

Abenomics' Macroeconomic Policy and Income distribution of Japan

June, Seoul, 2018

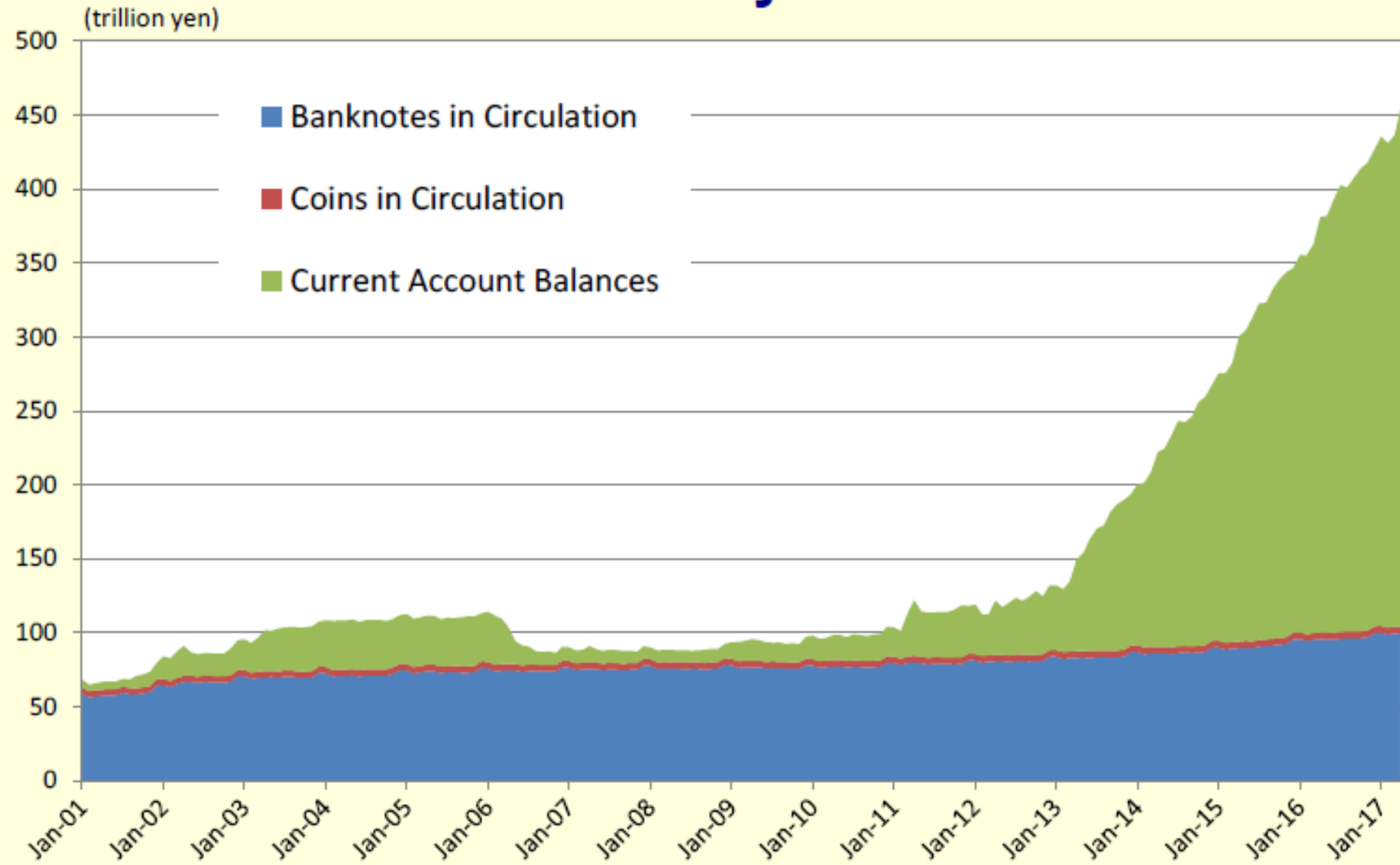
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Monetary Base



Source: Bank of Japan "Monetary Base"

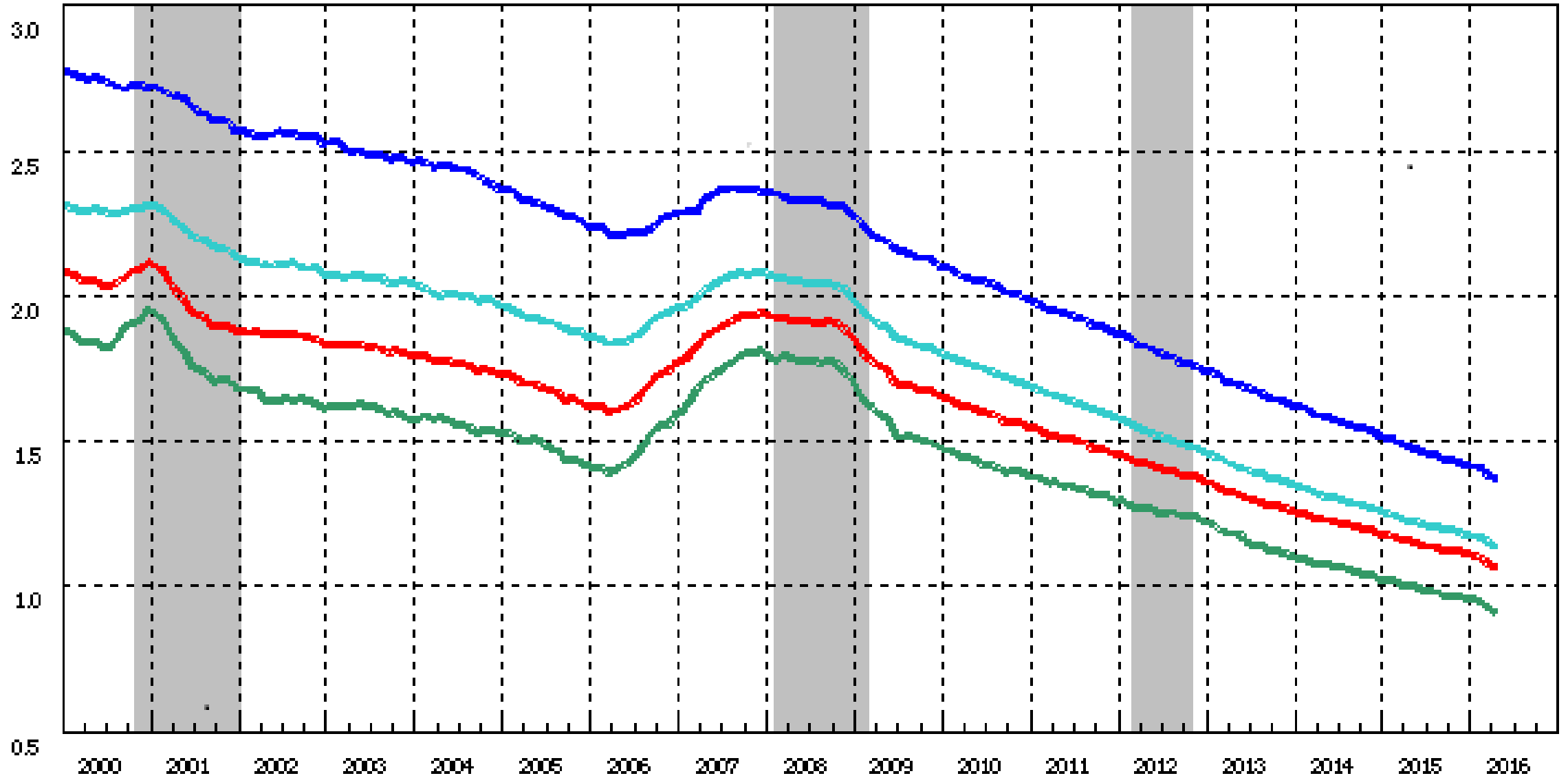
Monetary Base / Gross Domestic Product Ratio for Japan,
United States, and Eurozone (%)

	<i>Dec 2000</i>	<i>Dec 2012</i>		<i>July 2016</i>	
	<i>Monetary Base / GDP</i>	<i>Monthly QE Volume / GDP</i>	<i>Monetary Base / GDP</i>	<i>Monthly QE Volume / GDP</i>	<i>Monetary Base / GDP</i>
Japan	15	0.2	29	1.3	80
US	6	0.5	16	–	21
Eurozone	7	–	17	0.8	20

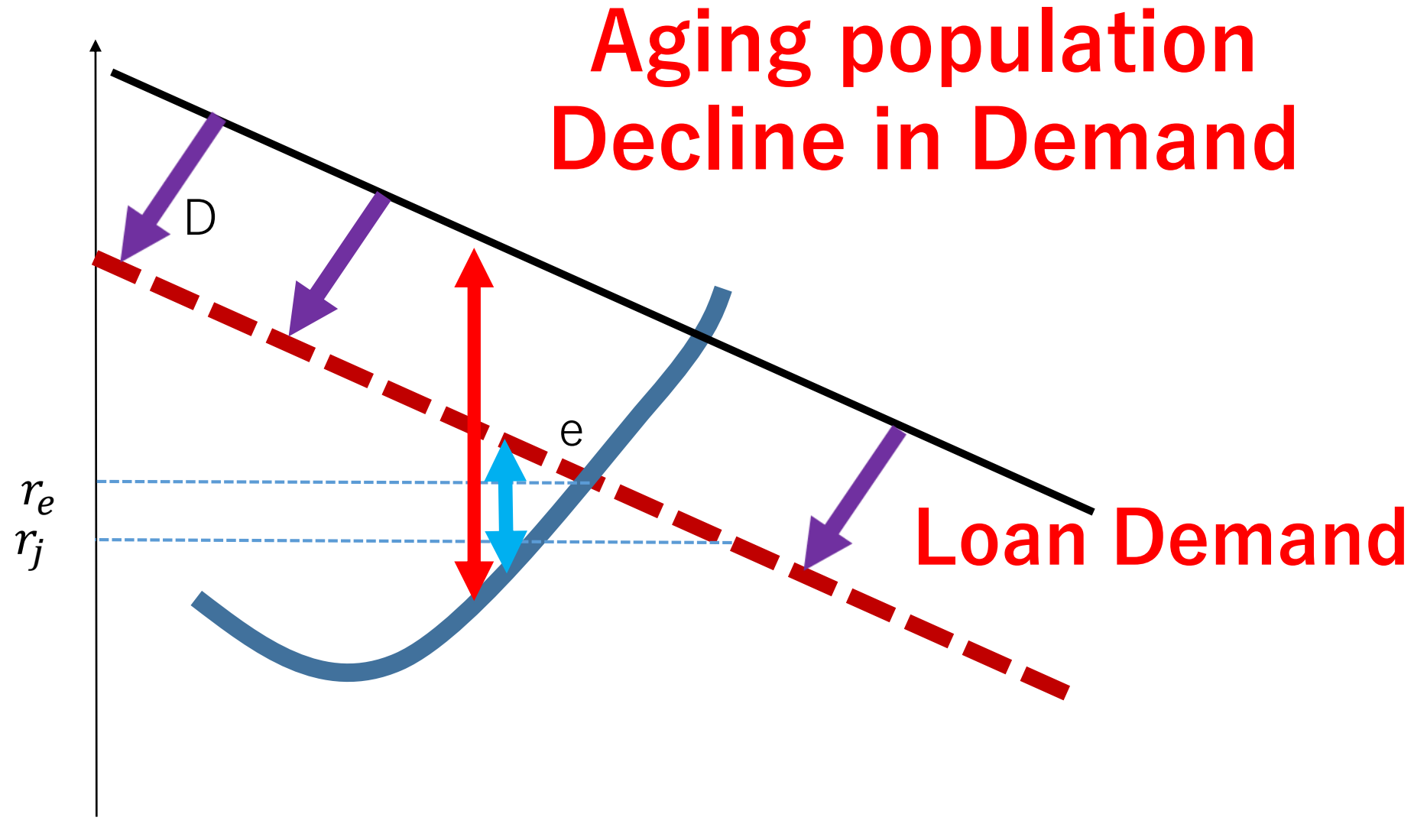
GDP = gross domestic product, QE = quantitative easing, US = United States.

