Digital technology, Aging Population and Income distribution of Japan

2019, May
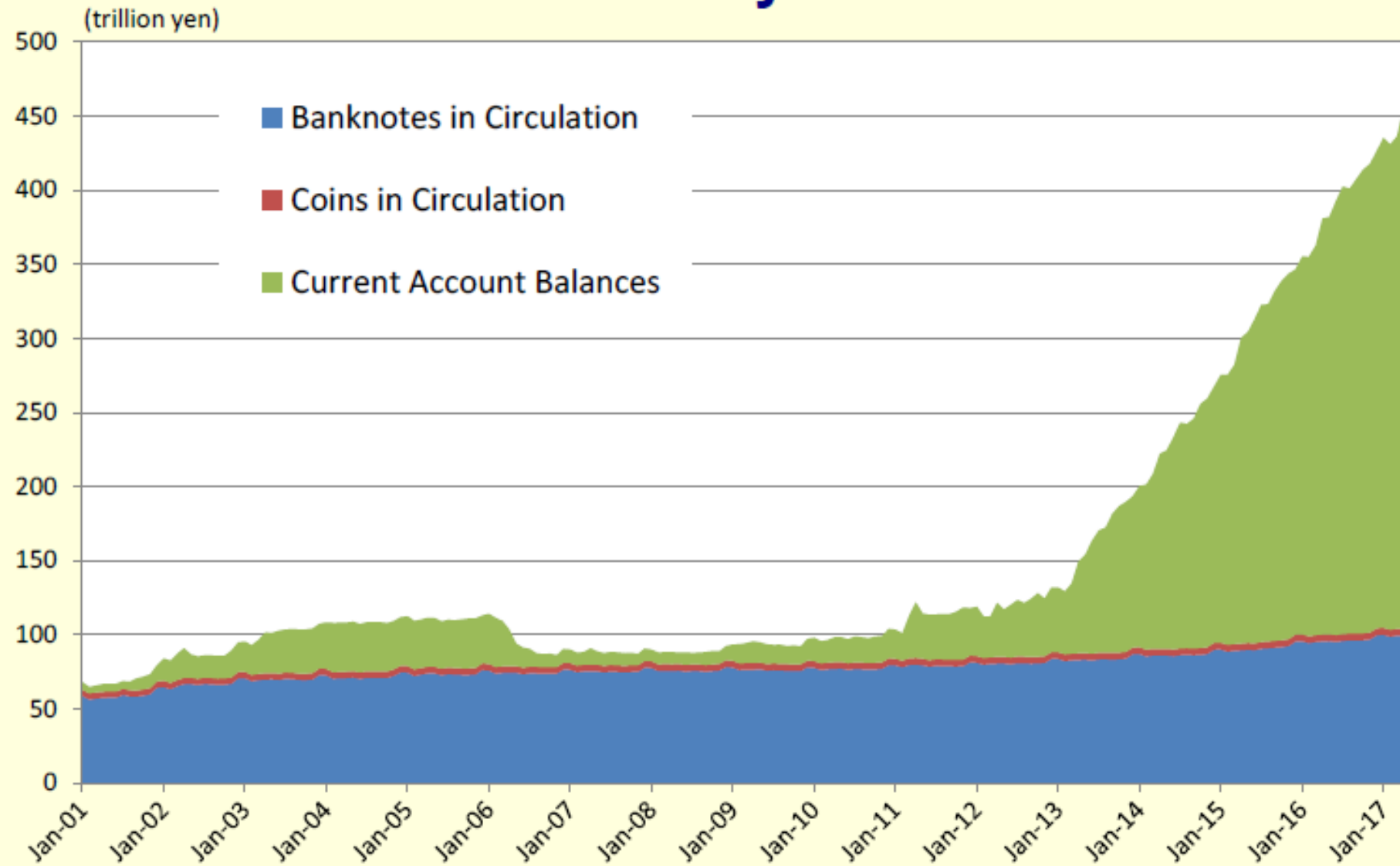
Naoyuki Yoshino

Dean & CEO, Asian Development Bank Institute

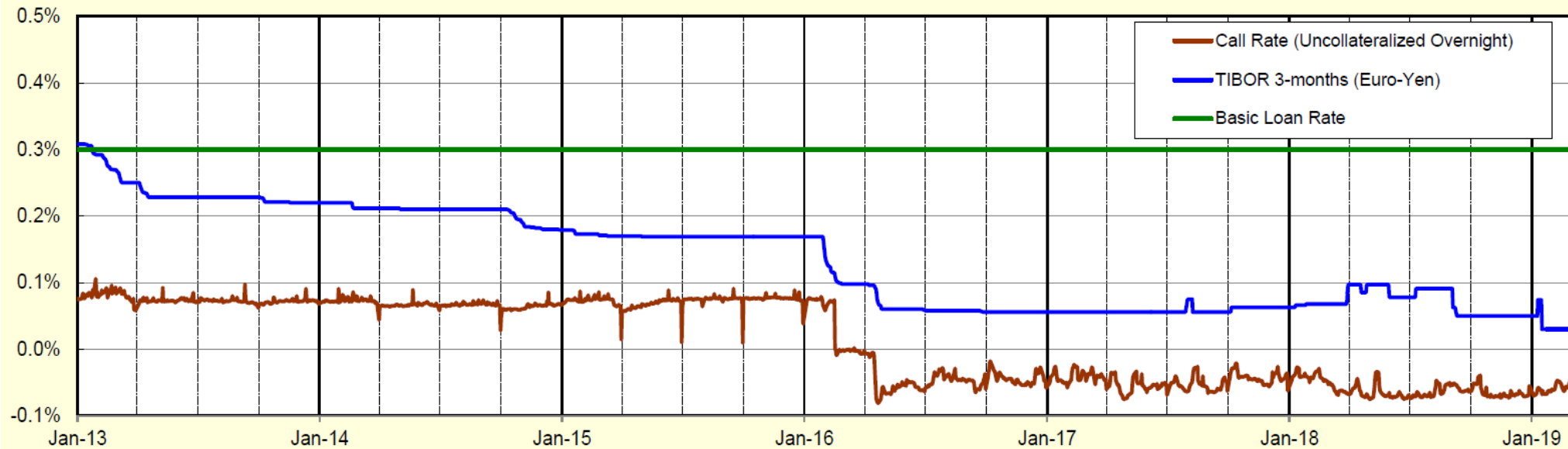**Professor Emeritus, Keio University, Japan**

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Monetary Base

(trillion yen)

- Banknotes in Circulation
- Coins in Circulation
- Current Account Balances

Source: Bank of Japan "Monetary Base"

Short-Term Interest Rates

(Until 28 February 2019)

Legend:
- Call Rate (Uncollateralized Overnight)
- TIBOR 3-months (Euro-Yen)
- Basic Loan Rate

Source: Bank of Japan, Japanese Bankers Association

Yields of JGB

(Until 28 February 2019)

Legend:
- 2-year bond
- 5-year bond
- 10-year bond
- 20-year bond
- 30-year bond
- 40-year bond

Source: Bloomberg

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Working population is diminishing and elderly population is growing rapidly⋯

(10 of Thousands) (%)

