	R_{2*}^a	δN_{2*}^{b+}	δF_{2*}^{b-}
3	Purchase of non-financial assets (secondary market)	δN_3^{a+}	δF_3^{a-}	δF_3^{b+}	$\delta N_3^{b-} + R_3^b$
3*	Sale of non-financial assets (secondary market)	δF_{3*}^{a+}	$\delta N_{3*}^{a-} + R_{3*}^a$	δN_{3*}^{b+}	δF_{3*}^{b-}
4	Acquisition of new financial assets	δF_4^{a+}	δF_4^{a-}	δF_4^{b+}	δL_4^{b+}
4*	Incurrence of new financial liabilities	δF_{4*}^{a+}	δL_{4*}^{a+}	δF_{4*}^{b+}	δF_{4*}^{b-}
5	Redemption of liabilities	δL_5^{a-}	δF_5^{a-}	δF_5^{b+}	δF_5^{b-}
5*	Redemption of financial assets	δF_{5*}^{a+}	δF_{5*}^{a-}	δL_{5*}^{b-}	δF_{5*}^{b-}
6	Purchase of financial assets (secondary market)	δF_6^{a+}	δF_6^{a-}	δF_6^{b+}	$\delta F_6^{b-} + R_6^b$
6*	Sale of financial assets (secondary market)	δF_{6*}^{a+}	$\delta F_{6*}^{a-} + R_{6*}^a$	δF_{6*}^{b+}	δF_{6*}^{b-}
Unilateral economic events					
7	Disposal of non-financial assets possessed by ‘a’	U_7^a	δN_7^{a-}		
7*	Disposal of non-financial assets possessed by ‘b’			U_{7*}^b	δN_{7*}^{b-}

Table 2 NLB, NFT and financial net worth in OECD National Accounts (year 2012)

	Difference between NLB and NFT					Macroeconomic total of NLB	Macroeconomic total of NFT	Macroeconomic total of financial net worth
	Non-financial corporations	Financial corporations	General government	Households and NPISH	Rest of the world			
Austria	-0.004	0.006	-0.001	-0.001	-0.001	0.000	0.000	0.000
Belgium	-0.008	0.008	0.001	-0.003	0.002	0.000	0.000	0.000
Czech	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Denmark	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Estonia	0.014	0.000	-0.001	0.001	0.000	0.014	0.000	0.000
Finland	0.019	-0.009	0.000	0.010	-0.021	0.000	0.000	0.000
France	-0.004	0.002	0.000	0.005	-0.004	0.000	0.000	0.000
Germany	0.002	0.001	0.000	-0.001	-0.001	0.000	0.000	0.000
Hungary	0.012	0.002	0.000	-0.026	0.012	0.000	0.000	0.000
Ireland	-0.006	0.027	0.000	-0.010	-0.019	-0.008	0.000	0.000
Italy	-0.001	0.003	0.000	0.001	-0.002	0.000	0.000	0.000
Japan	0.008	0.003	-0.003	-0.008	0.000	0.000	0.000	0.000
Luxembourg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Netherlands	0.000	0.000	0.000	0.001	-0.001	0.000	0.000	0.000
Norway	-0.026	0.013	-0.005	0.016	0.002	0.000	0.000	0.000
Poland	0.079	-0.049	0.002	-0.045	0.014	0.000	0.000	0.000
Portugal	-0.005	0.004	0.000	0.000	0.002	0.000	0.000	0.000
Slovak Republic	-0.001	0.000	0.001	0.000	-0.001	0.000	0.000	0.000
Slovenia	-0.004	-0.014	0.002	0.008	0.007	0.000	0.000	0.000
Spain	-0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Sweden	0.013	-0.014	0.000	0.005	-0.005	-0.001	0.000	0.000
UK	0.002	-0.001	0.000	0.001	-0.002	0.000	0.000	0.000
US	-0.001	0.005	-0.002	-0.007	0.000	0.000	0.006	0.171

Note 1: All figures are normalized by the financial assets of households.