Source: International Monetary Fund, International Financial Statistics (2016).

Declining Bank Loans



Declining Demand for Bank Loans





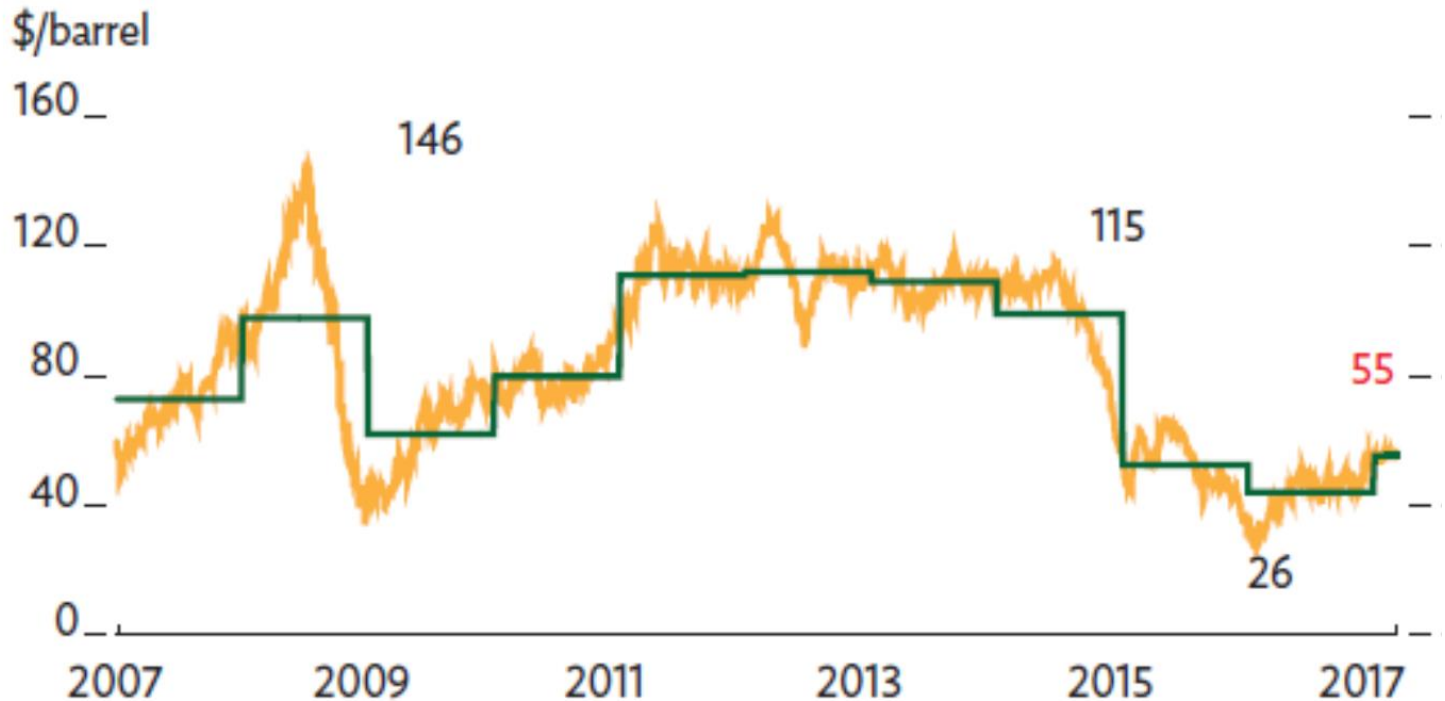
Naoyuki Yoshino
Farhad Taghizadeh-Hesary *Editors*

Monetary Policy and the Oil Market



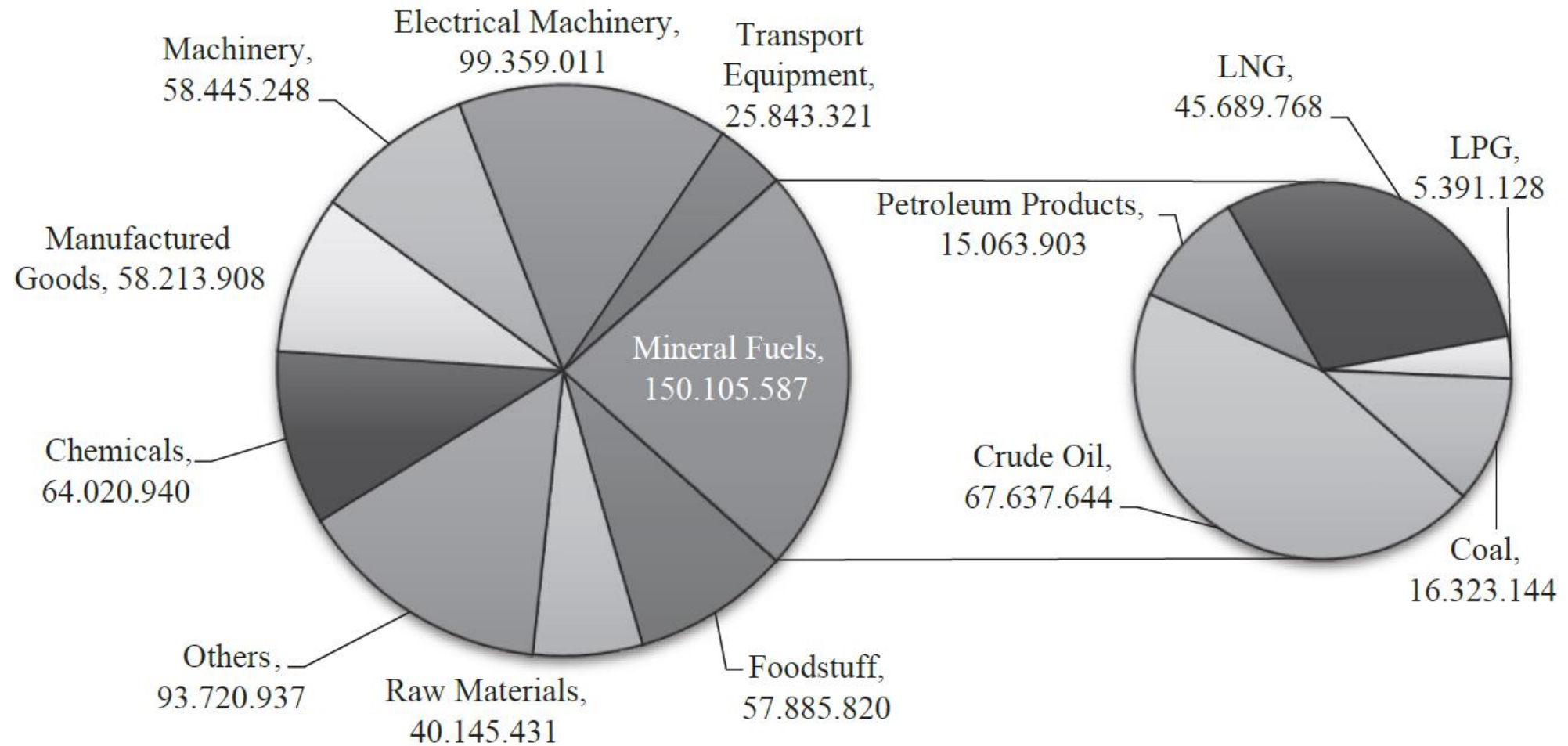
A1.13 Price of Brent crude

— Spot
— Annual average



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

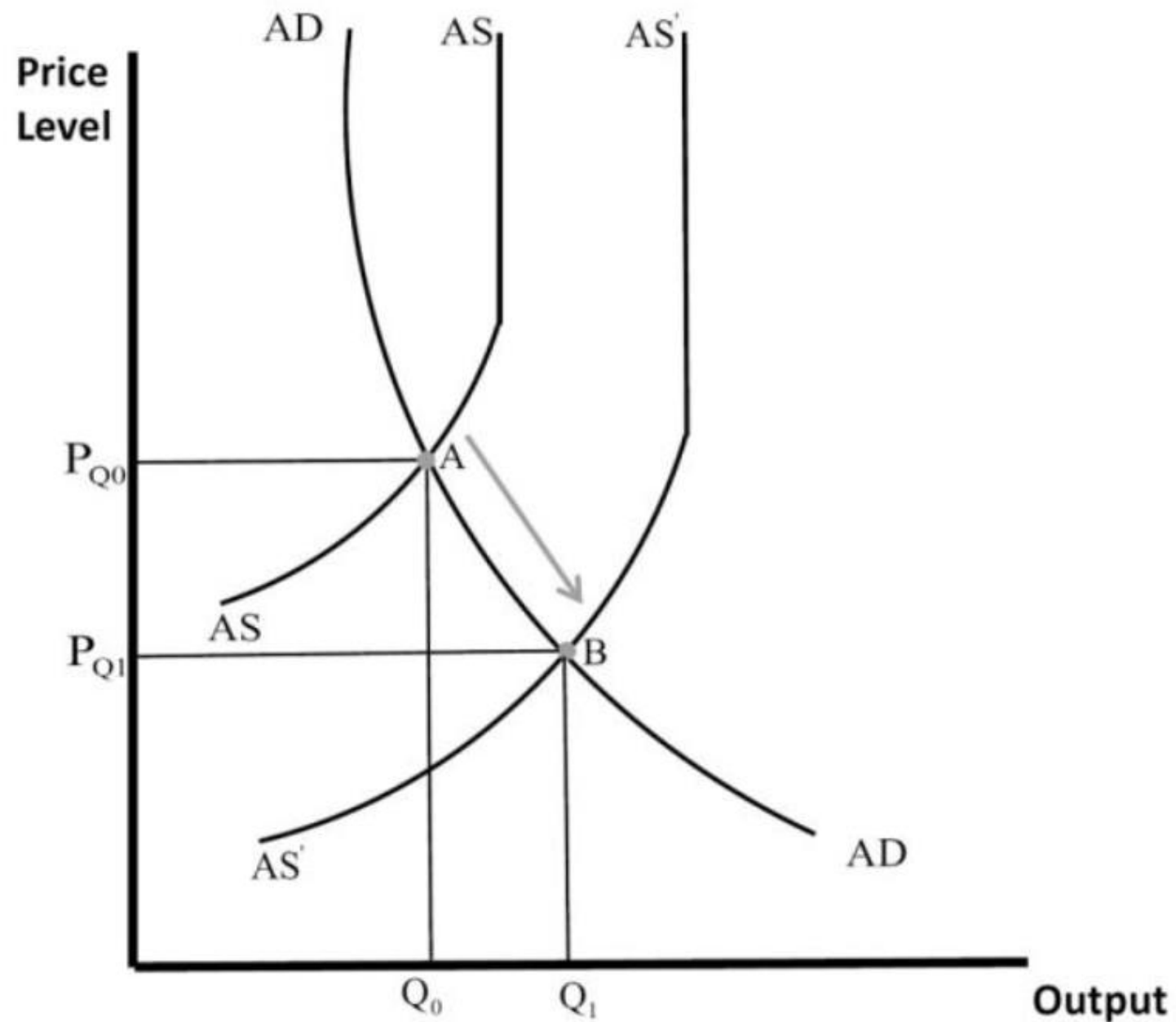
Impact of Oil Price Decline to Exporting Countries



LNG = liquefied natural gas, LPG = liquefied petroleum gas.