- Age 14 and less
- Age 65 and over
- Age 15–64
- Working Population Ratio (15–64)
- Aged Population Ratio
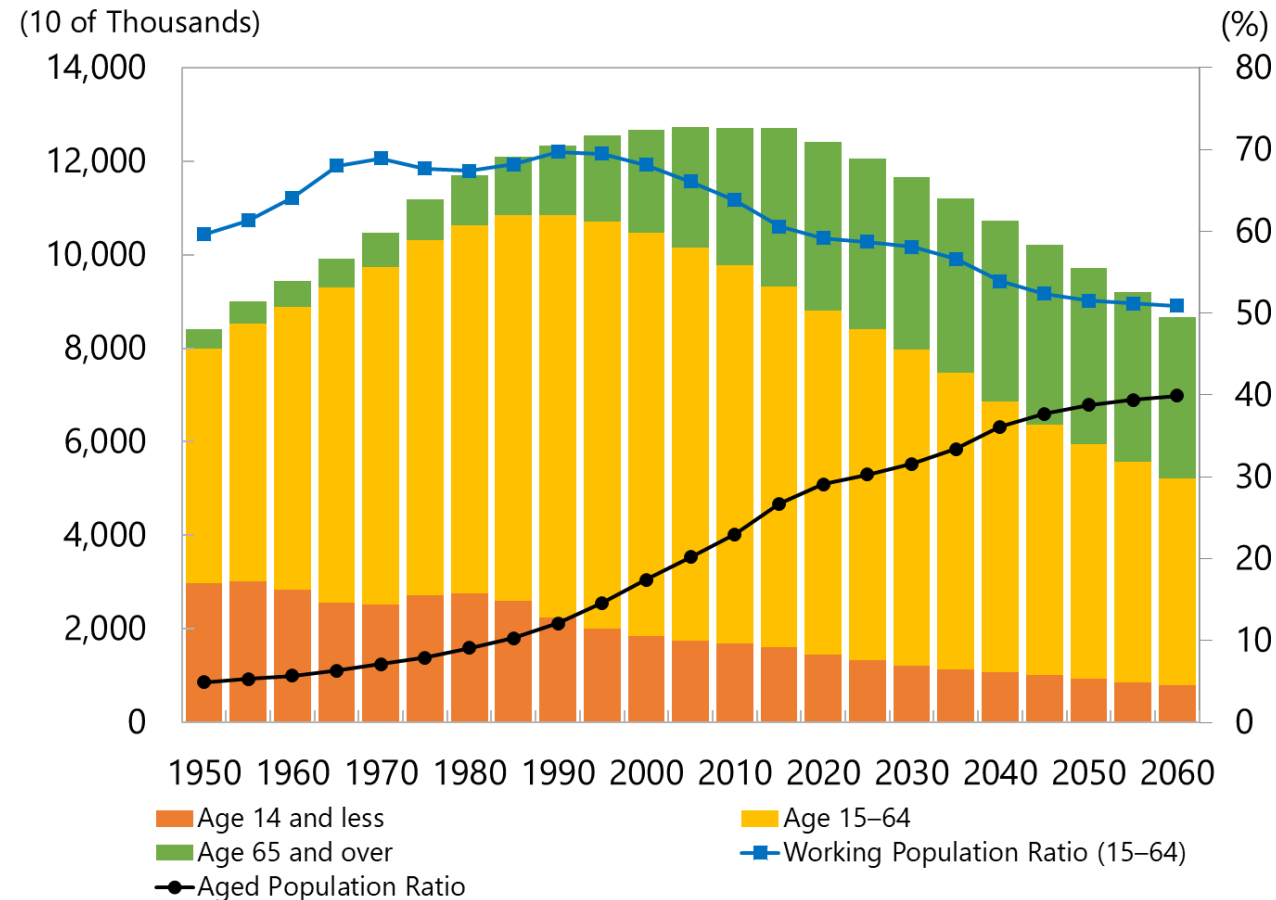
Population Aging in Asian Countries
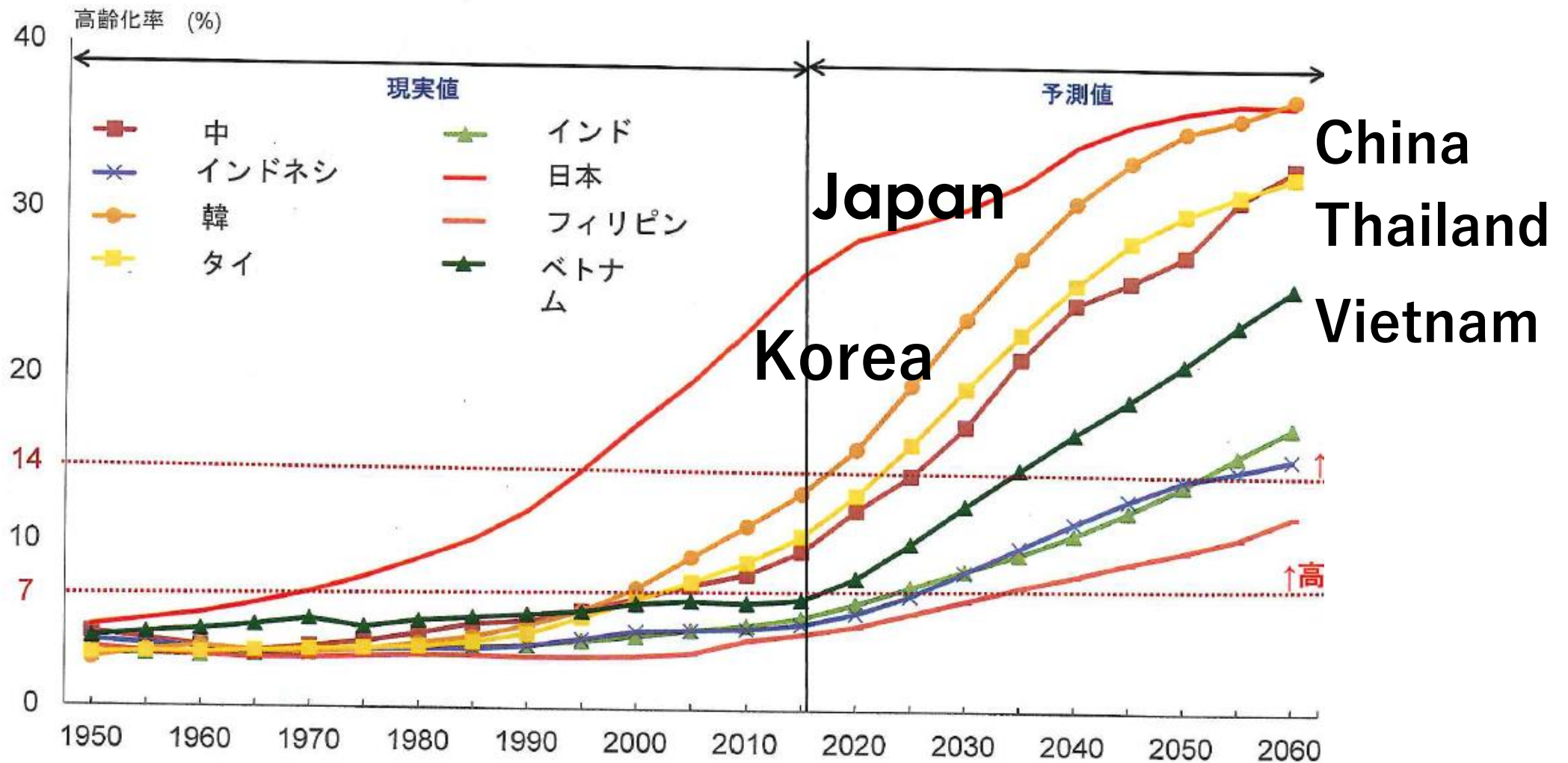
Declined effectiveness of fiscal and monetary policies faced with aging population in Japan[☆]
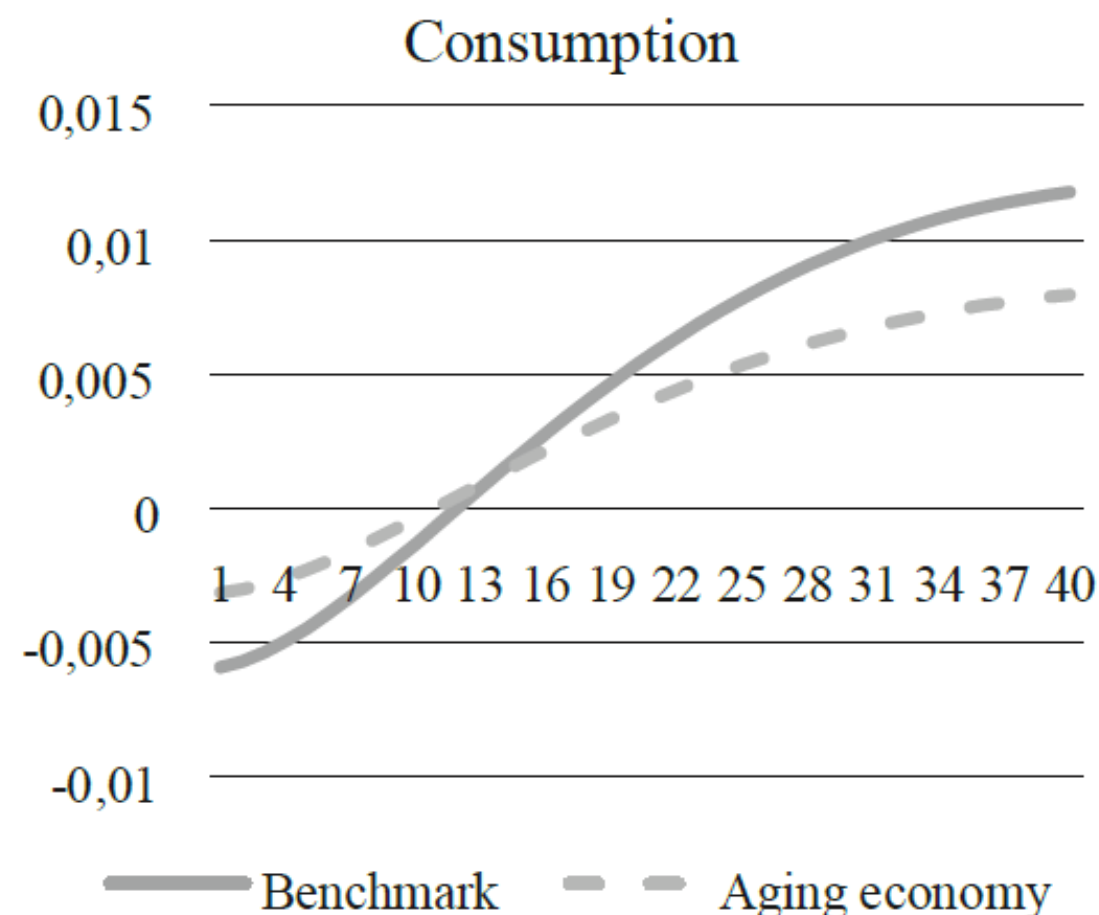
Naoyuki Yoshino[a], Hiroaki Miyamoto[b,*]

