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Inequalities in Japanese Economy during the Lost Decades*

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Abstract

This paper explores the development of inequalities in income, consumption, and wealth among Japanese households from the 1980s to the 2000s, a period that spans the bursting of Japan's bubble economy (1991Q1) and the banking crisis (1997Q4). We find that inequality of income and consumption widened during those three decades, and inequality of wealth increased, except for during the period after the bubble burst. Income inequality grew noticeably during the bubble era and periods after the banking crisis and the growth rate was particularly high during the former period. The two crises affected income inequality differently. The bubble burst led to a slow income growth for all households without greatly affecting the distribution of income, whereas the banking crisis dampened income growth exclusively among low-quantile households, exacerbating income inequality. Although the distributional effect of government policy was important, the general pattern of income inequality carried over into inequality in consumption. The dimensions of that carryover, however, diminished after the bubble burst, suggesting compositional changes in income shocks. The inequalities over life cycle are also discussed.

Keywords: Consumption inequality, Income inequality, Wealth inequality, Lost decades, Bubble burst

JEL Classification: D12, D31, E21, J11

1 Introduction

A growing number of studies investigate the dispersion of households' economic attributes, such as their labor earnings, consumption, and wealth, from various dimensions. MaCurdy (1982) and Katz and Autor (1999) investigate time series developments in earnings inequality in the U.S., Deaton and Paxson (1994) analyze life cycle dimension of inequalities, Acemoglu (2002) and Heathcote, Storesletten, and Violante (2010) discuss sources of inequalities including skill-biased technology change and education, and Krueger and Perri (2006) and Blundell, Pistaferri, and Preston (2008) explore how earnings inequality is translated in consumption inequality. Among related researches, the special issue of *Review of Economic Dynamics*, provide developments in inequality in nine countries.[1] In its introduction, Krueger et al. (2010) conduct international comparisons of inequality for the past three decades and document common features as stylized facts.

In this paper, employing analytical methodologies comparable with those in the special issue of *Review of Economic Dynamics*, we conduct a comprehensive investigation of the inequalities among Japanese households. Based on two household-level surveys, *the Family Income and Expenditure Survey* and *the National Survey of Family Income and Expenditure*, we investigate developments of inequalities in income, consumption, and wealth, transmission from inequality in income to inequality in consumption, and life cycle properties of inequalities, specifically focusing on their connections with macroeconomy.

Our sample period ranges from the 1980s to the 2000s. This period covers the economic boom accompanied by the speculative asset price bubble during the 1980s, its burst during the early 1990s, and the long-lasting recession that ensued, today called "the Lost Decades," which includes the banking crisis since the late 1990s. The bubble era starting in November 1986 coincided with historically high growth in money, credit, and asset prices. After stock prices peaked in 1989, the bubble burst in February 1991 as stock and land prices collapsed.[2] Figure 1 displays the time path of key macroeconomic variables, the growth rate of employee compensation, private consumption, households' financial asset holdings, households' real asset holdings, and Japan's unemployment rate. Clearly, growth rates of the first four variables slowed abruptly, simultaneously, and

[1] See Heathcote, Perri, and Violante (2010), Blundell and Etheridge (2010), Brzozowski, et al. (2010), Fuchs-Schiindeln et al. (2010), Jappelli and Pistaferri (2010), Pijoan-Mas and Sanchez-Marcos (2010), Domeij and Floden (2010), Binelli and Attanasio (2010), and Gorodnichenko et al. (2010) for analyses in the U.S., U.K., Canada, Germany, Italy, Spain, Sweden, Mexico, and Russia.

[2] See Okina, Shirakawa,and Shiratsuka (2001) for a detailed discussion of when Japan's bubble economy began and ended. They also discuss causes of Japan's bubble economy and its implications for monetary policy implementation.

significantly at the outset of the 1990s and never recovered during the subsequent two decades. On average, growth rates for employee compensation, consumption, financial assets, and real assets fell 4%, 3%, 6%, and 5%, respectively, from the bubble era to the subsequent period. The banking crisis that began in November 1997 originated from the turmoil in financial markets and produced the collapse of major financial institutions and a macroeconomic downturn. The recession was accompanied by a remarkable increase in Japan's unemployment rate: stable at 2%–3% during the 1980s, it ascended to 4%–5% in the latter 1990s.

Inequalities in income, consumption, and wealth during those three decades were much affected by changes in the macroeconomy. Inequality in earnings displayed a secular increase over the period. It grew at its highest rate during the bubble era, exhibited no clear growth for several years after the bubble burst, and grew at moderate rates after the banking crisis. During the bubble era, earnings of high-quantile households grew faster than that of low-quantile households, widening inequality among households. The bulk of increased earnings inequality at that time originated from within-group inequality that is independent from household characteristics. For several years after the bubble burst, the growth rate of earnings among high-quantile households slumped to the rate for middle- and low-quantile households. Consequently, earnings dispersion grew only to a small extent after the bubble burst. In contrast, the banking crisis led to greater earnings inequality, in a similar manner documented in Krueger et al. (2010). After the crisis, earnings growth among low-quantile households turned negative, while that among high-quantile households barely changed, widening earnings inequality. A sizable increase in earnings inequality during that time resulted from between-group inequality associated with family type and the household heads' occupation.

The transmission of inequality in earnings to that in consumption was mitigated by governmental policy and consumption smoothing by households. The income tax system was singularly important in reducing inequality in earnings during the 1980s, but it became less important in reducing the inequality following tax reforms in the late 1990s. By contrast, public transfers became the key tool of distributional policy during the current years. As a result, inequality in disposable income moderated compared to inequality in earnings. Inequality in consumption was smaller than that in disposable income over the period, suggesting that households to some extent succeeded in insuring themselves against income shocks. Similarly to the inequality in earnings, inequality in consumption displays a long-run positive trend. It grew at its highest rate during the bubble era, slowed a few years after the bubble burst, and increased again during the subsequent periods. During the bubble era, consumption by high-consumption

households ascended faster than that among other groups, increasing inequality in consumption among households. Most of the increase in consumption inequality at that time originated from within-group inequality. After the bubble burst, consumption by almost all households ceased to grow, maintaining the inequality at levels prevalent when the bubble burst. Since the mid-1990s, consumption by low-consumption households fell sharply, while consumption by other households remained stable, widening the inequality in consumption. In contrast to the inequality in earnings after the banking crisis, a sizable increase in inequality in consumption at that time was accounted for by within-group inequality.

Evidence indicates that the quantitative link between income and consumption weakened notably after the bubble burst. For instance, the covariance of disposable income and consumption of the same households increased until the beginning of the 1990s and remained unchanged during the subsequent period, while cross-sectional variance in both income and consumption continued to grow throughout the same period. This led to a decline in correlations between income and consumption. A similar tendency appears in the time-series analysis. To see how the transition of income inequality into consumption inequality changed over time, we compute the recursive ordinary least squares regression of consumption inequality on disposable income inequality. We find that the recursively-estimated coefficient of disposable income inequality declines greatly after the bubble burst, suggesting that a compositional change between temporary and permanent income shocks may have occurred near the beginning of the 1990s.

The wealth of Japanese households grew faster than income during the past three decades, driven primarily by upper-quantile households. Wealth inequality rose during the bubble era, dropped after the bubble crisis, and rose moderately during subsequent periods. The level of wealth inequality, measured by the Gini of financial wealth, is lower than the U.S., and comparable to Canada.

Along with the time-series property of inequality, we investigate the life cycle pattern of inequality in income and consumption. Inequalities generally increase with age, and their growth accelerates around the forties. Although the general life cycle pattern of these two inequalities is unchanged over time, their slope over the life cycle flattens during the current years. Increases in inequality of disposable income and consumption are milder compared to earnings, indicating that government transfers mitigated inequality, particularly among older households.

Inequality across Japanese households has been studied from various perspectives, but researchers agree that inequality has widened over time. Focusing on consumption inequality around the 1980s, Ohtake and Saito (1998) document that understanding

compositional changes in cohorts and demographic distribution is essential for understanding the observed increase in inequality. Kitamura and Miyazaki (2012) evaluate the distributional impact of Japan's income tax reforms from the 1980s to the 2000s on the development of inequality by disaggregating the time path of inequality across age groups.[3] Kohara and Ohtake (2006) examine the effect of work status on income and consumption inequality and document that inequality between the employed and unemployed increases among households headed by someone older than 45.

Among studies of Japanese inequality, this paper is closest to the work of Lise and Yamada (2012). Using three distinct survey datasets, they document long-run trends of inequality in wages, earnings, income, consumption, and wealth since the early 1990s.[4] There are, however, two notable differences between Lise and Yamada (2012) and our paper. First, our survey dataset, *the Family Income and Expenditures Survey*, contains monthly time series for income and consumption of interviewed households since the mid-1980s. Using the data, we document developments in inequalities with higher frequency and over longer horizon than their work, illuminating the connection between business cycles and inequalities, as well as the long-run trend in inequalities. Second, as for the source of inequality of earnings, Lise and Yamada (2012), drawing from *the Basic Survey of Wage Structure,* focus on workers' characteristics, including education, experience, and gender. They demonstrate that some of the increase in earnings inequality may be attributed to differences in hours worked. By contrast, our study concentrates on households data and investigate inequality of earnings from the perspective of households' characteristics.

This paper is organized as follows. Section 2 describes our two-survey data. Section 3 documents the development of inequalities in income, consumption, and wealth across Japanese households from the 1980s to the 2000s. We especially discuss how the dynamics of inequality relate to macroeconomic events during those years. We then investigate how the progression from inequality in earnings to that in consumption has changed over time. Section 4 illustrates the life cycle aspects of inequality. Section 5 concludes the study.

[3]Employing tax data from 1886 to 2005, Moriguchi and Saez (2008) document that income concentration was extremely high during the pre-WWII period, fell drastically during wartime, and remained low throughout the century.

[4]They investigate inequality in workers' annual wages on the basis of *Basic Survey of Wage Structure* and examine inequalities in household income, consumption, and wealth using data collected every five years by *the National Survey of Family Income and Expenditure.* They examine the annual wage process based on *the Japanese Panel Survey of Consumers.*

2 Data Sources

Our study is based on data collected by two distinctive surveys, *the Family Income and Expenditures Survey* (FIES) and *the National Survey of Family Income and Expenditure* (NSFIE), both compiled by the Statistics Bureau, Ministry of Internal Affairs and Communications. We use the monthly series from January 1981 to December 2008 from the former survey and data for 1984, 1989, 1994, 1999, and 2004 from the latter. Both contain household-level data about labor earnings, disposable income, consumption, and household characteristics. NSFIE also contains data about household wealth.[5] This section describes characteristics of our two-survey data and adjustments that were necessary to render our analysis comparable to studies for other countries.

2.1 FIES

FIES is a monthly data diary that collects the earnings, income, and expenditures of households and reports characteristics including household members' ages, gender, occupation, industry of employment, marital status, and region of residence. Information about households' educational attainments are not collected.[6] FIES is a data source for the expenditures weighting used to construct Japan's consumption price index and for the private consumption series in GDP. We investigate data only for households of two or more members, such as couples and extended families.[7] The survey contains approximately 8,000 households per month and has a panel structure.[8] A surveyed household typically reports monthly earnings and expenditures for a maximum of six consecutive months. The sampled households overlap, and one-sixth of the total sample is generally replaced by new households each month.

Compared with micro-surveys in other countries, such as *the Panel Study of Income Dynamics* and *the Consumer Expenditure Survey* in the U.S., FIES has the following characteristics. First, the data frequency is monthly, allowing us to study variations in inequality resulting from business cycles. Second, each households is surveyed no

[5]Kohara and Ohtake (2006) argue that FIES and NSFIE do not cover some high-income households because their opportunity cost of participating in these surveys is relatively high compared with other surveys. See Kohara and Ohtake (2006) for a discussion about the distinction between NSFIE and other surveys.

[6]For details of FIES, see also Stephens and Unayama (2011).

[7]We exclude single households from our analysis because FIES has collected data for single households only after 2002. In addition, after 2002, FIES began to collect data for household savings and debt. Because we focus on the long-run development of the asset that is comparable to the development of income and the consumption, we use NSFIE data instead of FIES to analyze asset holdings.

[8]FIES does not assign household IDs. Following Unayama (2011), we identify households by the city/town/village code, the area block code, the household ID within the area block, and the "serial household ID,".

longer than six months. As a result, annual growth rates for earnings and consumption expenditures, which are used in estimating income dynamics and the size of idiosyncratic risks in the literature (e.g., Storesletten et al., 2004a), are not available. Because monthly data incur seasonality, there is need to seasonally adjust the series.

2.2 NSFIE

NSFIE provides detailed cross-sectional, household-level data about income, expenditures, and wealth. This survey has been conducted every five years since 1959 and has a sample of approximately 60,000 households for each survey year. Interviews occur in September, October, and November for households with more than two members, and in October and November for one-person households. During the interview periods, respondent households are asked to record their income and expenditures in account books.

NSFIE reports two types of income data: annual income, referring to the past 12 months from the November interview, and monthly income, computed as the average income over the three months for households with two or more members and over the two months for one-person households. Unlike FIES, NSFIE provides detailed information for annual income, which enables us to construct annual labor earnings, pre-government income, and pre-government income plus social security benefits. However, NSFIE provides no data concerning annual taxes paid. Monthly income data are very detailed; using monthly income variables, one can construct disposable income.

As with monthly income, household expenditure data are available at a component level and refer to averages over the interview periods described above. In addition, NSFIE provides detailed information about household balance sheets. We use the information concerning household financial assets and liabilities and document several aspects of the cross-sectional distribution of net financial wealth below.

NSFIE provides a standard set of household characteristics, including household members' ages, gender, occupation, industry of employment, marital status, and region of residence. However, as with FIES, NSFIE does not collect information about households' educational attainments.

2.3 Target Variables: FIES and NSFIE

The analysis below focuses on inequality in earnings, income, expenditures, and assets. In defining these variables, we follow Heathcote, Perri, and Violante (2010) to enable cross-country comparisons. We construct variables step-by-step from a budget

constraint:

$$\begin{aligned} c + a' &= y_L + (1+r)a + b + T, \\ y_L^+ &\equiv y_L + b, \\ y &\equiv y_L + b + ra, \\ y_D &\equiv y_L + b + ra + T, \end{aligned}$$

where c is consumption, a is beginning-of-period assets, a' is end-of-period assets, r is the real interest rate, y^L is earnings, b is private transfers, and T is net public transfers. In addition, y_L^+, y, and y_D are income measures. Note that y and y_D are pre-government income and disposable income.

- y_L: To construct labor earning, we aggregate monthly earnings by each household head, his/her spouse and other household members. Earnings includes regular salary (010), temporary salaries (011), bonuses of the household head (012), salaries of spouse (013), salaries of other household members (014), and piecework (021).[9]

- y_L^+: To construct this series, we add private transfer to y_L. Private transfers consist of remittances (033) and gifts (032).