Source: Japan External Trade Organization (2016).

*Figure 2: Japan's Imports by Principal Commodity, 2015
(thousands of \$)*



AD = aggregate demand, AS = aggregate supply.

Year (0)	Producers (1)	CPI (2)	BM (3)'	Money (4)	Exchange (8)	Stock (9)	Land (10)	Oil (11)	Year
1984	0.30	2.11	5.40	7.80	251	11,061	86.5	:	1984
1985	-1.70	1.95	4.08	8.40	201	12,935	92.9	:	1985
1986	-5.20	0.00	6.12	8.70	160	18,032	106.2	:	1986
1987	-1.70	0.46	7.40	10.40	122	24,195	133.7	:	1987
1988	-0.60	0.79	10.31	11.20	126	28,865	171	:	1988
1989	2.70	2.81	10.77	9.90	143	34,968	212.8	:	1989
1990	1.30	3.17	11.09	11.70	136	26,872	276.8	:	1990
1991	0.40	2.90	1.94	3.60	125	23,350	285.3	:	1991
1992	-1.00	1.50	-2.29	0.60	125	17,189	241	:	1992
1993	-1.80	1.20	3.40	1.10	112	19,641	197.7	:	1993
1994	-1.40	0.50	4.60	2.10	99	19,509	174.9	:	1994
1995	-1.00	-0.30	5.20	3.20	103	19,868	151.4	:	1995
1996	-1.50	0.40	9.00	3.30	116	19,361	134.5	:	1996
2008	3.10	1.10	0.80	2.10	90.28	8,830	82.4	:	2008
2009	-5.20	-1.70	0.50	2.70	92.13	10,540	73.5	:	2009
2010	0.70	-0.40	0.90	2.80	81.51	10,210	69.6	116.94	2010
2011	1.40	-0.10	2.80	2.70	77.57	8,440	68.2	123.41	2011
2012	-1.10	-0.30	2.10	2.50	86.32	10,430		108.46	2012
2013	1.90	0.90	3.30	3.60	105.4	16,320		105.95	2013
2014	2.70	2.90	3.60	3.40	119.8	17,360		53.69	2014
2015	-3.20	0.20	4.90	3.70	120.4	19,000		36.75	
2016	-4.30	-0.40	6.80	3.40	103.63	16,610		40.76	

Empirical Analysis of AS-AD equations of Japan

	Q2 1994–Q4 2001	Q1 2002–Q2 2014
Phillips curve (Inflation rate)		
Lagged inflation rate	0.89(4.08)**	−0.36(−1.12)
GDP gap	0.69(2.18)*	−0.24(−0.45)
Crude oil price	0.06(3.27)**	0.07(2.59)**
Gas price	0.03 (0.45)	0.05(1.17)
Aggregate Demand (GDP gap)		
Long-term real interest rate	−0.02(−4.71)**	−0.02(−1.09)
Lagged GDP gap	−0.33(−1.66)	0.42(1.52)
Exchange rate	0.09(2.18)*	0.07(1.17)
Taylor Rule (Short-term interest rate)		
Inflation rate	1.21(0.67)	1.94(2.16)*
GDP gap	4.76(2.72)**	3.89(3.01)**

GDP = gross domestic product.

Notes: T-statistics are in parentheses. * indicates significance at 5%. ** indicates significance at 1%.

Source: Yoshino and Taghizadeh-Hesary (2015a).

Vertical IS Curve

Table 3.

(Sample:

$$y_t = -0.16 - 0.0002(i - E\Delta p_{+1}) + 1.01y_{t-1}$$

(-1.98)* (-0.53) (147.63)**

$R^2 = 0.99$ adjusted $R^2 = 0.99$ Durbin-Watson Statistic = 1.70

$$y_t = -0.15 + 0.0002(i - E\Delta p_{+1}) + 1.01y_{t-1}$$

(-2.36)* (1.17) (188.23)**

$R^2 = 0.99$ adjusted $R^2 = 0.99$ Durbin-Watson Statistic = 1.62

$$(m-p)_t = 0.02 + 0.70y_t - 0.025i_t + 0.99(m-p)_{t-1}$$

(0.11) (2.67)** (-2.72)** (171.06)**

$R^2 = 0.99$ adjusted $R^2 = 0.99$ Durbin-Watson Statistic = 1.93

Source: Authors' compilation.

Figure 12: The Ineffectiveness of Monetary Policy in Japan

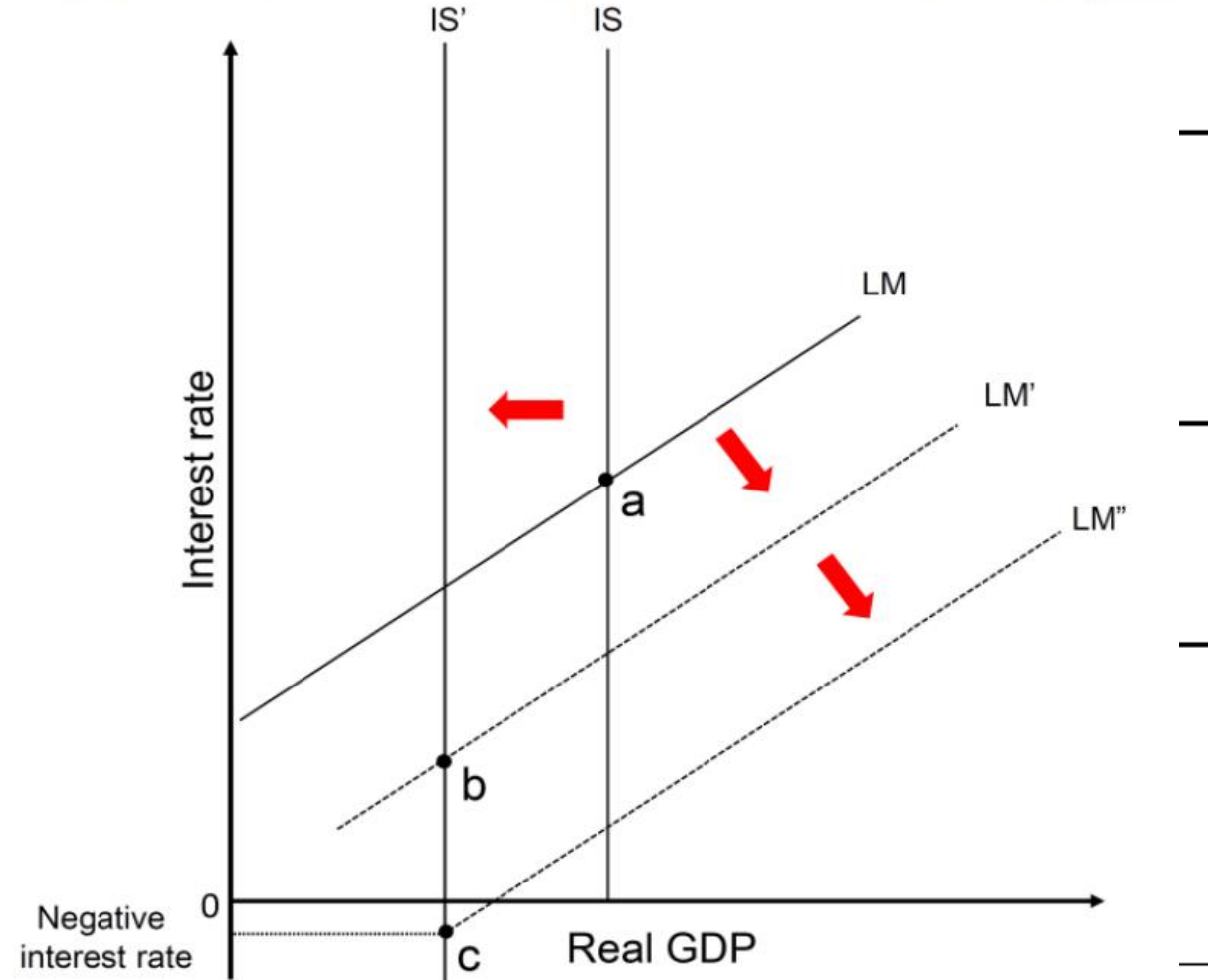
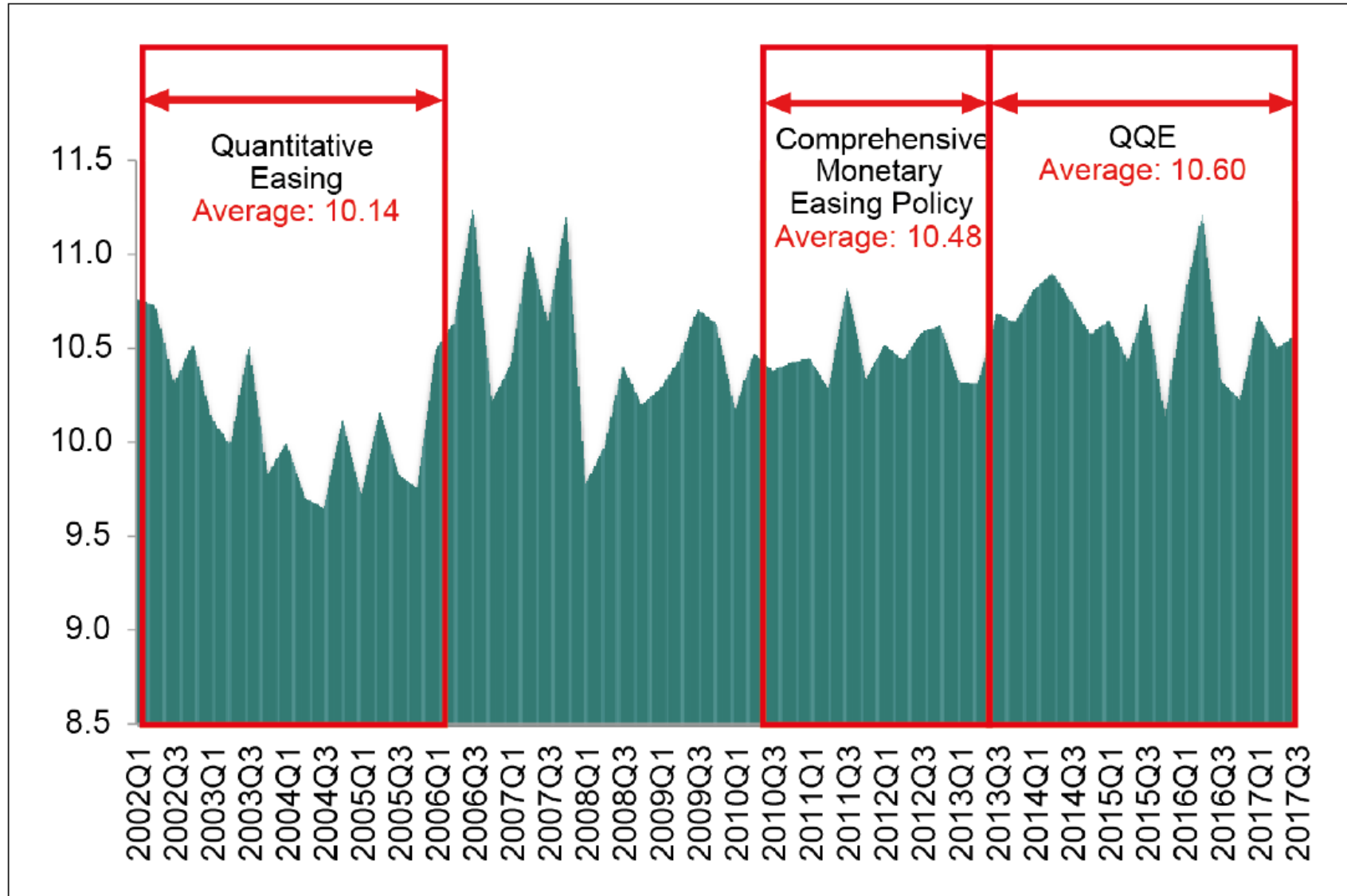


Figure 2: Average Household Income of Top 10% (Rich) over Average Household Income of Bottom 10% (Poor) 2002Q1–2017Q3



Source: Statistics Japan (<https://www.e-stat.go.jp>).