[a] Asian Development Bank Institute, Japan
[b] International Monetary Fund, United States

Output

Consumption

Benchmark — — Aging economy
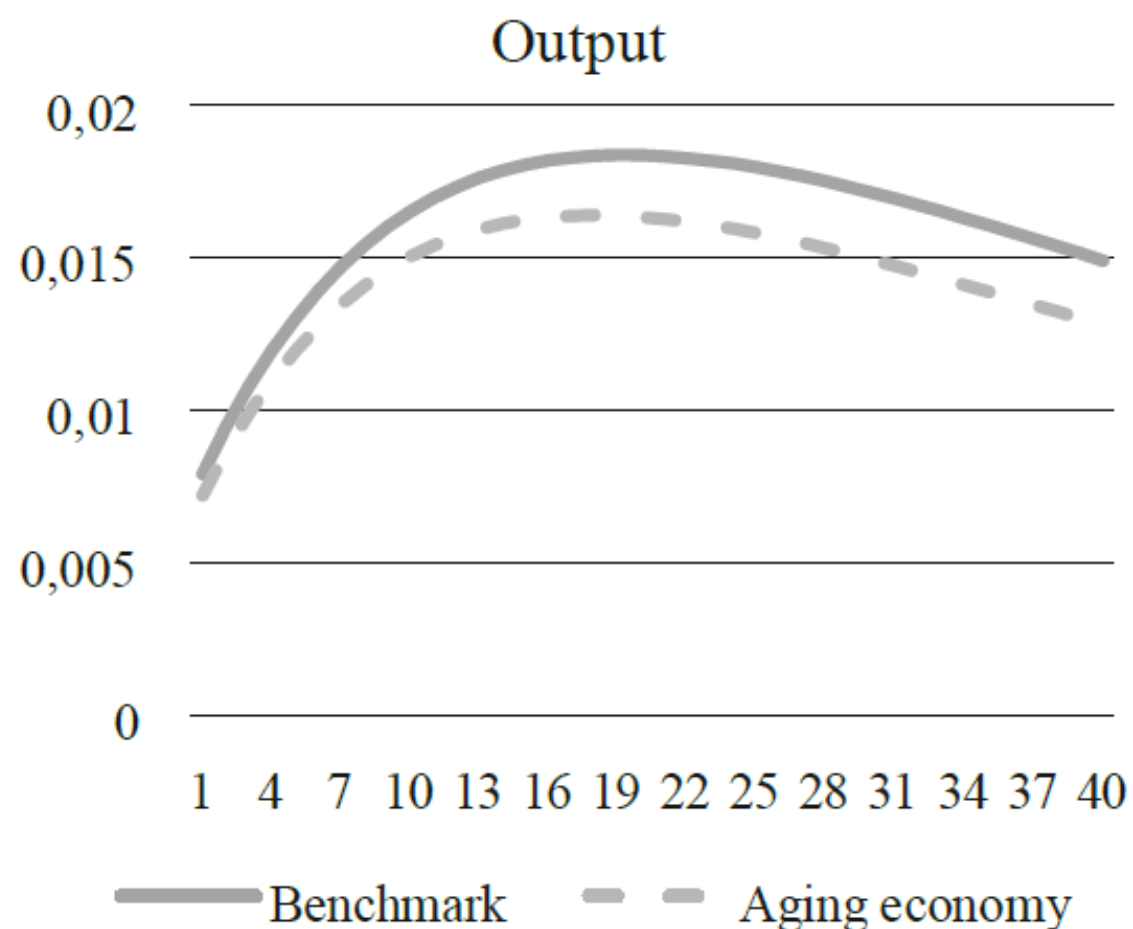
(a) Effects of an expansionary monetary policy

(b) Effects of a positive government investment shock

Effects of Expansional Monetary Policy

Monetary Policy (Working Population)

→ Increase investment

→ Wages of working population will rise

→ Consumption of working population will rise

(Retired Population)

→ relies on pensions and social welfare

→ monetary policy does not affect to retirees

Effects of Fiscal Policy (Public Works)

Fiscal Policy （Working Population）
- → Create new jobs
- → Unemployment rate declines
- → Consumption of working population will rise

Retired population
- → Not affected by fiscal policy （punli
- → consumption remains the same
- → lower interest rate reduces their interest income

Empirics – Miyamoto and Yoshino (2019)

- **Specification 1**

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + \gamma_t^k + \beta^k shock_{i,t} + \varepsilon_{i,t}^k$$

- y : log of output (debt-to-GDP ratio, private-investment-output ratio)
- $shock$: an unanticipated public investment shock
- α : country fixed effects
- γ : time fixed effects

- **Specification 2**

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + \gamma_t^k + \beta_1^k G(z_{i,t}) shock_{i,t} + \beta_2^k \left(1 - G(z_{i,t})\right) shock_{i,t}$$
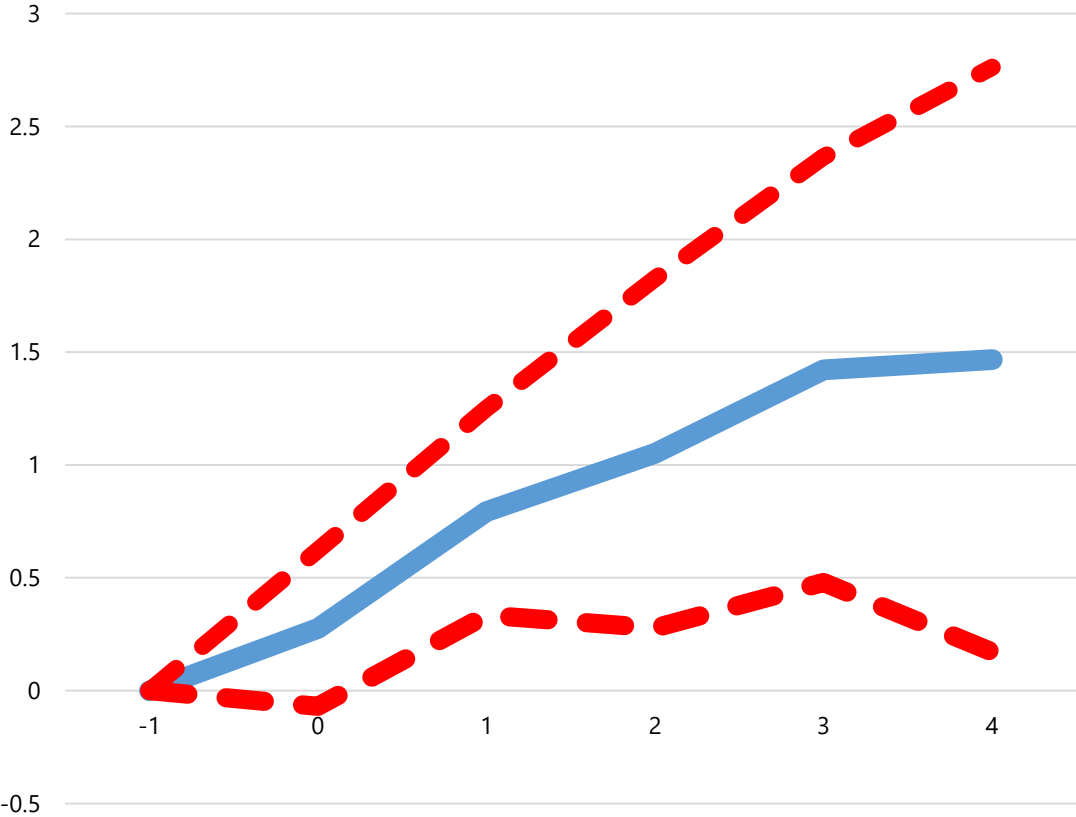
with

