

Role of public and private pension benefits in financing elderly household consumption — Comparison of OECD countries —

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Aims of this study

- Empirical analysis :
 - The extent to which retired households depend on public and private pension benefits to finance consumption
 - Sources of income including public pension benefit
 - Forms of dissavings including private pension benefit
- International comparison :
 - Relationship between social security benefits and private pension (based on macro level data)
 - Views from the life-cycle hypothesis of consumption (based on micro level data)
 - Adjustment of statistical concepts of gross income, non-consumption expenditure, consumption expenditure and dissavings (savings) for comparison purposes

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1. Introduction: Japan's rapid aging

- Among advanced economies, Japan's elderly share was the lowest until the 1980s. Today it is the highest, and is predicted to keep rising.

Table-1: Elderly share of population (age 65 and over)

C.Y.	1950	1960	1970	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	Change from 2000 to 2010
Austria	10.4	12.2	14.0	15.4	14.2	14.9	15.1	15.5	16.2	16.5	16.7	17.0	17.3	17.6	2.1
Canada	7.7	7.5	7.9	9.4	10.3	11.3	12.0	12.6	13.1	13.3	13.4	13.6	13.8	14.1	1.5
Denmark	9.1	10.6	12.3	14.4	15.1	15.6	15.3	14.8	15.1	15.3	15.6	15.9	16.3	16.7	1.9
Estonia	10.6	10.5	11.7	12.5	11.4	11.6	13.5	15.1	16.7	16.8	16.9	17.0	17.0	17.1	2.0
Finland	6.7	7.2	9.2	12.0	12.5	13.4	14.2	14.9	16.0	16.1	16.3	16.5	16.8	17.2	2.3
France	11.4	11.7	12.9	14.0	13.1	14.2	15.4	16.1	16.5	16.5	16.5	16.6	16.7	17.0	0.8
Germany	9.7	11.5	13.7	15.6	14.6	15.0	15.4	16.4	18.9	19.3	19.7	20.0	20.2	20.5	4.1
Hungary	7.3	9.0	11.6	13.4	12.4	13.3	14.3	15.1	15.6	15.8	15.9	16.1	16.2	16.4	1.3
Italy	8.1	9.6	11.2	13.5	13.3	15.2	17.0	18.4	19.6	19.8	20.0	20.1	20.2	20.4	2.0
Japan	4.9	5.7	7.0	9.1	10.2	12.0	14.4	17.2	19.9	20.4	20.9	21.4	22.0	22.6	5.3
Norway	9.7	11.1	12.9	14.8	15.7	16.3	15.9	15.0	14.5	14.5	14.6	14.6	14.8	15.0	0.0
Poland	5.2	5.8	8.2	10.1	9.4	10.1	11.1	12.2	13.3	13.3	13.3	13.3	13.4	13.5	1.3
Sweden	10.3	12.0	13.7	16.3	17.9	17.8	17.5	17.2	17.2	17.3	17.5	17.7	18.0	18.3	1.1
Switzerland	9.5	10.2	11.4	13.8	14.1	14.6	14.8	15.4	16.0	16.2	16.4	16.7	17.0	17.3	1.9
United Kingdom	10.7	11.7	13.0	14.9	15.2	15.7	15.9	15.9	16.1	16.2	16.2	16.3	16.4	16.6	0.7
USA	8.3	9.2	9.8	11.2	11.8	12.3	12.5	12.4	12.4	12.4	12.5	12.6	12.8	13.0	0.6
EU15	9.4	10.6	12.3	14.0	13.7	14.7	15.6	16.4	17.3	17.5	17.6	17.8	18.0	18.2	1.8
OECD30	7.7	8.5	9.6	10.8	10.9	11.6	12.4	13.1	13.8	14.0	14.1	14.3	14.5	14.7	1.6

Source: UN, *World Population Prospects, 2008 Revision*

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Features of pay-as-you-go public pension system

- Internal rate of return of a pay-as-you-go public pension system depends on the population growth rate and per capita wage growth rate.
- Rapid aging can cause intergenerational conflict, especially when expected net benefits differ significantly between retired and working generations.
- Merits of the public pension include:
 - Redistribution of income with the guaranteed minimum benefit
 - Compulsory participation and contribution
 - Whole life coverage insures against longevity risk
- Demerits of the public pension include:
 - Excessive intergenerational transfer or regressive distribution of income to wealthier retirees could diminish the public pension's reliability for working generations
 - Compulsory contribution does not mean compulsory savings for total economy
 - Voluntary labor supply of elderly households may be discouraged

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Internal rate of return of public pension system

< Assumptions: each generation lives for two periods >

- $C_{t,1}$: Per capita consumption of "generation t" in period t as a worker
- $C_{t,2}$: Per capita consumption of "generation t" in period t+1 as a retiree
- $Y_{t,1}$: Wage of "generation t" in period t as a worker
- $Y_{t+1,1}$: Wage of "generation t+1" in period t+1 as a worker
 $\Rightarrow Y_{t+1,1} = (1+w) Y_{t,1}$ (w; wage growth rate)
- $S_{t,1}$: Per capita private savings of "generation t" in period t
- $P_{t,1}$: Per capita public pension contribution of "generation t" in period t
 $\Rightarrow P_{t,1} = p Y_{t,1}$ (p; contribution rate, as percentage of wage)
- $B_{t,2}$: Per capita public pension benefit of "generation t" in period t+1
- L_t : Population of "generation t", L_{t+1} : Population of "generation t+1"
 $\Rightarrow L_{t+1} = (1+n) L_t$ (n; growth rate of population)
- r : Interest rate