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

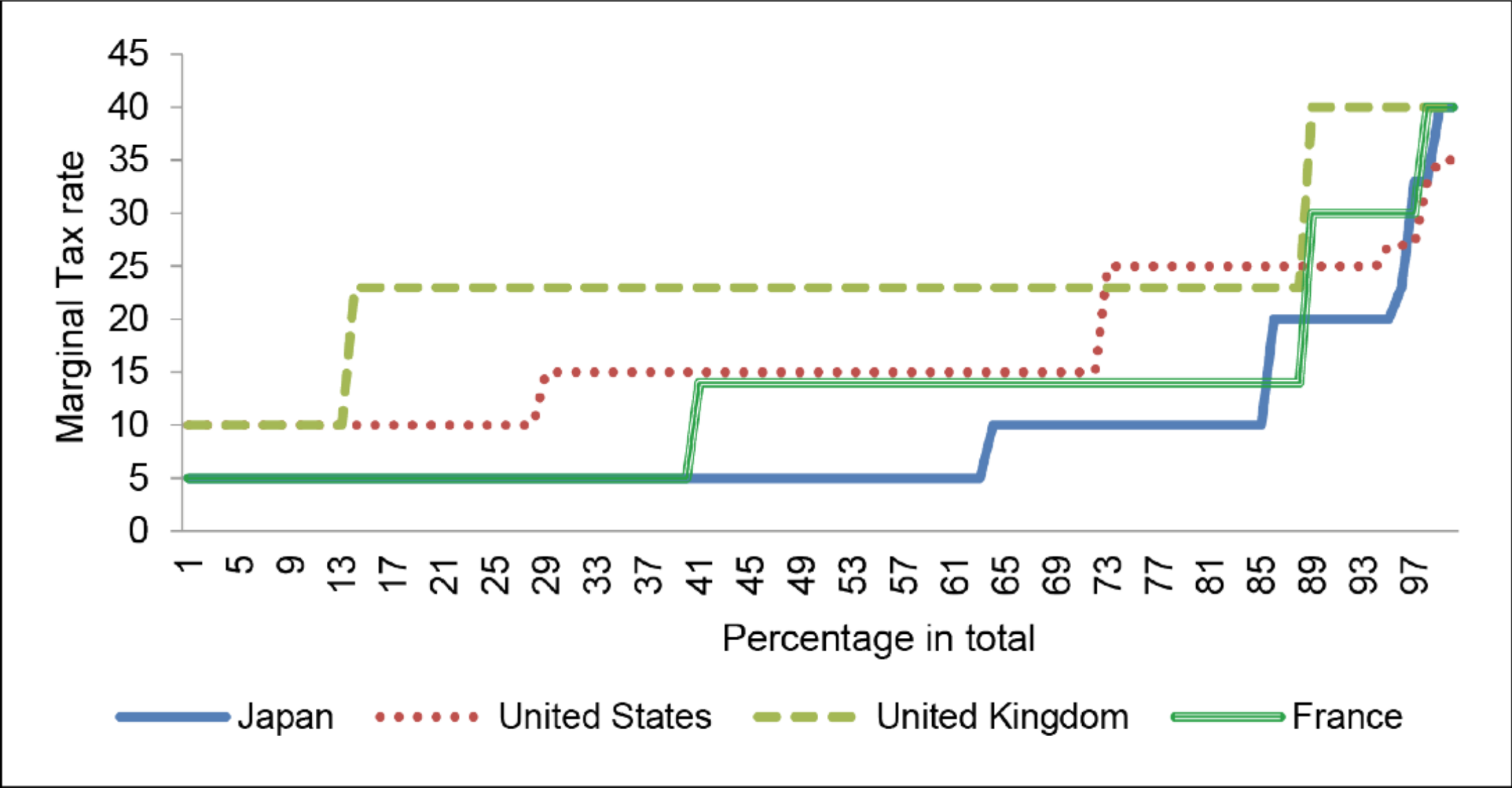
Bracket of Taxable Inheritance	Tax Rate
Up to 10 million	10
10 million–30 million	15
30 million–50 million	20
50 million–100 million	30
100 million–200 million	40
200 million–300 million	45
300 million–600 million	50
Over 300 million	55

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
<i>Over 1,950,000 yen</i>	Or under 3,300,000 yen	10
<i>Over 3,300,000 yen</i>	Or under 6,950,000 yen	20
<i>Over 6,950,000 yen</i>	Or under 9,000,000 yen	23
<i>Over 9,000,000 yen</i>	Or under 18,000,000 yen	33
<i>Over 18,000,000 yen</i>	Or under 40,000,000 yen	40
<i>Over 40,000,000 yen</i>	–	45

Figure 4: International Comparison of Tax Percentages Based on the Final Tax Rate per Income Bracket



Empirical Model

$$E_H = w_H L_H + r_D D_H + \pi P_S S_R \quad \text{High Income Earners} \quad (1)$$

$$E_L = w_L L_L + r_D D_L \quad \text{Low Income Earners} \quad (2)$$

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

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

**Effects of
Monetary Policy**

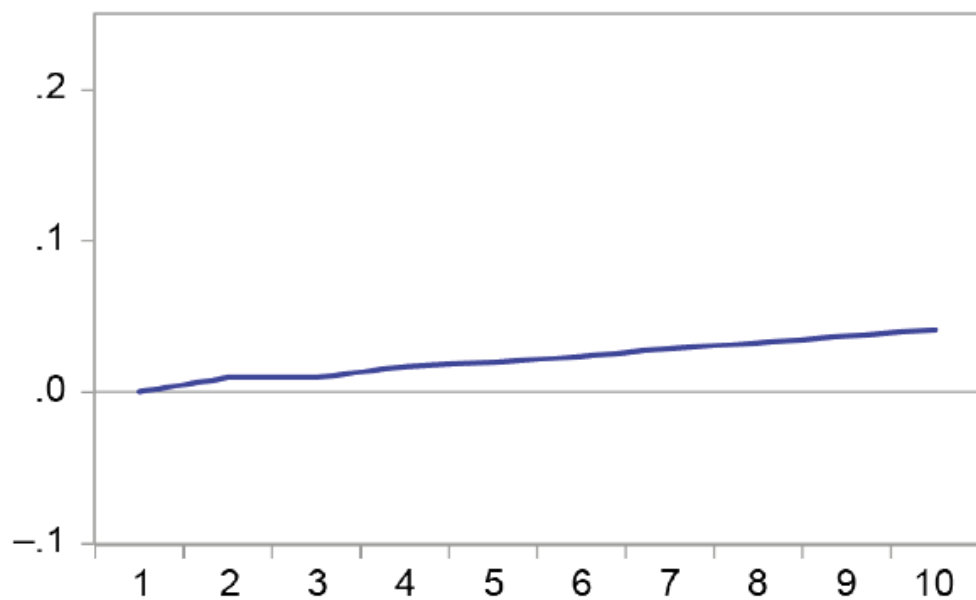
$$\frac{E_H}{E_L} = \frac{(1-t_W^H)w_H l_H + (1-t_C^H)(r_D D_H + \pi P_S S_H)}{(1-t_W^L)w_L l_L + (1-t_C^L)r_D D_H} \quad (8)$$

$$\frac{\partial E_H}{\partial M} = (1 - t_w^H) \left(\frac{\partial w_H}{\partial M} L_H + w_H \frac{\partial L_H}{\partial M} \right) + (1 - t_C^H) \left\{ \frac{\partial r_D}{\partial M} D_H + r_D \frac{\partial D_H}{\partial M} + \pi P_S \frac{\partial S_H}{\partial M} + \frac{\partial \pi}{\partial M} P_S S_H + \pi \frac{\partial P_S}{\partial M} S_H \right\} \quad (6)$$

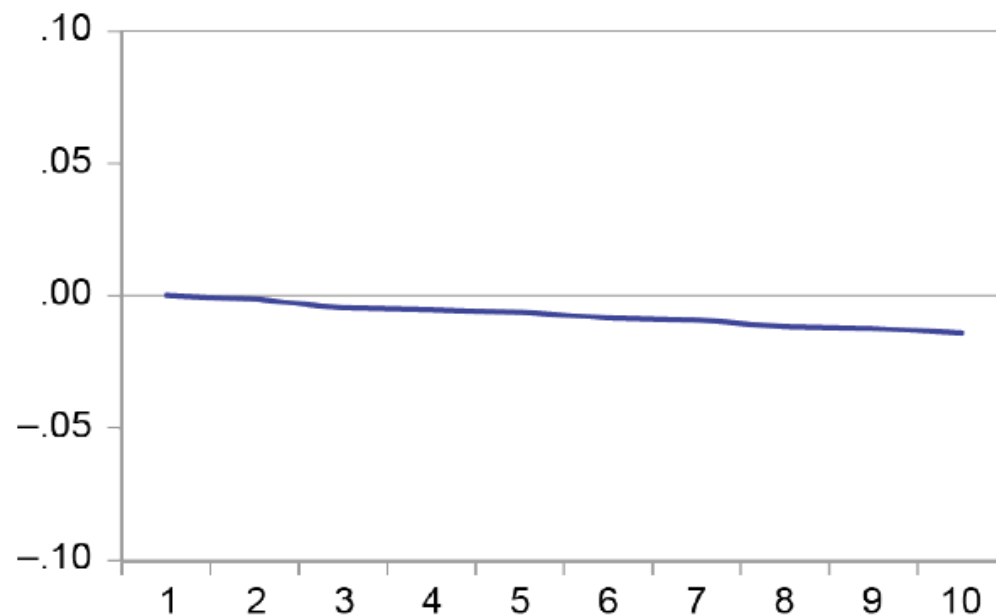
$$\frac{\partial E_L}{\partial M} = (1 - t_w^L) \left(\frac{\partial w_L}{\partial M} L_L + w_L \frac{\partial L_L}{\partial M} \right) + (1 - t_C^L) \left(\frac{\partial r_D}{\partial M} D_L + r_D \frac{\partial D_L}{\partial M} \right) \quad (7)$$

$$\frac{E_H}{E_M} = \alpha_0 + \alpha_1 Y + \alpha_2 M + \alpha_3 t + a_4 r \dots \quad (16)$$