$$G(z_{i,t}) = \frac{\exp(-\delta z_{it})}{1 + \exp(-\delta z_{it})}, \delta > 0$$
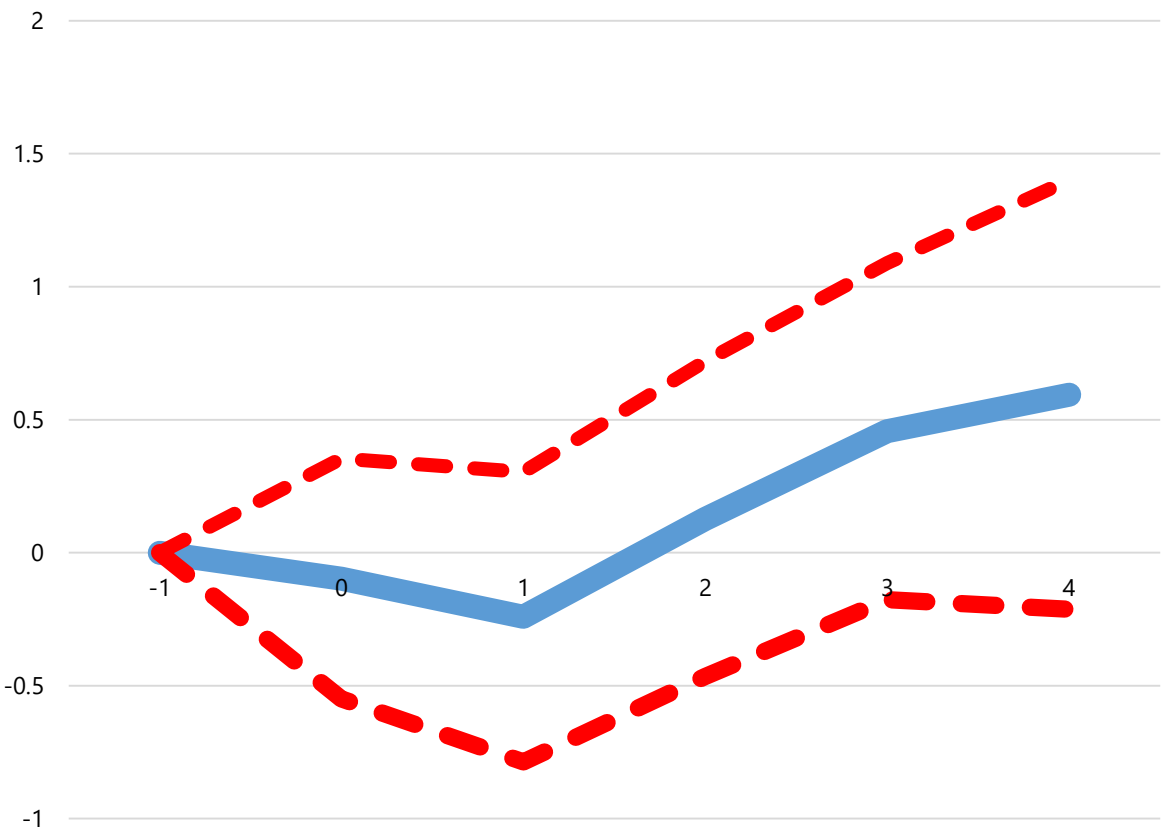
where δ is an indicator of public investment efficiency

Impact of Fiscal Policy (Public Investment)
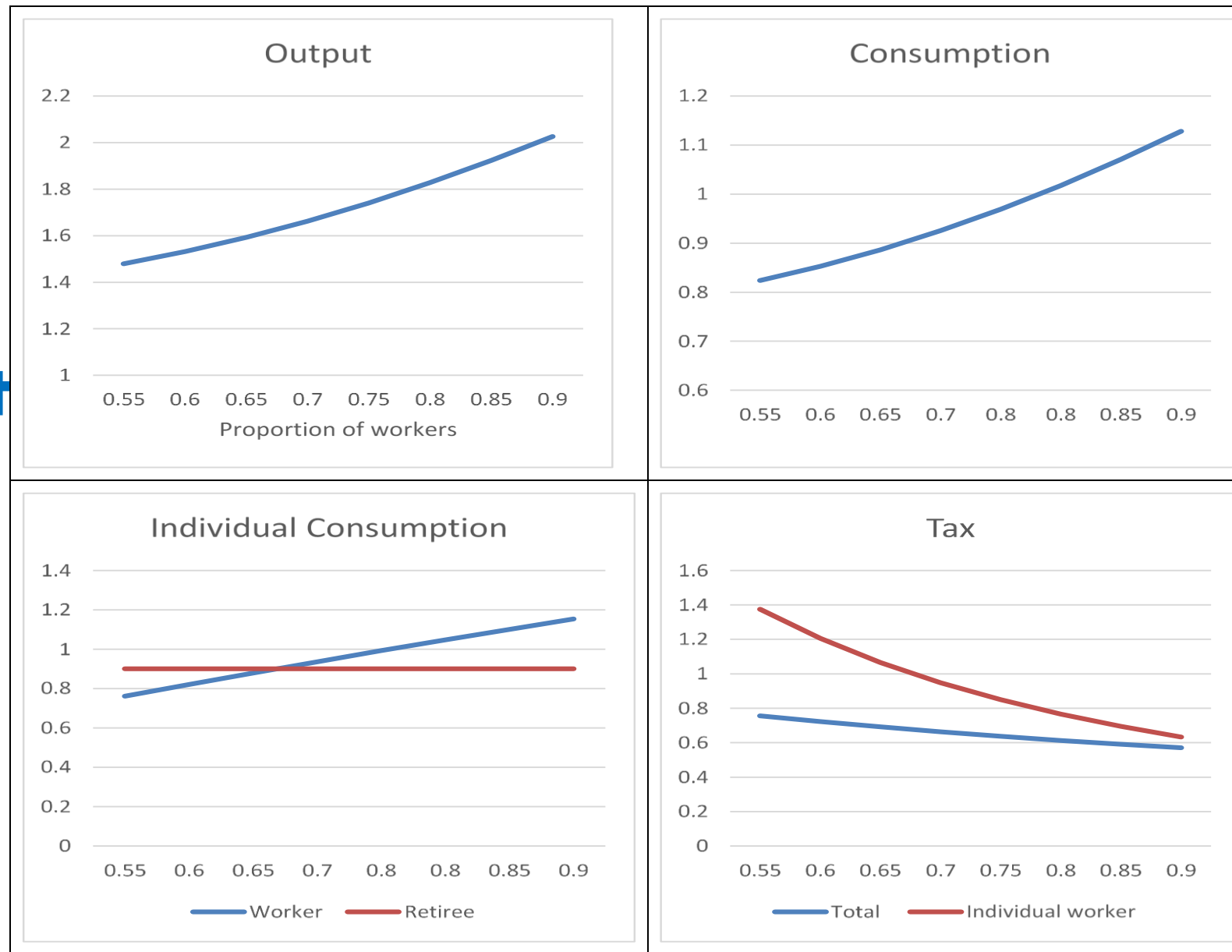

Non-aging economy

Aging economy

Recommended Policy

Productivity based wage rate and postpone retirement age by use of Technological Progress

Yoshino-Miyamoto (2017) __Japan and the World Economy__

Yoshino-Farhad-Miyamoto (2017) __Credit and Capital Markets__

Output

x-axis: Proportion of workers (0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9)

Consumption

Individual Consumption — Worker, Retiree

Tax — Total, Individual worker

Source: Yoshino and Miyamoto (2016).