< Funded public pension system >

- Relationship of consumption, wage, contribution and benefit of "generation t"
 $C_{t,1} = Y_{t,1} - P_{t,1} - S_{t,1}$, $C_{t,2} = (1+r)S_{t,1} + B_{t,2}$
- Condition for balanced income and expenditure of public pension system:
 $L_t B_{t,2} = L_{t+1} P_{t+1,1} \Rightarrow B_{t,2} = (1+r) P_{t,1}$
- Rate of return for "generation t":
 $B_{t,2} \div P_{t,1} - 1 = r$
- Whole life budget constraint:
 $C_{t,1} + C_{t,2} / (1+r) = Y_{t,1}$

< Pay-as-you-go public pension system >

- Relationship of consumption, wage, contribution and benefit of "generation t"
 $C_{t,1} = Y_{t,1} - P_{t,1} - S_{t,1}$, $C_{t,2} = (1+r)S_{t,1} + B_{t,2}$
- Condition for balanced income and expenditure of public pension system: $L_t B_{t,2} = L_{t+1} P_{t+1,1}$
 $\Rightarrow B_{t,2} = (1+n) P_{t+1,1} = (1+n)p Y_{t+1,1} = (1+n)p (1+w) Y_{t,1}$
- Rate of return for "generation t":
 $B_{t,2} \div P_{t,1} - 1 = (1+n)(1+w) - 1 \doteq n + w$
- Whole life budget constraint:
 $C_{t,1} + C_{t,2} / (1+r) = Y_{t,1} + \{(1+n)(1+w) / (1+r) - 1\} p Y_{t,1}$

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Money's worth ratio of Japan's public pension

- Intergenerational inequality occurs in net benefits:
 - Elderly generations receive more than they have paid in.
 - Younger generations pay in more than they will receive.

Table-2: Money's worth ratio by year-of-birth cohort (after 2004 reform)

Cohort by year of birth	(A) Whole life contributions paid by an employee household (coupled household)	(B) Whole life benefit to an employee household (coupled household)	(C) = (B) / (A)	(D) = (B) / (2A)
1935	¥ 8.3 mil.	¥ 52.0 mil.	6.27	3.13
1945	¥ 15.0 mil.	¥ 49.0 mil.	3.27	1.63
1955	¥ 25.0 mil.	¥ 55.0 mil.	2.20	1.10
1965	¥ 37.0 mil.	¥ 68.0 mil.	1.84	0.92
1975	¥ 51.0 mil.	¥ 86.0 mil.	1.69	0.84
1985	¥ 66.0 mil.	¥ 107.0 mil.	1.62	0.81
1995	¥ 83.0 mil.	¥ 133.0 mil.	1.60	0.80
2005	¥ 103.0 mil.	¥ 164.0 mil.	1.59	0.80

Notes: A, B and C are published figures; A and B show present value discounted by assumed interest rate; A does not include contributions paid in by employers.

Source: Ministry of Health, Labour and Welfare

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Possibilities of substitution by private pension

- Merits of private pension are:
 - Robustness to demographic change
 - Funding source of benefit
 - Non-decreasing effect on savings
 - Payment of premium may reduce other forms of savings, but not total savings in the economy
 - Pension contributions paid by employers function as compulsory savings for myopic households
 - Neutrality with respect to labor supply decision of elderly households
 - On the other hand:
 - Private pension plans for individuals have no income redistribution effect
 - Myopic households may refrain from paying voluntary contributions.
 - Whole life coverage against longevity risk is not adequate.
 - Most retirees entitled to receive benefit prefer lump-sum to pension payment.
- ⇒ Not all, but some roles of the public pension are substitutable.

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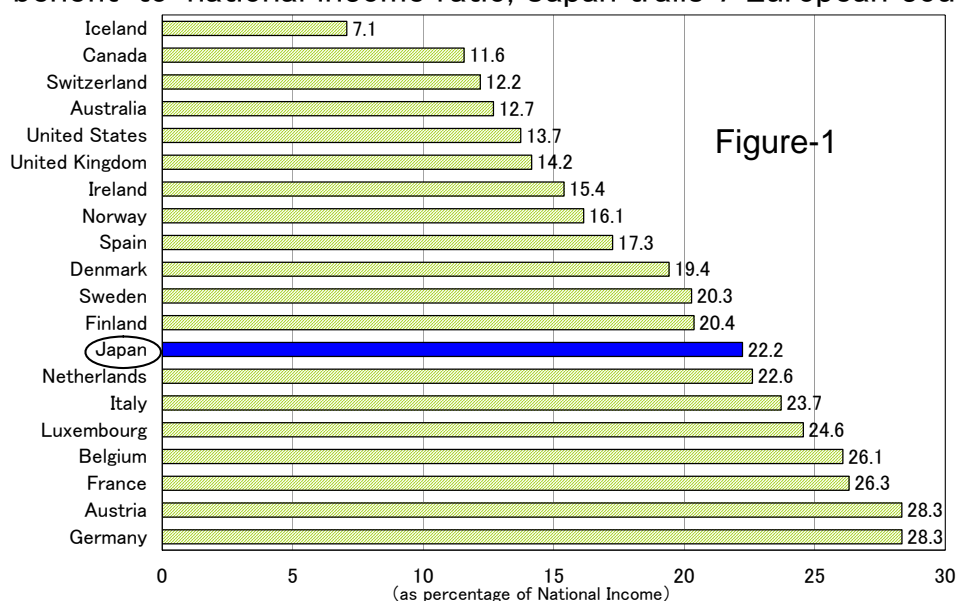
2. International comparison based on macro level data