- y: To construct pre-government income, we add asset income ($-ra$ in the budget constraint) to y_L^+. Asset income includes house rents (022), property income (030), and income from self-employment (020).[10]

- y_D: To construct disposable income, we add public transfers, such as public pension (034,035), minus tax to y. Taxes consist of earned income taxes (070), residence taxes (075), other taxes (071), and social insurance premiums (073, 074, 076, and 078) such as public pension insurance, health insurance, and nursing care insurance.

- c_{ND}: As the measure of consumption we choose nondurable expenditure, defined in a manner similar to Heathcote, Perri, and Violante. (2010). Nondurable expenditure includes food (1), repair and maintenance (2.2), fuel, light and water charges (3), domestic utensils (4.4), domestic nondurable goods (4.5), domestic services

[9]The number in the parenthesis denotes the corresponding FIES classification table code (income) and item code (expenditure).

[10]FIES began collecting data for households engaged in agriculture, forestry and fisheries only after 1999. We exclude data for these households so that our analysis is unaffected by the compositional change in households' industry.

(4.6), clothing and footwear (5), medical care (6), transportation and communication (7) (excluding purchase of vehicles (7.2.1) and bicycles (7.2.2)), education (8), culture and recreation (9) (excluding recreation durable goods (9.1)) and other consumption expenditures (10) (excluding remittance (10.4)).

2.4 Adjustment for Seasonality: FIES

FIES monthly income and expenditure data exhibit seasonality. The upper panels of Figure 2 plot average earnings and nondurable expenditure. As the figure shows, average earnings is higher in June, July, and December because the majority of households receive bonuses during these months. Nondurable expenditure is higher in July and December because they include extended vacation seasons. Also, Japan's academic and fiscal years start in April; in March, households typically expend more for tuition and preparation for a new academic year.

Given that facts about inequality in other countries are documented with annual frequency, it is important when making international comparisons to control for seasonality in our data. To do so, we take averages of our income and consumption variables over the six-month period in the FIES, controlling for the effects of biannual bonuses. Note, however, that the sample size diminishes as we drop households that did not complete six months of surveys. The lower panels of Figure 2 display six-month averages of earnings and nondurable expenditure. Seasonality patterns flatten for both earnings and nondurable expenditure, although weak seasonality in expenditure remains.[11] We mainly use the six-month average when computing inequality over time and life cycles.

2.5 Other Adjustments: FIES and NSFIE

Besides seasonal adjustments, we make three adjustments to the original series for both FIES and NSFIE. First, because we focus on the inequality of variables in real terms, we construct the real series using the common deflator, aggregate CPI, while all surveyed series are reported in nominal terms. Second, following Heathcote, Perri, and Violante (2010), we employ the OECD measure to obtain the equivalent scale for income and consumption. Third, when we construct quarterly series of the data used in Section 3.3, we drop from the sample households that were not interviewed for three consecutive months in each quarter.

[11] Following, Hayashi (1997), we estimate several inequality measures by computing deviations from year- and month-specific averages as an alternate seasonal adjustment of data. The results differ little from those obtained under six-month averages.

2.6 Sample Selection: FIES and NSFIE

Tables 1 and 2 report our sample selection. For comparisons between averages in FIES and NSFIE and the corresponding SNA values, we use the whole sample, which we call "Sample A."

To document inequality measures, we select an FIES sample as follows. First, we exclude households that did not complete their six-month survey period because we use variables representing six-month averages of income and consumption to control for seasonality. Second, we exclude those younger than 25 or older than 60 as households head. Third, we exclude households whose head is self-employed or unemployed.[12] This is because the FIES survey does not collect the data of the monthly earnings/income for self-employed or unemployed.[13] Finally, we exclude households with missing or non-positive earnings, income, or nondurable expenditures. We call this benchmark sample "Sample B."

In Section 3.3, we conduct time-series analysis making use of quarterly series of inequalities. For the calculation we use households that completed surveys for consecutive three months. We call this sample "Sample F."

For NSFIE data, we construct Samples A and B in the same manner as with FIES. To document inequality of wealth, we use the sample of households that completed their interviews and whose head is of working age. We call this sample "Sample N."

As described in Section 2.2, monthly earnings/income variables in the NSFIE cover only the period from September to November (for households with more than two members) or October to November (for one-person households), thus omitting most bonuses for households. Because bonuses are major sources of cross-sectional variation in earnings in Japan, measures of inequality in monthly earnings/income are likely to be biased downward in the NSFIE. Moreover, to the extent that households anticipate the amount of bonuses, their consumption should reflect the variation in bonuses. In this respect, measures of inequality in earnings/income and nondurable expenditures are not comparable in the NSFIE. For these reasons, we document changes in measures of inequality in earnings/income/consumption over time and life cycles using Sample B of FIES.

[12]Here, the definition of "household head" parallels the FIES survey–i.e., the household's primary income-earner or the first person named in the list of household members.

[13]All households, including those headed by the self-employed or unemployed, report their annual income in both FIES and NSFIE. Using detailed annual earnings/income data from NSFIE, we report several inequality measures for alternative samples. The level of inequality is substantially higher when we include self-employed and unemployed persons. However, intertemporal changes in inequality measures resemble those observed in our benchmark sample. See the Appendix for details

2.7 Summary Statistics: FIES and NSFIE

Tables 3 and 4 document the summary statistics for data from interviewed households reported in FIES and NSFIE. Summarized data include average age of the household head,[14] average family size, the number of adults and children, percentage of households in Japan's three major metropolitan areas, average annual income (nominal), average total expenditures (nominal), average food expenditures (nominal), average nondurable goods expenditures (nominal), and the sample size.

2.8 Comparison with Japanese System of National Accounts

Before analyzing inequalities in income, consumption, and wealth, we examine how well the time paths of the mean of these variables, calculated using FIES and NSFIE data, track the time path of comparable series in the National Accounts (SNA). In addition, we compare the three series of the employment-to-population ratio on the basis of our two-survey data and the official Labour Force Survey (LFS) to see if our dataset captures the general pattern of labor market conditions shown in the aggregate statistics.

Figure 3 displays the labor earnings and nondurable consumption series taken from our two surveys and the SNA. The three series commonly show that growth rates of earnings and consumption were high during the 1980s and fell in subsequent periods, although the timing of the slowdown is slightly earlier in the SNA than in our two-survey series. Regarding the levels of the time path, our two-survey series are, in general, substantially smaller than those of SNA. Regarding the growth rate of the time path, our two-survey series are comparable to the SNA. The correlation of growth rates between FIES and SNA are 0.8 and 0.7 for earnings and consumption.

Figure 4 displays the employment-to-population ratio from our two-survey data and the LFS. In the left panel, the population is defined as persons aged 15 and older, and in the right panel the population is defined as the working-age population. It is noteworthy that the long-run trend in the left panel is positive because of Japan's growing numbers of retirees, whereas the trend in the right panel is negative. Our two-survey data capture the general time path pattern of the LFS in both panels.

[14] Following *the Review of Economic Dynamics* project, we define the head of each household as the oldest working-age male (25–60) in the household. If there are multiple working-age males of the same age, we choose the earliest listed household members. If there is no male in the household, we choose the oldest working-age female. In there is a tie, we identify the female who appears earlier in the list of household members as the head of the household.

3 Developments of Inequality over Time

This section documents developments among inequalities in income, consumption, and wealth for Japanese households from the 1980s to the 2000s. Our results for income and consumption inequality are based on FIES unless otherwise noted. Results associated with wealth inequality are based on NSFIE.

3.1 Earnings/Income Inequality

Development of earnings inequality

Figure 5 displays inequality of equivalized earnings measured by the variance of the log, the Gini coefficient, the 50th–10th percentile ratio, and the 90th–10th percentile ratio. The dotted vertical line denotes the period of bubble burst and outbreak of banking crisis in 1991 and 1997. The four inequality measures indicate the increase in inequality over the sample period. In particular, the variance of logs, the Gini coefficient, and the 50th–10th percentile ratio grow faster over the sample period compared with the 90th–50th percentile ratio, indicating that increases in inequality in earnings occur less often among low-income quantiles. The growth rate of inequality in earnings differs across the sample period. For instance, on average, the variance of log increases by 97×10^{-3}, 33×10^{-3}, and 1×10^{-4} points per year during the 1980s, 1990s, and the 2000s, respectively. The Gini displays a similar pattern, attaining its highest growth rate during the 1980s and slowing down during subsequent periods. Regarding the consequences of the bubble burst and the banking crisis on inequality in earnings, Figure 5 suggests the latter crisis had a comparatively large impact. Before the banking crisis started in November 1997, the inequality in earnings was stable. It began to rise after 1998, in both variance of log and Gini, and it peaked during the mid-2000s, when governmental initiatives more or less restored functionality in the financial system.[15]

To present the evolution of inequality in earnings in greater detail, Figure 6, plots the mean earnings of households in five earning quantiles. The time paths of earnings among the three highest-quantile households evolve differently from those of low-quantile households over the sample period, leading to period-by-period changes in inequality of earnings. During the 1980s when Japan's economy grew steadily, the increase in earnings inequality primarily arose through disproportionately rapid earnings growth among high-quantile households. Earnings of the highest-quantile households then grew by about 3×10^{-2} points yearly, whereas earnings of the lowest-quantile households grew

[15] According to Hoshi and Kashyap (2011), Japan's economy reverted to recovery from the banking crisis in 2003, thanks to recapitalization of the banks. They also point out, however, that banks could not increase revenues by themselves until after 2006.

by about -1$\times 10^{-3}$ points yearly, yielding a large increase in inequality. There is little evidence that the bubble burst in 1991 widened inequality in earnings. Instead, earnings growth of high-quantile households started to slow down in 1992, while earnings of low-earning households increased slightly, mitigating the inequality in earnings. For instance, during the period between the bubble burst and the banking crisis, earnings of the highest-earning households and those of the low-quantile households both grew by about .015 points per year. Inequality in earnings widened again from the latter-1990s. The crisis disproportionately dampened earnings of low-quantile households. From 1997 to 2003, while earnings of the highest-earning households declined by about 3×10^{-3} points yearly, those of the lowest-quantile households declined by about 2×10^{-2} points yearly. Kawaguchi and Mori (2008) also call attention to the widening of earnings inequality after 1997, which was driven in their analysis by low-wage male workers.[16]

Source of earnings inequality

To see the causes behind the increase in earnings inequality, following Heathcote, Perri, and Violante (2010), we decompose the inequality into the portion accounted for by observed characteristics, including family type $D^f_{i,t}$, age $f_t(A_{i,t})$, occupation $D^o_{i,t}$, region $D^r_{i,t}$, and the rest $\epsilon^y_{i,t}$ by the following equation:

$$\ln y_{i,t} = D^y_t + \beta_{1,t} D^f_{i,t} + f_t(A_{i,t}) + \beta_{2,t} D^o_{i,t} + \beta_{3,t} D^r_{i,t} + \epsilon^y_{i,t}, \tag{1}$$

Family type classifies households into (1) married couple without children, (2) married couple with children, (3) single father, (4) single mother, and (5) others. Occupation classifies households by household's head's occupation into (1) regular workers, (2) temporary workers, (3) working at private company, (4) working at public company, and (5) not employed. While existing studies focus on the educational attainment, the FIES does not collect the households' educational data.

The left panel of Figure 7 displays the raw series of earnings, equivalized earnings, and the residual—that portion of equivalized earnings not accounted for by observed characteristics. The right panel of Figure 7 displays the portion of earnings accounted for by each of the observed characteristics. The small discrepancy between the equivalized series and the residual implies that the bulk of the inequality in earnings is attributable to within-group inequality. The discrepancy, however, increases over time and accelerates around the mid-1990s, indicating that observed characteristics cause some of the

[16]Shifts in earnings of low-quantile households after the banking crisis, shown in Figure 6, coincide with the findings of Kuroda and Yamamoto (2005). They document that downward rigidity in nominal wages, which was prevalent in Japan's labor market until 1997, began to diminish around 1997 when firms needed to reduce costs during the deepening recession.

increased inequality. The two quantitatively most important observed characteristics are family type and occupation.

During the 1980s, within-group inequality contributed to more than 90% of the increase in inequality in earnings, indicating that the increasing dispersion in earnings then occurred commonly across households. During this period of Japan's bubble era, inequalities in earnings stemming from family type and region also increased, although their quantitative roles were limited. Within-group inequality grew little between the burst of the bubble and the banking crisis, while between-group inequality stemming from family type increased slightly, leading to a moderate increase in earnings inequality. After the banking crisis, between-group inequality stemming from occupation and within-group inequality began to rise. Consequently, earnings inequality widened.[17]

3.2 From Income Inequality to Consumption Inequality

This section first discusses how inequality in earnings translated into inequality of disposable income through taxes and public transfers by the government sector. It then discusses how inequality in disposable income translated into inequality in consumption.

From earnings to disposable income

Figure 8 displays inequalities in households' labor earnings, pre-government nonfinancial income, pre-government income, disposable income, and nondurable consumption expenditures. Figure 9 displays the inequality in pre-government income, pre-government income minus taxes, pre-government income plus public transfers, and disposable income, in terms of variance of log and Gini. The discrepancy between inequality of pre-government income and inequality of disposable income captures the impact of redistribution policy. The average discrepancy is .05 in variance of log and .024 in Gini coefficients, and it widens monotonically over the sample period for both measures of inequality. This suggests that government policy was quantitatively important in mitigating the inequality in pre-government income and that its significance increased. In particular, during the current years, public transfers became the dominant device for mitigating inequalities in pre-government income. For both variance of log and Gini, the discrepancy between pre-government income and income adjusted for public trans-

[17] Admittedly, a portion of the within-group inequality in earnings shown here might be attributed to between-group inequality stemming from education and experience while our data set does not include information about such variables. By contrast, the literature often discusses how uneven distribution of human capital may create income inequality. Focusing on inequality in Spain, Pijoan-Mas and Sanchez-Marcos (2010) document that a decline in the college premium is the main driver of the decrease in income and consumption inequality from the 1980s to the 2000s. Kawaguchi and Mori (2008) claim that a secular increase of wage in high-income households is attributed to the skill upgrading of workers.

fers increased slowly, but monotonically. In variance of log, for instance, the average discrepancies during the 1980s, 1990s, and 2000s, are .010, .024, and .038, respectively. A reason behind this observation is an increase in social benefits paid to households as members of the sampled families aged.[18]

By contrast, the tax system has became less important in curbing inequalities over time. In variance of log, the average discrepancies between pre-government income and income adjusted for taxes during the 1980s, 1990s, and 2000s, are .027, .025, and .013, respectively. This finding is consistent with Kitamura and Miyazaki (2012), who study changes in the distributional role of Japan's income tax system from 1984 to 2004 on the basis of NSFIE's micro data. Investigating the effects of the three major tax reforms during the sample period, (1) the reduction of the income highest tax rate, together with the softening of the progressivity applied to the middle-income households, that was implemented in 1987 and 1989, (2) the reduction of the highest income tax rate and the number of brackets that were implemented in 1995 and 1999, and (3) the introduction of the fixed-rate cut of income tax and inhabitant tax that has been implemented since 1998[19], they point out that the last two tax reforms significantly contributed to mitigating the distributional effect of the tax system, mainly by reducing tax burdens on high-income households, leading to a secular widening of income inequality.