Naoyuki Yoshino
Farhad Taghizadeh-Hesary *Editors*

Monetary Policy and the Oil Market

ADBInstitute

Springer

A1.13 Price of Brent crude

—— Spot
—— Annual average

$/barrel
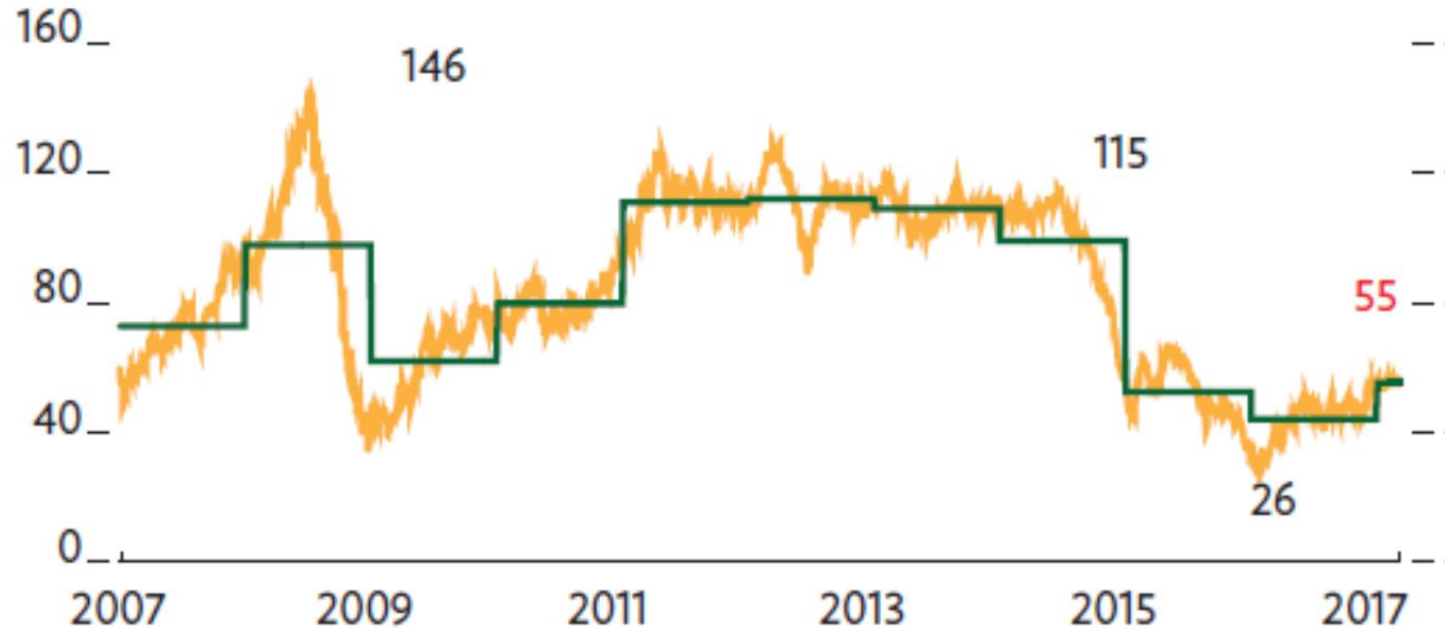
Sources: Bloomberg; World Bank. Commodity Price Data (Pink Sheet).
http://www.worldbank.org (both accessed 9 March 2017).

Impact of Oil Price Decline to Exporting Countries
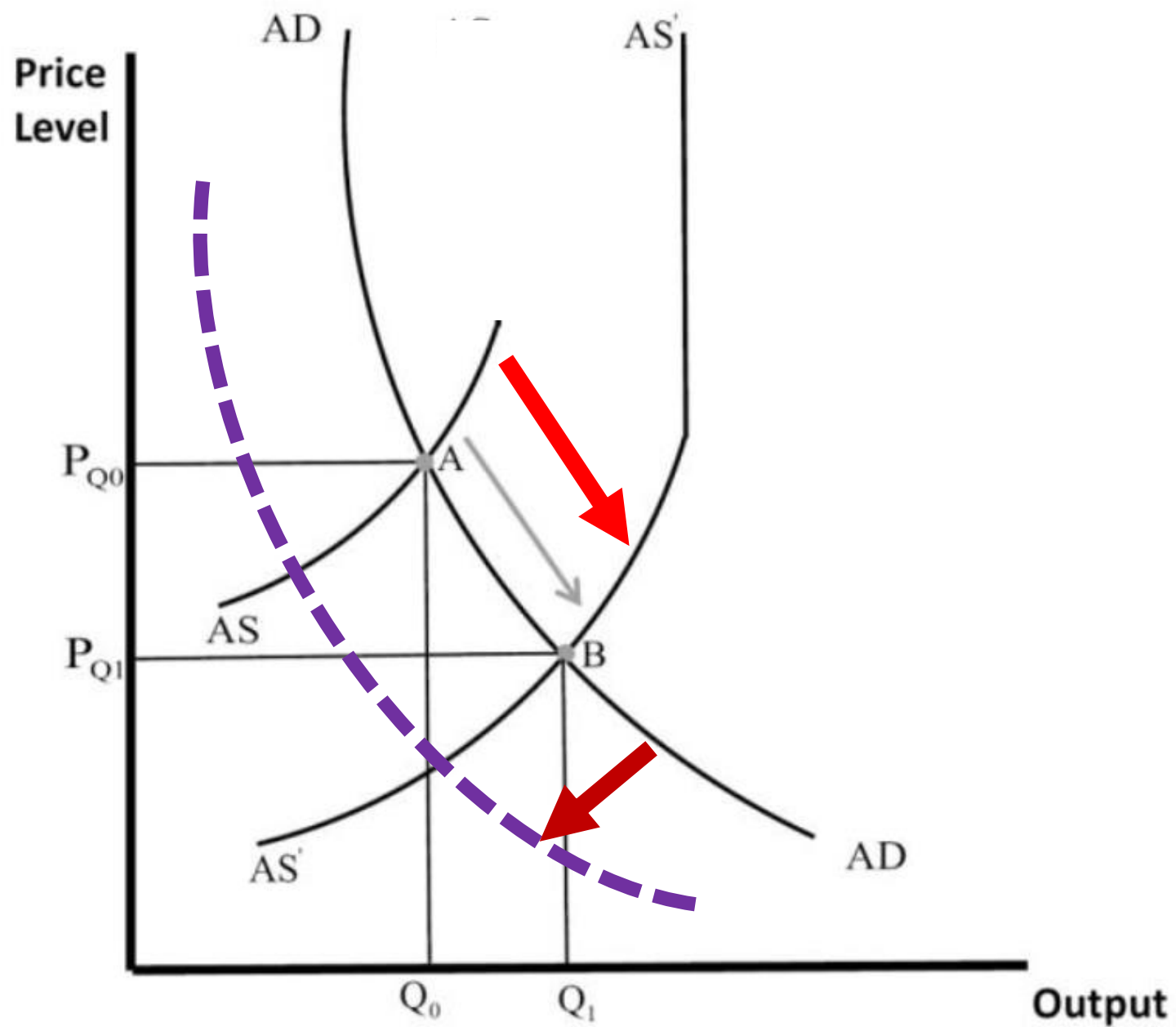
AD = aggregate demand, AS = aggregate supply.