- Data sources used:
 - Cabinet Office, *Annual Report on National Accounts* for Japan
 - National Statistical Office, *Blue book* for United Kingdom
 - U.S. Department of Commerce, *National Income and Product Accounts* for United States
 - OECD, *National Accounts* for other countries
- Sector coverage and statistical concepts are uniform internationally
- Allows for comparison of social benefits by general government, financial asset of social security fund as a sub-sector of general government, net equity of households in pension funds
- Data sources not used:
 - OECD, *Social Expenditure*
 - OECD, *Pension at a glance*
- Coverage and definitions vary by country

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2-1. Social security benefits by general government in high-income OECD countries (CY 2007)

- By benefit-to-national income ratio, Japan trails 7 European countries



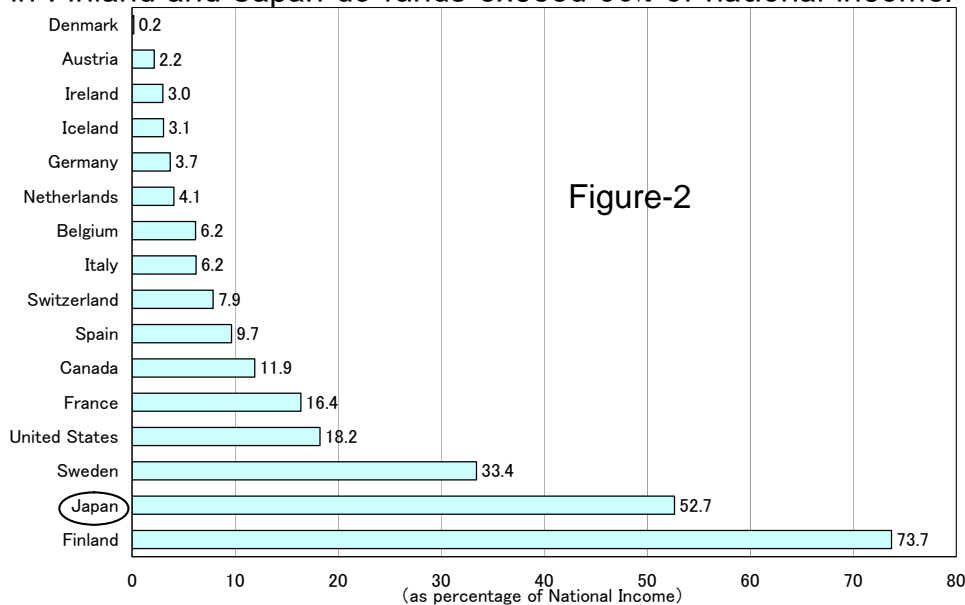
Note: Social security benefits by general government is defined as “social benefits other than social transfers in kind” plus “social benefits in kind related to expenditure on products supplied to households via market producers” in the sector account for general government.

Sources: Cabinet Office, Government of Japan, *Annual Report on National Accounts*; OECD, *National Accounts*.

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2-2. Financial assets of social security funds in high-income OECD countries (CY 2007)

- As a percentage of national income, social security funds are small.
- Only in Finland and Japan do funds exceed 50% of national income.



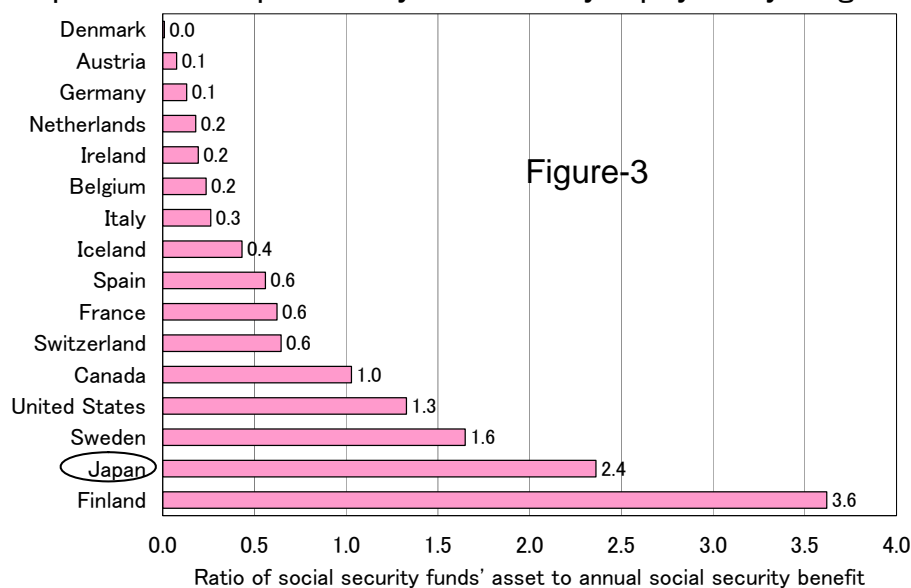
Note: Data is not available for Australia, Luxemburg, Norway and United Kingdom.

Sources: Cabinet Office, Government of Japan, *Annual Report on National Accounts*; OECD, *National Accounts*.

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2-3. Asset-to-benefit ratio of social security funds in high-income OECD countries (CY 2007)

- No country has fund assets exceeding four years worth of benefits.
- ⇒ Public pensions are practically financed by a pay-as-you-go method.



Note: Data is not available for Australia, Luxemburg, Norway and United Kingdom.

Sources: Cabinet Office, Government of Japan, *Annual Report on National Accounts*, OECD, *National Accounts*.

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2-4. Financial assets of private pension funds in high-income OECD countries (CY 2007)

- In four countries, private pension fund assets exceed national income.