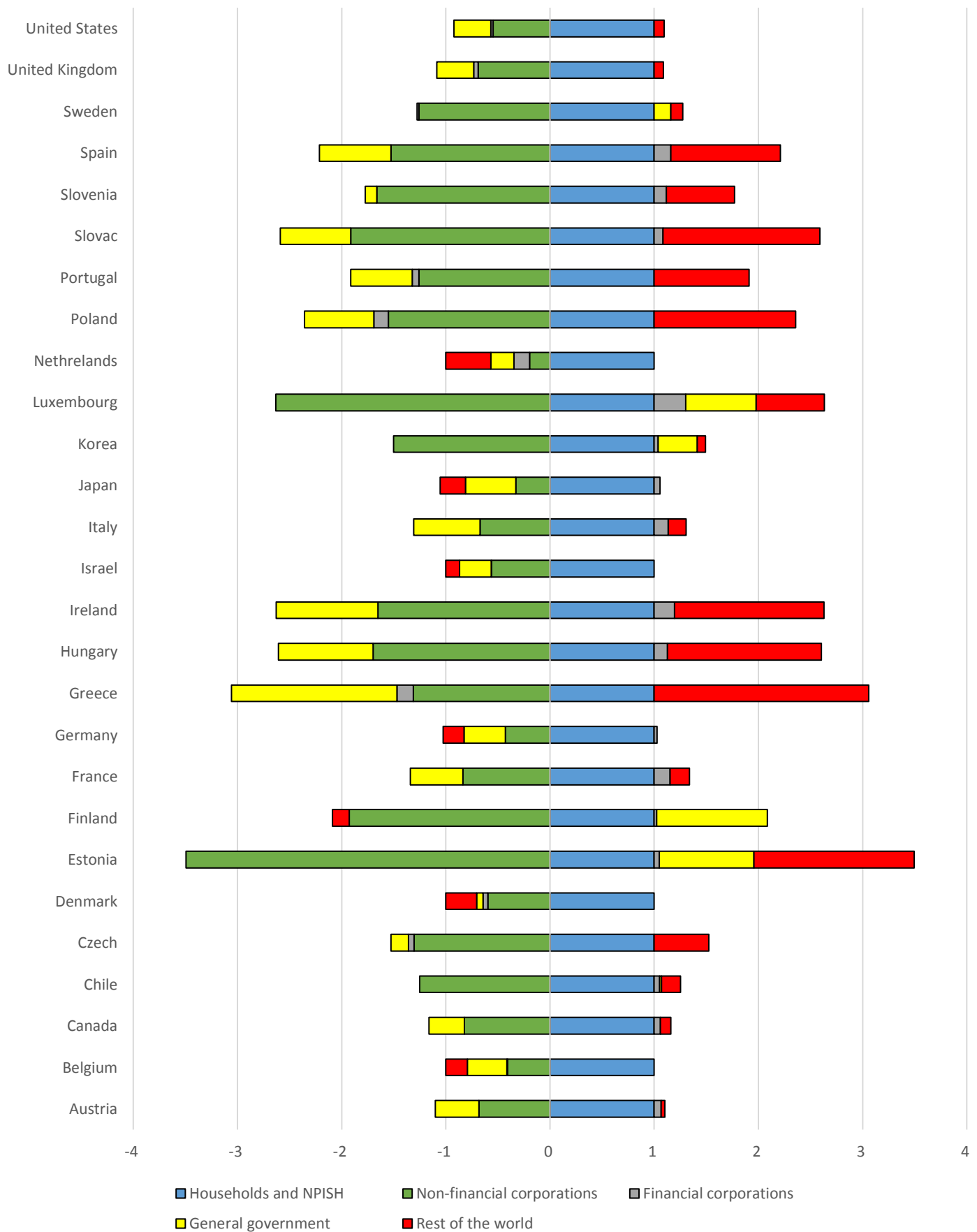
Note 2: Red cells indicate the value is greater than 0.001 while blue cells are less than -0.001.

Table 3 Distribution Patterns of the Financial Net Worth among Institutional Sectors

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Belgium	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV
Canada	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Chile	–	–	–	–	–	–	–	–	–	–	I	I	II	III	III	III	III	III
Czech Republic	II	III	III	III	III	III	III	III	III	III	III	III	III	III	III	I	I	I
Denmark	V	V	V	V	V	V	V	V	V	V	IV	V	III	III	II	VI	IV	IV
Estonia	III	III	III	III	III	III	III	III	III	III	III	III	III	III	III	III	III	III
Finland	III	III	III	III	III	III	III	III	III	III	III	III	III	III	III	II	II	II
France	IV	IV	IV	IV	IV	IV	IV	V	V	V	V	V	V	V	V	V	V	V
Germany	IV	IV	IV	V	V	V	IV	V	V	IV	IV	V	IV	IV	IV	IV	IV	IV
Greece	IV	V	V	V	V	V	V	V	V	V	V	V	V	I	I	I	I	I
Hungary	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Ireland	–	–	–	–	–	–	V	I	V	I	I	I	I	I	I	I	I	I
Israel	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	IV	IV	IV
Italy	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Japan	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV
Korea	–	–	–	–	–	–	–	III	III	III	III	III	III	III	III	III	III	III
Luxembourg	–	–	–	–	–	–	–	–	–	–	–	III	III	II	III	III	III	III
Mexico	–	–	V	V	V	V	V	V	V	V	V	V	V	V	V	–	–	–
Netherlands	IV	IV	V	V	V	V	V	V	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV
Poland	III	III	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Portugal	V	V	V	V	V	V	I	I	I	I	I	I	I	I	I	I	I	I
Slovak Republic	III	III	III	III	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Slovenia	–	–	–	–	–	–	III	III	III	III	III	III	III	III	III	III	I	I
Spain	V	V	V	V	V	V	V	I	I	I	I	I	I	I	I	I	I	I
Sweden	I	I	I	I	I	I	III	I	I	III	III	III	III	III	III	III	III	III
Switzerland	–	–	–	–	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	–
UK	V	V	V	V	V	V	V	V	V	V	V	V	V	IV	V	V	V	V
US	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V