Accumulated Response of EH/EL to M1



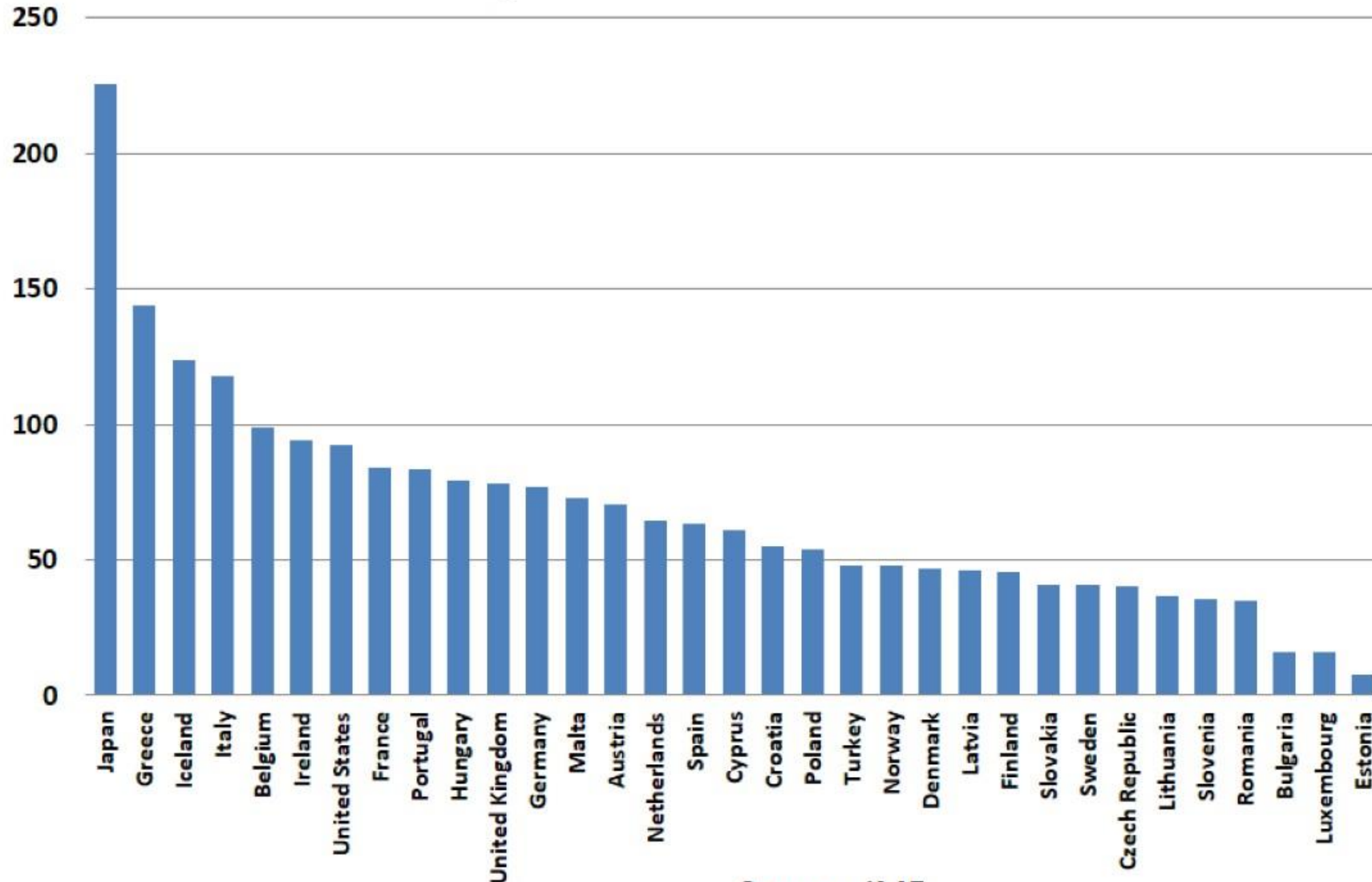
Accumulated Response of EH/EL to interest rate



**Table 1: Monetary Base and Japanese Government Bond Purchase Data
(comparison of April 2013 with May 2016)
(¥ trillion)**

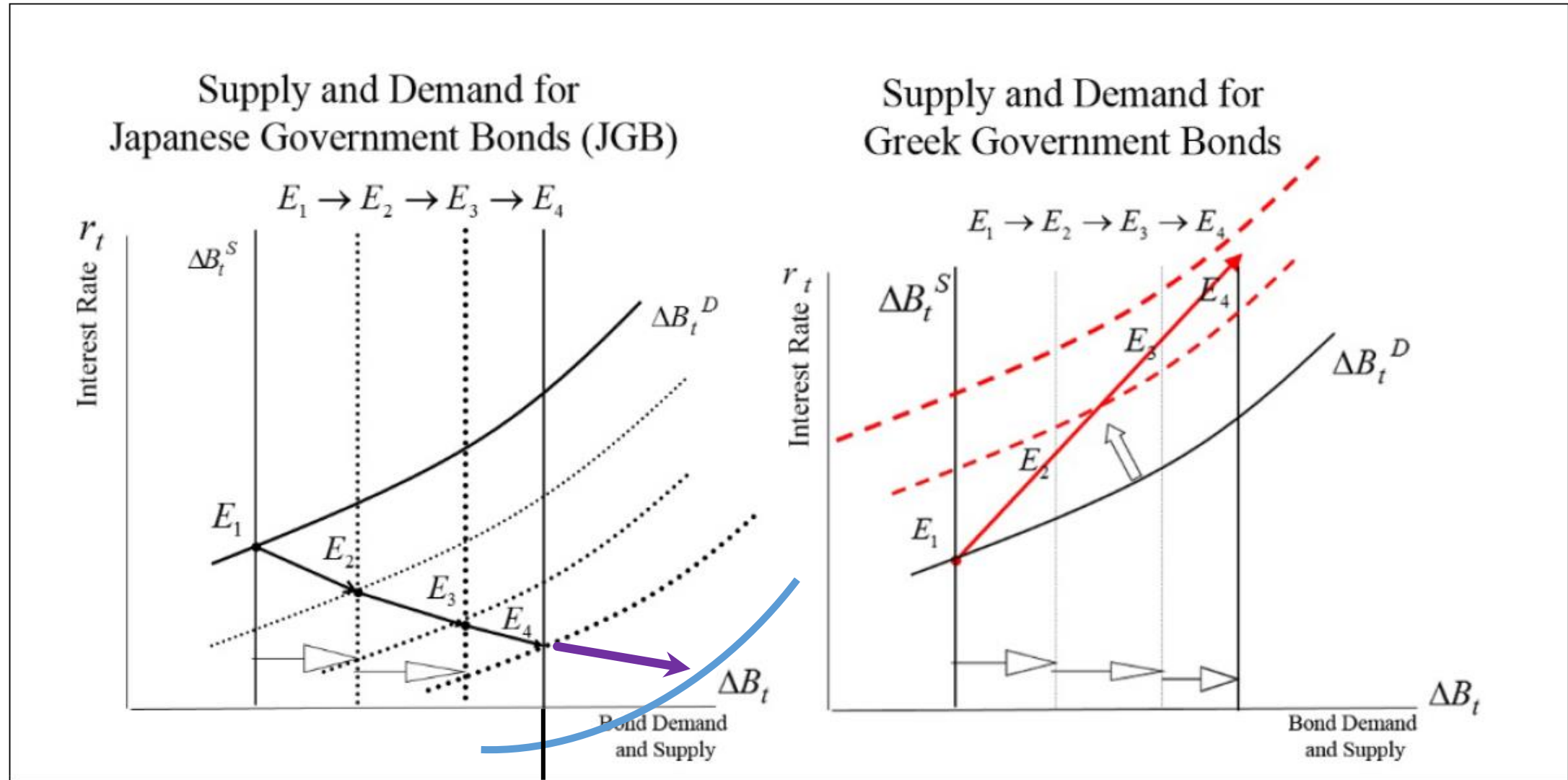
	April 2013 (Actual)	May 2016 (Actual)	Average Annual Increase
Monetary Base	155	387	About ¥80 trillion
JGB	98	319	About ¥80 trillion
CP	1.4	2.3	Outstanding balance maintained
Corporate Bonds	2.9	3.2	Outstanding balance maintained
ETFs	1.7	8.0	About ¥3 trillion
J-REITs	0.13	0.31	About ¥90 billion
Total Assets of the BoJ	175	426	–