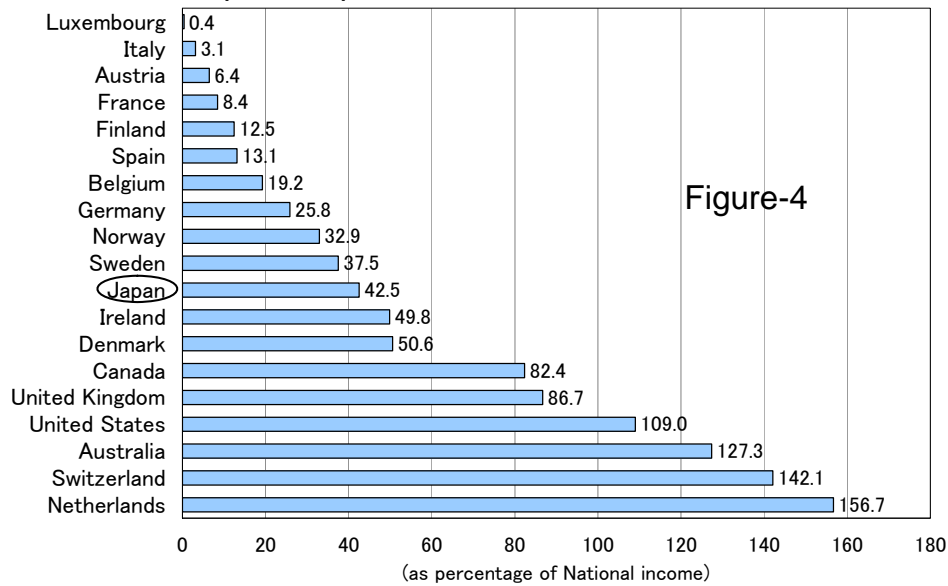


Figure-4

- Notes: 1. Private pension funds include pension funds for corporate employees and for individuals.
 Figures comprise a portion of gross financial asset of households and non-profit institutions serving households.
 2. Data is not available for Iceland.

Sources: Cabinet Office, Government of Japan, *Annual Report on National Accounts*; OECD, *National Accounts*.

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2-5. Relationship between private pension fund assets and social security benefits (CY 2007)

- Negative correlation suggests public and private pension are substitutes.

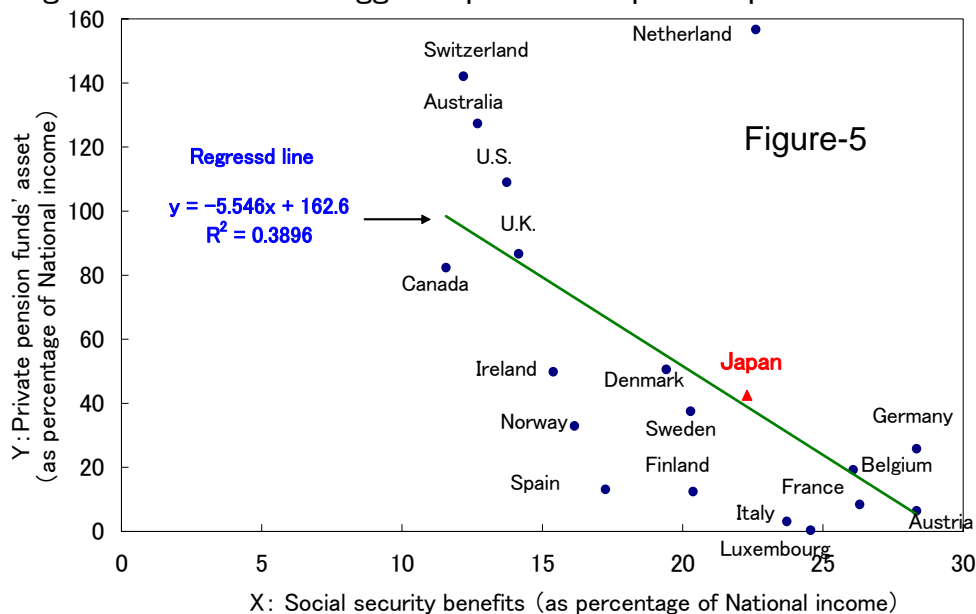


Figure-5

- Notes: 1. Private pension funds include both corporate pension funds for employees and pension funds for individuals.
 Figures comprise a portion of gross financial asset of households and NPISH (non-profit institutions serving households).
 2. Data is not available for Iceland.

Sources: Cabinet Office, Government of Japan, *Annual Report on National Accounts*; OECD, *National Accounts*.

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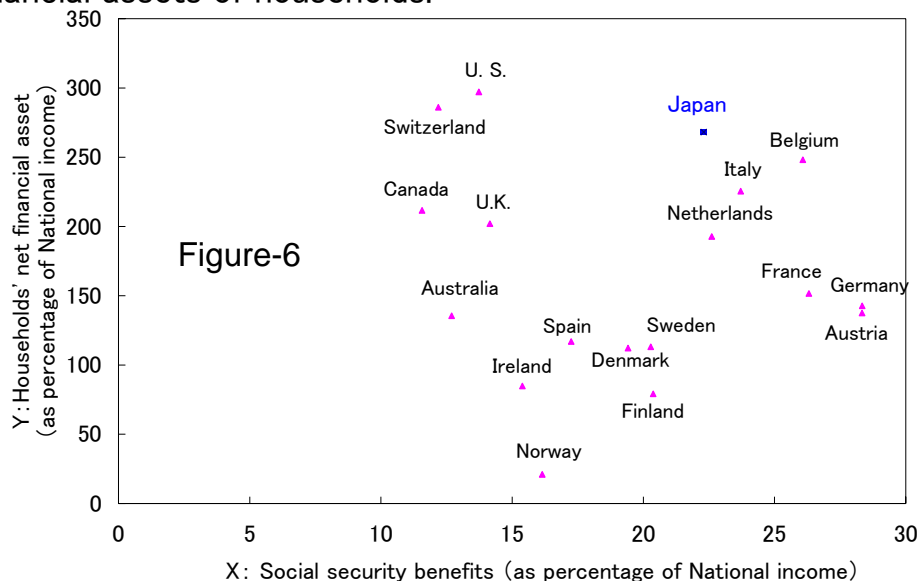
Degree of dependency on public pension system

- (A) Countries weighted toward private pension: Australia, Canada, Ireland, Switzerland, U.K., U.S.
- (B) Countries weighted toward public pension: Austria, Belgium, France, Germany, Italy, Luxemburg
- (C) Countries with well-balanced weights of public and private pension: Denmark, Finland, Japan, Norway, Sweden

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2-6. Relationship between households' net financial assets and social security benefits (CY 2007)

- No relationship is observed between social security benefits and total net financial assets of households.