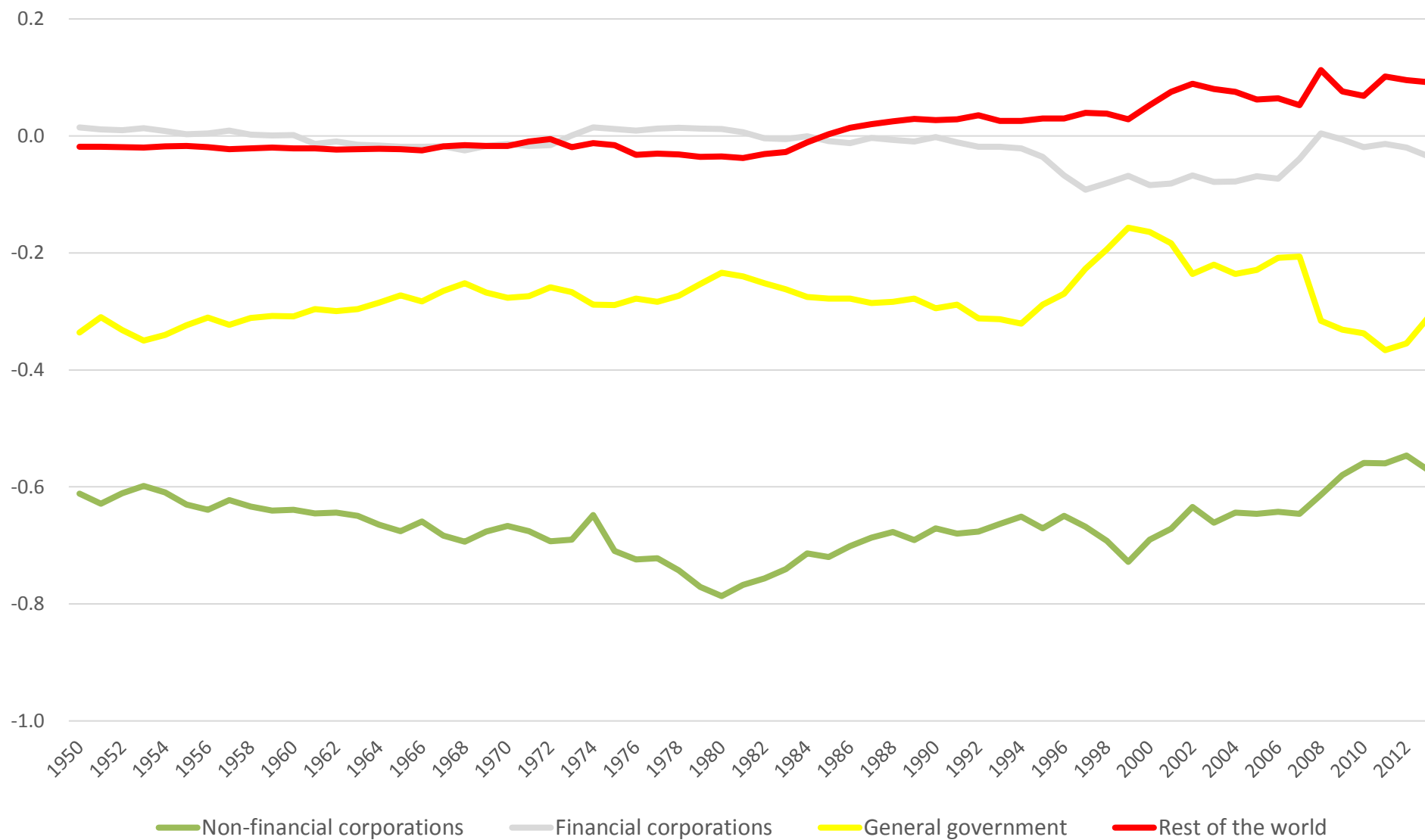
Data Source: National Accounts of OECD Countries, Financial Balance Sheets