The resultant inequality of disposable income inherits, to some extent, the time-series property of inequality in pre-government income, although government policy achieves a sizable reduction in inequality of pre-government income. Along with inequality of pre-government income, inequality of disposable income grew almost monotonically over the three decades, with the highest growth rate during the bubble era and the lowest for several years after the bubble burst.

From disposable income and consumption

Now we discuss how inequality of disposable income translated into inequality of consumption. Figure 10 compares the inequality of disposable income and nondurable consumption measured by the variance of log, the Gini coefficient, the 50th–10th percentile ratio, and the 90th–10th percentile ratio. Similar to earlier studies, including Heathcote, Perri, and Violante (2010), the dispersion is smaller in nondurable consumption than in disposable income, suggesting that households adjust their asset holdings to defend somewhat against income shocks. The high growth rate during the 1980s, the

[18]According to SNA, nominal government transfers quadrupled from 1980 to 2008, while nominal GDP merely doubled. Nominal government transfers are the sum of social benefits payable, excluding transfers in kind and net of other current transfers.

[19]The fixed-rate tax cut was partly rescinded in 2006 and abolished in 2007. The widening of discrepancies associated with the tax system from 2005 to 2006 may be attributed to tax reform.

temporary slowdown at the beginning of the 1990s, and the subsequent acceleration in recent years in the disposable income inequality are in general reflected in the nondurable consumption. As shown in the two lower panels, income inequality transitions less into consumption inequality among low-quantile households than among high-quantile households.[20] Income inequality among low-quantile households is more transmittable during the earlier periods of the sample.

Figure 11 and 12 display (1) the decomposition of inequality in consumption into within-group inequality and between-group inequality and (2) the residuals for earnings, disposable income, and nondurable expenditures. Compared to inequality in earnings, the portion of variation in inequality in consumption accounted for by the observed characteristics is small. While the contributions of family type and occupation are sizable in earnings inequality, they play minor role in consumption inequality.

To explore the relationship between disposable income and nondurable consumption, Figure 13 displays the evolution of the means of the two variables for households in five quantiles. Income growth among households in the highest three quantiles is relatively well transmitted into consumption during the bubble era and less transmitted during years following the bubble burst. The growth rates of their income and consumption increase together during the 1980s at a high rate and decelerate after the bubble burst, albeit with different timing. Income grew at positive rate up to the period of the banking crisis and displays no growth during the subsequent period. Consumption ceases to grow immediately after the bubble burst and stagnates thereafter. Among households in the lowest two quantiles, income and consumption were parallel only in several years after the banking crisis. During and after the bubble burst, their income evolved similarly to that of high-quantile households, displaying positive growth, but consumption again evolved weakly, displaying zero or moderately negative growth even during the 1980s. Following the banking crisis, income of these households fell drastically until 2003, when it returned to positive growth. Their consumption dropped before the banking crisis and continued to fall until 2002, when its growth turned slightly positive. A hypothesis in line with this observation is that while shocks to income consists of temporary and permanent components, the effects of each component differs over time and across types of households. For households in higher quantiles, permanent shocks to income may have dominated during the bubble era, whereas for households in lower quantiles the permanent shock may have dominated after the banking crisis.[21]

[20] Finding a similar pattern for low-income households in U.S. data, Heathcote, Perri, and Violante (2010) surmise that low-income households may be subject to temporary income shocks more frequently than high-income households.

[21] Following methodology proposed by Abowd and Card (1989), Abe and Inakura (2008) studied the change in composition over the 1990s and 2000s of income shocks affecting Japanese households headed

Following Blundell and Preston (1998), we next display the time path of log-variance in disposable income and nondurable consumption and their covariance in Figure 14. Log-variance of income and consumption grew at almost the same rate during the 1980s, 1990s, and 2000s, although growth in income inequality slightly exceeded consumption inequality by 1.7×10^{-3} points per year on average. Covariance increased with dispersion in consumption during the 1980s and remained nearly constant afterward, while the dispersion of consumption increased. Although less visible than in the case of the U.K. (Blundell and Etheridge, 2002) and the U.S. (Blundell, Pistaferri, and Preston, 2008), the discrepancy between inequality in disposable income and that in consumption widened after the bubble burst.

Figure 15 displays the covariance between disposable income and consumption and the correlation coefficient of the two variables by household head's age. A general pattern of evolution in the covariance is seen in most the groups of households. Their covariance is the highest during the 1980s and declines slowly during subsequent periods. Exception is households headed by someone older than 50 years. The covariance of those households is higher than any other group and stable over time. For all age groups, the correlation coefficient is high and stable during the bubble era. The coefficient starts to fall during subsequent periods and never reclaims its original level.

3.3 From Time Series Perspectives

To see the quantitative relationship between income and consumption inequality from a time-series perspective, we construct the quarterly series of the log-variance of disposable income and nondurable consumption. The year-over-year growth rates of constructed series are shown in the upper left panel of Figure 16. It is seen from the panel that the two series comoved until the early half of 1990 and slightly diverged in the subsequent periods. Based on the series, we next compute four year rolling variance of the two growth rates shown in the upper right panel. In general, the rolling variance of income inequality is greater than that of consumption inequality, and the discrepancy between the variances widens over time, as the volatility of income inequality grows faster than that of consumption inequality during the current years. The lower left panel displays the recursive coefficient of the ordinary least square regression that includes year-over-year growth rate of inequality in consumption as the dependent variable and that of income inequality as the explanatory variable. The estimated coefficient is large during the bubble era and declines monotonically after the bubble burst. The low right panel

by someone in his or her thirties. They find that the permanent component increases during the latter 1990s and the increase is larger among those with high school rather than college educations.

displays the cross-correlation between year-over-year growth rate of inequality in income in period t and that of income inequality in period $t+j$, for two sub-sample periods, one that covers from 1982Q1 to 1991Q1 and the other that covers the rest. The correlation coefficient between income inequality and consumption inequality is large during the bubble boom, and becomes substantially smaller in the rest of the sample period. All of the four measures, therefore, suggest that the transmission of income inequality into consumption inequality has weakened, particularly after the bubble burst.

3.4 Wealth Inequality

In addition to the income process, the evolution of wealth holdings is important in determining inequality in consumption. In particular, as Figure 1 demonstrates, household wealth fluctuated wildly around the beginning of the 1990s, reflecting the bubble era and its burst, and affected the macroeconomy significantly. Figure 17 displays the ratio of net financial wealth to pre-government income. Figure 18 displays household net worth for five quantiles. Figure 19 displays over five sample years of Gini coefficients, the correlation between wealth and income, the correlation between wealth and consumption, the share of wealth belonging to the top 1% of households, and the share of wealth belonging to the top 5% of households. All data in the figures are based on NSFIE.

During the sample period, net financial wealth grew faster than income. It grew rapidly from 1984 to 1989, slipped for a decade, and grew moderately during the later years. The increase in inequality was driven by high-wealth households in all periods. Low-wealth households display secular declines in wealth, even during the bubble era. The Gini coefficient increased from 1984 to 1989 and fell in 1994, indicating that the bubble burst reduced the dispersion of wealth across households. Wealth inequality began to increase again after 1994. Correlations between wealth and consumption and between wealth and income reached their zenith in 1984, dropped in 1989, and reverted moderately during later years. The two lower panels in Figure **??** display a similar picture. The concentration of wealth advanced from 1984 to 1989, and then receded. The inequality in wealth is somewhat moderate compared to the U.S. and is comparable to Canada. For instance, the Gini coefficient evolves from .60 to .70 in Japan, whereas the Gini coefficient averages .77 in the U.S. (Heathcote, Perri, and Violante, 2010), and .66 in Canada (Brzozowski et al., 2009).

4 Inequality over Life Cycle

Japanese society has become progressively and prominently more elderly during the past three decades. Studying Japanese consumption inequality during the 1980s, Ohtake and Saito (1998) document that inequality increases with age and stress that life cycle differences in inequality are important in explaining the development of aggregate inequality. They also discuss how the Japanese corporate system of layoffs and promotions helps to widen inequality over the life cycle. This section documents life cycle patterns of inequality for income and consumption.

Following Heathcote, Perri, and Violante (2010), we control either time effects or cohort effects in estimating the life cycle properties of inequalities. Figure 20 and 21 document the variance of log of labor earnings, equivalized labor earnings, equivalized disposable income, and equivalized nondurable consumption by age conditional on cohort effects and time effects, respectively.[22] As Heathcote, Perri, and Violante (2010) indicate, estimating the age aspect of inequality is sensitive to how the estimation equation is conditioned. In both time-effect and cohort-effect methodologies, aging leads to greater inequality of income and consumption, although the increase in consumption inequality is less than that in income inequality. As Storesletten, Telmer, and Yaron (2004b) discuss, the observed increase in consumption inequality may suggest that Japanese income inequality is driven by the heterogeneity in income shocks rather than by that in endowed skills. Differences in estimated life cycle patterns of inequality across the two methodologies are, however, small for Japan compared with other countries.

Figure 24 and 25 demonstrate the cohort and time effects from different perspectives. The former figure displays inequality in income and consumption by cohorts born during the 1940s, 1950s, 1960s, and 1970s. Inequality increases with age within cohorts and younger cohorts display higher inequalities than older cohorts, suggesting that cohort effects may not be forceful in generating increasing pattern of life cycle inequalities. The latter figure displays inequalities by time in the 1980s, 1990s, and 2000s. There, inequalities, in general, increases with age and time. It is also seen that the discrepancy between the 1990s and the 1980s is remarkable while that between the 2000s and the 1990s is negligible, suggesting the bubble era greatly affected the development of inequality across households with different ages.

Observed life cycle patterns of income and consumption inequality differ slightly. Income inequality widens monotonically with age. It grows linearly when FIES is used and exhibits convexity when NSFIE is used. The latter pattern is similar to a finding by

[22]The two figures following Figures 22 and 23 display the same series based on NSFIE.

Heathcote, Perri, and Violante (2010). By contrast, inequality in consumption does not increase monotonically. It either maintains the same level of inequality among people in their twenties or falls until their mid forties, and starts to rise during their late forties.

According to the estimation conditional on cohort effects, for all four variables, inequality of elder households exceeds that of younger households. In addition, the discrepancy between inequalities in earnings and consumption are small for younger ages and widen as households get older. As Kitamura and Miyazaki (2012) indicate, because average earnings is generally higher for older households, Japan's income tax is more progressive for older households.

5 Conclusion

This paper has examined development of inequalities in income, consumption, and wealth across Japanese households using two household-level surveys. Our sample period covers Japan's two great economic slumps of the post-war period—the bubble burst in 1991 and the banking crisis in 1997. We found that earnings inequality grew quickly during the 1980s, when Japan's bubble economy was hearty, ceased growing after the bubble burst, and resumed growing during the years after the banking crisis. The bubble burst and the banking crisis affected inequality differently. The former broadly dampened the mean growth rate of earnings across households with different earnings without much affecting the distribution. It was therefore accompanied by a smaller increase in inequality. The latter disproportionately dampened the earnings of low-quantile households, widening inequality across households.

The general pattern of inequality in earnings is transmitted into inequality in consumption, although government policy mitigated the inequality significantly. Inequality in consumption grew quickly during the 1980s, stopped growing for several years after the bubble burst, and resumed growing during the subsequent years. Although the transmission from earnings inequality to consumption inequality is clear during the 1980s, the relationship is less clear during subsequent periods, suggesting a compositional change in transitory and permanent shocks in the income process.

Our result indicates that developments of inequalities have been importantly affected by macroeconomic activities. In addition, it suggests that quantitative relationship between earnings inequality and consumption inequality has changed over time, particularly after bubble burst. In the current analysis, however, we do not focus on connections between households' inequalities and specific macroeconomic variables such as GNP, unemployment rate, and inflation, or do not investigate what changes in macroeconomic

environments played the key role in weakening the income-consumption relationship. Our next step is therefore to formulate a detailed time series analysis, including vector autoregression, making use of monthly and quarterly series of inequalities constructed from FIES together with macroeconomic variables. For instance, we may explore how structural shocks to technology or monetary policy rule affect inequalities through movements of macroeconomic variables, or the connections between compositional changes in households' earnings process and the lost decades. Extending current study to these directions are left for our future research.

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A Appendix

A.1 Comparison Between FIES and NSFIE

For most of the analysis, we use data from the FIES, because we are interested in the changes in income and consumption inequality at the annual or quarterly frequency. However, one of the caveats for using the FIES data is that the sample size is relatively small, which may bias our benchmark results. Therefore, this section examines the robustness of our benchmark results by comparing results from the FIES with those from the NSFIE that has a much larger sample size.[23]

Figures A.1 and A.2 report basic inequalities of equivalized labor earnings and non-durable goods expenditure using the FIES and NSFIE data. In this comparison, we use data on the average earnings and expenditure from September to November in the FIES to make the FIES data comparable to the NSFIE data. Figure A.1 and A.2 show that the levels and trends of inequalities in the two data sets coincide.

A.2 Alternative Sample Selections in NSFIE

In the benchmark samples (Samples B and N in Tables 1 and 2), we drop one-person households and households whose heads are *not* employed as workers in private/government enterprises or establishment (for example, self-employed, unemployed, etc). It is because data for one-person households are only available from 2002 in FIES, and persons who are not employed in enterprises or establishment are not required to report their monthly earnings.

To examine how the sample selection affects our benchmark results, this section examines inequalities in annual pre-government income and non-durable expenditure for alternative samples using the NSFIE data. In this exercise, we use annual income data because data on annual income are available even for those who do not report monthly income. We use data from the NSFIE, because it provides detailed data on annual income and monthly expenditure for all types of households.

Figure A.3 reports the variance of logarithm and Gini coefficient of annual pre-government income for the following four samples. The first sample ('Sample B (Annual)'), shown in a solid line with circles at data points, restricts the sample to households with working-age heads but includes all types of households. The second sample ('Worker'), shown in a dashed line with plus marks, further restricts Sample B (Annual) by excluding households whose heads are not employees. The third sample ('Two more

[23]The sample size of FIES is about 8,000 per month, while the sample size of NSFIE is about 60,000 per year.

members'), shown in a dashed line with crosses, excludes one-person households. The fourth sample ('Worker & Two-more'), shown in a dotted line with triangles, excludes both one-person and non-employee households, which corresponds to our benchmark.

Figure A.3 shows that the levels of the variance of logarithm and the Gini coefficient are substantially higher if one includes other types of households such as singles and households with heads being self-employed or unemployed. For example, the average of the variance of logarithm for Sample B (Annual) is 0.37, while that for the Worker& Two-more sample is 0.25. Although the levels are different, changes in the variance of logarithm and Gini coefficient are similar across the above four samples, except for that the inclusion of one-person households affects the patterns slightly. The variance of logarithm increases by 0.10 point for Sample B (Annual), while it increases by 0.08 point for the Worker & Two-more sample. The Gini coefficient increases by 0.02 point for Sample B (Annual), while it increases by 0.03 point for the Worker & Two-more sample.