Gross Debt/GDP ratio, Japan, USA, EU



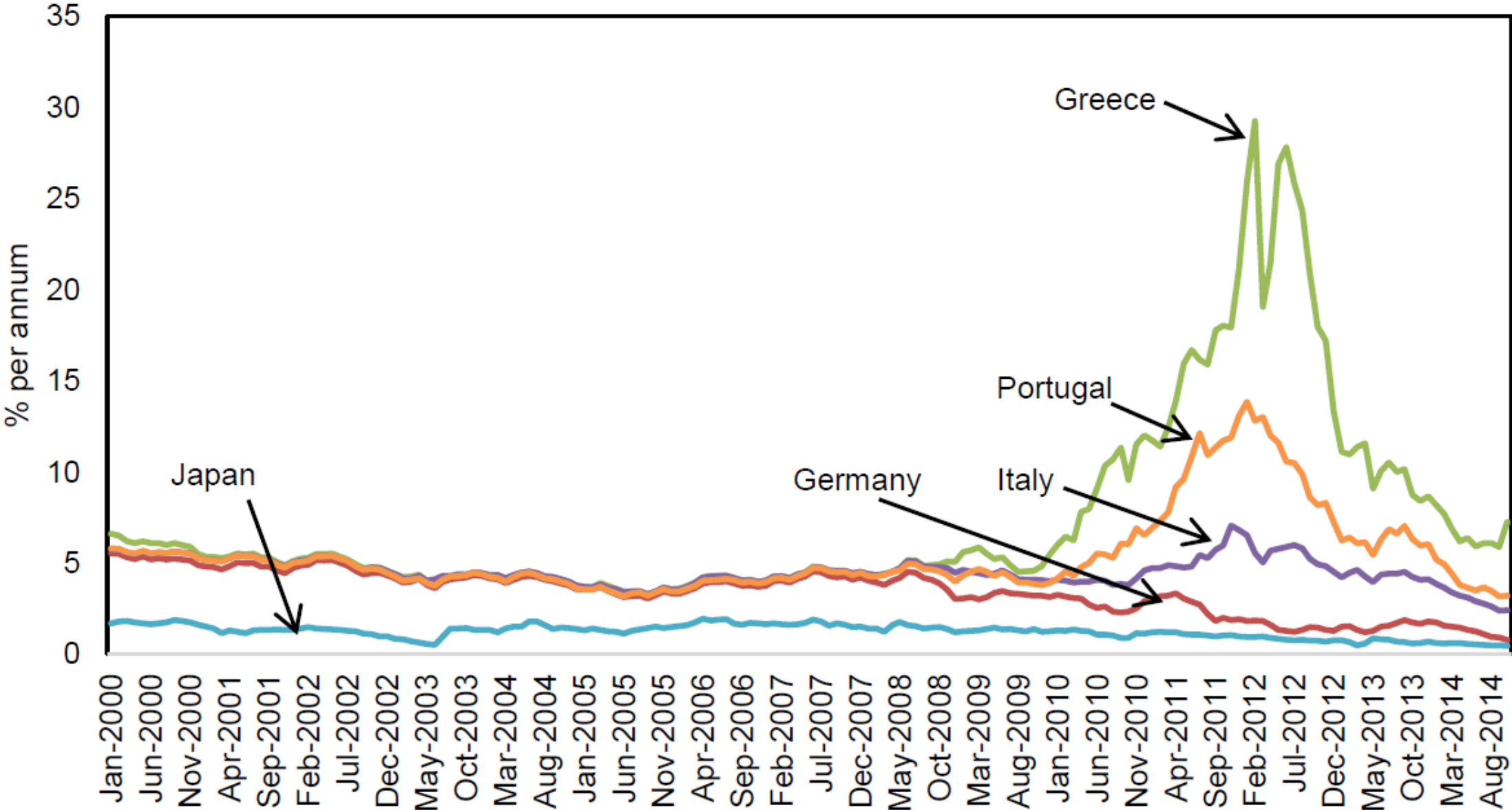
Source: IMF

Figure 2: Government Bond Markets of Japan and Greece

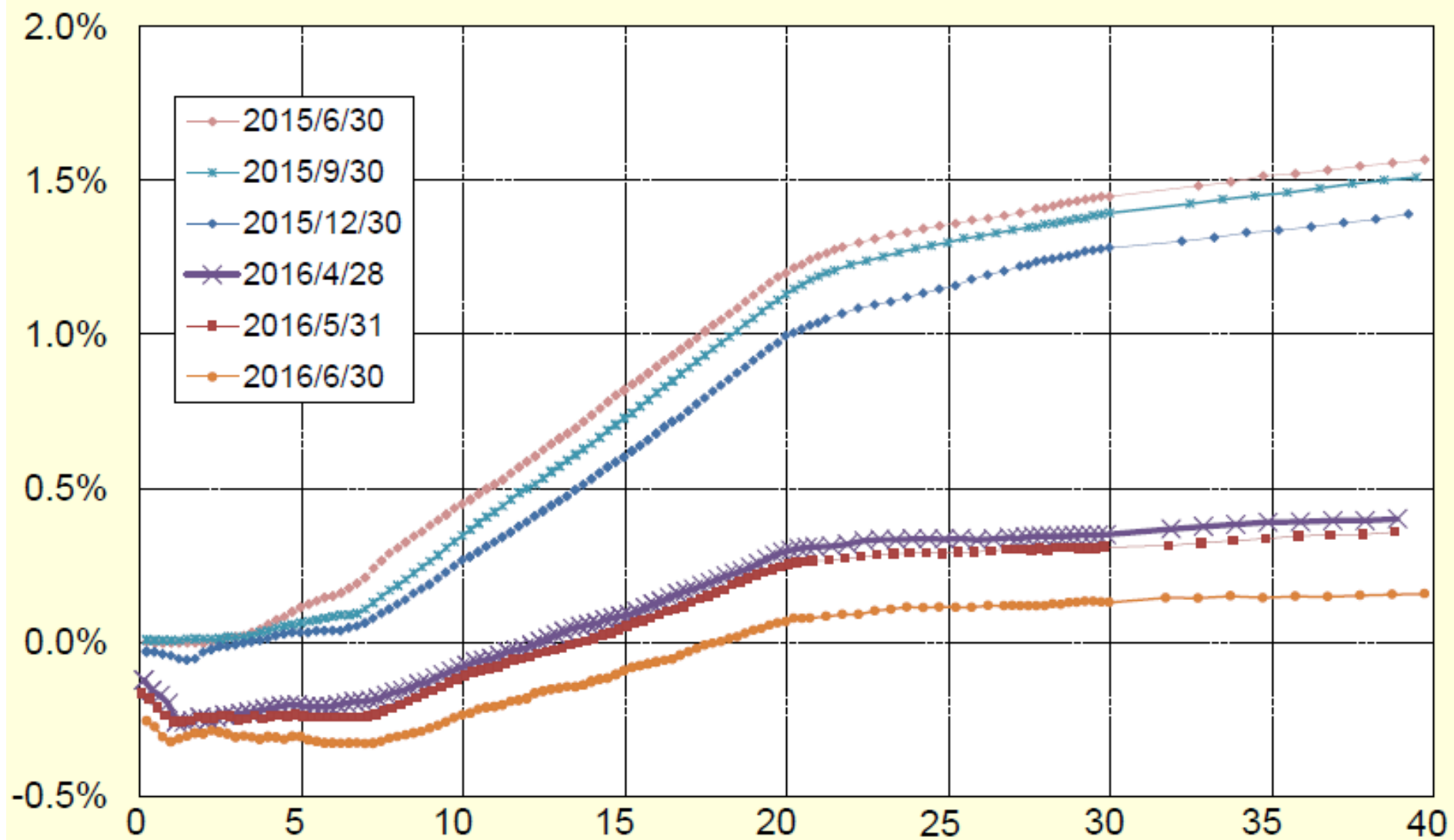


Source: Yoshino and Taghizadeh-Hesary (2014a).

Figure 2: Interest Rates in Selected OECD Countries



JGB Yield Curves

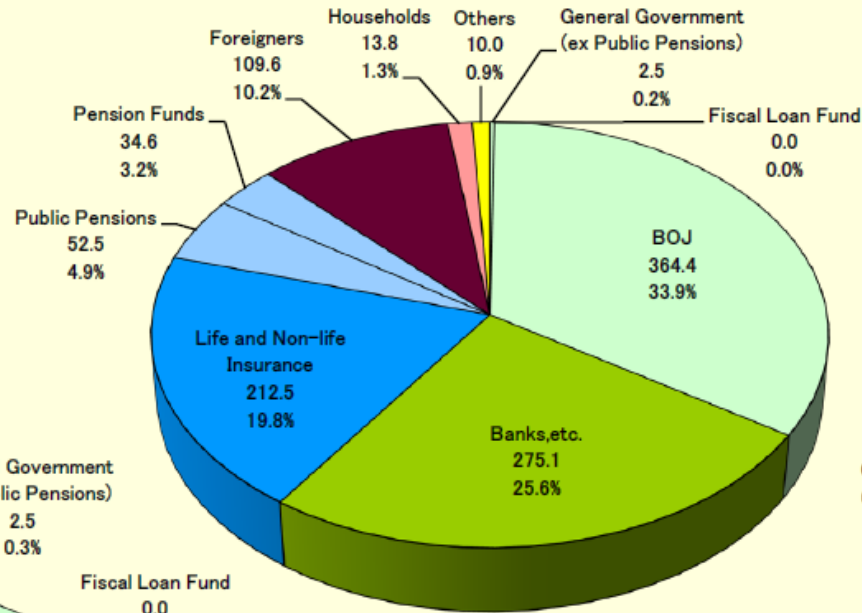


Source: Japan Bond Trading Co.,Ltd.

Breakdown by JGB and T-Bill Holders (Mar. 2016)

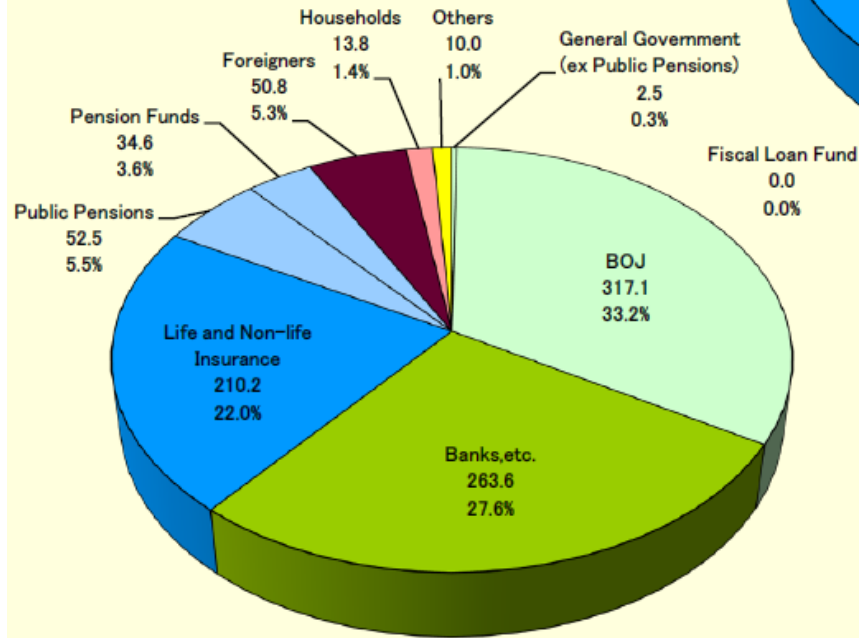
JGB and T-Bill Holders

(trillion yen)