Figure 1 Financial Net Worth Normalized by that of Households



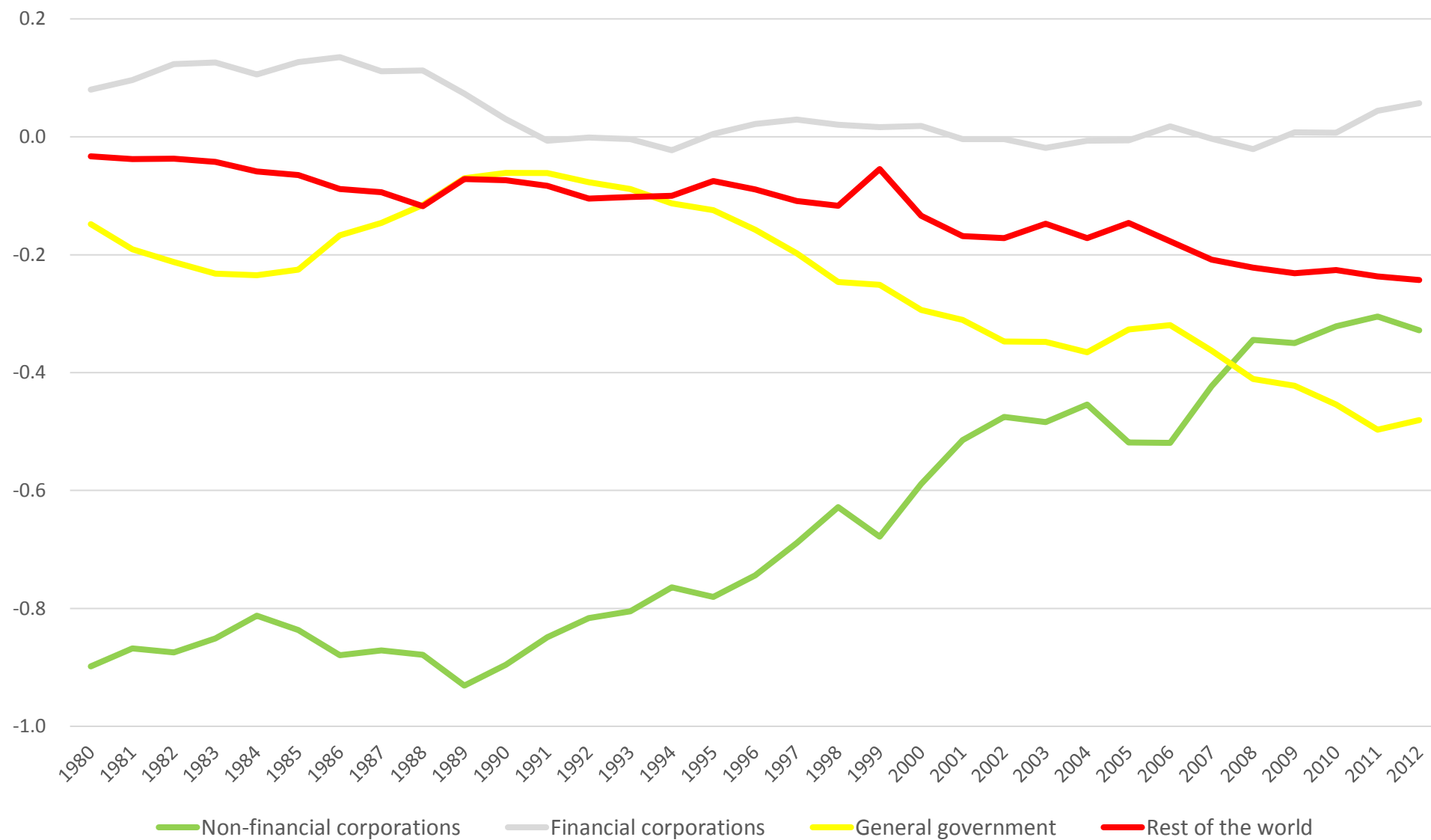
Data source: National Accounts of OECD Countries, Financial Balance Sheets 2012

Figure 2 Financial Net Worth Normalized by that of Households (United States)



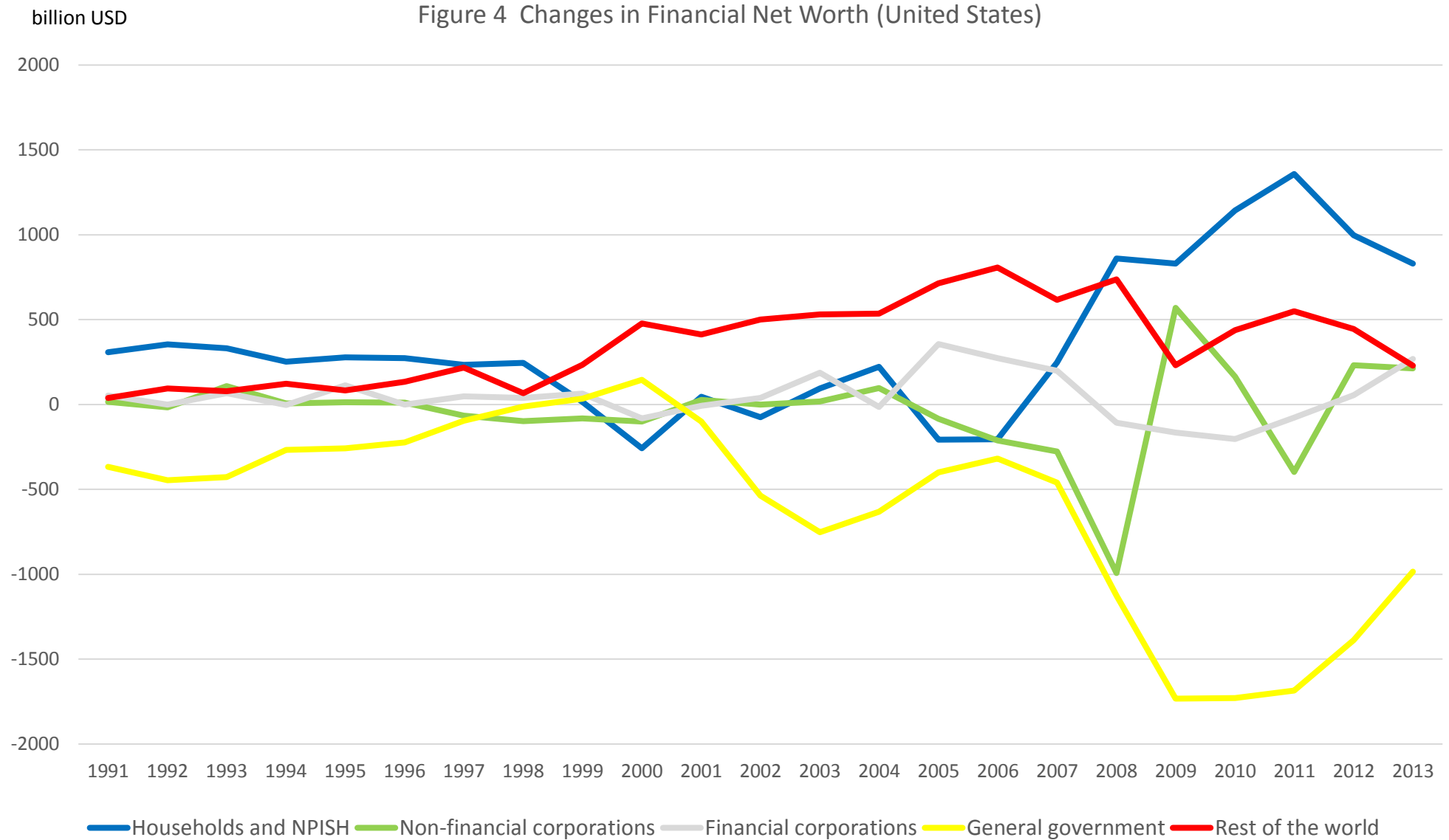
Data source: National Accounts of OECD Countries, Financial Balance Sheets