Figure A.4 shows the variance of logarithm and the Gini coefficient of nondurable goods expenditure for the above four samples. Like annual pre-government income, the levels of these statistics are higher if one includes one-person households and households whose heads are not employees. Changes are somewhat different across the different samples, though the overall patterns are similar: both the variance of logarithm and Gini coefficient increase between 1984 and 1999 and stay stable or decrease between 1999 and 2004.

B Figures

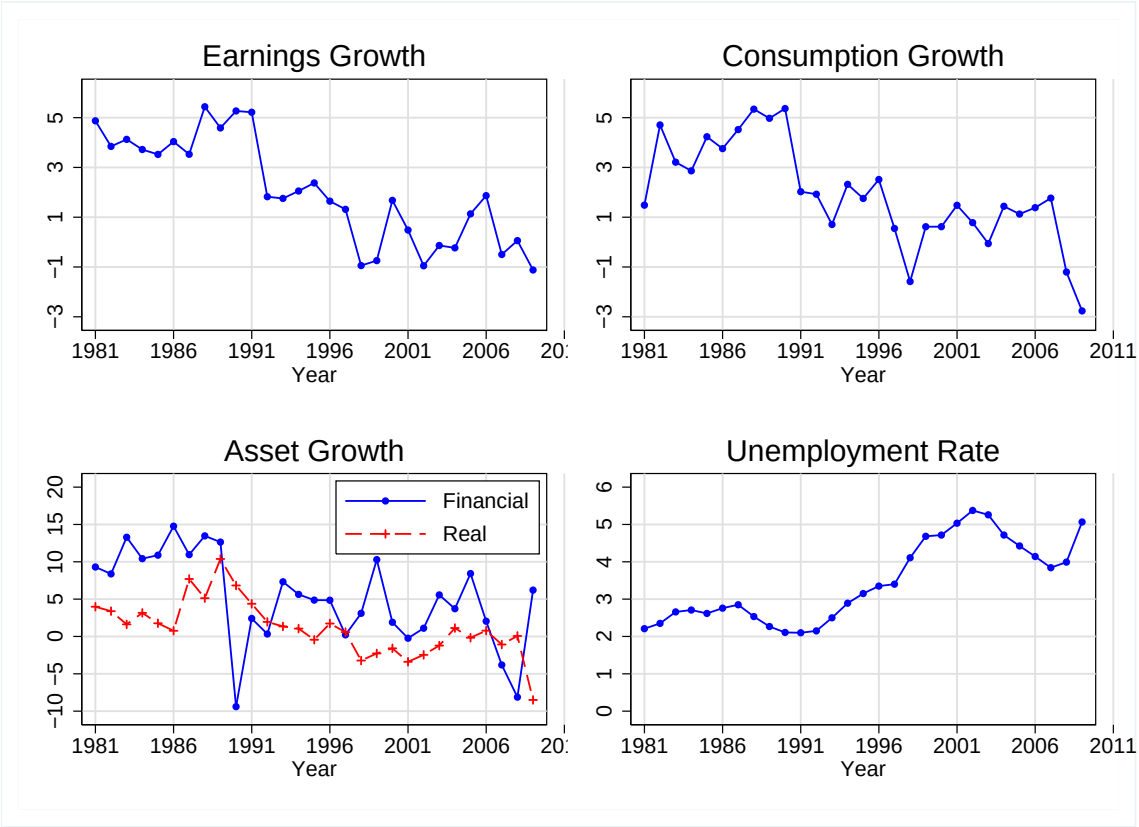

Figure 1: Macroeconomic Statistics in Japan. Source: SNA and the Labor Force Survey. All variables excluding unemployment rate are deflated by the GDP deflator. Earnings growth in the upper left panel is the real growth rate of compensation of employee from SNA. Consumption growth in the upper right panel is the real growth rate in private consumption excluding the imputed rent. Asset growth rates in the lower panel are the growth rate of households' (including private unincorporated enterprises) financial assets subtracting total liabilities and fixed assets respectively. The unemployment rate is from the Labour Force Survey.

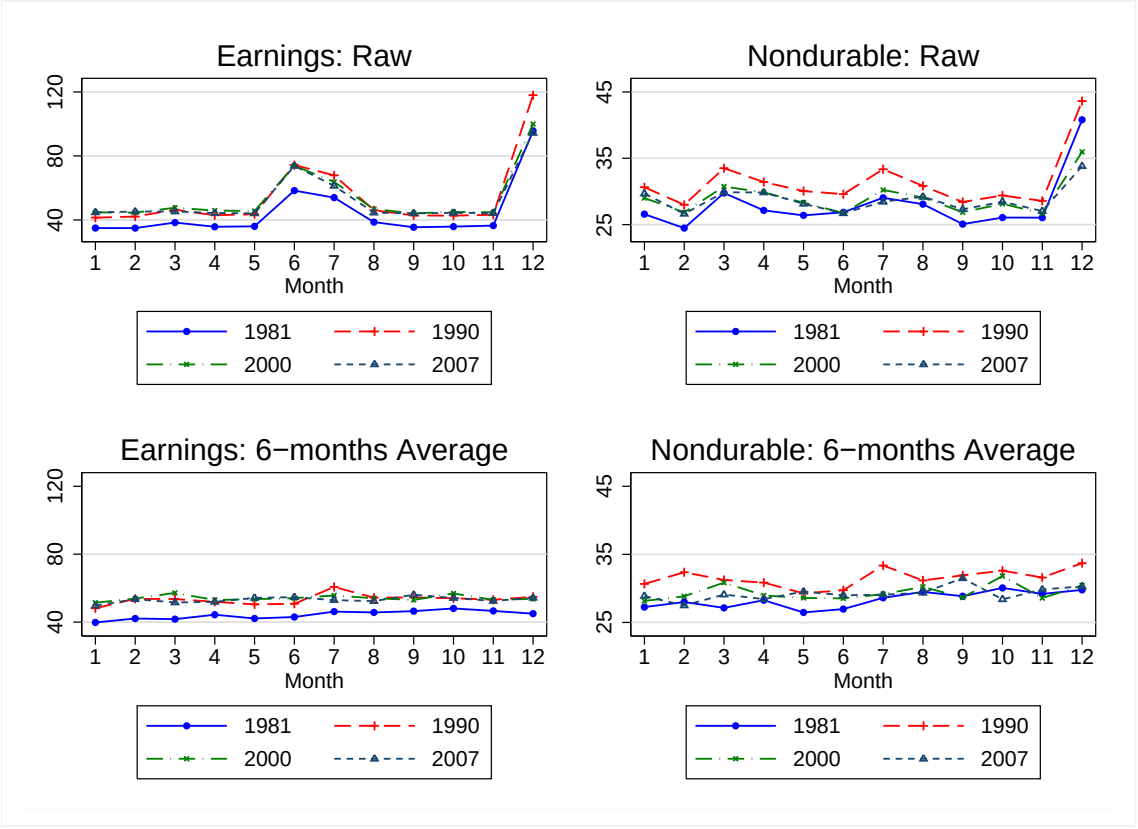

Figure 2: Seasonality in Earnings and Nondurable Expenditure Source: FIES. Unit is 10,000 yen. In the upper two panels, we use non-workers' households without any adjustments. In the lower two panels, we use Sample B. Monthly earnings are higher on June, July, and December because bonuses are paid in these month. Nondurable expenditures are high in March, July, and December.

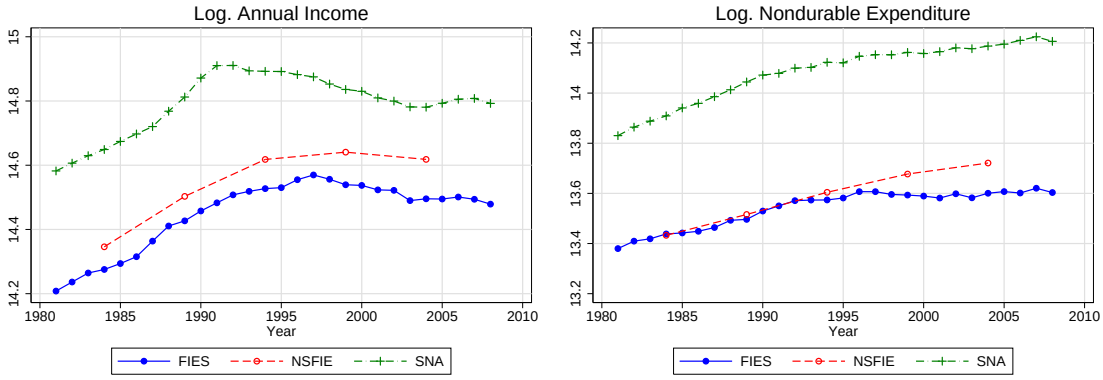

Figure 3: Comparison with SNA. Source: FIES, NSFIE and SNA. The original sample is used. Data are per capita values deflated by CPI. As the annual income for SNA, we use the sum of "wages and salaries", "mixed income", "property income", and "social benefits other than social transfers in kind." As the nondurable expenditure for SNA, we use the sum of "nondurables" and "services".

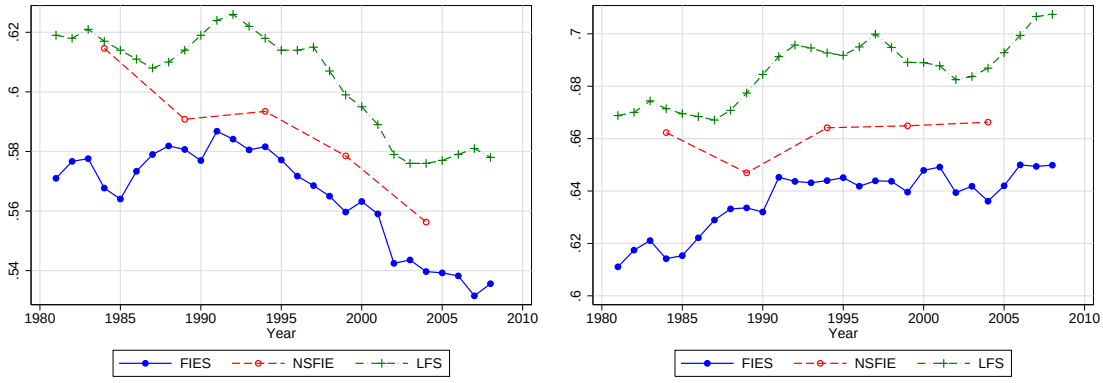

Figure 4: Employment to Population Ratio. Source: FIES, NSFIE and the Labor Force Survey. The original sample is used. Left: The employment to population ratio is defined as the proportion of the working-age population (age 15 and above) that is employed. Rights: The employment to population ratio is defined as the proportion of the working-age population (aged 15-64) that is employed.

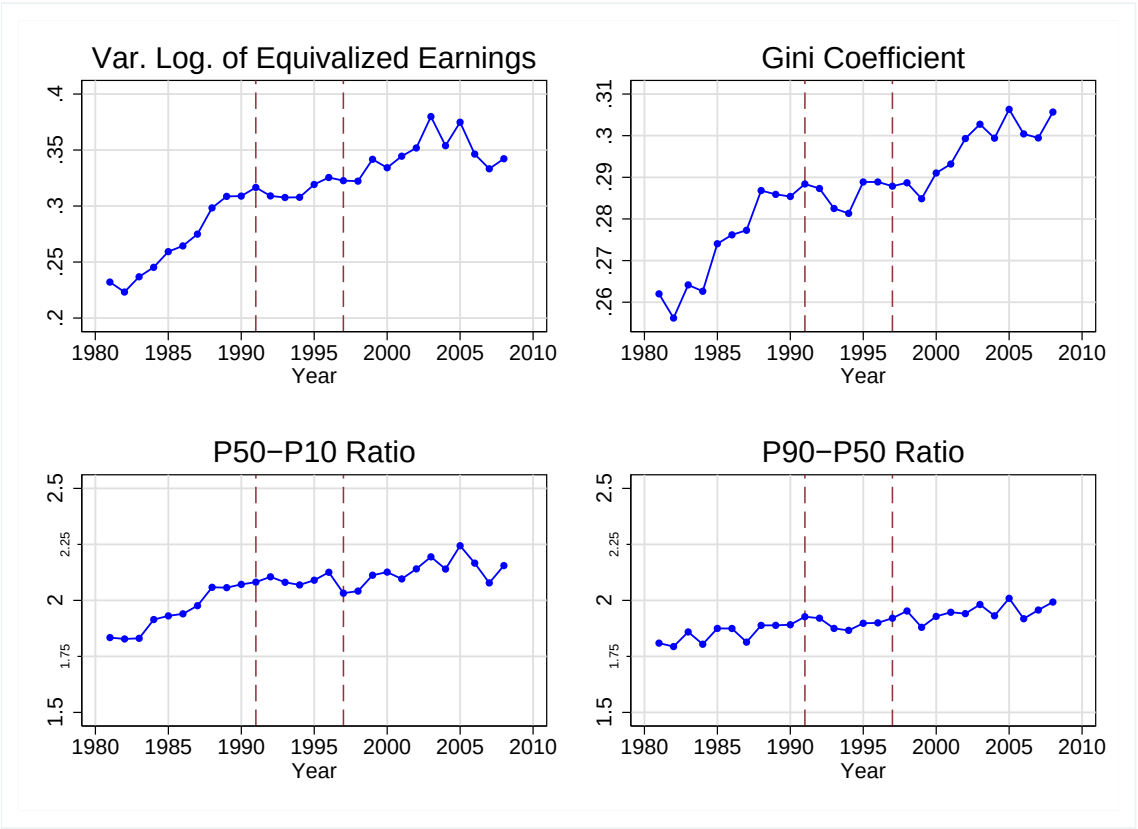

Figure 5: Basic Inequality in Equivalized Earnings. Sample B is used. Dotted vertical lines show the bubble burst (1991Q1) and the banking crisis (1997Q4).

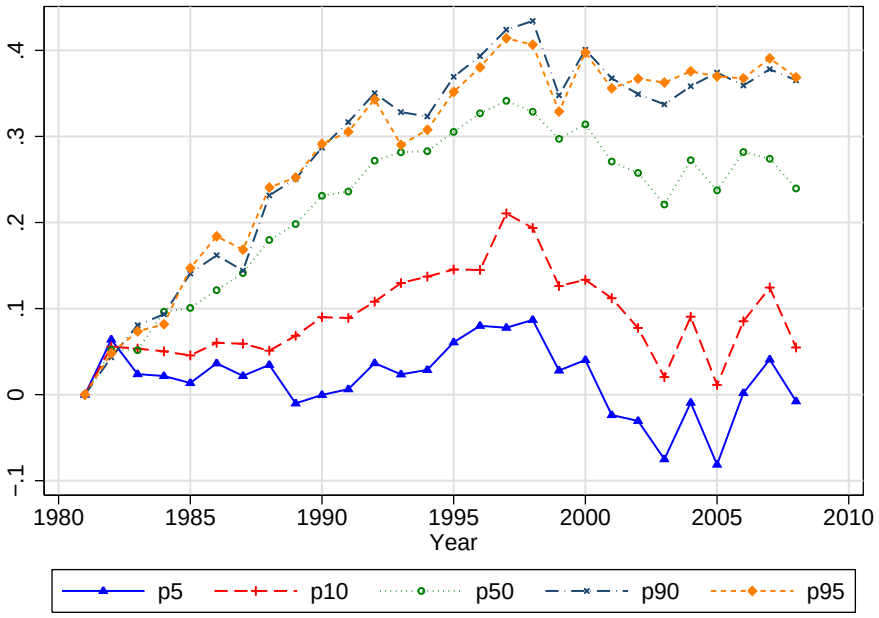

Figure 6: Percentiles of the Equivalized Earnings. Sample B is used. Earnings of each percentile are standardized in 1981.

