



Third Annual Lecture on the Japanese Economy

The Intergenerational War in Japan: Macroeconomic Burdens of the Demographic Change

Takatoshi Ito

Professor, School of International and Public Affairs and
Center on Japanese Economy and Business

Columbia University

October 3, 2017

Takeaways

- Macroeconomic condition: Strong real & weak nominal
 - Policy choices: More stimulus and/or growth policies
- Intergenerational inequity is large in Japan
 - The baby boom generation (born in 1947-49) has “retired”
 - As the elderly dependency ratio (POP65+)/(POP20-65) rises, **burdens will be increasingly on the young**
 - The younger generation receives fewer benefits/contributions than the older generation
- Government debts worsen the intergenerational inequity, even if a financial crisis does not happen
- How to rectify the inequity:
 - Curtail social security expenditures;
 - Reduce government debts; and
 - Produce better human capital.

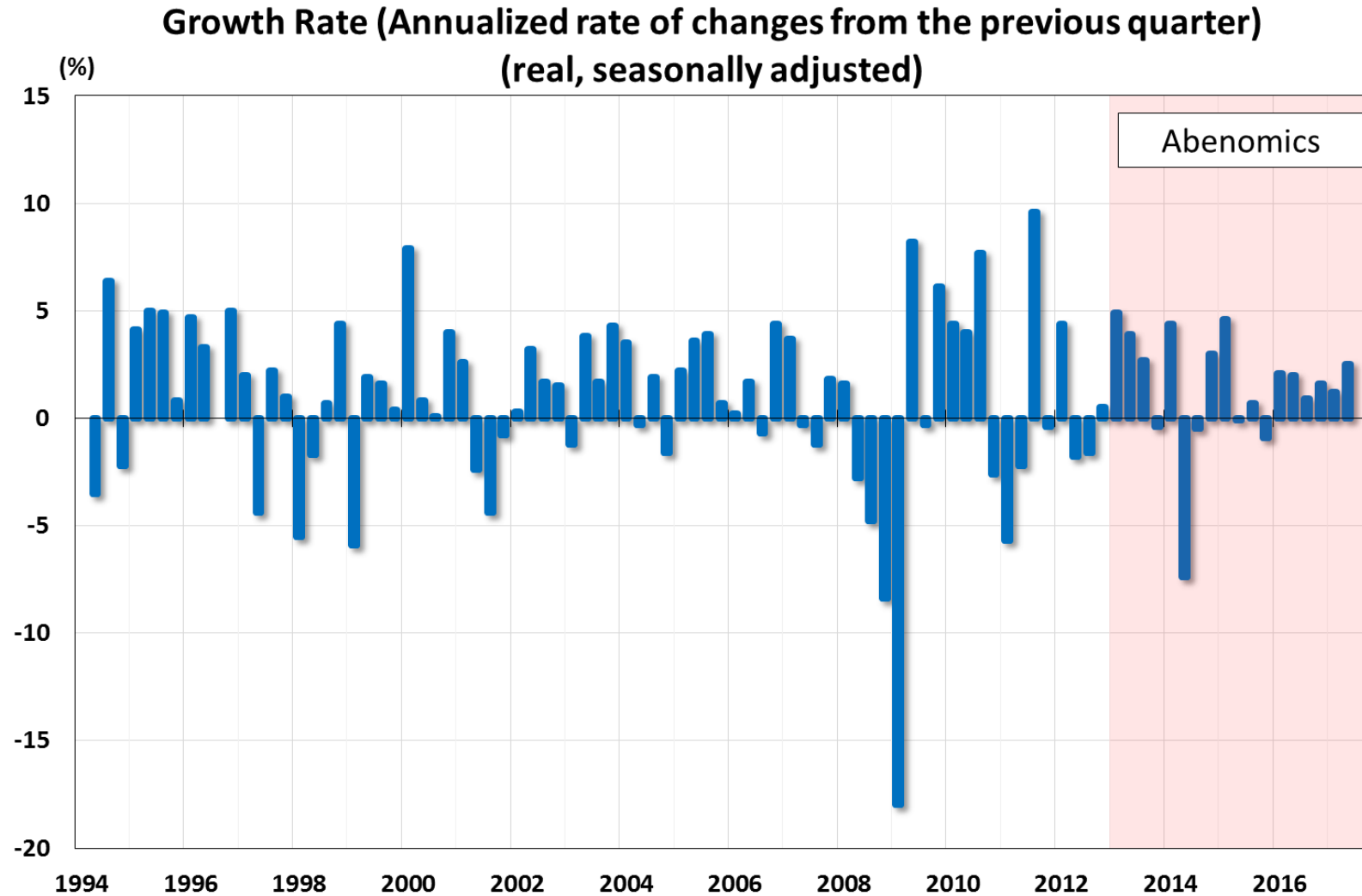
Agenda

- Macroeconomic Condition
- Intergenerational War
 - Demographic transition
 - Economic implications
 - Pension system
 - Government bonds