Figure 3 Financial Net Worth Normalized by that of Households (Japan)



Data source: National Accounts of OECD Countries, Financial Balance Sheets

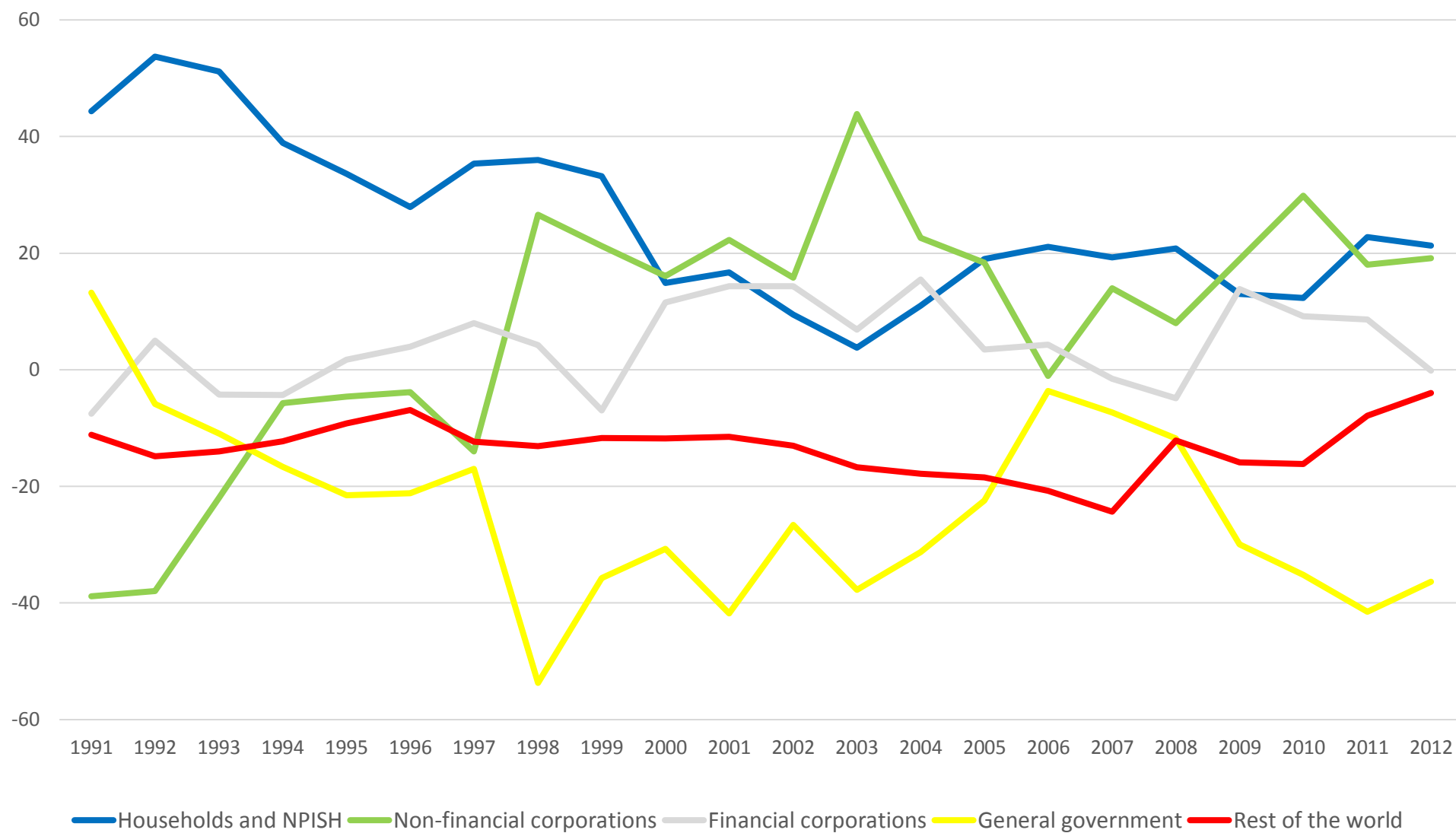
Figure 4 Changes in Financial Net Worth (United States)