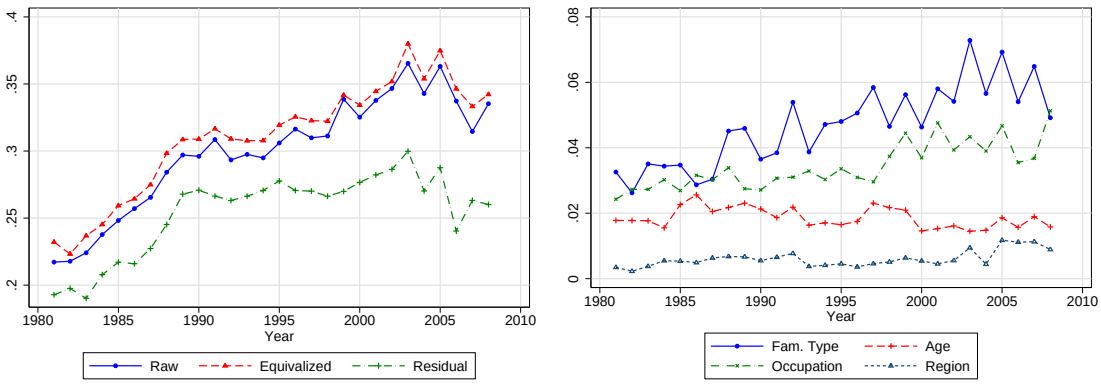

Figure 7: Earnings Inequality and its Decomposition. Sample B is used.

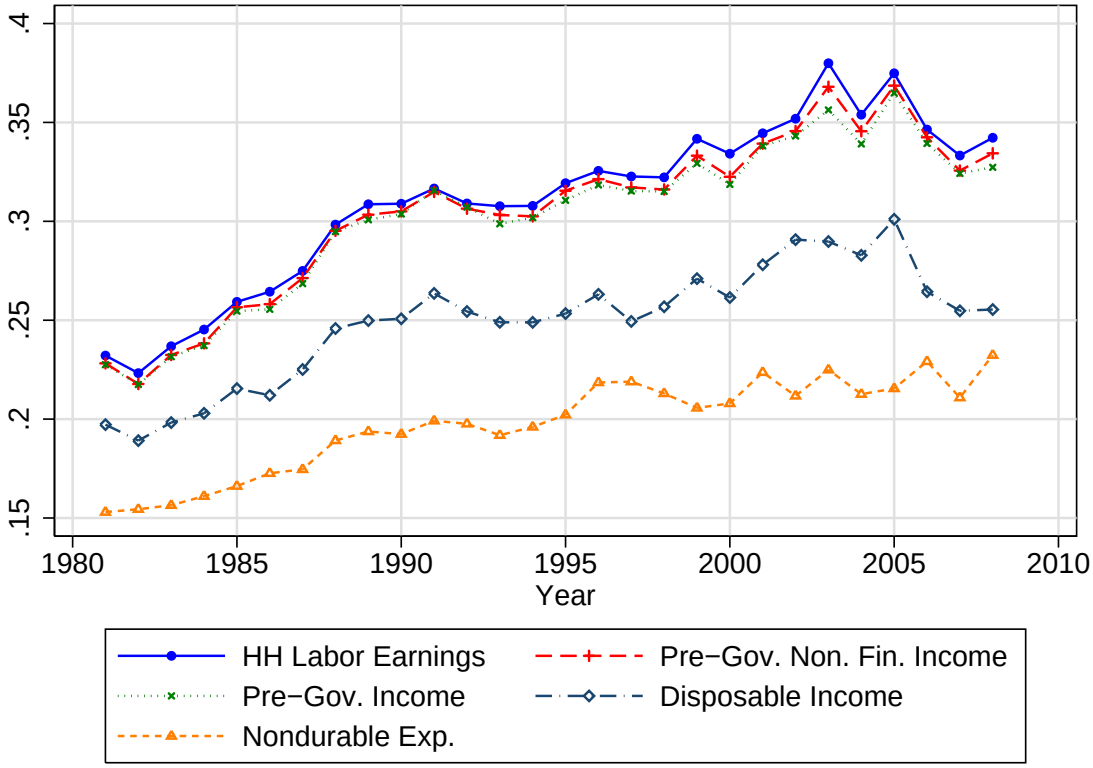

Figure 8: From Earnings to Consumption. Sample B is used.

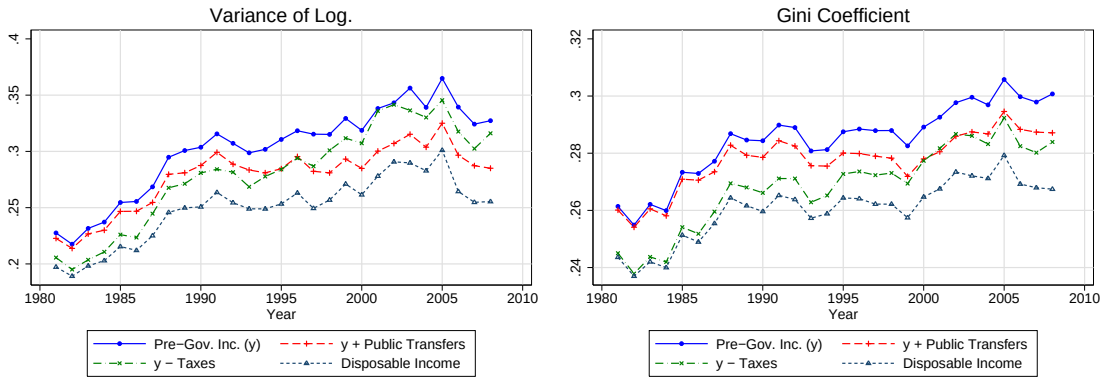

Figure 9: Public Transfers and Taxes. Sample B is used. Public transfers include public pension and other social security benefits. Taxes include income tax, residence tax, and social security payments which include public pension, public health insurance, and long-term nursing care.

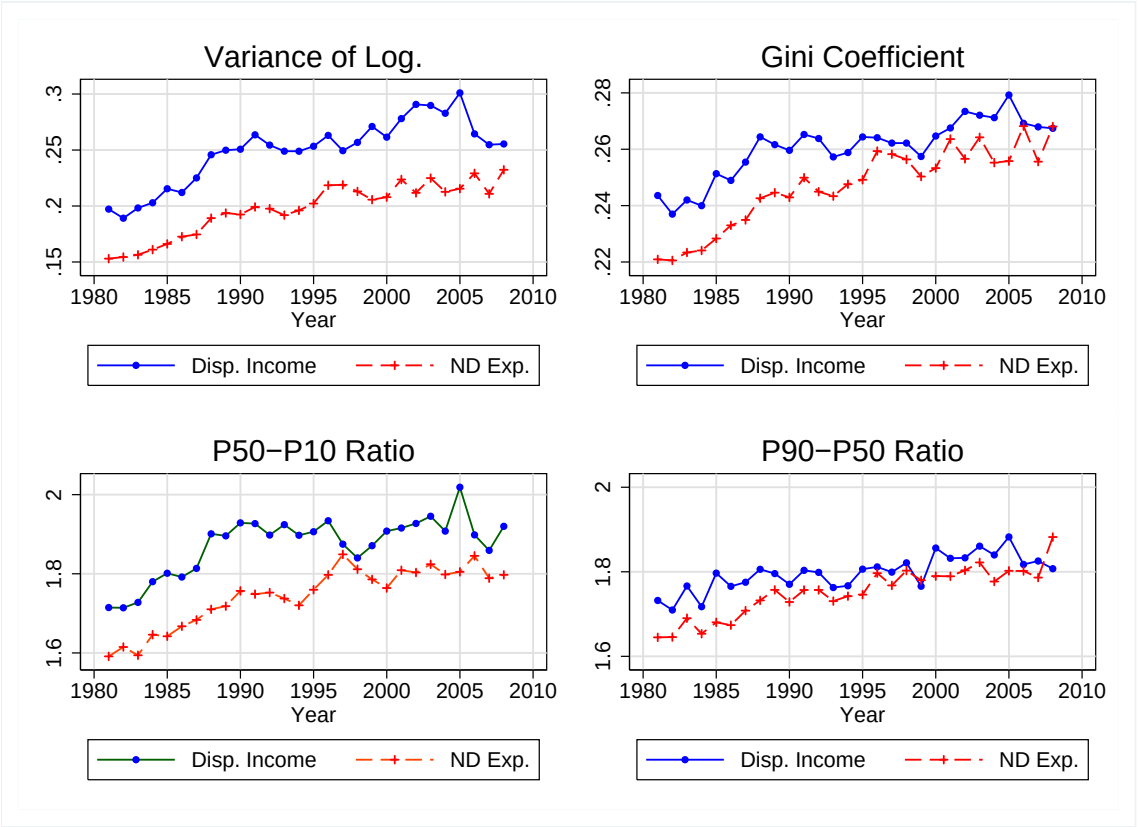

Figure 10: Basic Inequality in Equivalized Disposable Income and Equivalized Nondurable Expenditure. Sample B is used.

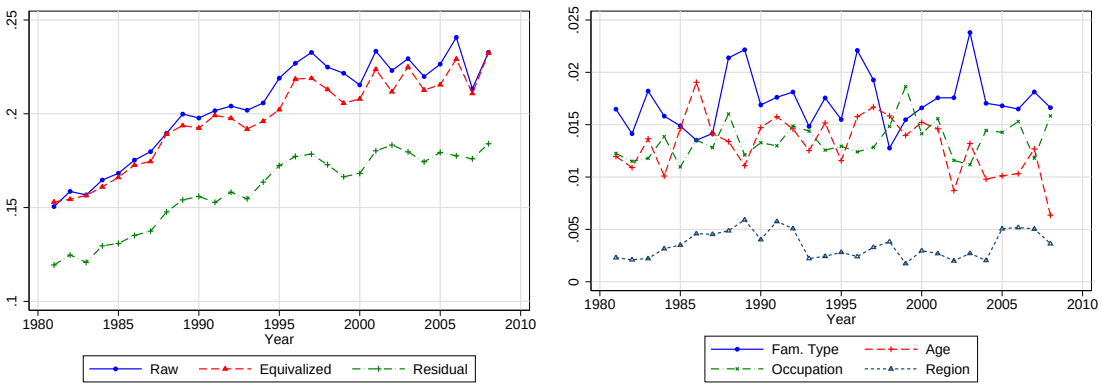

Figure 11: Nondurable Expenditure Inequality and its Decomposition. Sample B is used.

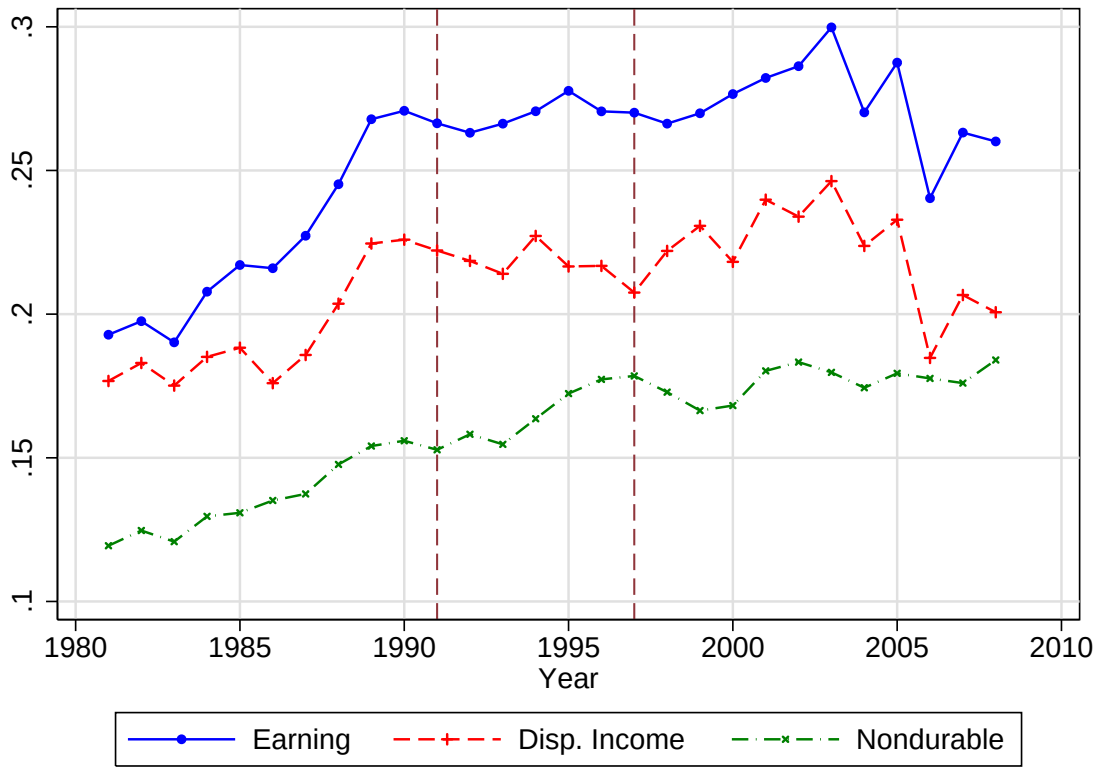

Figure 12: Residuals of Earnings, Disposable Income and Nondurable Expenditure. Sample B is used. Dotted vertical lines show the bubble burst (1991Q1) and the banking crisis (1997Q4).

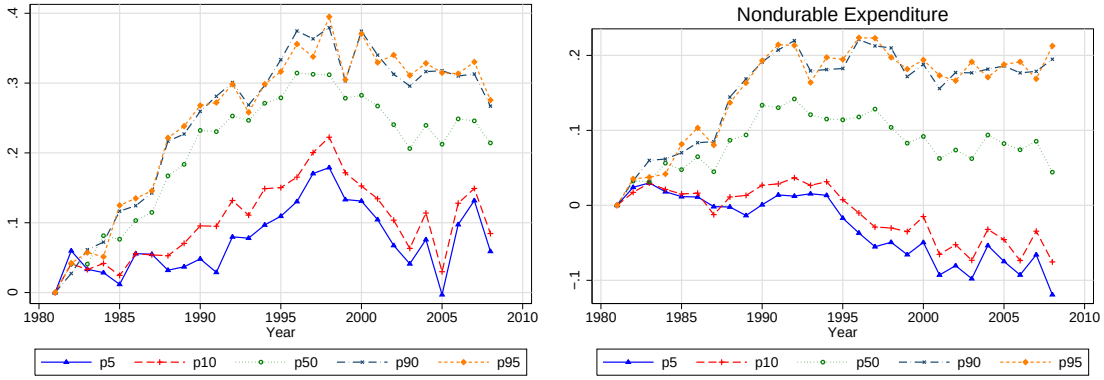

Figure 13: Percentiles of the Equivalized Disposable Income and Equivalized Nondurable Expenditure. Sample B is used.