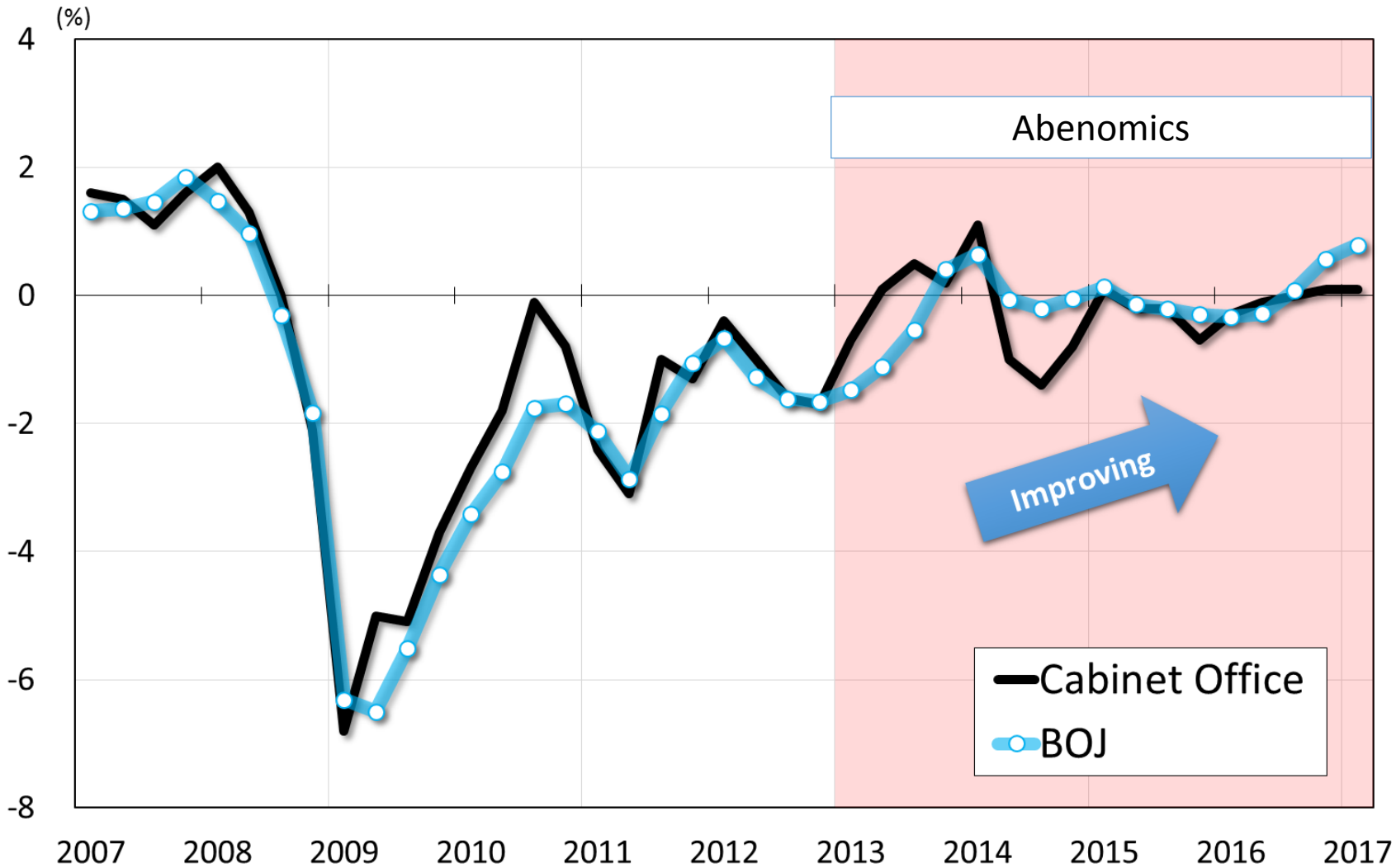
Macroeconomic Condition

- Real side is reasonably strong
- Nominal side is weak

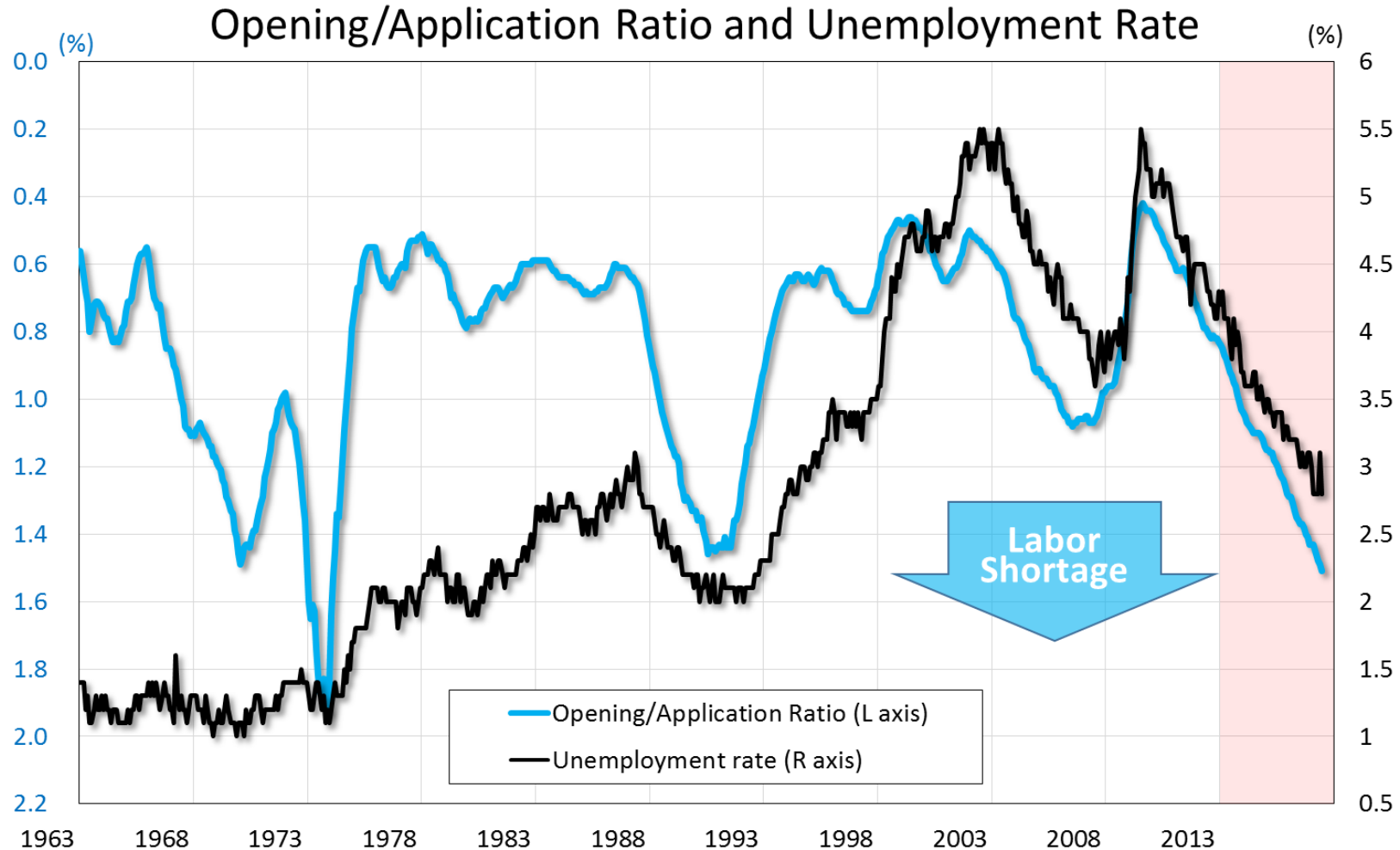
GDP growth rate, at potential rate



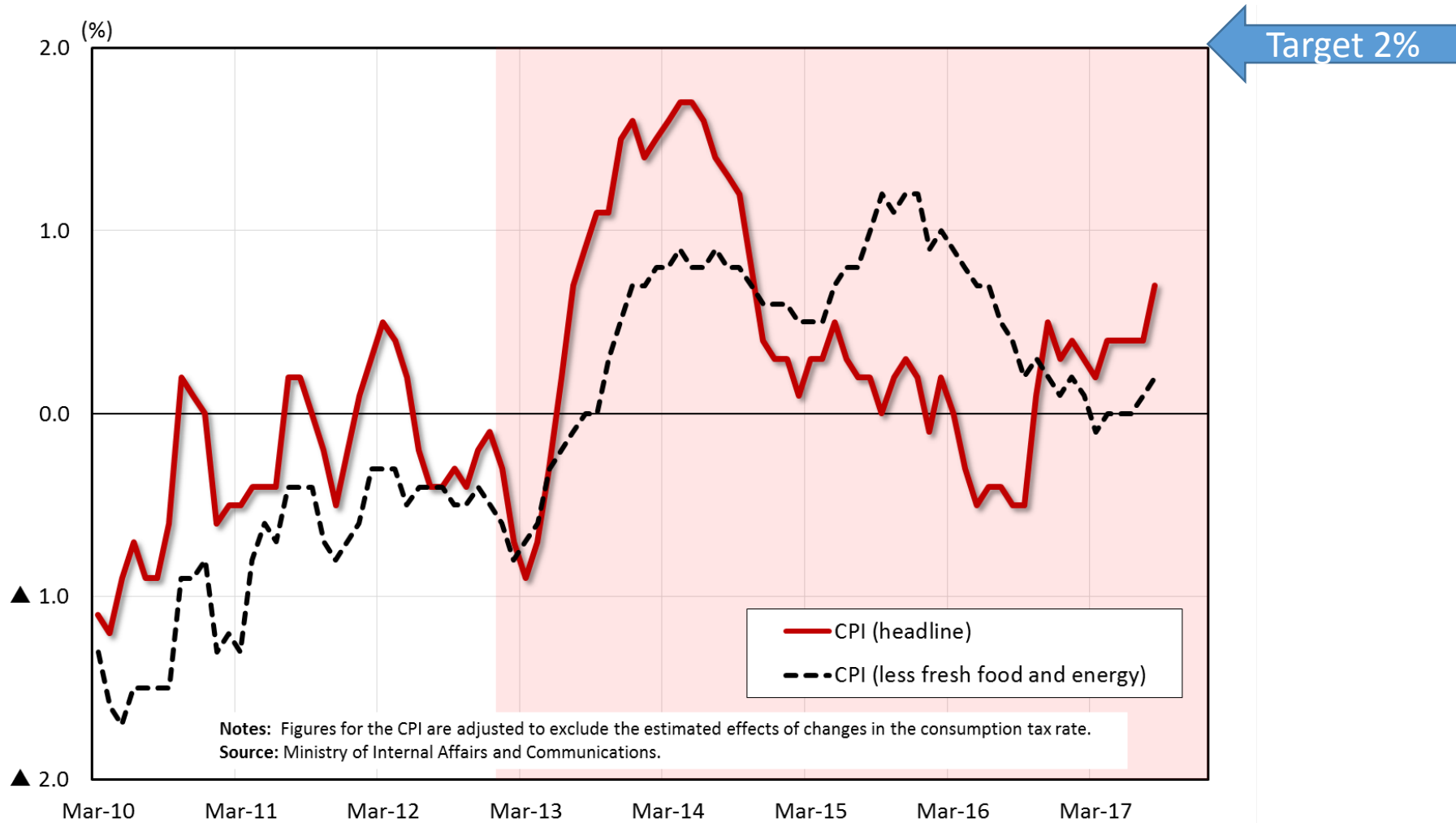