Data source: National Accounts of OECD Countries, Financial Accounts

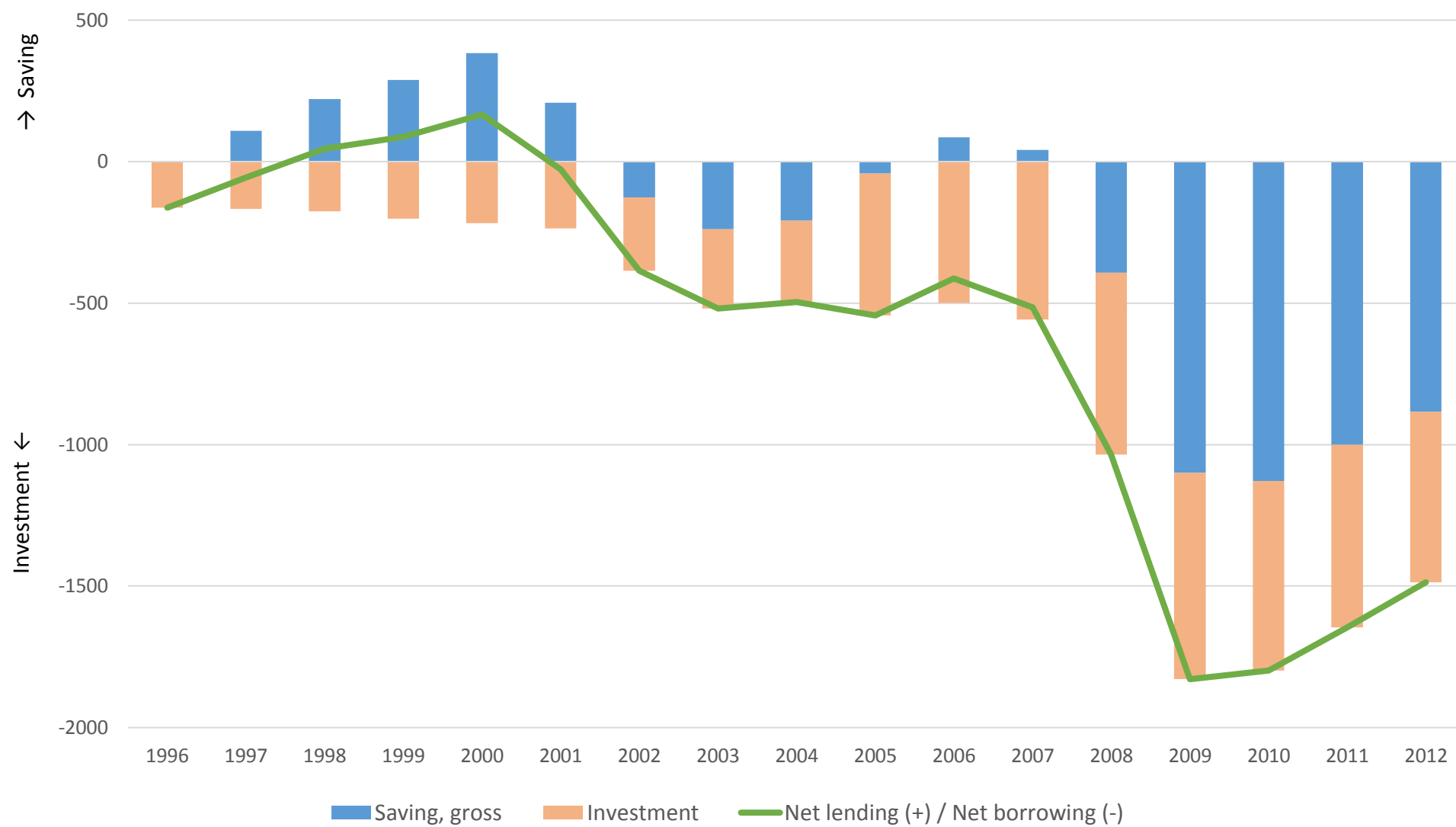
trillion JPY

Figure 5 Changes in Financial Net Worth (Japan)