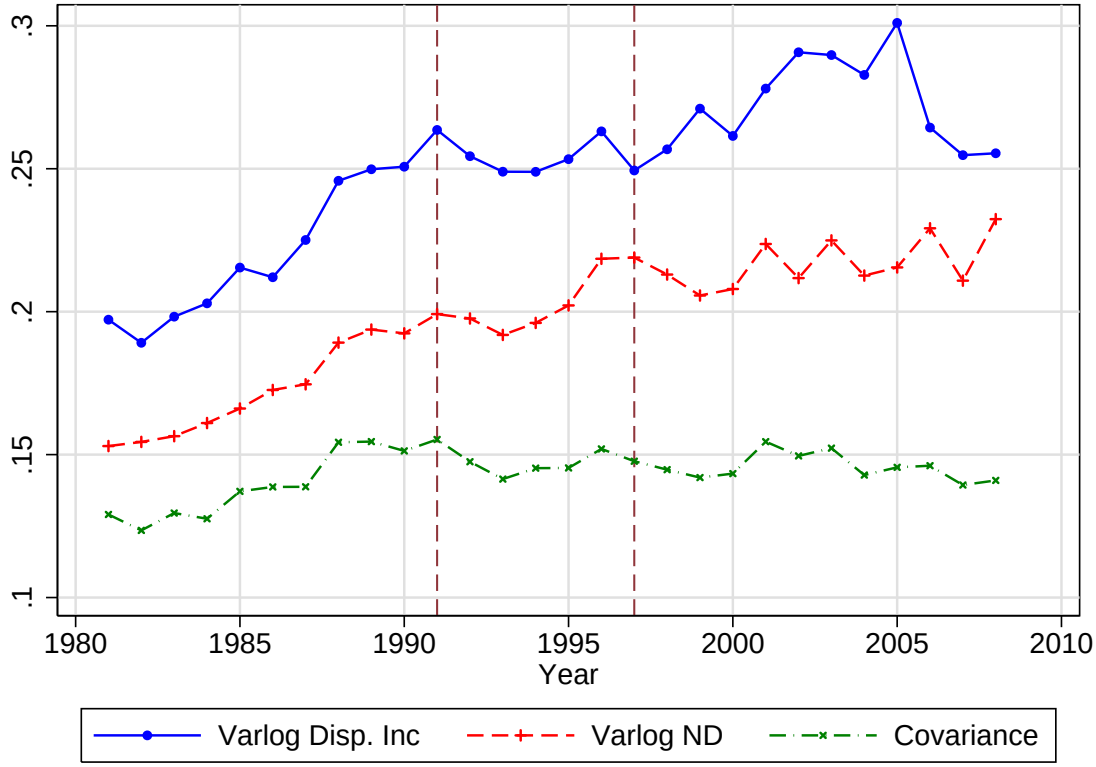

Figure 14: Variance and Covariance of $\ln y_D$ and $\ln c_{ND}$. Sample B is used. Dotted vertical lines show the bubble burst (1991Q1) and the banking crisis (1997Q4).

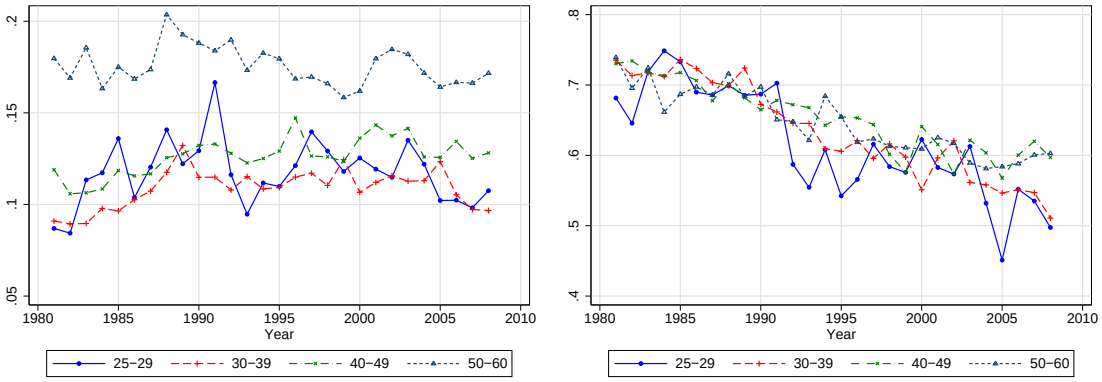

Figure 15: Covariance and Correlation Coefficients of $\ln y_D$ and $\ln c_{ND}$ by Age Group. Sample B is used. Left: covariance. Right: correlation coefficient.

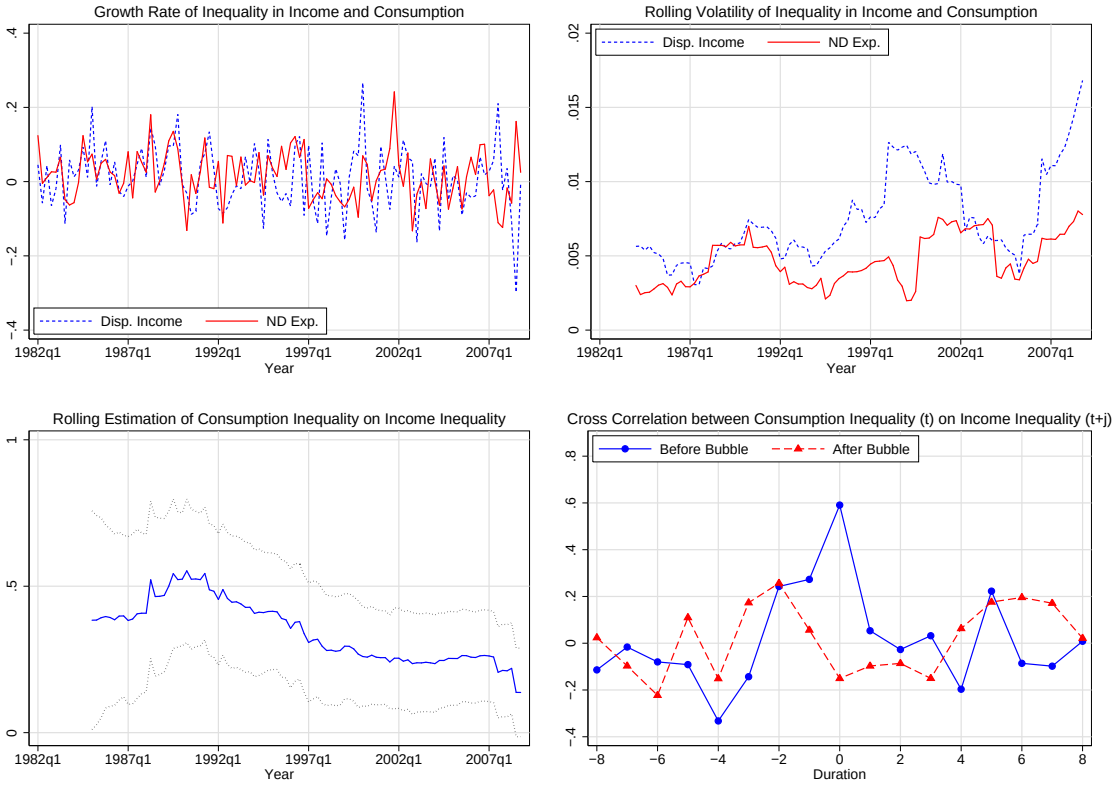

Figure 16: Time-Series Properties of Economic Inequality.

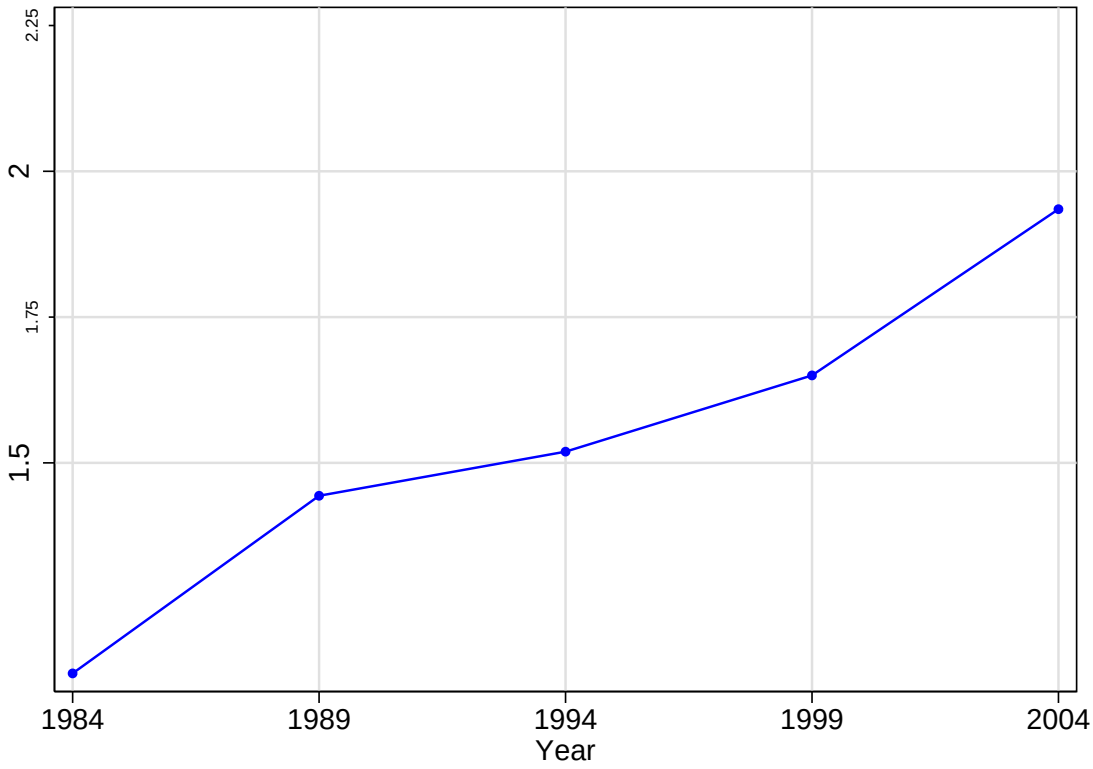

Figure 17: Ratio of Net Financial Wealth to Pre-Government Income. Sample A is used (Source: NSFIE).

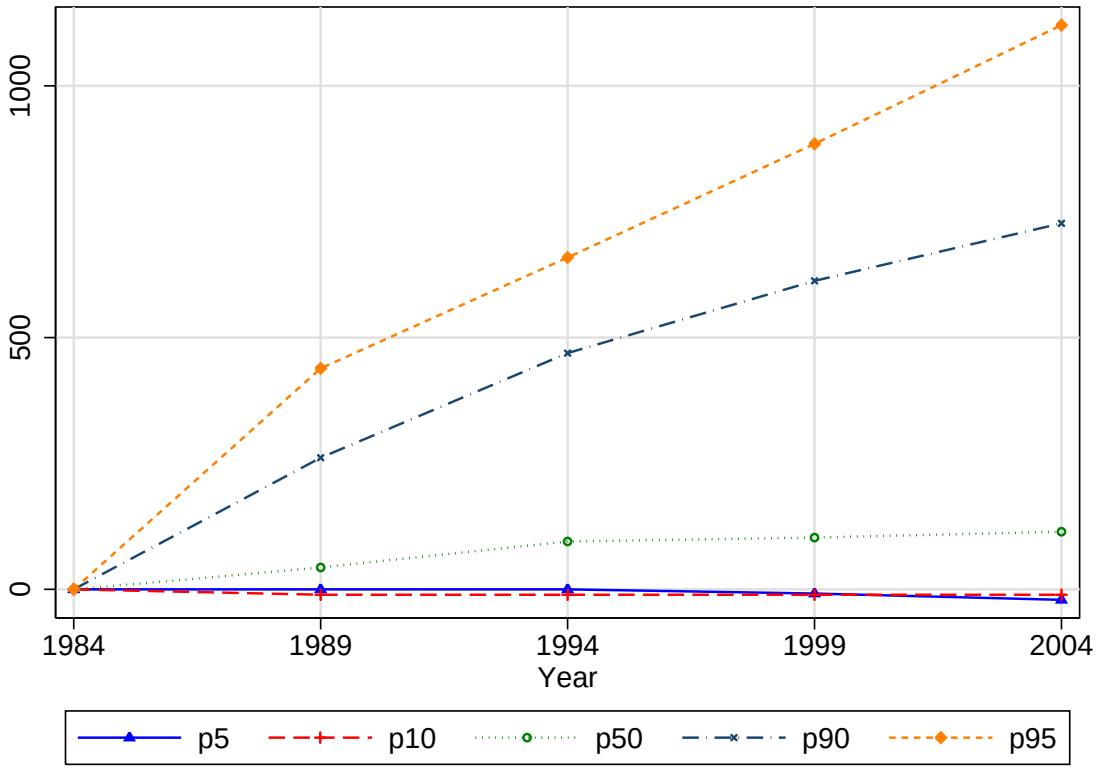

Figure 18: Percentiles of Net Financial Wealth. This figure reports changes in the 5th, 10th, 50th, 90th, and 95th percentiles from their 1984 values. Sample N is used (Source: NSFIE).