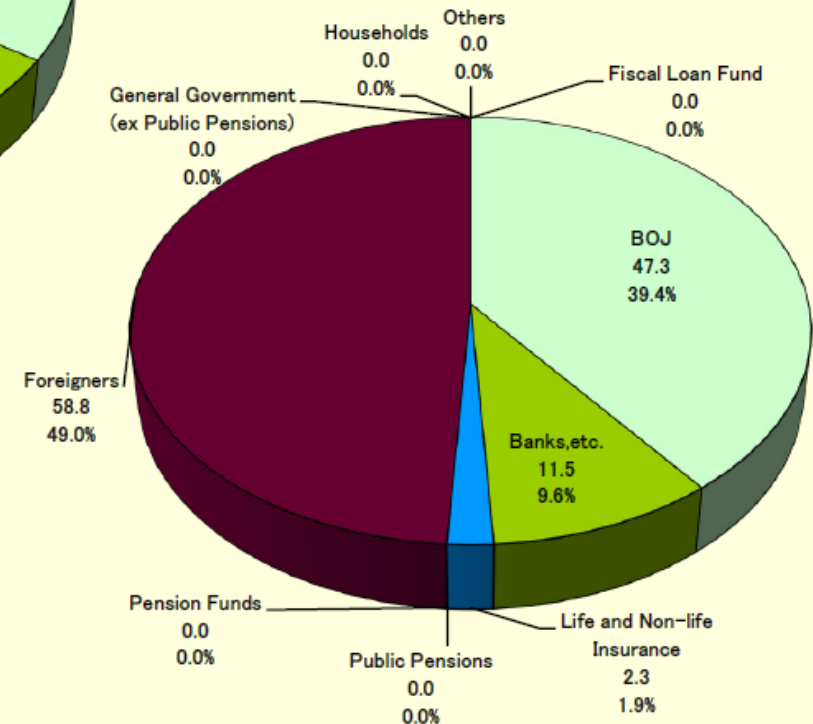
Total 1,075.0 trillion yen

JGB Holders



Total 955.0 trillion yen

T-Bill Holders



Total 119.9 trillion yen



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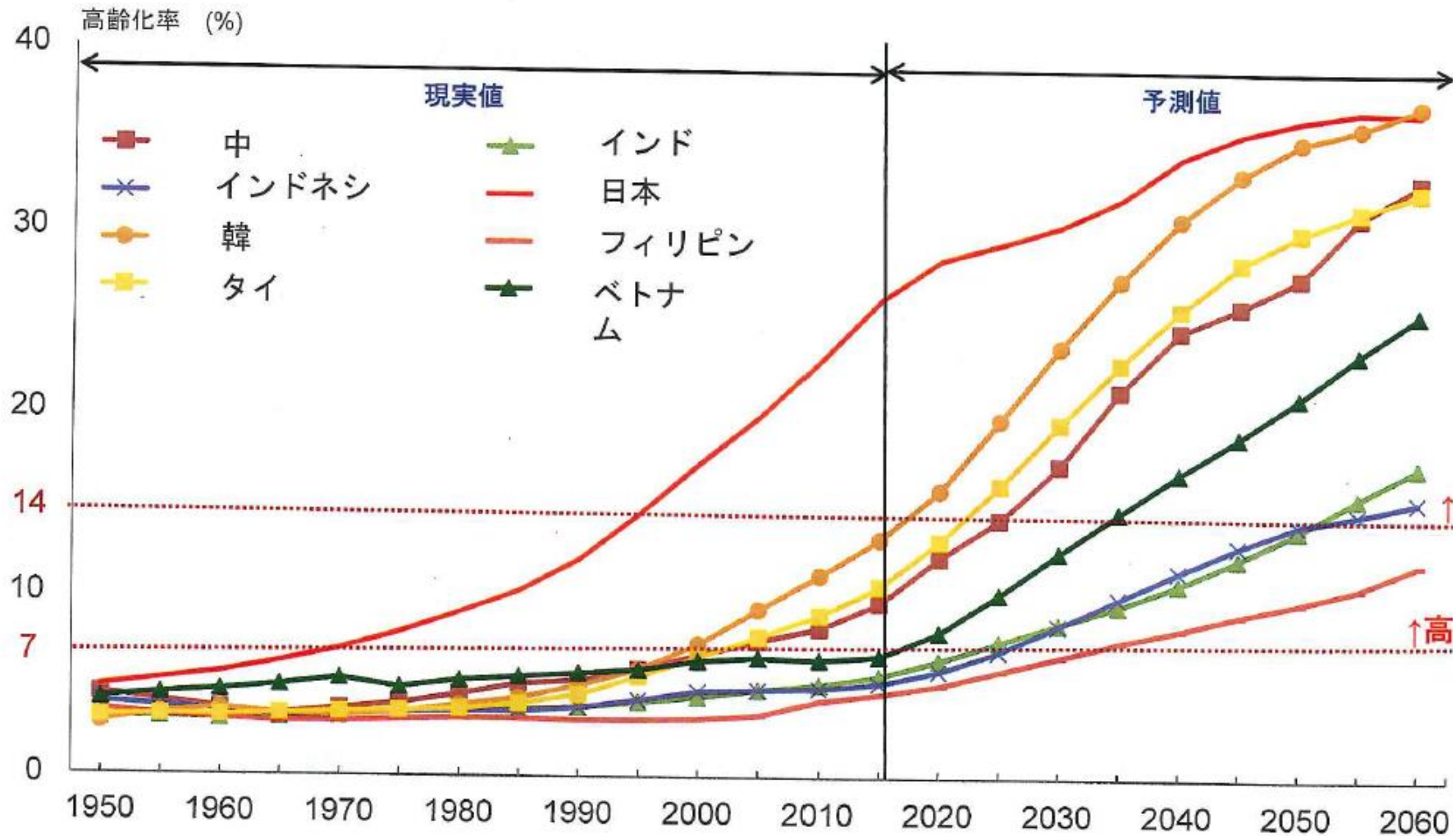
Declined effectiveness of fiscal and monetary policies faced with aging population in Japan[☆]

Naoyuki Yoshino^a, Hiroaki Miyamoto^{b,*}

^a *Asian Development Bank Institute, Japan*

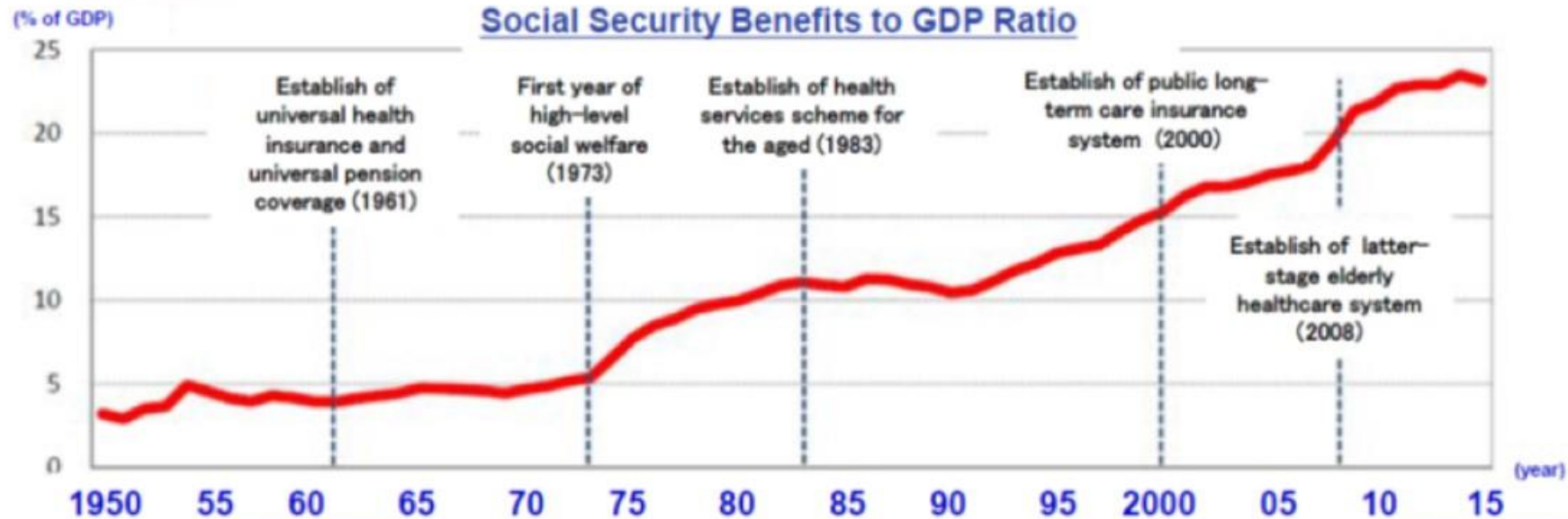
^b *International Monetary Fund, United States*

Population Aging in Asian Countries



Increase in Social Security Benefits and the demographic transition in Japan

- ✓ With the rapid progress of aging population, social security benefits have been increased.



Year	1960	1970	1980	1990	2000	2010	2015
Topics, etc.	Establish of universal health insurance and universal pension coverage	First year of high-level social welfare	Establish of health services scheme for the aged	The bubble economy period	Establish of public long-term care insurance system	Establish of latter-stage elderly healthcare system	Last year
Life expectancy (Men)	65.3	69.3	73.4	75.9	77.7	79.6	80.8
Life expectancy (Women)	70.2	74.7	78.8	81.9	84.6	86.3	87.1
Aging rate	5.7	7.1	9.1	12.1	17.4	23.0	26.7
Total fertility rate	2.0	2.13	1.75	1.54	1.36	1.39	1.46

Household's problem (2.1)

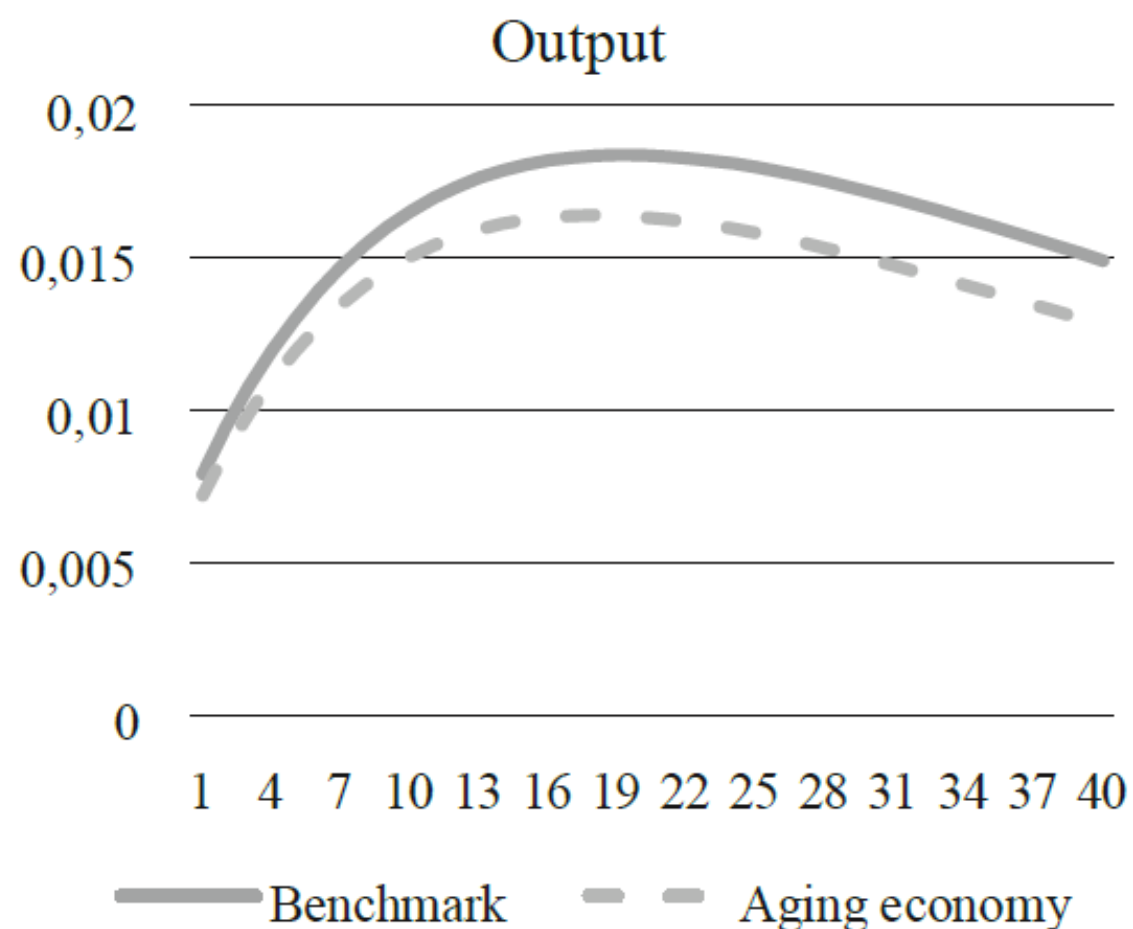
- Worker's problem:

$$\max \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ \frac{1}{1-\sigma} \left[\left\{ \omega c_{w,t}^{\frac{\zeta-1}{\zeta}} + (1-\omega) g_t^{\frac{\zeta-1}{\zeta}} \right\}^{\frac{\zeta}{\zeta-1}} \right]^{1-\sigma} + \frac{m_{w,t}^{1-\gamma}}{1-\gamma} - \frac{h_{w,t}^{1+\mu}}{1+\mu} \right\}$$