Notes: 1. Net financial assets consist of gross financial assets minus liabilities of households and NPISH.

2. Data is not available for Iceland and Luxemburg.

Sources: Cabinet Office, Government of Japan, *Annual Report on National Accounts*; OECD, *National Accounts*.

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3. International comparison based on micro level data

- Do elderly households consume less than younger households?
- How do elderly households finance consumption?
- Sources used: **Table-3**

Austria	Statistics Austria	Household Budget Survey
Denmark	Statistics Denmark	Household Budget Survey
Finland	Statistics Finland	Household Budget Survey Income Distribution Statistics
Germany	Federal Statistical Office	Household Budget Survey
Ireland	Central Statistics Office	Household Budget Survey
Italy	Banca d'Italia	Survey on household income and wealth
Japan	Ministry of Internal Affairs and Communications	Family Income and Expenditure Survey
Sweden	Statistics Sweden	Household Budget Survey
Switzerland	Swiss Federal Statistical Office	Household Budget Survey
United Kingdom	National Statistics of UK	Family Spendings
United States	U.S. Bureau of Labor Statistics	Consumer Expenditure Survey

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3-1. Definitional relationship of income and expenditure

- Disposable income = Gross income – Non-consumption expenditure
- Non-consumption expenditure = Income taxes + Social security contributions + Other taxes
- Savings = Disposable income – Consumption expenditure
Occurs when Consumption expenditure \leq Disposable income
- Dissavings = Consumption expenditure – Disposable income
Occurs when Consumption expenditure $>$ Disposable income
- Dissavings = Decrease in financial assets + Decrease in real (non-financial) assets + Increase in liabilities
if no capital gains and losses accrue on assets and liabilities

(Note)

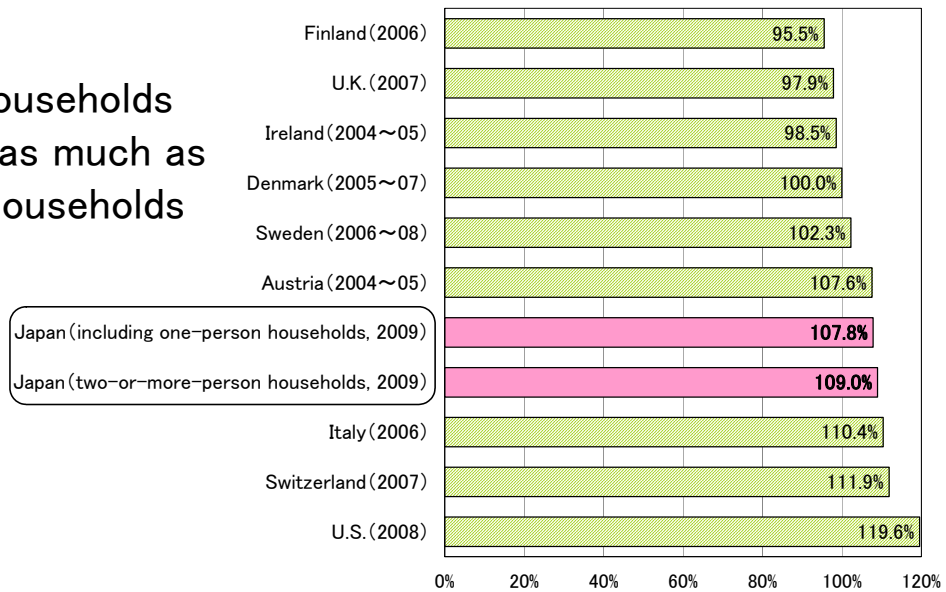
- In contrast to the public pension benefit, the private pension benefit should not be regarded as a source of income, but as a form of dissavings, because the corresponding contributions were extracted from disposable income as a form of savings in the past.

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3-2. Per capita consumption of retired households relative to total households