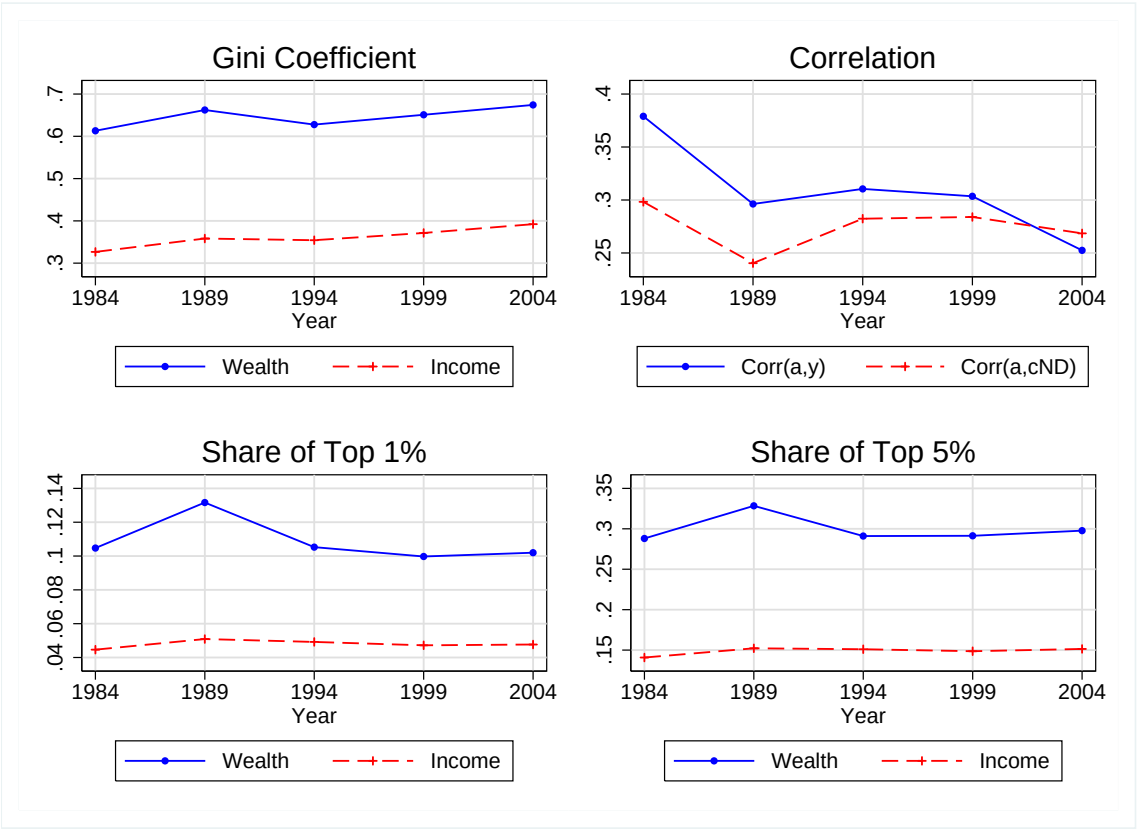

Figure 19: Net Financial Wealth and Pre-Government Income. Sample N is used (Source: NSFIE).

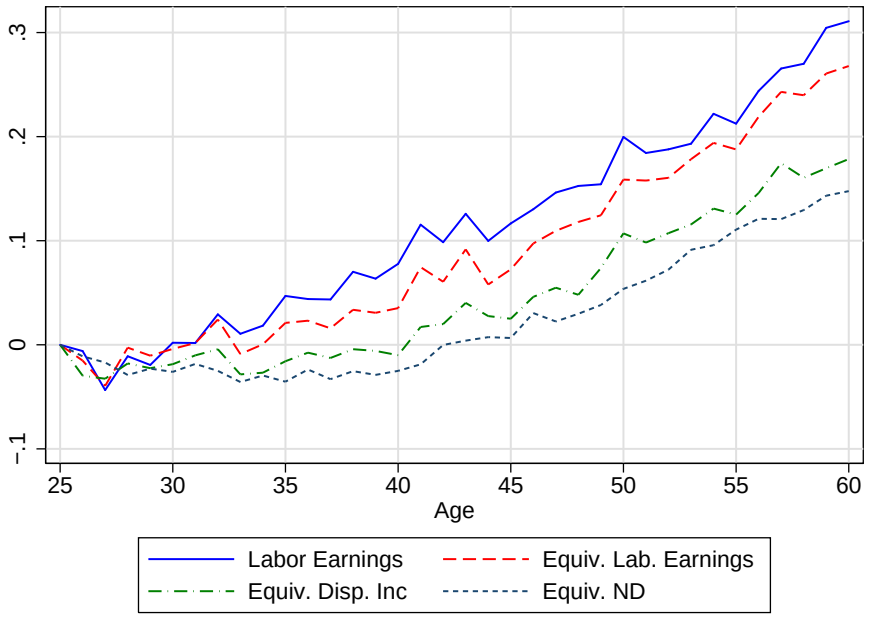

Figure 20: Inequality over Life-Cycle by FIES (Controlling for Cohort Effects). Sample B is used.

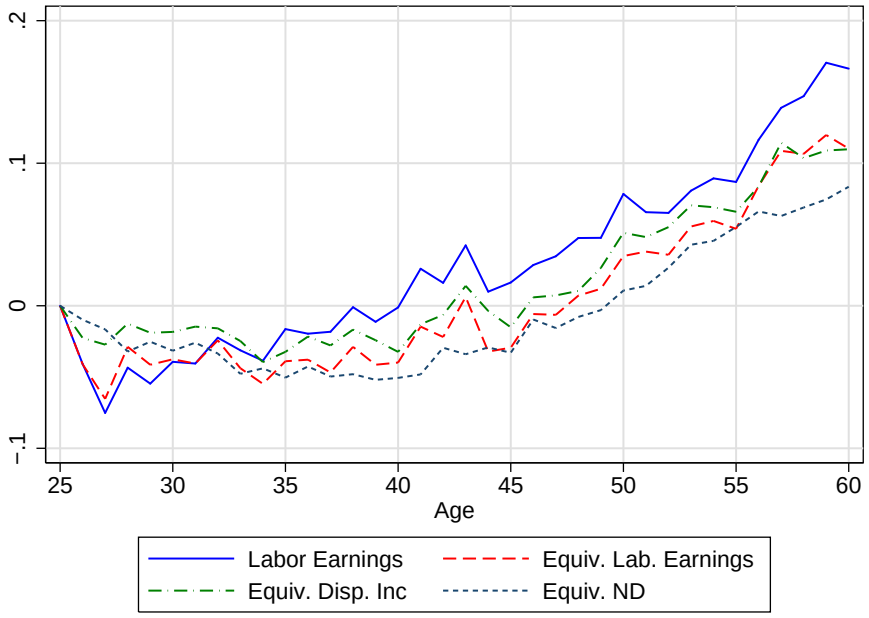

Figure 21: Inequality over Life-Cycle by FIES (Controlling for Time Effects). Sample B is used.

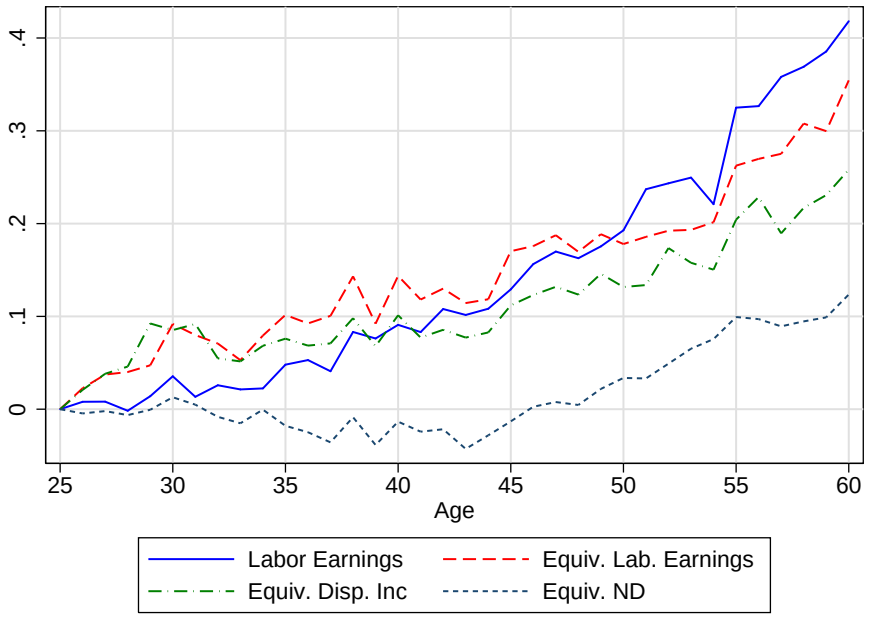

Figure 22: Inequality over Life-Cycle by NSFIE (Controlling for Cohort Effects). Sample B is used.

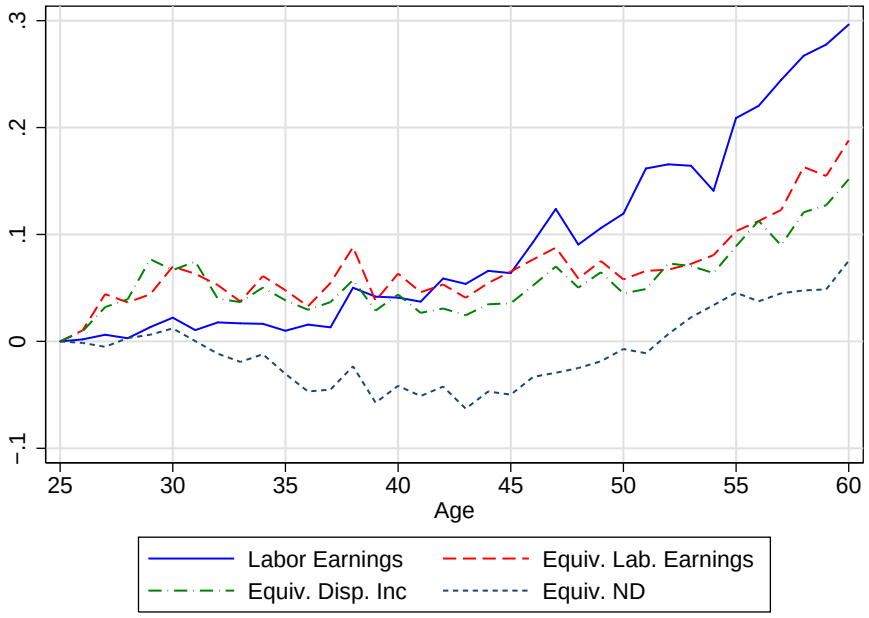

Figure 23: Inequality over Life-Cycle by NSFIE (Controlling for Time Effects). Sample B is used.

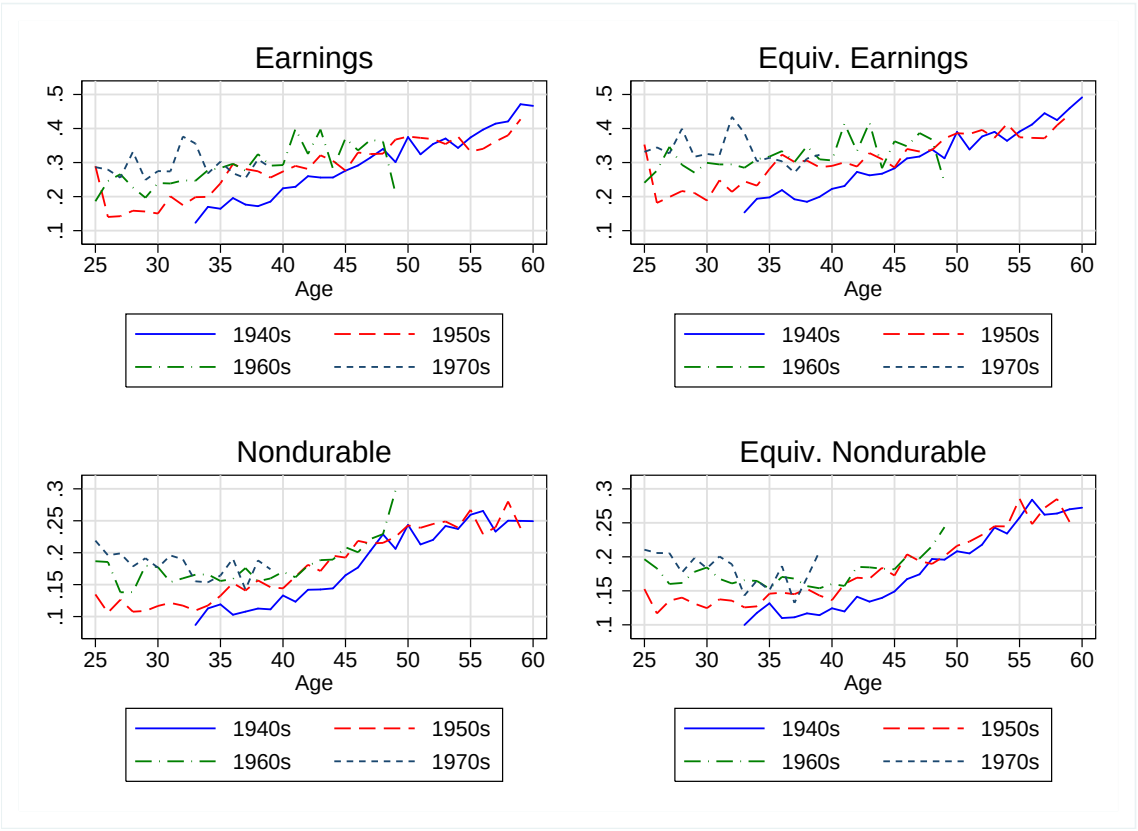

Figure 24: Inequality in Earnings and Expenditure by Cohort. Sample B is used.

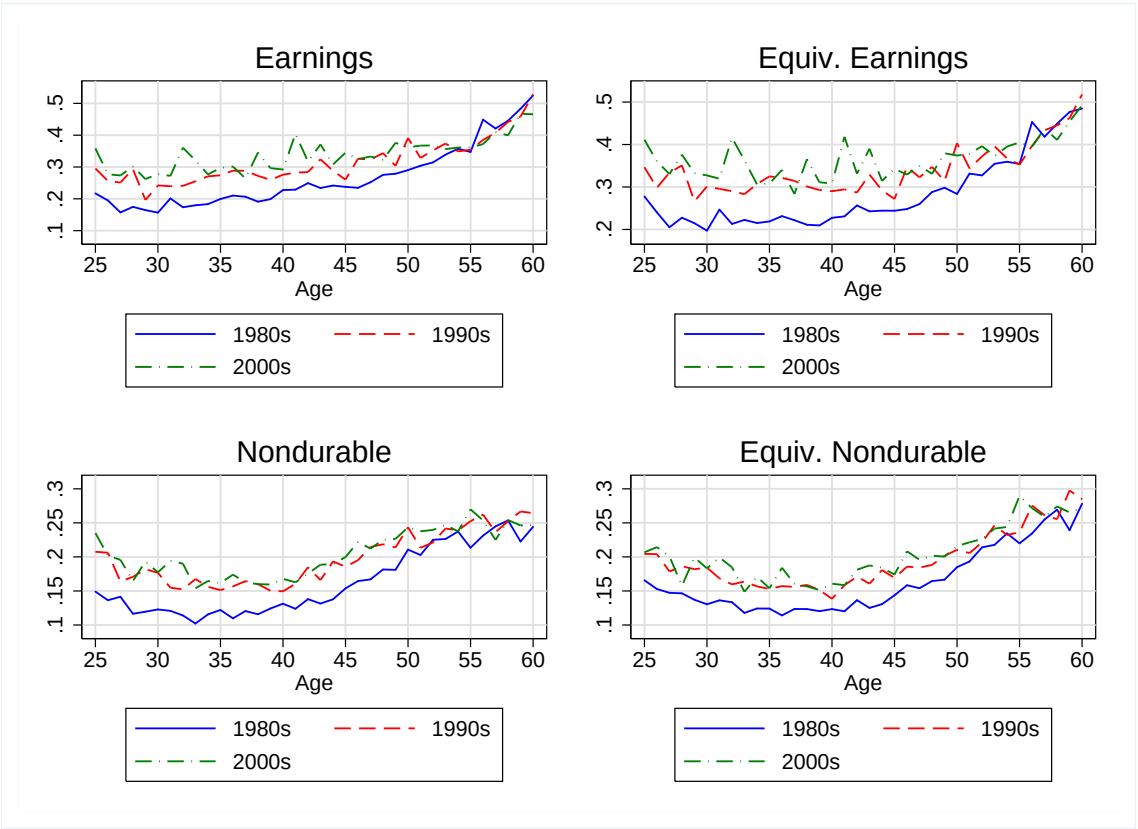

Figure 25: Inequality in Earnings and Expenditure by Time. Sample B is used.