GDP gap is zero



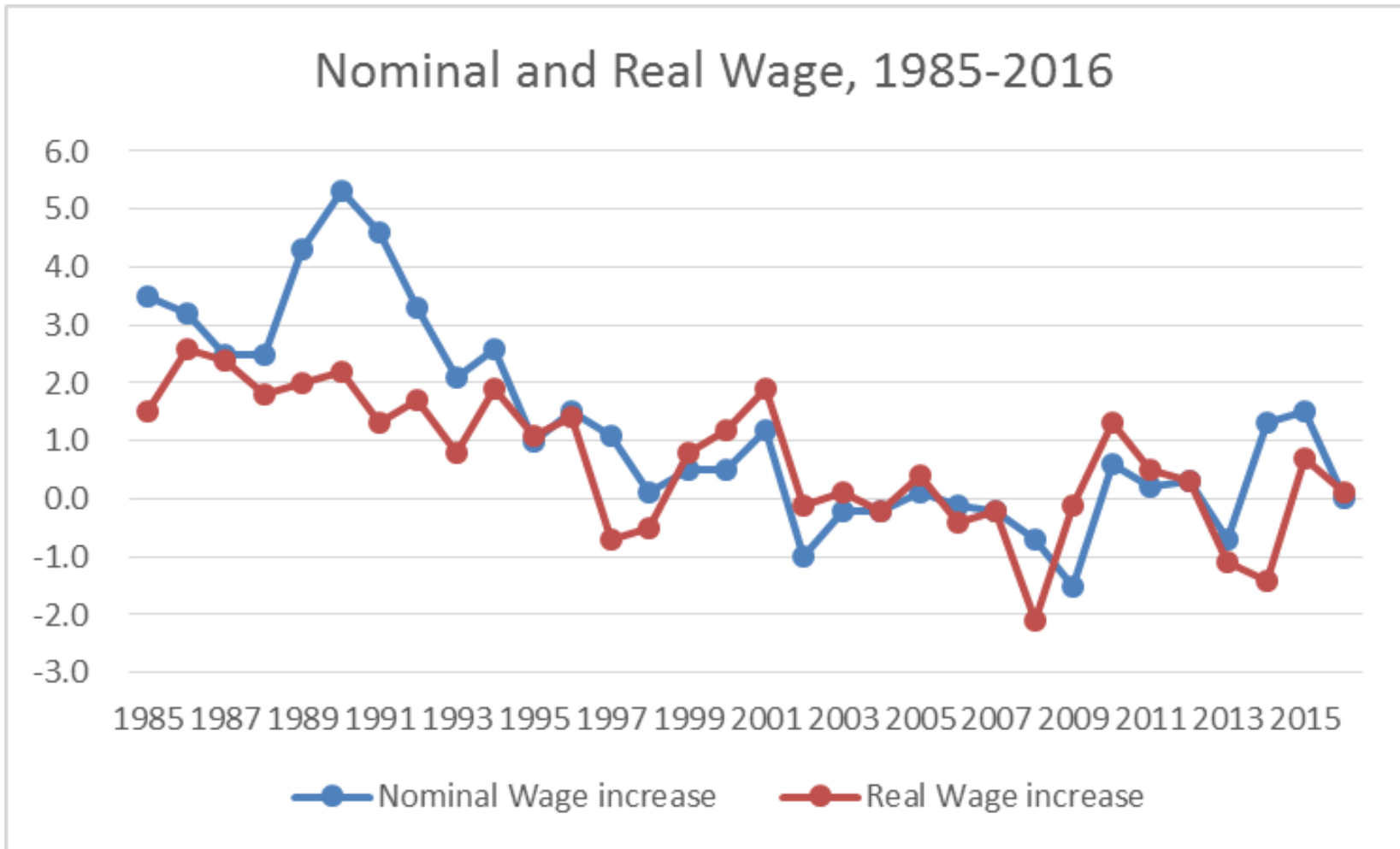
Labor market is extremely tight



Nominal is weak, far from 2% inflation target



Nominal and real wages



Will 2% inflation target be hit by 2019?