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Figure 2: Average Household Income of Top 10% (Rich) over Average Household Income of Bottom 10% (Poor) 2002Q1–2017Q3
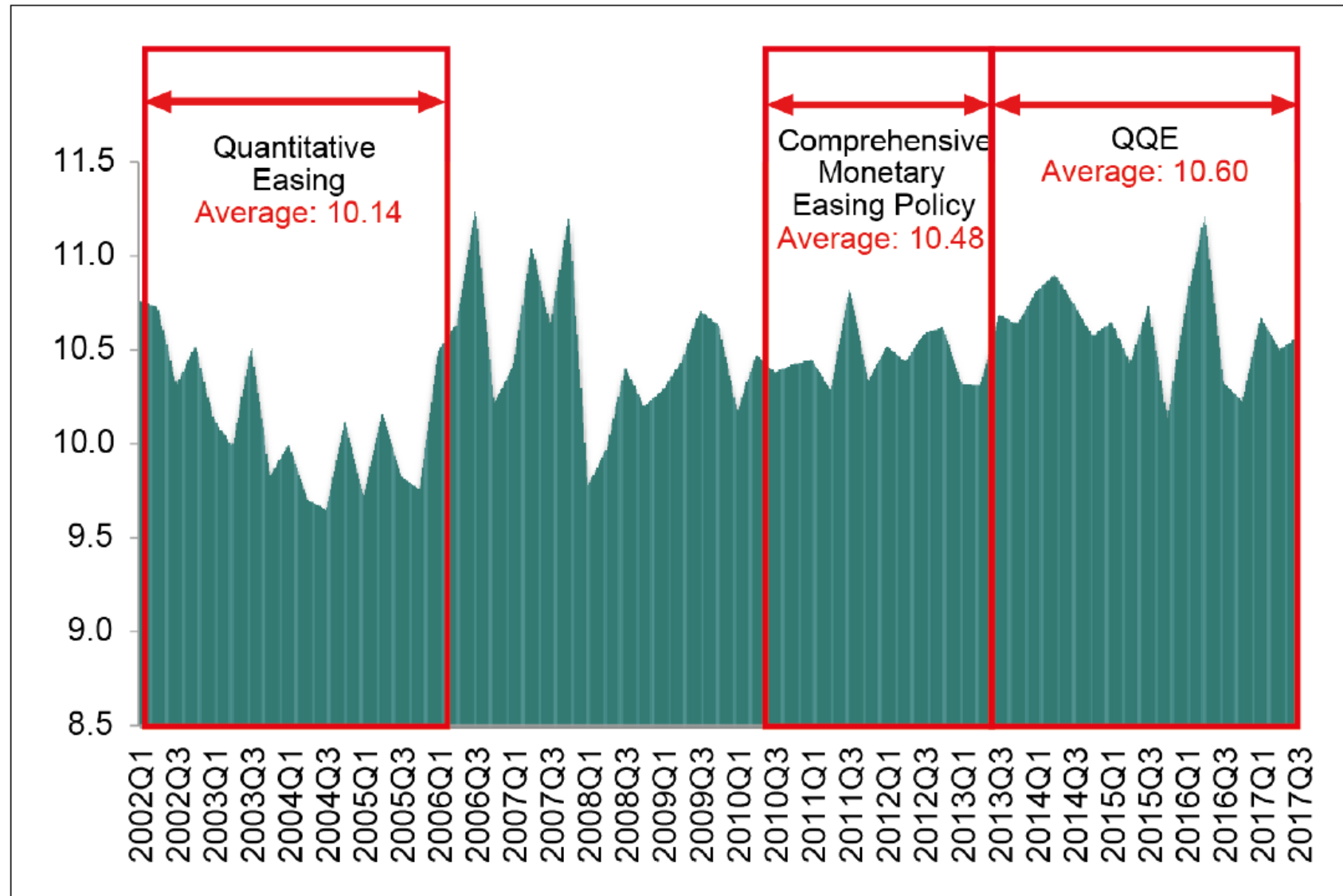
Source: Statistics Japan (https://www.e-stat.go.jp).

Table 3: Bracket of Taxable Inheritance in Japan (January 2015)

(%)

Bracket of Taxable Inheritance	Tax Rate
Up to 10 million	10
10 million–30 million	15
30 million–50 million	20
50 million–100 million	30
100 million–200 million	40
200 million–300 million	45
300 million–600 million	50
Over 300 million	55

Source: Ministry of Finance (2018).http://www.mof.go.jp/tax_policy/summary/property/e01.htm (accessed 31 January 2018).

Table 4: Individual Income Tax Rates in Japan (January 2017)

(%)

Brackets of Taxable Income		Tax Rates
–	Or under 1,950,000 yen	5
Over 1,950,000 yen	Or under 3,300,000 yen	10
Over 3,300,000 yen	Or under 6,950,000 yen	20
Over 6,950,000 yen	Or under 9,000,000 yen	23
Over 9,000,000 yen	Or under 18,000,000 yen	33
Over 18,000,000 yen	Or under 40,000,000 yen	40
Over 40,000,000 yen	–	45

Empirical Model

$$E_H = w_H L_H + r_D D_H + \pi P_S S_R \qquad (1)$$

High Income Earners

$$E_L = w_L L_L + r_D D_L \qquad (2)$$

Low Income Earners

$$M \uparrow \rightarrow r \downarrow \text{ and } r_D \downarrow \rightarrow r_D D \downarrow \qquad (4)$$

$$M \uparrow \rightarrow r \downarrow P_S \uparrow \qquad (5)$$

Effects of Monetary Policy

$$\frac{E_H}{E_L} = \frac{(1-t_W^H)w_H l_H + (1-t_C^H)(r_D D_H + \pi P_S S_H)}{(1-t_W^L)w_L l_L + (1-t_C^L)r_D D_H} \qquad (8)$$
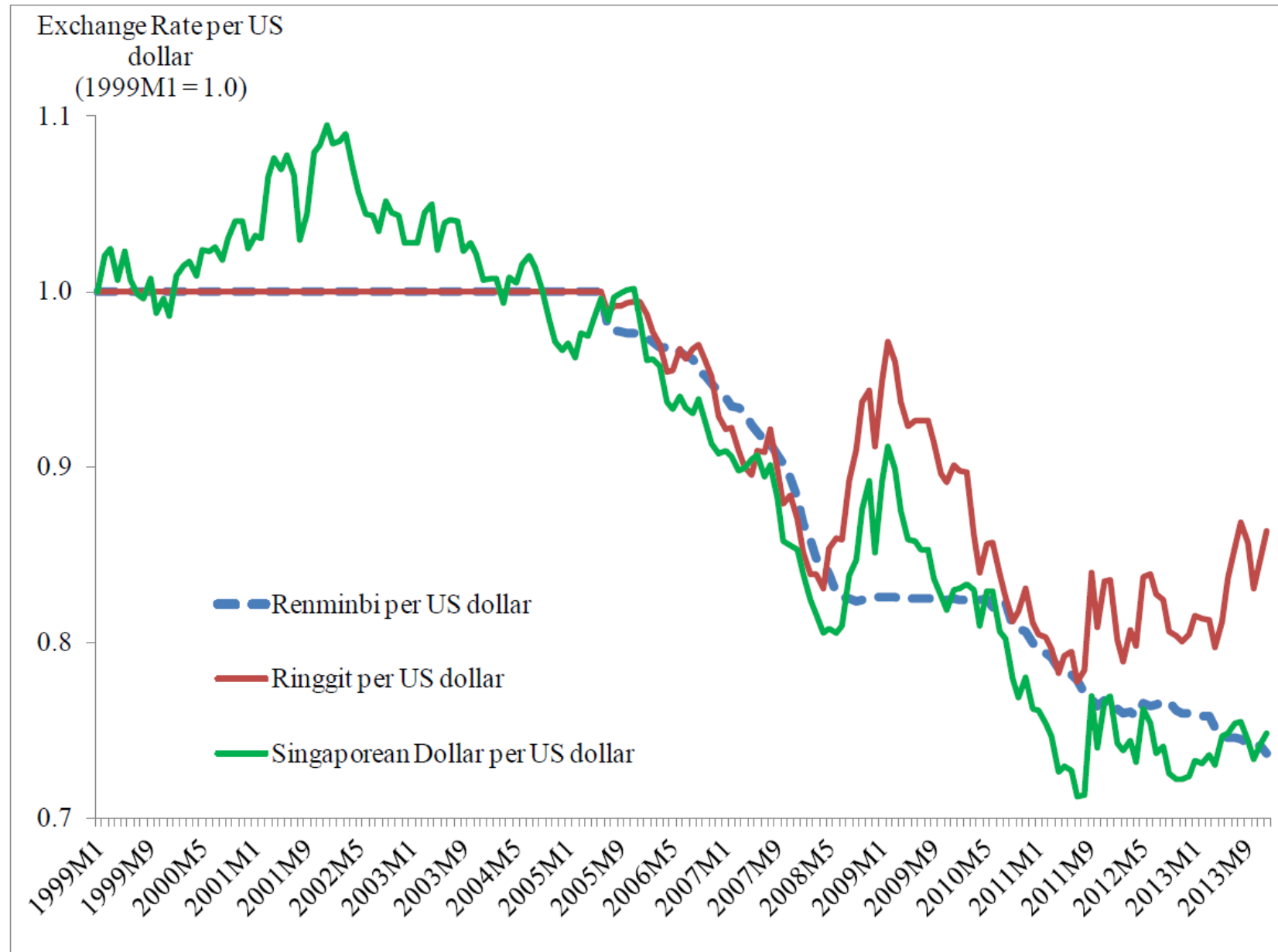
Development of Financial Technology