C Tables

Table 1: Sample Selection in FIES

	Observations deleted	Remaining observations
Original data set (1981 – 2008)		2667261
Sample A		**2667261**
Initial number of households		483713
Answer all the six-months	86554	397159
Aged less than 25 or more than 60	54867	342292
Non-worker households	110375	231917
Non-positive/missing labor earnings	1061	230856
Non-positive/missing disposable income	54	230802
Non-positive/missing consumption	0	230802
Sample B		**230802**
Sample F		**336163**

Table 2: Sample Selection in NSFIE

	Observations deleted	Remaining observations
Original data set (1984, 1989, 1994, 1999, 2004)		296827
Incomplete responses	6370	290457
Sample A		**290457**
Initial number of observations (Sample A)		290457
Aged less than 25 or more than 60	43169	247288
Non-worker households	75725	171563
Non-positive/missing labor earnings disposable income, nodurable expenditure	61	171502
Sample B		**171502**
Initial number of observations (Sample A)		290457
Aged less than 25 or more than 60	43169	247288
Non-positive/missing annual income	18981	228307
Sample B (Annual)		**228307**
Initial number of observations (Sample A)		290457
Aged less than 25 or more than 60	43169	247288
Sample N		**247288**

Table 3: Mean Characteristics (FIES)

Year	1984	1989	1994	1999	2004
Age	42.60	43.47	43.87	44.17	44.88
Family size	3.83	3.77	3.68	3.62	3.55
# Adults	2.58	2.61	2.66	2.65	2.59
# Children	1.26	1.16	1.03	0.97	0.97
Married	0.95	0.94	0.94	0.93	0.92
Metropolitan area	0.53	0.54	0.54	0.53	0.52
Annual income	5348.77	6375.38	7629.83	7854.62	7347.08
Total expenditure	280.22	314.95	349.34	341.85	328.63
Nondurable expenditure	256.32	285.07	314.98	308.41	296.25
Food	64.56	66.27	69.27	65.54	59.88
Observation	9110	8927	8747	8125	7502

Sample B is used and non-workers are dropped. All entries except for the last row refer to the mean of a given variable. The rows designated by "# Adults" and "# Children" report the number of household members aged older than 16 and the number of members aged 16 or younger, respectively. The row "Metropolitan area" reports the fraction of households living in Japanese three metropolitan areas including Tokyo, Nagoya, and Osaka. The rows "Total expenditure", "Nondurable expenditure" and "Food" report monthly averages of those expenditures. All monetary values are in the unit of 1000 yen. (Source: FIES)

Table 4: Mean Characteristics (NSFIE)

Year	1984	1989	1994	1999	2004
Age	41.03	42.11	43.04	42.83	43.78
Family size	3.49	3.51	3.41	3.11	3.09
# Adults	2.36	2.46	2.47	2.31	2.34
# Children	1.13	1.05	0.94	0.80	0.76
Married	0.82	0.83	0.82	0.74	0.76
Metropolitan area	0.54	0.54	0.53	0.54	0.53
Annual income	5235.11	6284.71	7583.14	7356.17	6977.69
Total expenditure	259.72	299.24	339.24	324.35	319.55
Nondurable expenditure	231.12	263.48	295.40	278.01	276.63
Food	57.51	62.63	65.33	58.88	54.06
Observation	31585	35869	37676	35827	30545

Sample B is used. All entries except for the last row refer to the mean of a given variable. The rows designated by "# Adults" and "# Children" report the number of household members aged older than 16 and the number of members aged 16 or younger, respectively. The row "Metropolitan area" reports the fraction of households living in Japanese three metropolitan areas including Tokyo, Nagoya, and Osaka. The rows "Total expenditure", "Nondurable expenditure" and "Food" report monthly averages of those expenditures. All monetary values are in the unit of 1000 yen. (Source: NSFIE)

Table 5: Net Financial Wealth and Pre-Government Income

	1984	1989	1994	1999	2004
Gini coefficient					
Pre-Government income	0.33	0.36	0.35	0.37	0.39
Net financial wealth	0.61	0.66	0.63	0.65	0.67
Share of the top 1%					
Pre-Government income	0.04	0.05	0.05	0.05	0.05
Net financial wealth	0.10	0.13	0.11	0.10	0.10
Share of the top 5%					
Pre-Government income	0.14	0.15	0.15	0.15	0.15
Net financial wealth	0.29	0.33	0.29	0.29	0.30
Fraction of zero or negative values					
Net financial wealth	0.08	0.12	0.10	0.12	0.14
Correlation coefficient					
(Pre-Government income, net financial wealth)	0.43	0.33	0.35	0.33	0.31

Sample N is used. (Source: NSFIE)

D Appendix Figures

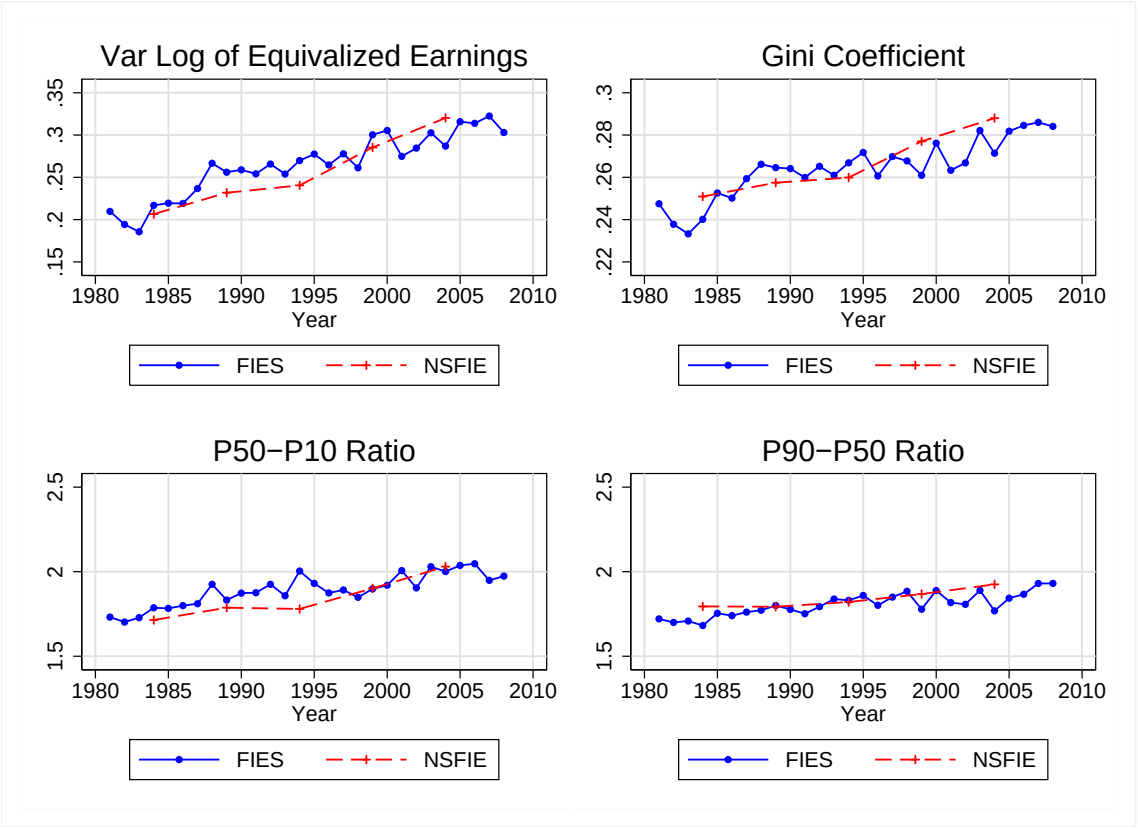

Figure A.1: Basic Inequality in Equivalized Earnings. Source: NSFIE and FIES. Sample B is used.

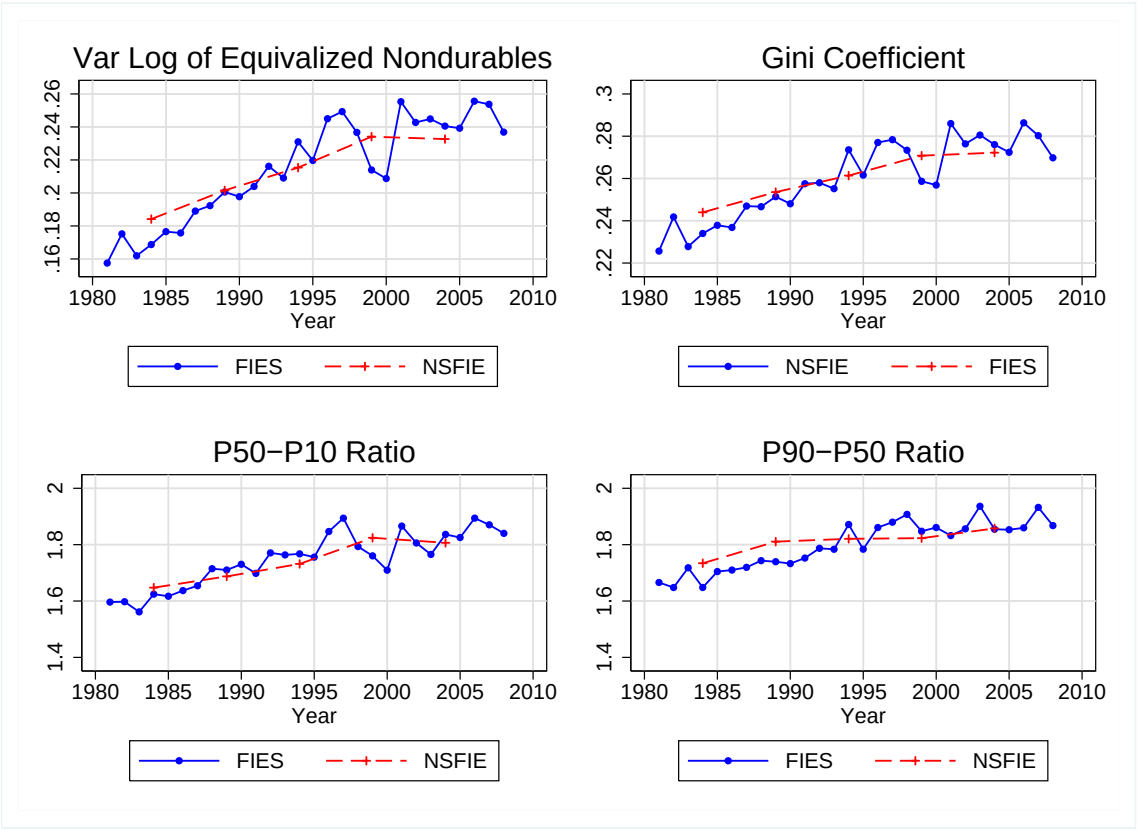

Figure A.2: Basic Inequality in Equivalized Nondurable Expenditure. Source: NSFIE and FIES. Sample B is used.

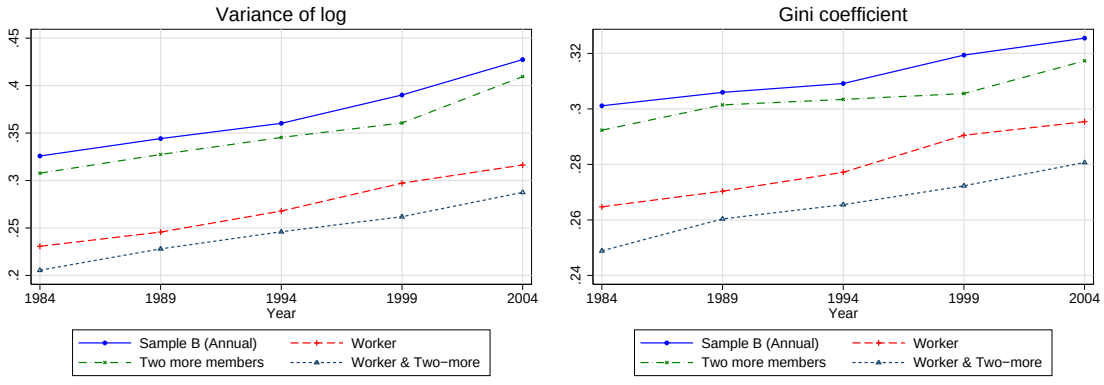

Figure A.3: Inequality of Equivalized Annual Pre-government Income with Alternative Samples. Source: NSFIE. The left figure reports the variance of log of annual pre-government income, while the right figure reports the Gini coefficient of the same variable. The label "Sample B (Annual)" refers to the sample of households whose head is 25-60 years old and relevant annual income variables are not missing. "Worker" restricts Sample B (Annual) by excluding non-worker households. "Two more members" excludes one-person households from Sample B (Annual). "Worker & Two-more" excludes households that are classified as non-worker or one-person from Sample B (Annual).

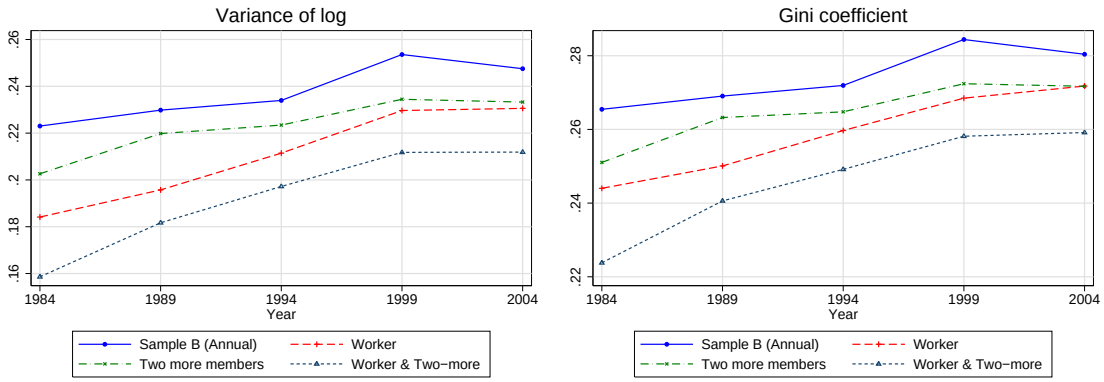

Figure A.4: Inequality of Equivalized Nondurable Expenditure with Alternative Samples. Source: NSFIE. The left figure reports the variance of log of nondurable expenditure, while the right figure reports the Gini coefficient of the same variable. The label "Sample B (Annual)" refers to the sample of households whose head is 25-60 years old and relevant annual income variables are not missing. "Worker" restricts Sample B (Annual) by excluding non-worker households. "Two more members" excludes one-person households from Sample B (Annual). "Worker & Two-more" excludes households that are classified as non-worker or one-person from Sample B (Annual).