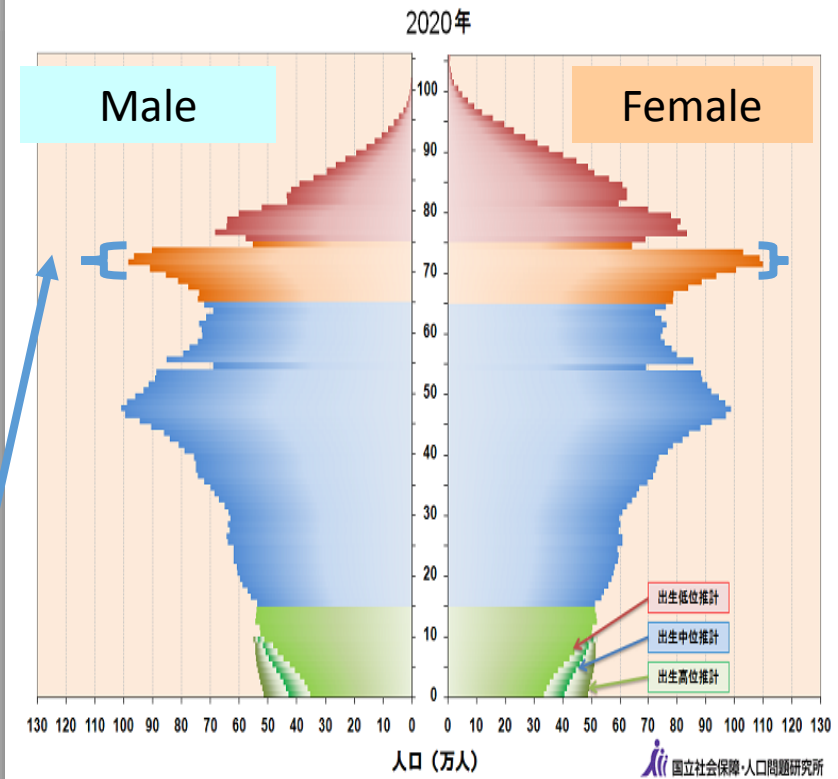
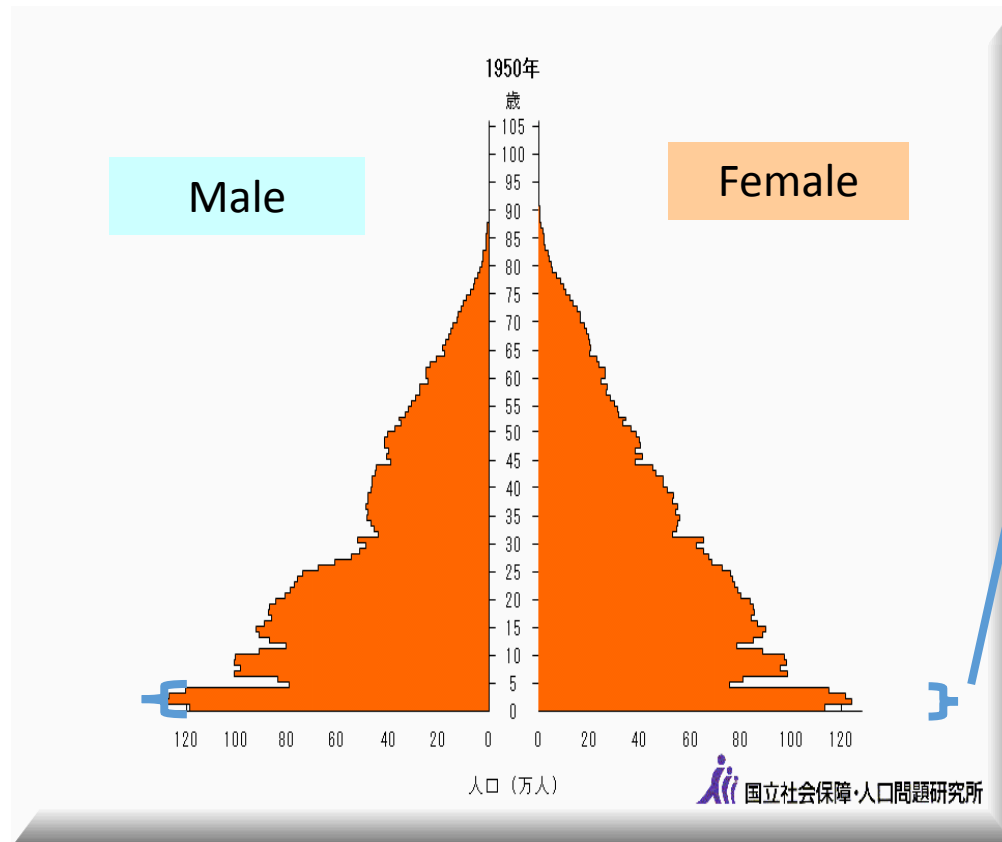
- The labor market condition suggests an acute shortage of labor in all industries, esp. construction
- Growth is approx. at the potential
- GDP gap is near zero
- However, wages are stagnant
- Inflation rate is expected to rise soon, if the traditional relationship between growth and inflation holds
- Why are firms are not raising wages? Not investing? Or paying higher dividends? But still keep saving?

Demography

- Population is shrinking
 - Population to shrink by 30% in the next 50 years
- A sharp especially decline in working age population
 - POP (age 20-64) to shrink by 40% in the next 50 years
- Elderly dependency becomes burden on the younger generation
 - POP (age 20-64)/POP(65+) goes from 2.1 to 1.2