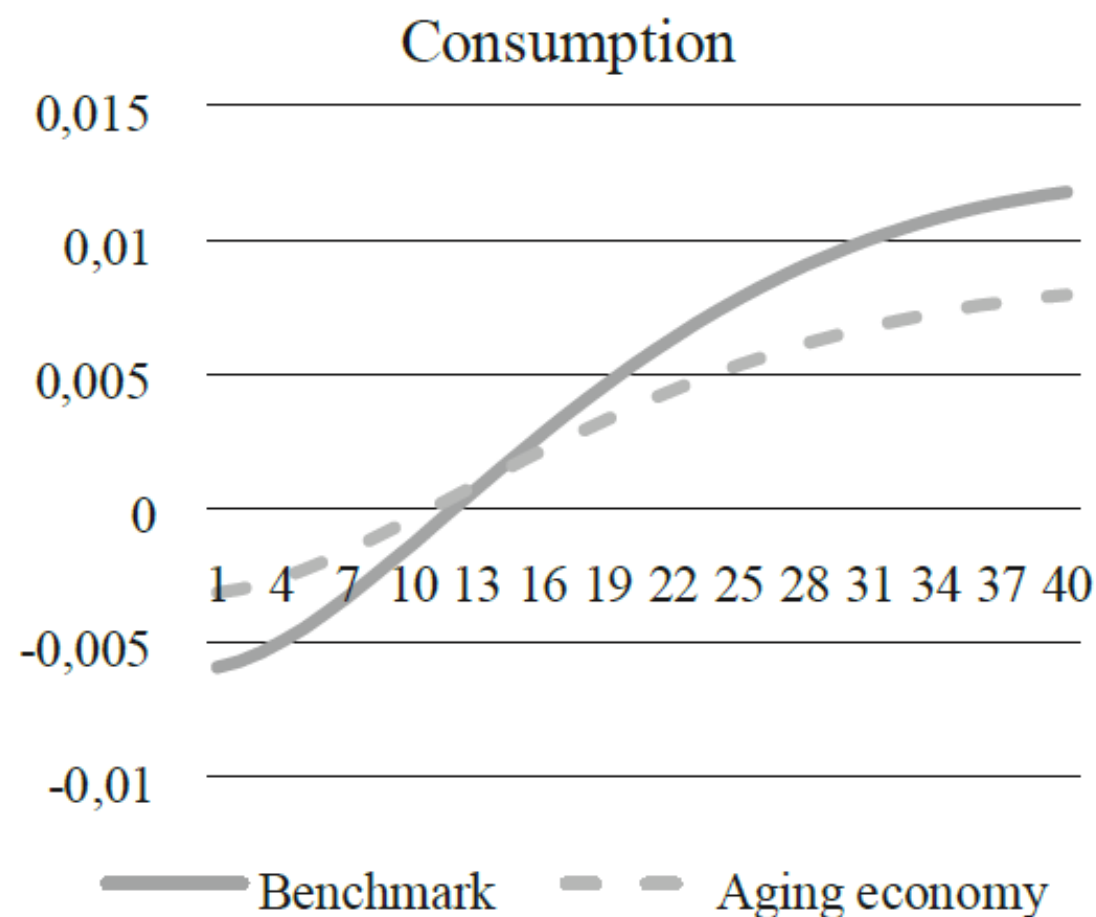
$$\text{s.t. } c_{w,t} + k_{w,t} + m_{w,t} + b_{w,t} = w_t h_{w,t} + r_{k,t} k_{w,t-1} + (1-\delta) k_{w,t-1} \\ + R_{t-1} \frac{b_{w,t-1}}{\pi_t} + \frac{m_{w,t-1}}{\pi_t} + d_{w,t} - \tau_{w,t}$$

- Retiree's problem:

$$c_{r,t} = S.$$



(a) Effects of an expansionary monetary policy



(b) Effects of a positive government investment shock

The Domar condition is obtained from the government budget constraint as follows.

$$G_t + r_t B_{t-1} = \Delta B_t + T_t \quad \text{Government Budget Constraint (1)}$$

Equation (1) states that government spending (G_t) + interest payments ($r_t B_{t-1}$) = new issue of government bonds (ΔB_t) + tax revenue (T_t).

Domar condition
and
Bohn's condition

Dividing Equation (1) by GDP (Y_t) and rewriting Equation (1), we get

$$b_t - b_{t-1} = \frac{(r_t - \eta_t)}{1 + \eta_t} b_{t-1} + g_t - t_t \quad \text{Domar Condition (2)}$$

where $b_t = B_t/Y_t$, $\eta_t = \Delta Y_t/Y_t$, $g_t = G_t/Y_t$, and $t_t = T_t/Y_t$

- $PB_t = g_t - t_t$ Primary Balance (PB)
- $PB_t = PB_1 + \mu(b_{t-1} - b_0)$ Bohn's Rule: Primary Balance improvement Rule at t

$$\sum_{t=1}^{\infty} \frac{PB_t}{(\lambda)^t} = b_0$$

- Bohn's Rule satisfied with "transversarity condition".

We minimize the loss from the government's objective function by means of government spending (G_t) and the smooth change of taxation (T_t).

$$\begin{aligned} \min_{G_t, T_t} L(B_t, Y_t, G_t, T_t, \Delta B_t) \\ = \frac{1}{2} w_1 (B_t - B_t^*)^2 + \frac{1}{2} w_2 (Y_t - Y_t^f)^2 + \frac{1}{2} w_3 (G_t - G_{t-1})^2 + \frac{1}{2} w_4 (T_t - T_{t-1})^2 \\ + \frac{1}{2} w_5 (\Delta B_t - \Delta B_t^*)^2 \end{aligned}$$

From Equation (15), we obtain our government spending rule.

$$G_t - G_{t-1} = \alpha_1 (B_t - B_t^*) + \alpha_2 (\Delta B_t - \Delta B_t^*) + \alpha_3 (Y_t - Y_t^f)$$

Government Spending Rule (17)

where $\alpha_1 = \frac{w_1}{w_3} \left(\frac{B_{t-1}}{b_1 - B_{t-1}} + 1 \right)$, $\alpha_2 = \frac{w_5}{w_3} \left(\frac{B_{t-1}}{b_1 - B_{t-1}} + 1 \right)$, $\alpha_3 = -\frac{w_2}{w_3} \left(\frac{(d_1 + i_1) + d_1 i_1}{\Delta} \right)$

$$T_t - T_{t-1} = \beta_1 (B_t - B_t^*) + \beta_2 (\Delta B_t - \Delta B_t^*) + \beta_3 (Y_t - Y_t^f)$$

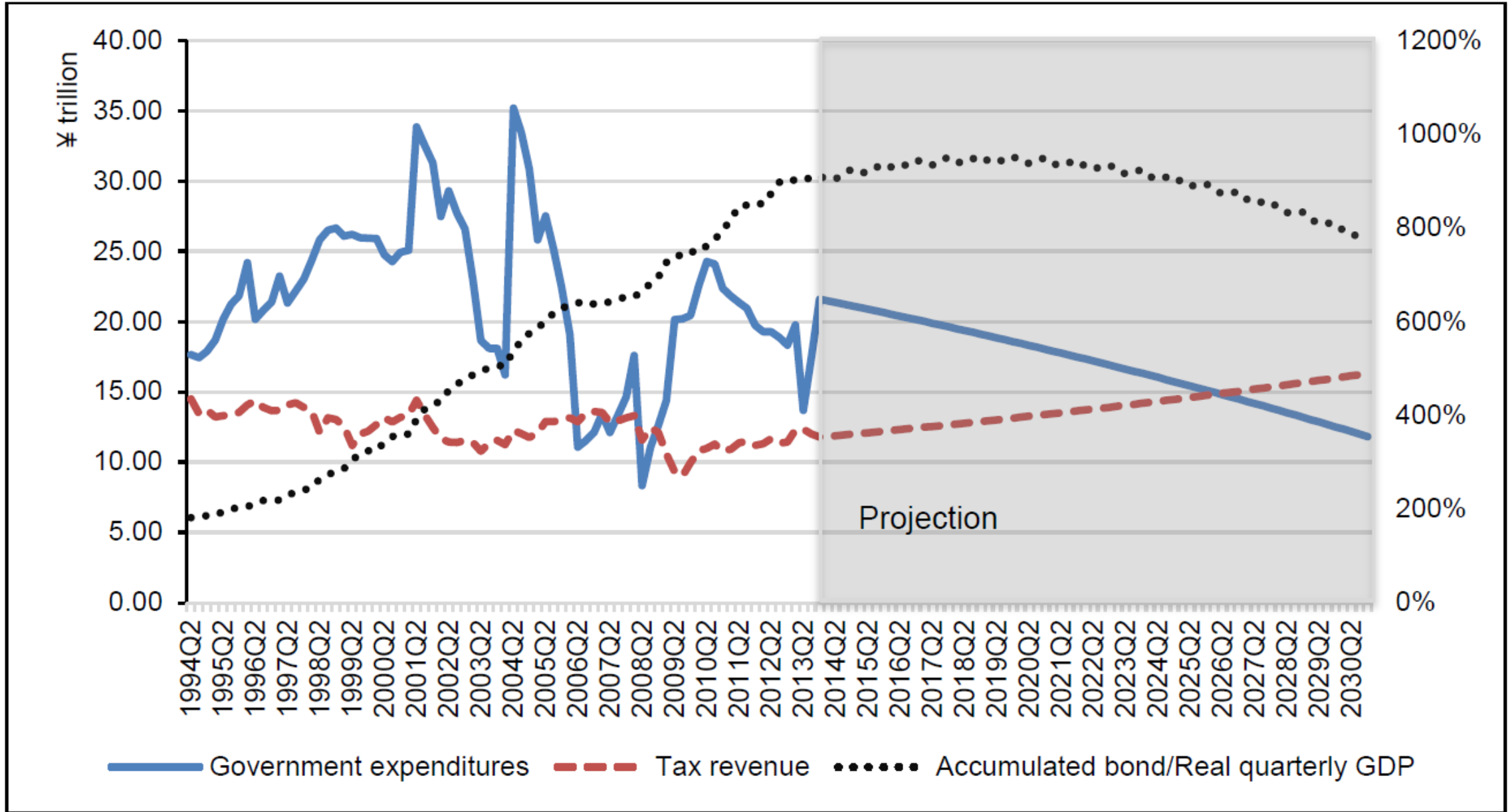
Taxation Rule (18)

where $\beta_1 = -\frac{w_1}{w_4} \left(\frac{B_{t-1}}{b_1 - B_{t-1}} + 1 \right)$, $\beta_2 = -\frac{w_5}{w_4} \left(\frac{B_{t-1}}{b_1 - B_{t-1}} + 1 \right)$, $\beta_3 = \frac{w_2}{w_4} \left(\frac{(d_1 + i_1) c_1 + d_1 i_1}{\Delta} \right)$.

From these two first-order conditions, we can find the relationship between $G_t, T_t, (B_t - B_t^*), (\Delta B_t - \Delta B_t^*)$ and the primary balance.

$$PB_t - PB_{t-1} = (\alpha_1 - \beta_1)(B_t - B_t^*) + (\alpha_2 - \beta_2)(\Delta B_t - \Delta B_t^*) + (\alpha_3 - \beta_3)(Y_t - Y_t^f) \quad (19)$$

Figure 10: Government Expenditure and Tax Revenue



Thank you so much

Naoyuki Yoshino, Dean and CEO
Asian Development Bank Institute

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