Figure-7

- Retired households consume as much as younger households do

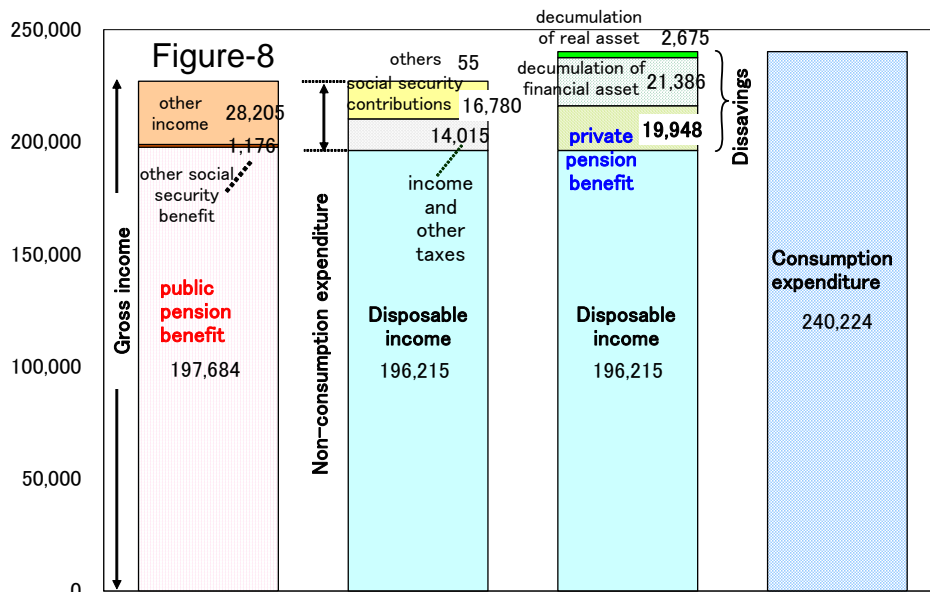


Notes: 1. If original consumption data includes repayment of mortgage loans, property taxes or private pension contributions, these are excluded from consumption after adjustment.
 2. Data on number of household members is not available for Germany.
 3. All data include one-person households, except as noted for two-or-more person households in Japan.

Sources: Official statistics (see slide 16).

3-3. Income, consumption and savings of retired households in Japan (CY 2009)

- Main source of gross income is public pension benefit.
- Retired households dissave, as they consume more than they earn.



Note: Shows monthly average in JPY for two-or-more person households with nonworking householder aged 65 and over.
 Source: Sources: Ministry of Internal Affairs and Communications, Family Income and Expenditure Survey

3-4. Income, consumption and savings of retired households in selected OECD countries

Table-4	①	labor income	property income	Social security benefit	public pension benefit	Other income	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
	Gross income														
(B) Austria (2004~05)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	100.0	93.4	6.6	n.a.	n.a.	n.a.	n.a.
(C) Denmark (2005~07)	146.2	11.7	19.8	77.7	n.a.	37.0	4.6	41.6	100.0	100.9	-0.9	-2.6	1.6	77%	3%
(C) Finland (2006)	125.9	8.1	20.3	95.7	91.1	1.9	0.4	25.5	100.0	84.0	16.0	-3.0	19.0	114%	4%
(B) Germany (2007)	118.8	6.3	19.2	89.1	78.3	4.2	n.a.	18.8	100.0	93.1	6.9	-7.5	14.4	96%	8%
(A) Ireland (2004~05)	112.8	34.1	7.7	63.5	55.3	7.5	0.0	12.8	100.0	155.6	-55.6	-68.3	12.7	41%	44%
(B) Italy (2006)	n.a.	8.9	26.6	64.5	n.a.	n.a.	n.a.	n.a.	100.0	78.2	21.8	n.a.	n.a.	83%	n.a.
(C) Japan (two-or-more-person households, 2009)	114.5	6.8	1.2	101.8	n.a.	4.7	n.a.	14.5	100.0	122.6	-22.6	-10.2	-12.4	83%	8%
(C) Japan (including one-person households, 2009)	115.7	8.8	1.2	101.3	100.7	4.4	n.a.	15.7	100.0	122.4	-22.4	-10.2	-12.3	83%	8%
(C) Sweden (2006~08)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	100.0	81.4	18.6	n.a.	n.a.	n.a.	n.a.
(A) Switzerland (2007)	190.7	9.8	34.7	127.3	115.1	18.9	n.a.	90.7	100.0	200.3	-100.3	-103.4	3.1	64%	52%
(A) U.K. (2007)	127.4	6.0	22.0	99.4	n.a.	n.a.	1.0	26.3	100.0	144.2	-44.2	-70.4	26.2	69%	49%
(A) U.S. (2008)	115.2	35.0	16.1	63.4	60.5	0.7	5.9	9.3	100.0	159.5	-59.5	-56.0	-3.5	40%	35%

Notes: 1. All data include one-person households, except as noted for two-or-more person households in Japan.

2. All data are indexed except in ⑨ and ⑩. Disposable income is standardized to 100. ④=①-②-③, ⑥=④-⑤, ⑧=⑥-⑦

3. For Italy, breakdowns of gross (before-tax) income are replaced with after-tax income.

4. For US, public and private pension benefit are estimated using total benefit amount found in survey data, adjusted with aggregated public and private pension benefit amounts found in macro statistics.

Sources: Official statistics (see slide 16).

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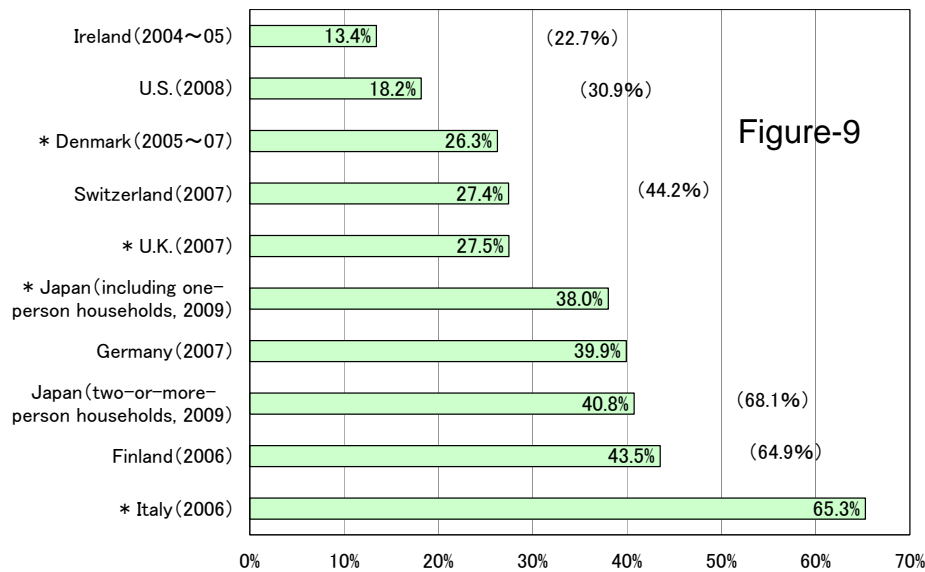
Do retired households save or dissave?