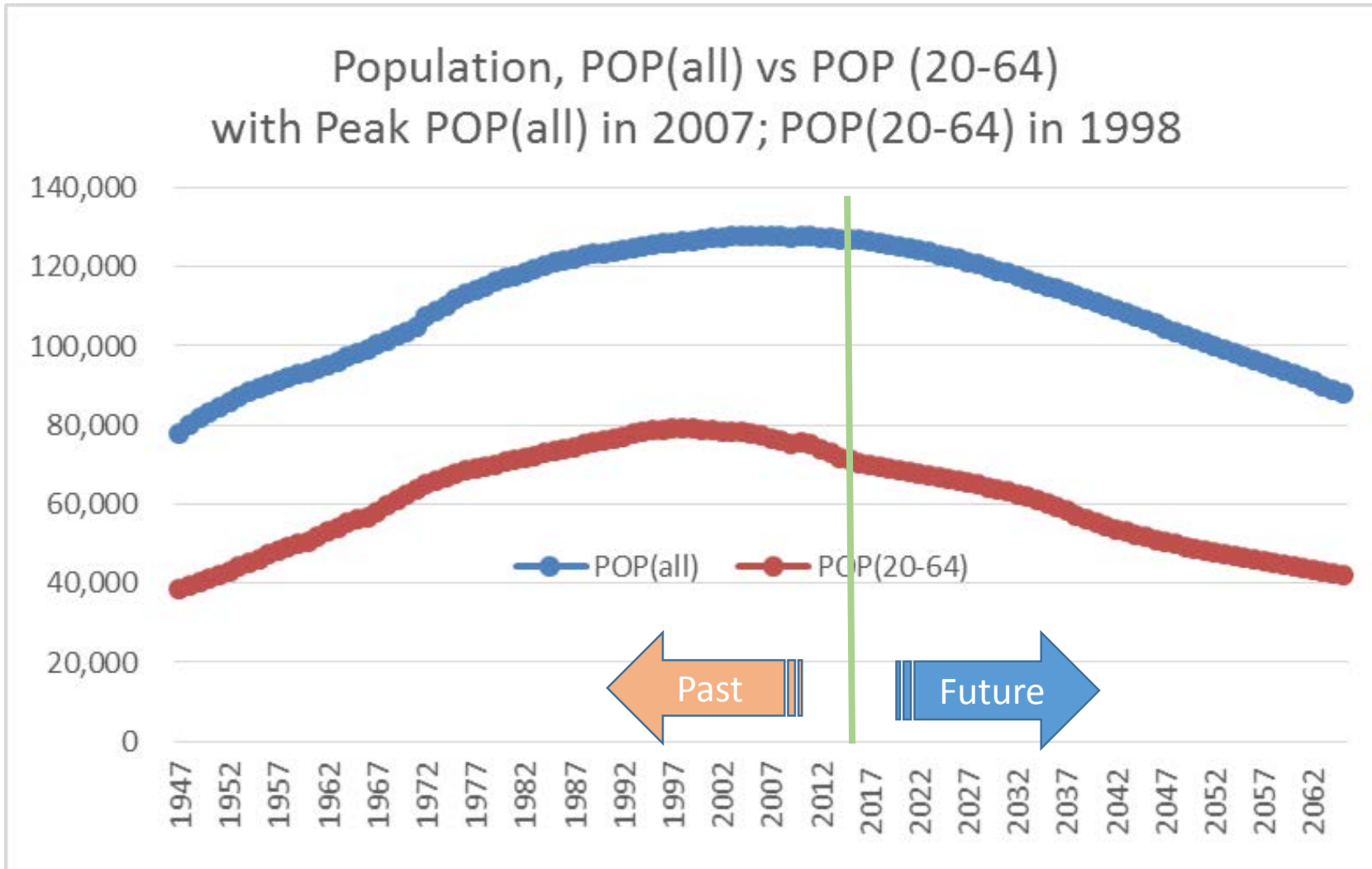
1950

2020

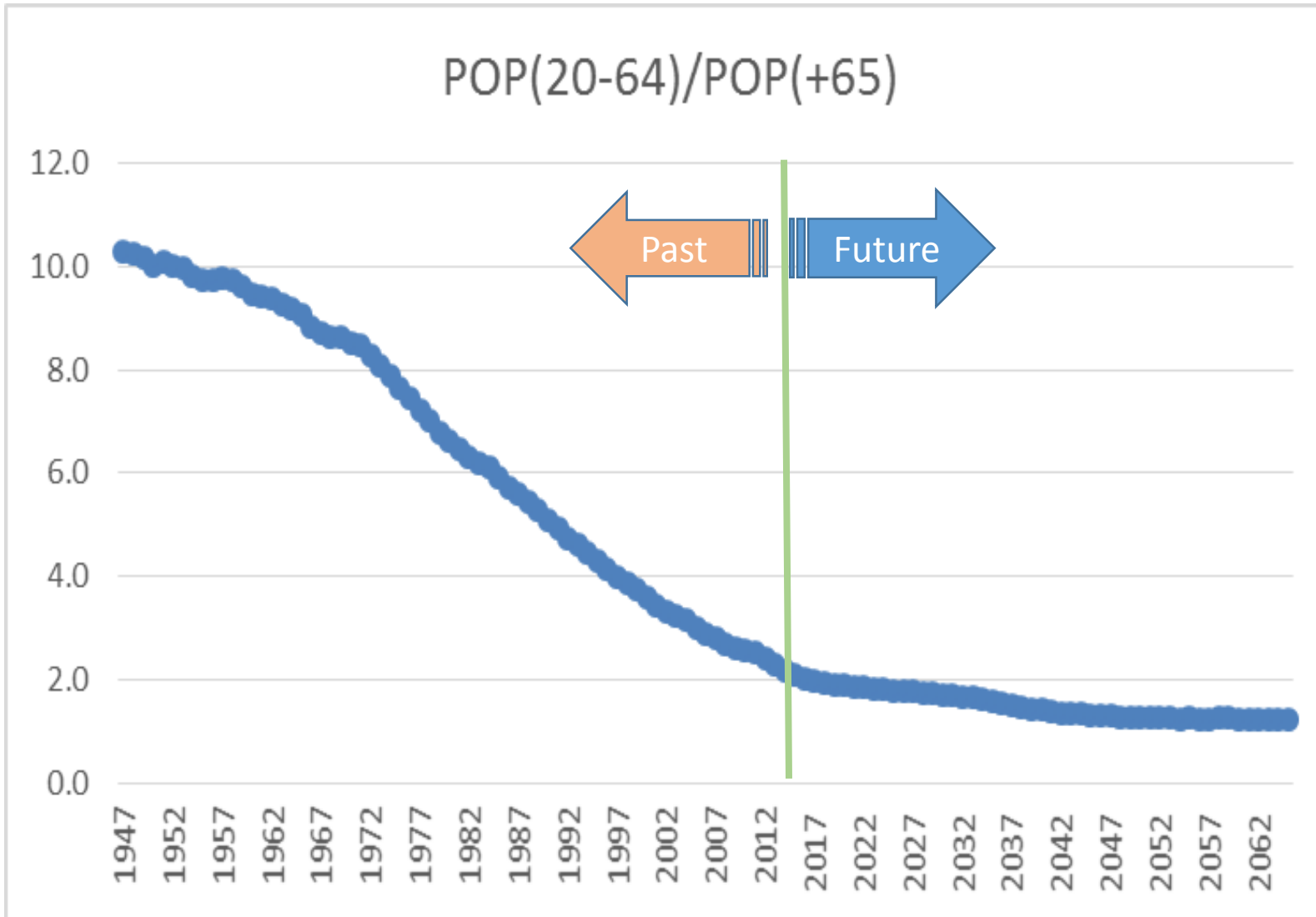


資料：1920～2010年：国勢調査、推計人口、2011年以降：「日本の将来推計人口（平成24年1月推計）」。

Long-run demographic Change

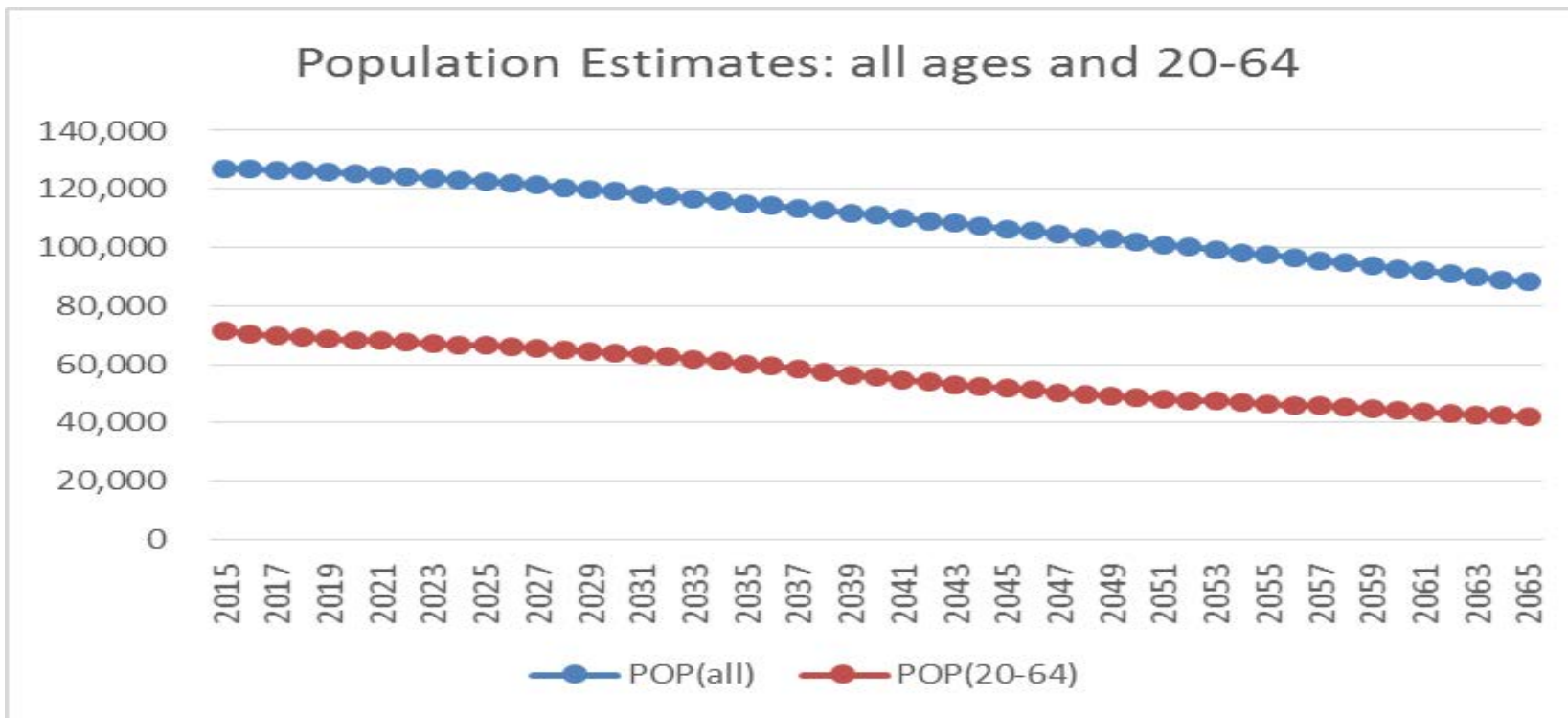


How many young persons per one elderly

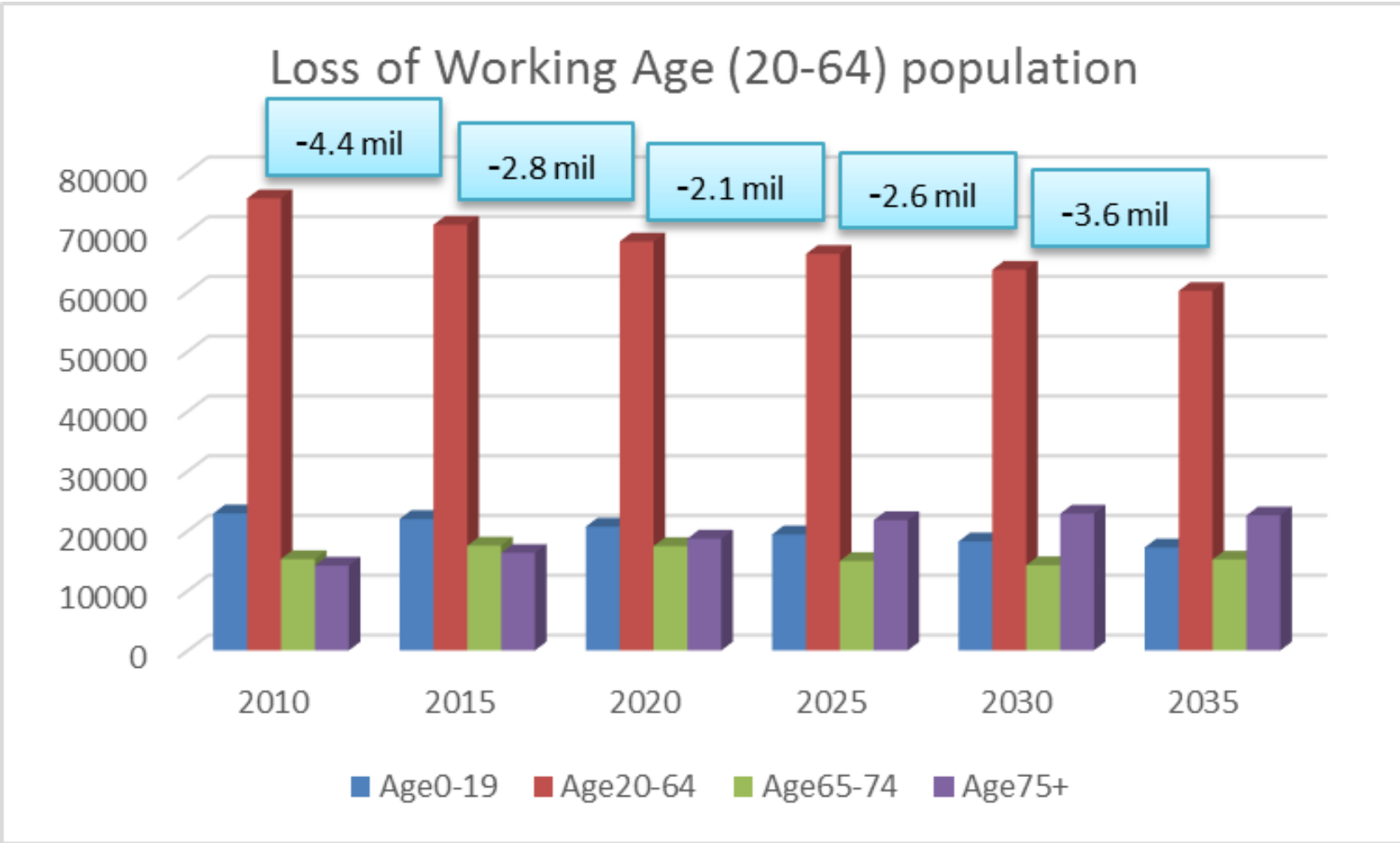


Demographic Change in next 50 years

	2015	2065	Change
Total population	127,095	88,077	-31%
Population age 20-64	71,227	41,893	-41%
Ratio (POP 20-64)/POP (65+)	2.1	1.2	



Working age population declines



Economic implications of declining population

- Growth will be slower
 - Less workers for production – supply side
 - Slow innovation: Fewer young entrepreneurs – supply side
 - Consumption will be lower – demand side
 - Investment will be lower – demand side
 - Companies will not invest where the market is shrinking
- PAYGO pension system
 - Income transfer from the young to the old becomes more burdensome as generations go by
- Government debt will play the same function as PAYGO

Implication of PAYGO pension

- Many
 - (pure) PAYGO pension
 - Intergenerational & intra-generational income transfer
 - Intra-generational social insurance (against longevity risk)
 - Generationally collective defined-contribution social insurance (against longevity risk)
 - Each generation accumulates assets until retirement
 - Intra-generational income transfer from rich to poor, possible
 - Intra-generational social insurance (against longevity risk)
 - Individual defined contributions + annuity contracts
 - Either public or private; either after tax or before tax

What is PAYGO insurance?