1, Access to financial products through mobile phone

2, Financial products can be supplied from overseas

3, Households can shop around various financial products through mobile phone
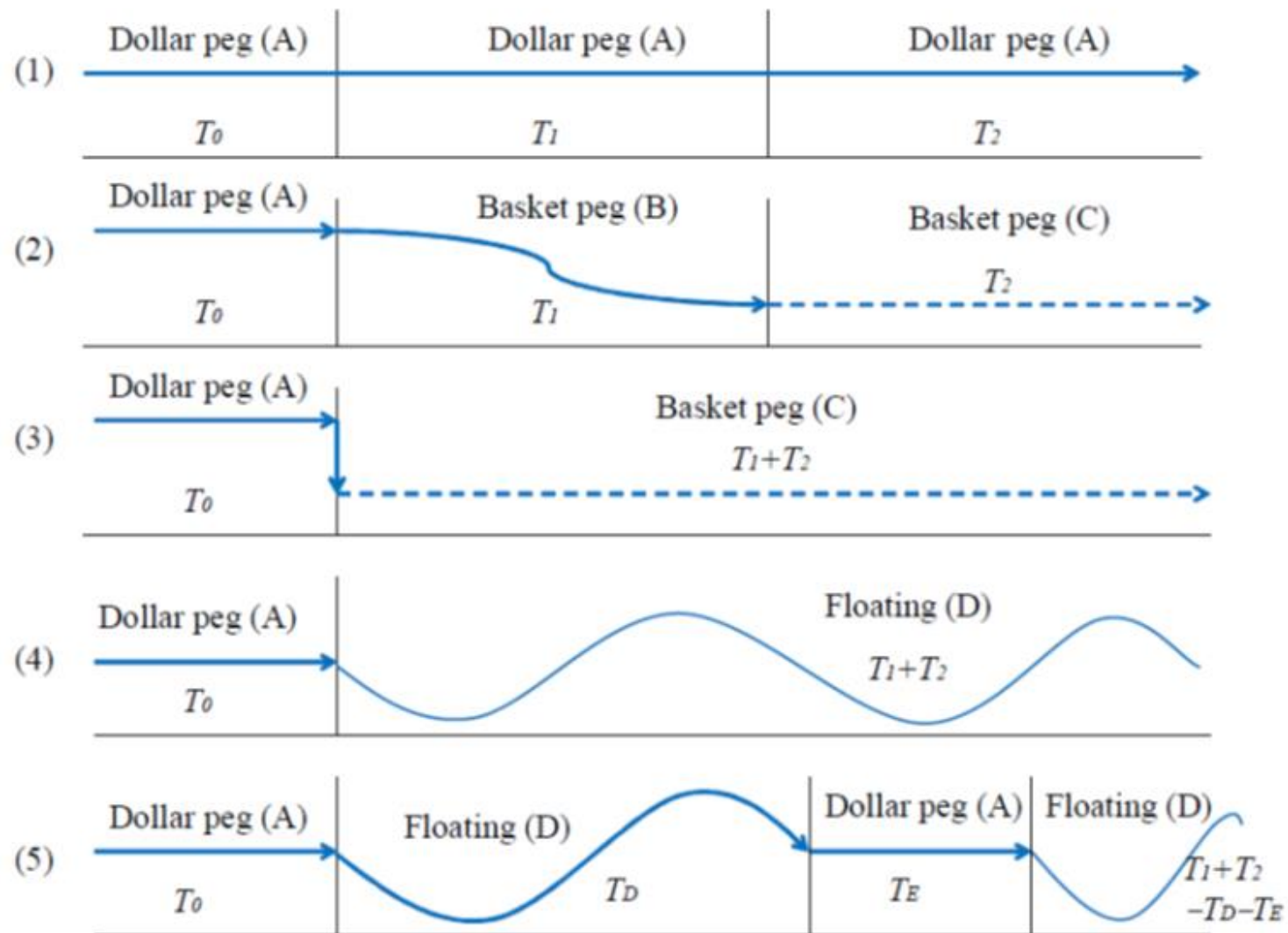
4, Easy for individuals to access to credit

     Households' Debt Overhang

5, Financial education will be very important

Figure 1. Nominal Exchange Rates Against the US Dollar

Exchange Rate per US dollar (1999M1 = 1.0)

- - - Renminbi per US dollar
—— Ringgit per US dollar
—— Singaporean Dollar per US dollar

Source: IMF International Financial Statistics.

(1)

Dollar peg (A) | Dollar peg (A) | Dollar peg (A)

T_0 | T_1 | T_2

(2)

Dollar peg (A) | Basket peg (B) | Basket peg (C)

T_0 | T_1 | T_2

(3)

Dollar peg (A) | Basket peg (C) T_1+T_2

T_0

(4)

Dollar peg (A) | Floating (D) T_1+T_2

T_0

(5)

Dollar peg (A) | Floating (D) | Dollar peg (A) | Floating (D)

T_0 | T_D | T_E | T_1+T_2 $-T_D-T_E$

Values of the Cumulative Losses and Policy Instruments

|	Policy (1)	Policy (2)	Policy (3)	Policy (4)	Policy (5)[b]
Stable regime	Dollar peg	Basket peg	Basket peg	Floating	Managed floati
Adjustment	—	Gradual	Sudden	Sudden	Sudden
Instrument value	$i^* = 4.34$	$v^* = 0.58$	$v^{**} = 0.68$	$m^* = 0.016$	$m^{**} = 0.017$
Cumulative loss (value)	17.04	1.80	1.91	2.67	2.31
Cumulative loss (% of $\bar{y}^2$)[a]	23.4	2.4	2.6	3.7	3.2