- Retired households who save: **Austria**, Finland, **Germany**, **Italy**, Sweden
- Not consistent with simple life-cycle hypothesis of consumption
- (Possible reasons)
 - Households in countries weighted toward the public pension may have a precautionary motive for savings owing to uncertainty about unfunded public pension system
 - Or they may have a bequest motive for savings. If so, intergenerational transfer through public pension will be partially offset by private intergenerational transfer through bequest.
 - Survey data may have not successfully captured dissavings
- Retired households who dissave: Denmark, **Ireland**, Japan, **Switzerland**, **U.K.**, **U.S.**
- Consistent with life-cycle hypothesis of consumption
- Negative household saving rates are large in countries weighted toward private pension.

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3-5. Gross replacement rates in actual household data

- Present benefit level relative to workers' wage in Japan is not low.



- Notes: 1. All data includes one-person households, except as noted for two-or-more person households in Japan.
2. Gross replacement rate is defined as average public pension benefit of retired households, divided by average of wages and salaries of working households, most of whom are younger generations.
3. Asterisk (*) indicates that amount of public pension benefit is substituted by amount of social security benefit.
4. Number in parentheses is ratio when average wages and salaries per household is substituted by amount per worker.
Sources: Official statistics (see slide 16).

4. Changes in Japanese households

- Retired households aged 65 and over are well-off.
- Private pension benefit contributes to the level of their consumption.
- The amount of dissavings, and thus importance of private pension benefit, has been growing, as the amount of public pension benefit has been decreasing for householders aged 60-64.
- Decrease of public pension benefit will continue until 2030.
- The amount of voluntary contributions to private pension differ between generations.
- Preparation for retirement by younger generation may not be enough.

4-1. Stepping-up of pensionable age in Japan

- The pensionable age of the first-pillar public pension benefit has been increased gradually since 2001.
- Stepping-up of the pensionable age for the second-pillar benefit is planned to start in 2014.

Table-5: Stepping-up of pensionable age for public pension benefits

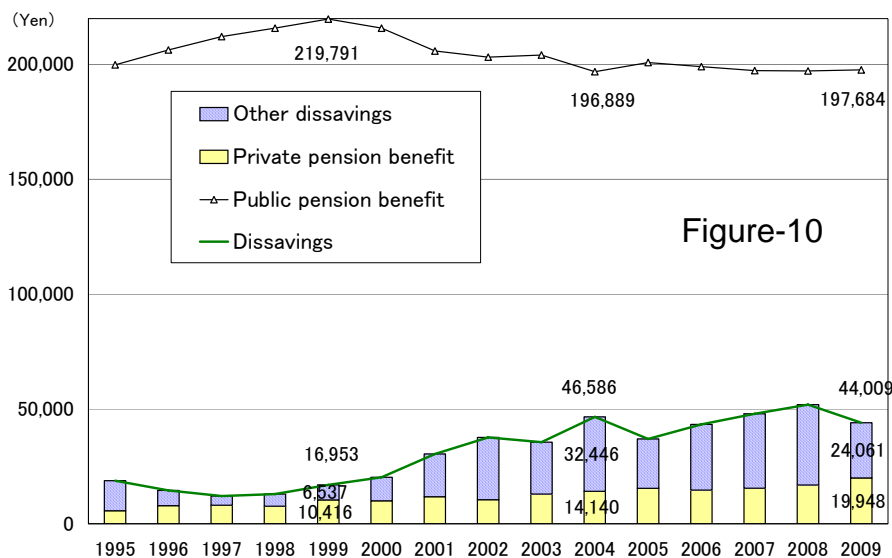
Date of birth	The first pillar benefit (Basic old-age pension)				The second pillar benefit (Employees' old-age pension, earnings-related)			
	Men		Women		Men		Women	
	Age	Year	Age	Year	Age	Year	Age	Year
~1941.4.1	60	2000		2000		2000		2000
41.4.2~42.4.1	61	2002	60	2001	60	2001	60	2001
42.4.2~43.4.1		2003		2002		2002		
43.4.2~44.4.1	62	2005	60	2003	60	2003	60	2003
44.4.2~45.4.1		2006		2004		2004		
45.4.2~46.4.1	63	2008	60	2005	60	2005	60	2005
46.4.2~47.4.1		2009		2006		2006		
47.4.2~48.4.1	64	2011	60	2008	60	2007	60	2007
48.4.2~49.4.1		2012		2009		2008		
49.4.2~50.4.1	65	2014	60	2011	60	2009	60	2009
50.4.2~51.4.1		2015		2010		2010		
51.4.2~52.4.1	65	2016	60	2013	60	2010	60	2010
52.4.2~53.4.1		2017		2011		2011		
53.4.2~54.4.1	2018	2012	2012	2012	2012	2012	2012	2012
				61		2014		2013