- PAYGO pension (pure form)
 - The working age pays SS contributions
 - The contributions form a pool of benefits
 - Benefits are paid to the old generation *in the same year*
 - PAYGO is *not a typical insurance* policy in the sense that what you paid as contribution are not what you receive later
 - But it is an intergenerational income transfer from the young to the old
 - However, when time comes to time of benefits, longevity risk is covered among the old by social security; it becomes a mutual insurance in a cohort, transfer from a short-lived to a long-lived
 - Intergenerational income transfer is advantageous to all generations if the population is expanding and/or the per-capita income is growing forever
 - In Japan, it made sense in the 1970s-80s, but not in the 2000s

Benefits of PAYGO

- PAYGO provides greater returns when:
 - Per-capita (lifetime) income is growing
 - Population is growing
 - See an example next slide

Examples

- A person has 3 phases of life
 - Young (age 20-39) work and save
 - Middle age (age 40-59) work and save
 - Elderly (age 60-79) retire and spend
- In each period (“year”), three generations coexist
- (1) Static economy
 - No POP growth
 - No per-capita income growth
- (2) Income growing economy
 - No POP growth
 - Per-capita income grows over time
- (3) POP growing economy
 - No per-capital income growth
 - POP growth

Static economy

- Static Economy
 - Life divided into 3 phases (young, middle age, elderly) with each phase consisting of 20 years
 - Wage income (150, 150, 0)
- Assume no population growth; no income growth
- W/O social security system, in each year, there is young, MA, elderly, earning (150, 150, 0)

Three life stages

- Each generation has 3 life stages
- Work during the young (age 20-40); the middle age (MA) (age 40-60); and the elderly (age 60-80)
- Earn 150 during the young; and also 150 during MA

	YOUNG	MIDDLE-AGE	ELDERLY	
Generation	Age 20 - 40	Age 40 - 60	Age 60 - 80	Lifetime
Income (Y)	150	150	0	300

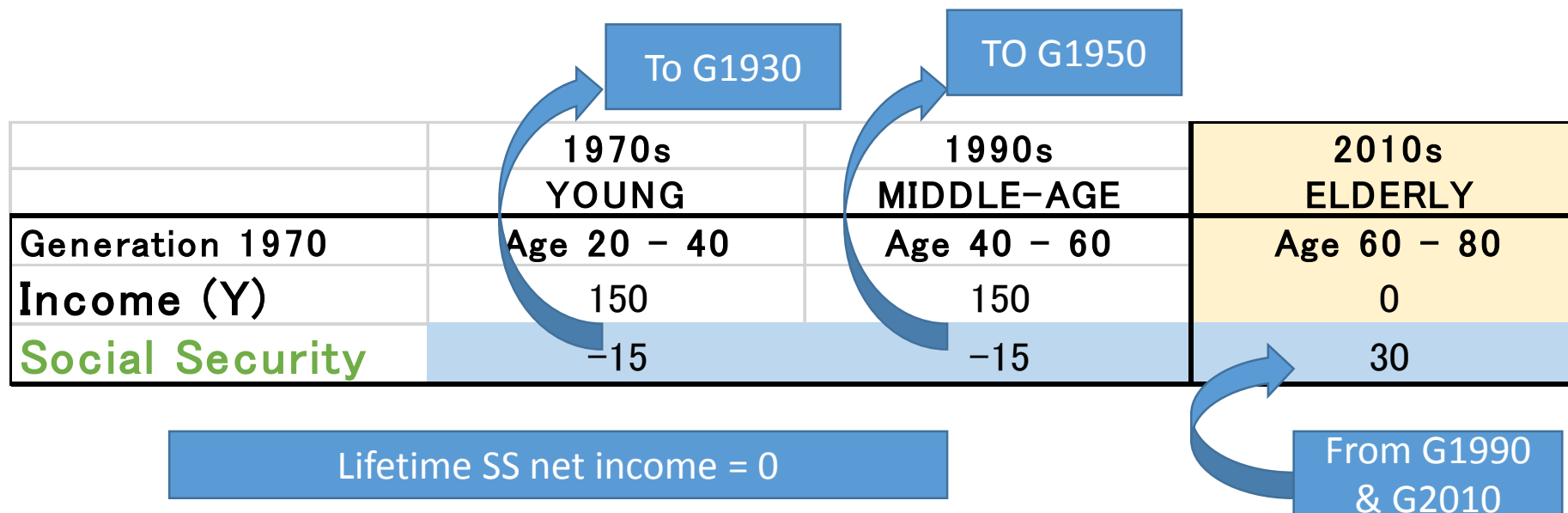
Overlapping Generations

- At any year (decade), 3 generations coexist

2010s	
Generation 1970	ELDERLY
Income (Y)	Age 60 - 80 0
Generation 1990	MIDDLE-AGE
Income (Y)	150
Generation 2010	YOUNG
Income (Y)	150

In static economy, PAYGO does **not** make life better or worse

- Suppose 10% SS tax on income of workers
- Entirety of revenue given to the elderly as pension benefits
- For each generation, you pay SS tax when young and MA (from older generations), and receive pension when elderly (from younger generations)



Growing Economy

- The irrelevance of PAYGO SS pension changes dramatically in a growing economy
 - Population growth
 - Per-capita income growth
- In a growing economy, PAYGO SS pension system will raise lifetime net income, because lifetime SS net income is positive

In static economy, PAYGO is irrelevant

- Suppose 10% SS tax on income of workers
- PAYGO: Entirety of revenue given to the elderly as pension benefits
- Each generation pays SS tax when young and MA (to older generations), and receive pension when elderly (from younger generations)
- For 1 elderly, there are 1 MA and 1 Young. $POP(20-59)/POP((60+)) = 2$
- Which is the case NOW, 2017!

	1970s YOUNG	1990s MIDDLE-AGE	2010s ELDERLY
Generation 1970	Age 20 - 40	Age 40 - 60	Age 60 - 80
Income (Y)	150	150	0
Social Security	-15	-15	30

To G1930 TO G1950

Lifetime SS net income = 0

From G1990 & G2010

Population growth

- Suppose population is growing: doubles in 20 years
- For one elderly person, there are 2 middle-aged and 4 young people
- $POP(20-60)/POP(60+) = 6$
- This was the case in Japan—in 1985!
- All the generation benefit from PAYGO system – Intertemporal Ponzi scheme

	1970s YOUNG Age 20 – 40	1990s MIDDLE-AGE Age 40 – 60	2010s ELDERLY Age 60 – 80
Generation 1970			
Income (Y)	150	150	0
SS 10% tax	-15	-15	90

Lifetime SS net income = 90 (30% of Y)

From G1990 & G2010

Population decline

- Suppose population will decline at the rate of 28% per 20 years
- For 1 elderly, only 0.72 MA and 0.51 young.
- $POP(20-59)/POP(60+)=1.24$, which is like 2065
- All the generations will **lose due to the PAYGO system**