Data source: National Accounts of OECD Countries, Financial Accounts

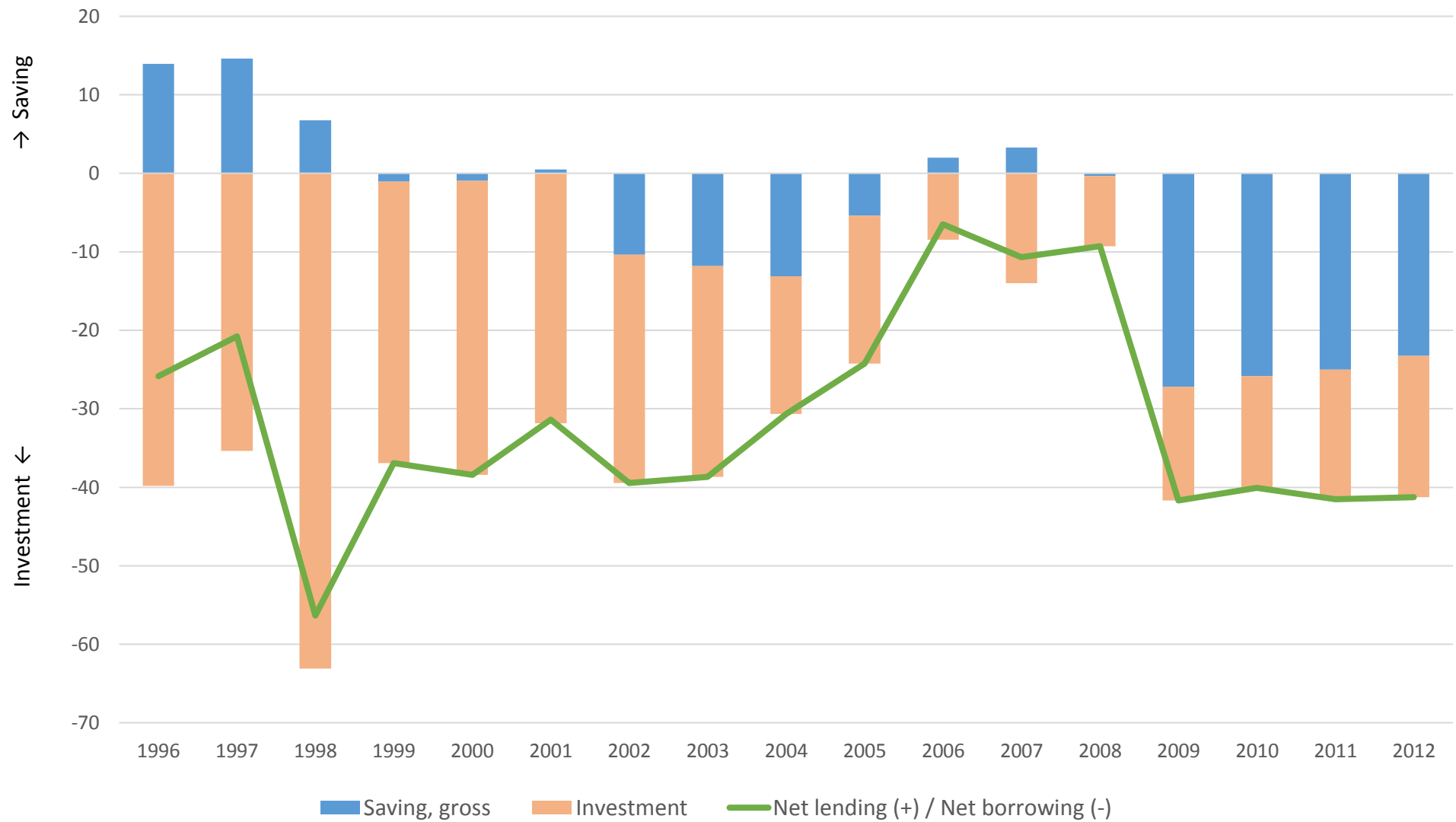
Figure 6 General Government Saving-Investment Balance (United States)



Data source: National Accounts of OECD Countries, General Government Accounts

Figure 7 General Government Saving-Investment Balance (Japan)