Gross Debt/GDP ratio, Japan, USA, EU

Source: IMF

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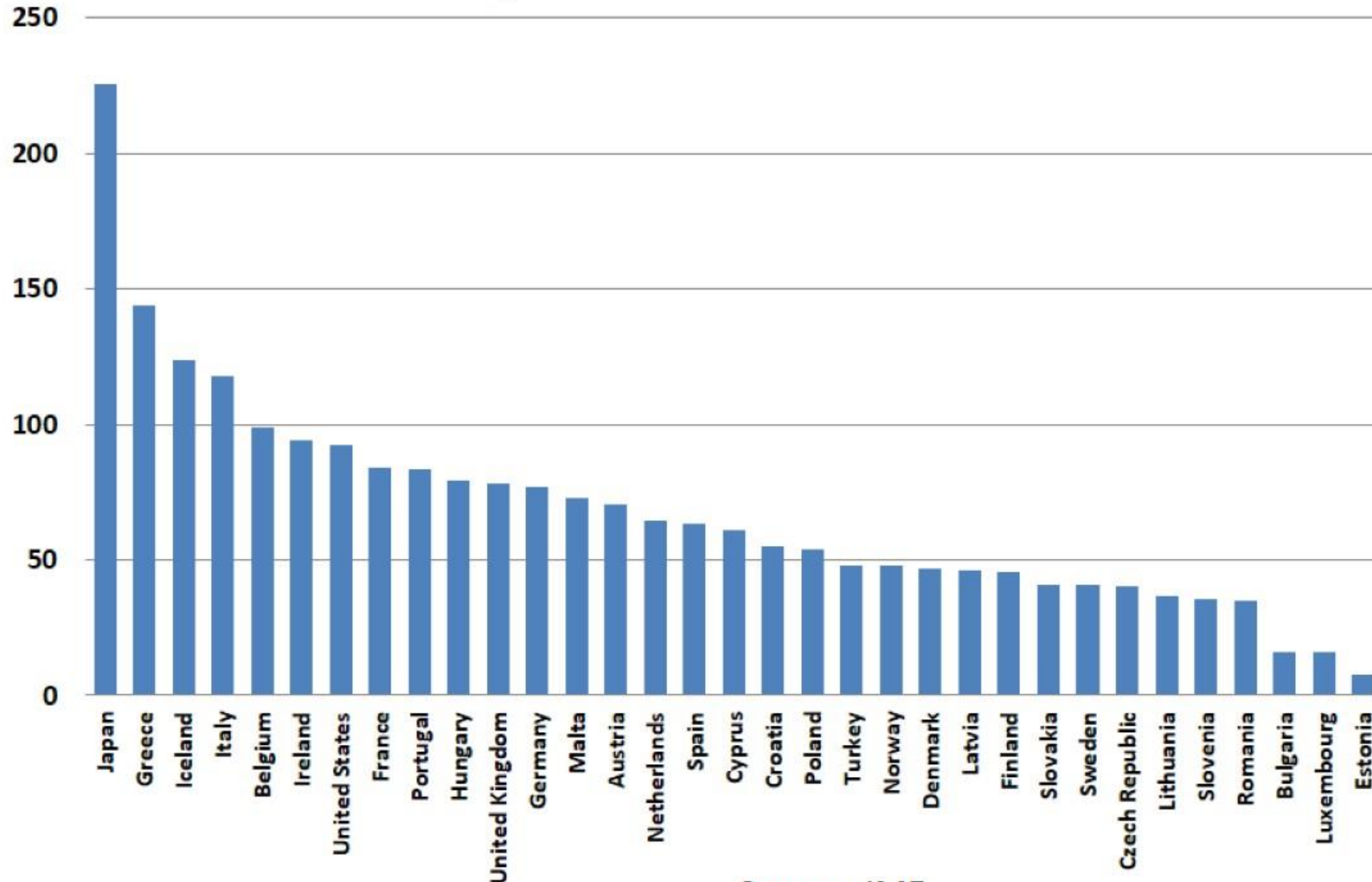
Figure 2: Government Bond Markets of Japan and Greece
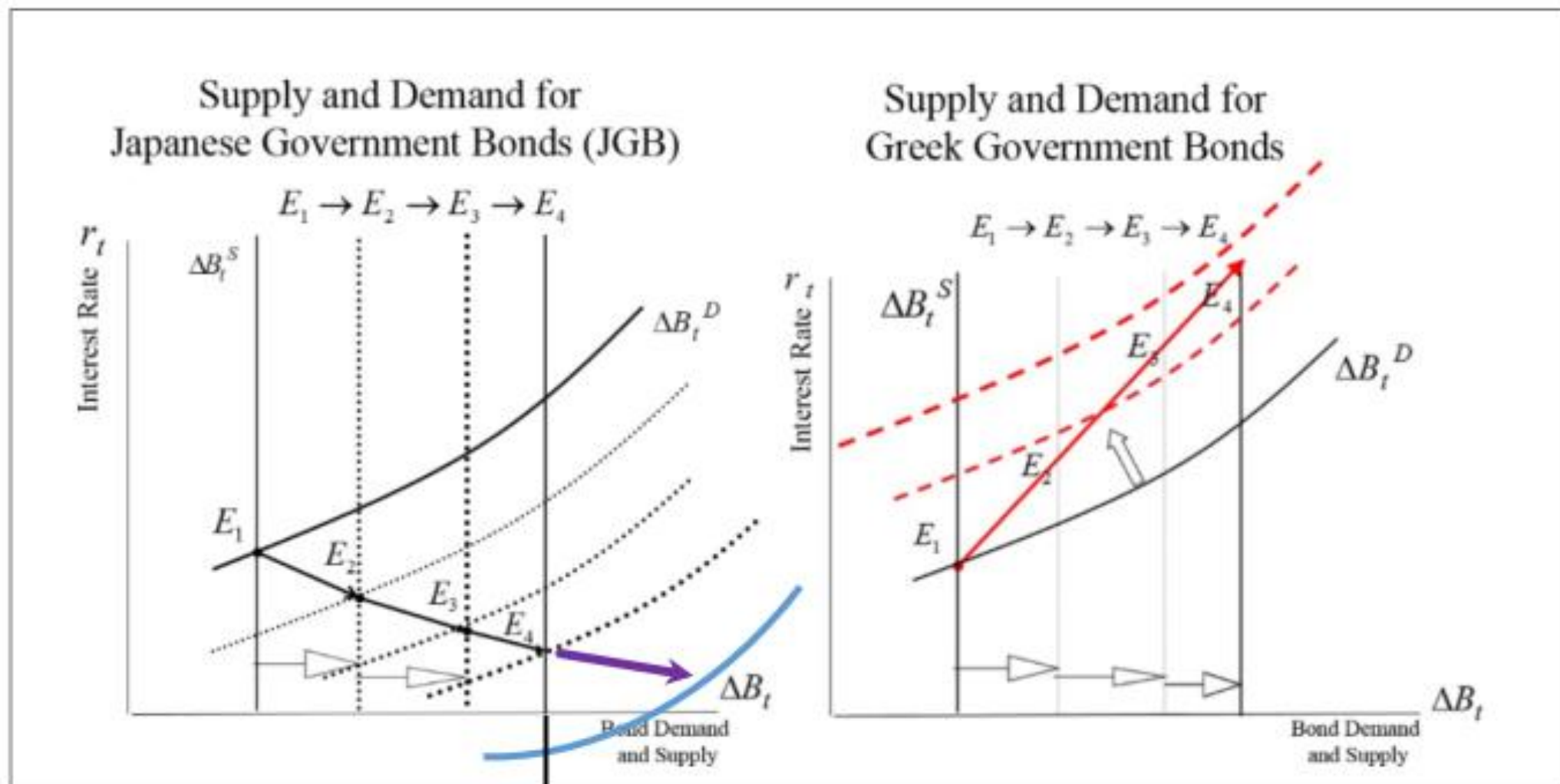
Source: Yoshino and Taghizadeh-Hesary (2014a).

Figure 10: Government Expenditure and Tax Revenue
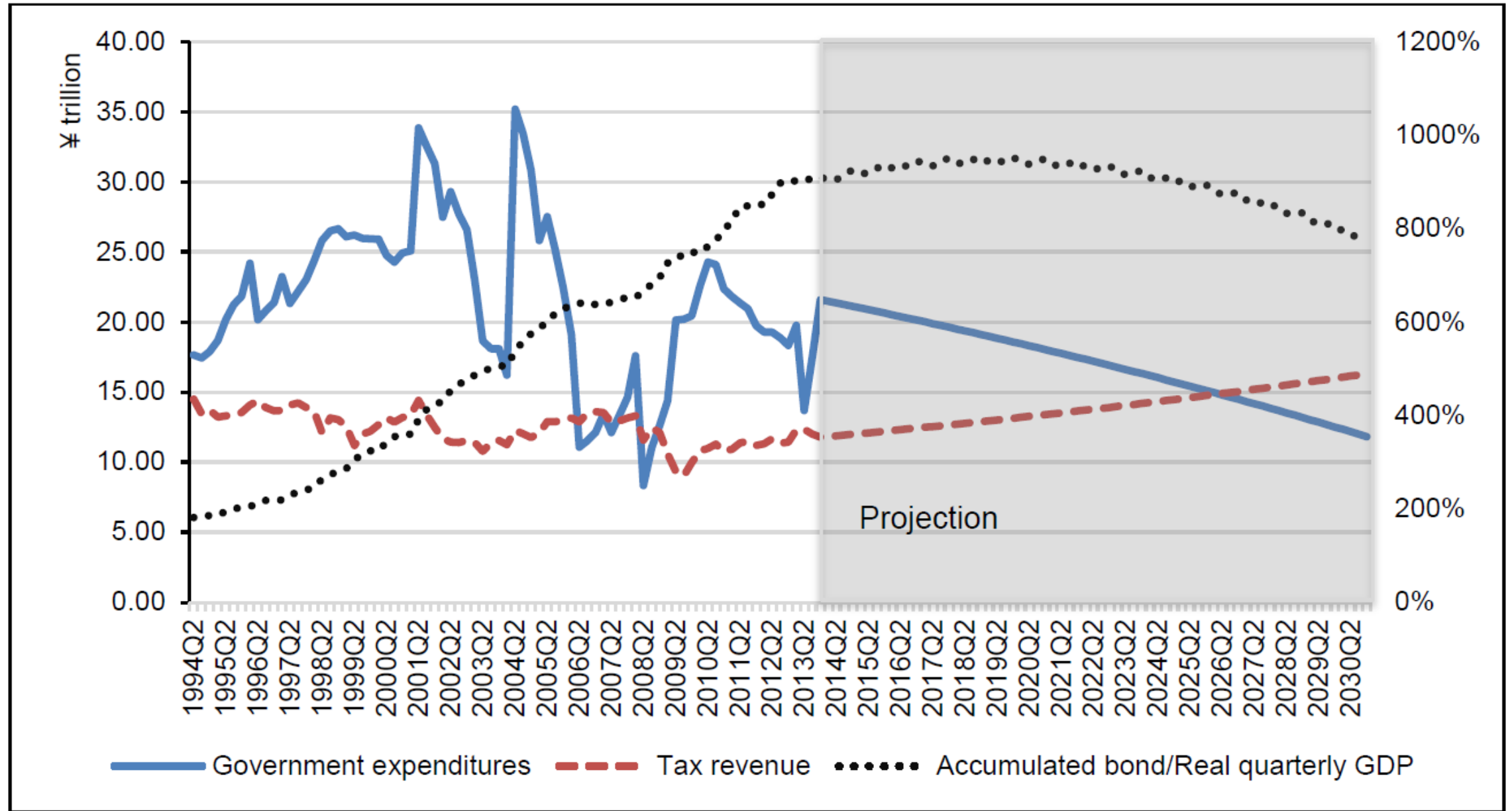
Thank you so much

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Asian Development Bank Institute

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