	1970s YOUNG Age 20 - 40	1990s MIDDLE-AGE Age 40 - 60	2010s ELDERLY Age 60 - 80
Generation 1970			
Income (Y)	150	150	0
SS 10% tax	-15	-15	18.576

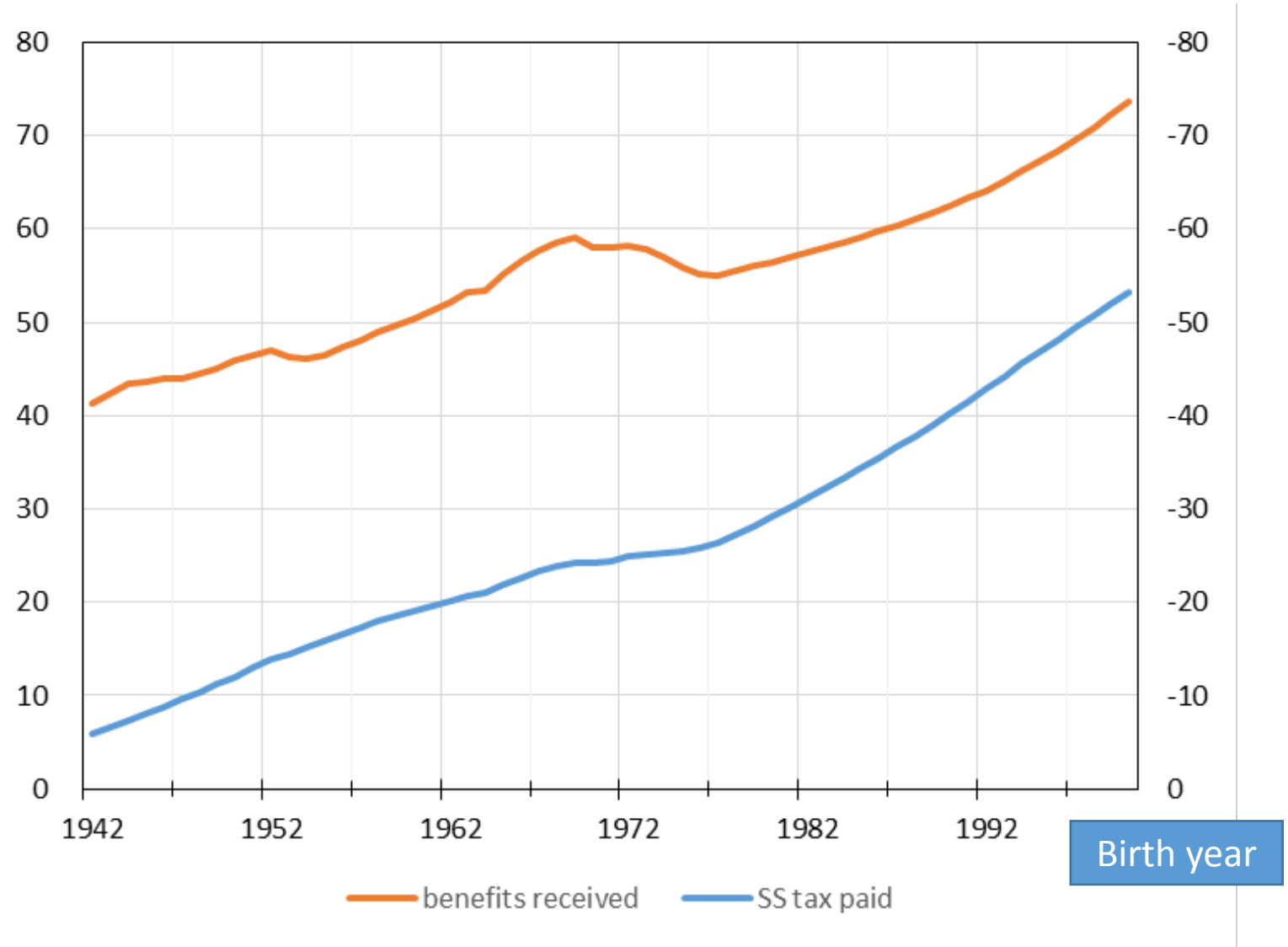
Lifetime SS net income = -11.4 (Loss of 3.8% of Y)!!

From G1990 &
G2010

Discussion

- When per-capital income grows, similar consequences
 - Details will be different
- When the economy is growing PAYGO pension makes sense
- When the economy is shrinking, PAYGO pension is terrible
- Transition problem
- When (POP and per-capita income) growth rates decline, what to do?
 - Benefit cuts
 - Raise SS tax rate (hit the ceiling of 18.3%)
 - Raise retirement age
 - Inject other tax revenues to SS system
 - Build a reserve fund to make the transition less painful → GPIF

Simulation of pension system, cost and benefit to each cohort



Source: Author's calculation

Will GPIF rescue future generations from high SS tax rates and poor benefits?

- GPIF is a reserve fund that has accumulated the difference between contribution (SS tax) and benefits payout
- Yes, it will help future generations *if* GPIF's portfolio generates higher returns.
- GPIF should not hold Japanese government bonds (except for liquidity needs) because in order to redeem them, when needed, taxes have to be levied on future generations. → Economic consequence is similar to the PAYGO system.

Government bonds in a shrinking economy

- Let us consider a parallel between Government bonds and PAYGO pension

Role of government bonds

- Bonds are assets (store of value), similar to money and PAYGO pension system
- Ponzi scheme possible if the economy grows forever (shown above)
- Bonds are Liabilities
 - Crowding out ($S = I + \Delta B$)
 - Tax increase in the future (intergenerational shift of burden)
 - Fiscal crisis (when private sector $\Delta \text{Asset} < \Delta B$)
- National net wealth declines when $\Delta B > \Delta \text{Domestic saving}$, and ΔB are used in government consumption → Hoshi and Ito (2013; AEPR)
- Pension system may become unsustainable
 - Lifetime SS tax payments > Lifetime pension benefits

So, gov't bonds are like PAYGO

- One generation (G 1970) issue bonds to the next generation (G 1990), reaps the benefits
- The next generation receive bonds only because a generation after (G 2010) will accept it in the future
- And so on. Instead of SS tax and transfer, it is government bond transaction.
- But it is the same thing
- Now when PAYGO is unsustainable, so are gov't bonds

Role of Government Bonds

Does the size of debts matter wehn sustainable?

- Growing economy (textbook case)
 - Bonds offer a “store of value” from one generation to next
 - PAYGO can work similarly
 - Bonds or PAYGO can be instruments for an intertemporal Ponzi scheme
- Shrinking economy (Japan)
 - Bonds or PAYGO can be an instrument to pass liabilities onto the next generation
 - Some generations in the future will be hit by a sudden decline in bonds/PAYGO benefits → Fiscal Crisis

Intergenerational inequity: PAYGO and Demographic transition

- Generous pensions possible
 - If population continues to grow
 - If per-capita income continues to grow
 - Raise value of human capital
- Lifetime benefits/contributions deteriorate with subsequent generations in Japan
 - Time-series pension contribution changes: dead end
 - Adverse change in $POP(20-64)/POP(65+)$
 - Economic growth stagnates
- Similarity between PAYGO and government bonds

END