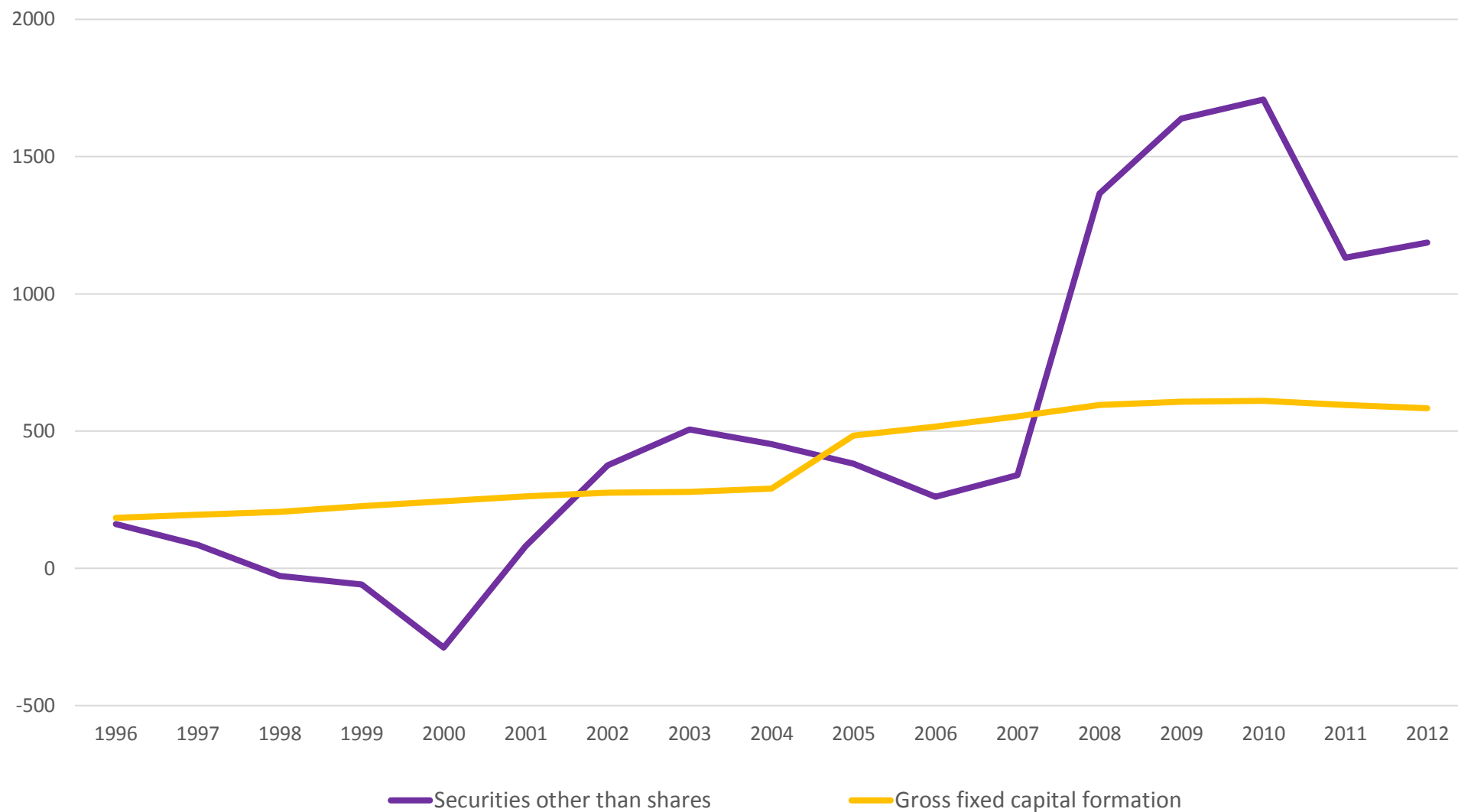
Trillion JPY



Data source: National Accounts of OECD Countries, General Government Accounts

Figure 8 Security Issurance and Gross Fixed Capital Formation (United States)

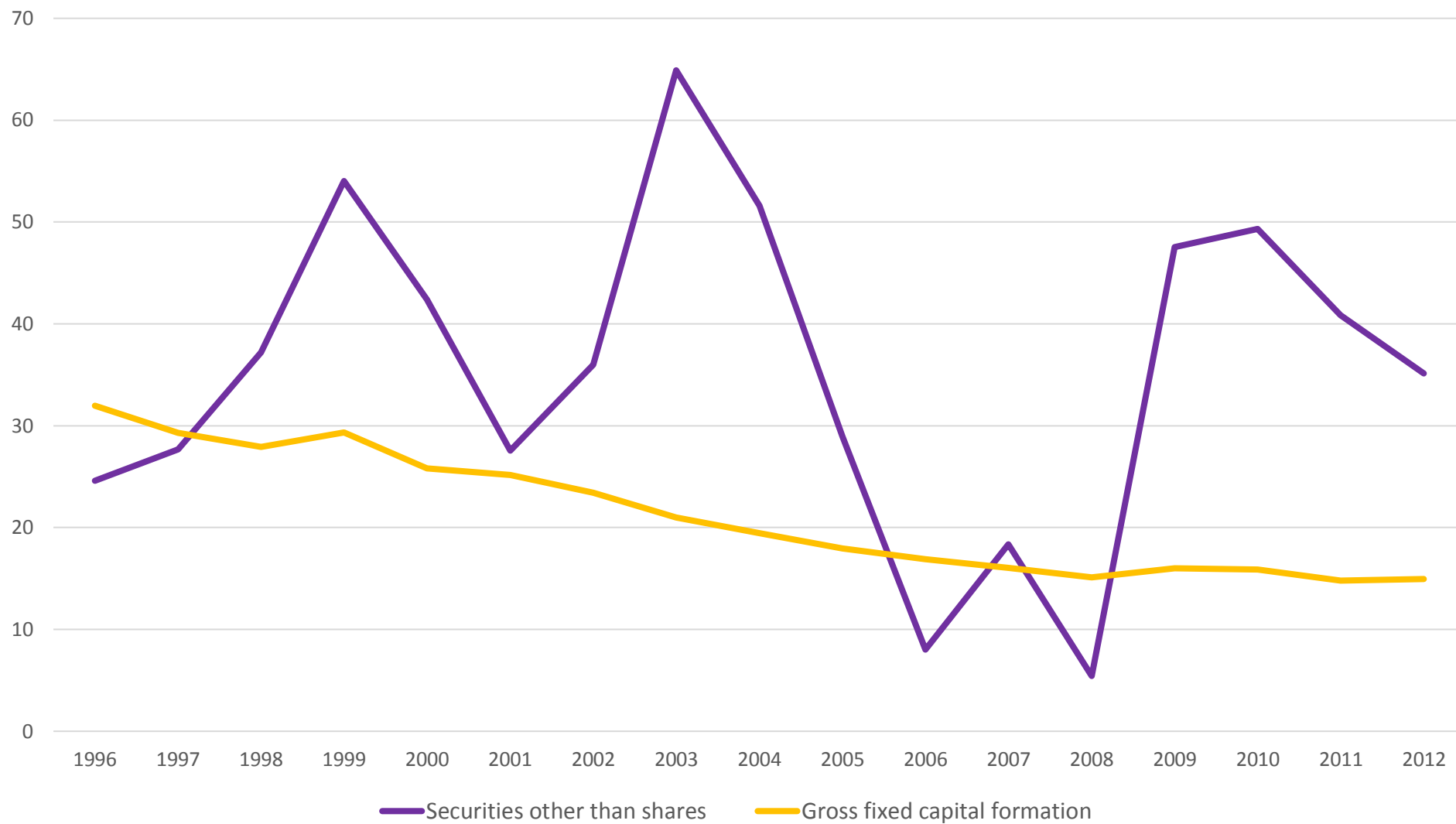
Billion USD



Data source: National Accounts of OECD Countries, General Government Accounts

Figure 9 Security Issuance and Gross Fixed Capital Formation (Japan)

Trillion JPY



Data source: National Accounts of OECD Countries, General Government Accounts