Date of birth	The first pillar benefit (Basic old-age pension)				The second pillar benefit (Employees' old-age pension, earnings-related)			
	Men		Women		Men		Women	
	Age	Year	Age	Year	Age	Year	Age	Year
54.4.2~55.4.1	65	2019	65	2019	65	2015	65	2014
55.4.2~56.4.1		2020		2020		2017		2015
56.4.2~57.4.1	65	2021	65	2021	65	2018	65	2016
57.4.2~58.4.1		2022		2022		2020		2017
58.4.2~59.4.1	65	2023	65	2023	65	2021	65	2019
59.4.2~60.4.1		2024		2024		2023		2020
60.4.2~61.4.1	65	2025	65	2025	65	2024	65	2022
61.4.2~62.4.1		2026		2026		2026		2023
62.4.2~63.4.1	65	2027	65	2027	65	2027	65	2025
63.4.2~64.4.1		2028		2028		2028		2026
64.4.2~65.4.1	65	2029	65	2029	65	2029	65	2028
65.4.2~66.4.1		2030		2030		2030		2029
1966.4.2~	2031	2031	2031	2031	2031	2031	2031	2031

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4-2. Trends in public pension benefit and dissavings in retired households aged 65-and-over in Japan

- The amount of dissavings is growing, although the public pension benefit level is stable.
- Private pension benefit represents 45% of the amount of dissavings in 2009.

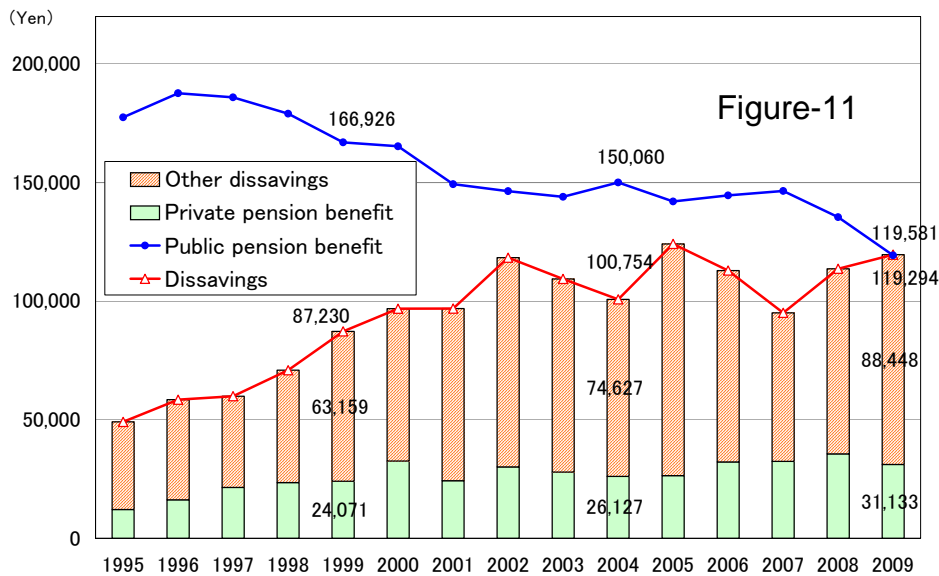


Source: Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey*

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4-3. Trends in public pension benefit and dissavings of retired households aged 60-64 in Japan

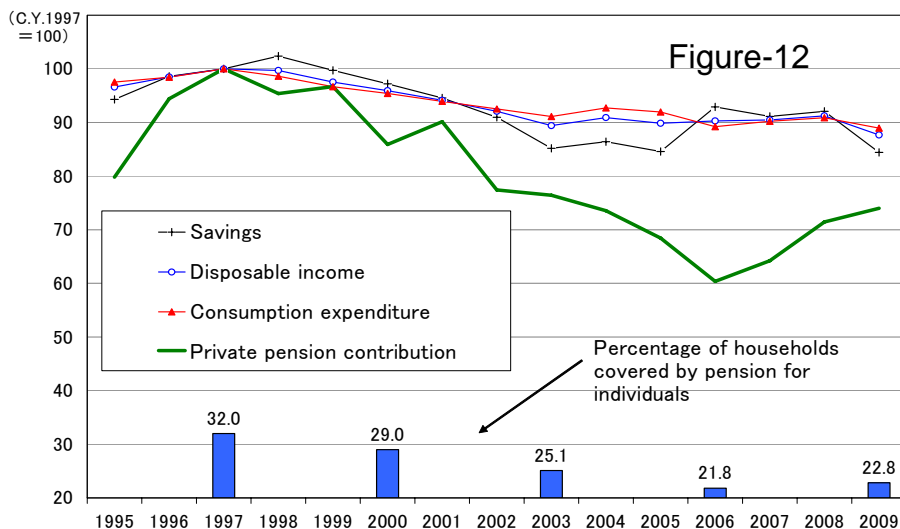
- Dissavings exceeded the public pension benefit amount in 2009.
- Decrease of public pension benefit mainly reflects stepping-up of the pensionable age from 60 to 65.



Source: Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey*.

4-4. Trends in private pension contributions and savings of working households in Japan

- Levels of disposable income, consumption and savings of working households have been unchanged since 2003, but are lower than before.
- Downtrend is observed in voluntary contributions to private pensions.



Note: Data for private pension premium does not include employees' pension contributions paid by employers.
Sources: Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey*; Cultural Center for Life Insurance, *National Survey on Life Insurance*.



Summary

- Public and private pensions are possibly good substitutes. The actual extent of dependency on the public pension system varies by country.
 - Countries weighted toward private pension: Ireland, Switzerland, UK and US
 - Countries weighted toward public pension: Austria, Germany, Italy
 - Countries with well-balanced weighting of public and private pension : Denmark, Finland, Japan, Sweden
 - Main source of income for Japanese retired households is the public pension benefit. However, importance of private pension benefit and other types of dissavings has been growing so as to keep their consumption not lower than that of younger households.
 - As the pensionable age is stepped up, the public pension benefit has decreased for householders aged 60–64, and this trend will continue.
 - Voluntary contributions to private pensions by younger households in preparation for retirement are much lower than contributions made by present beneficiaries in the past.
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