Long term stagnation of Japan and Lessons to Korea

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Abenomics: 3 Arrows (by Prime Minister)

(1) Aggressive Monetary Policy--Inflation target

(2) Fiscal Consolidations

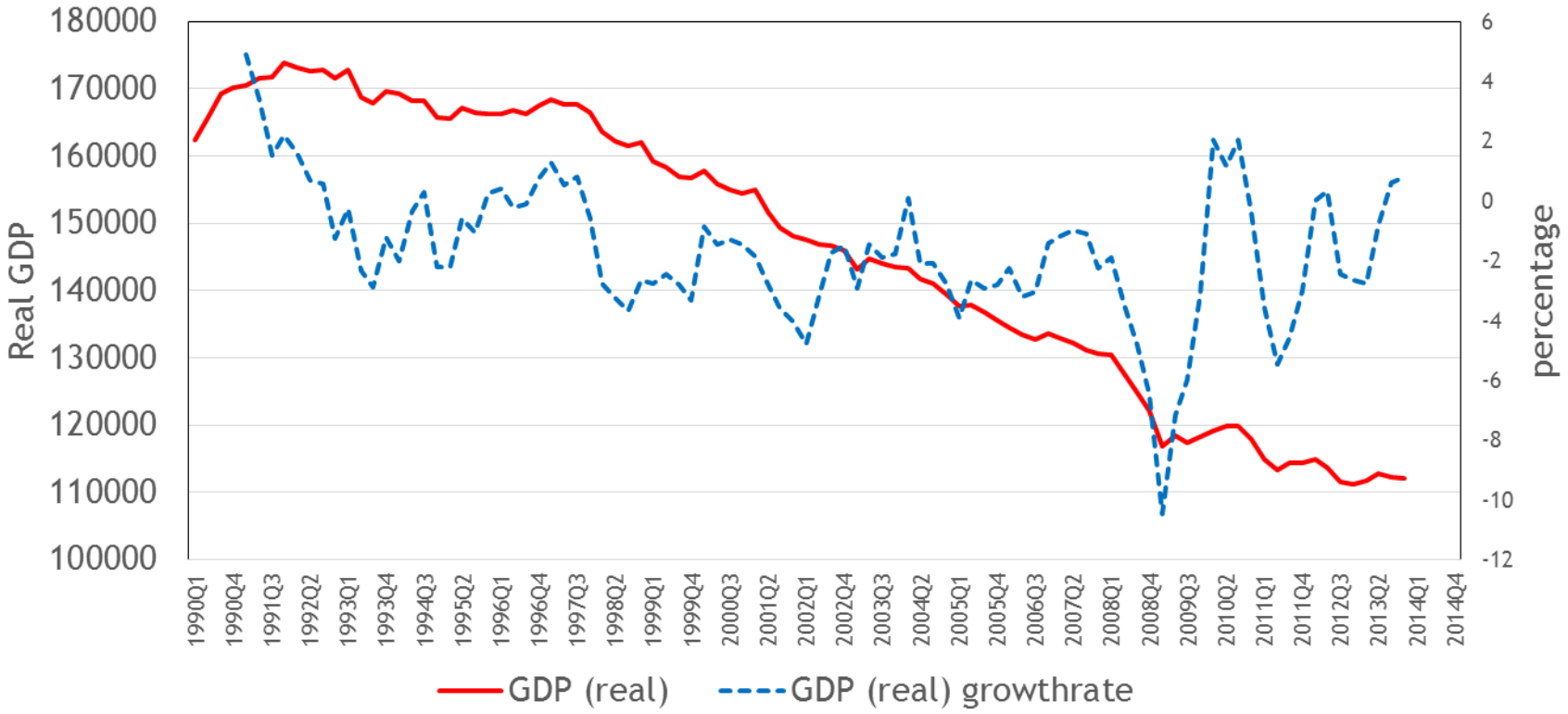
(3) Growth Strategy

Aggressive Monetary Policy

The government and the Bank of Japan (BOJ) announced the joint statement on overcoming deflation and achieving sustainable economic growth on January 22. The BOJ set the price stability target at 2 percent in terms of the year-on-year rate of change in the consumer price index. The government expects the BOJ to implement aggressive monetary easing to achieve this target at the earliest possible time.

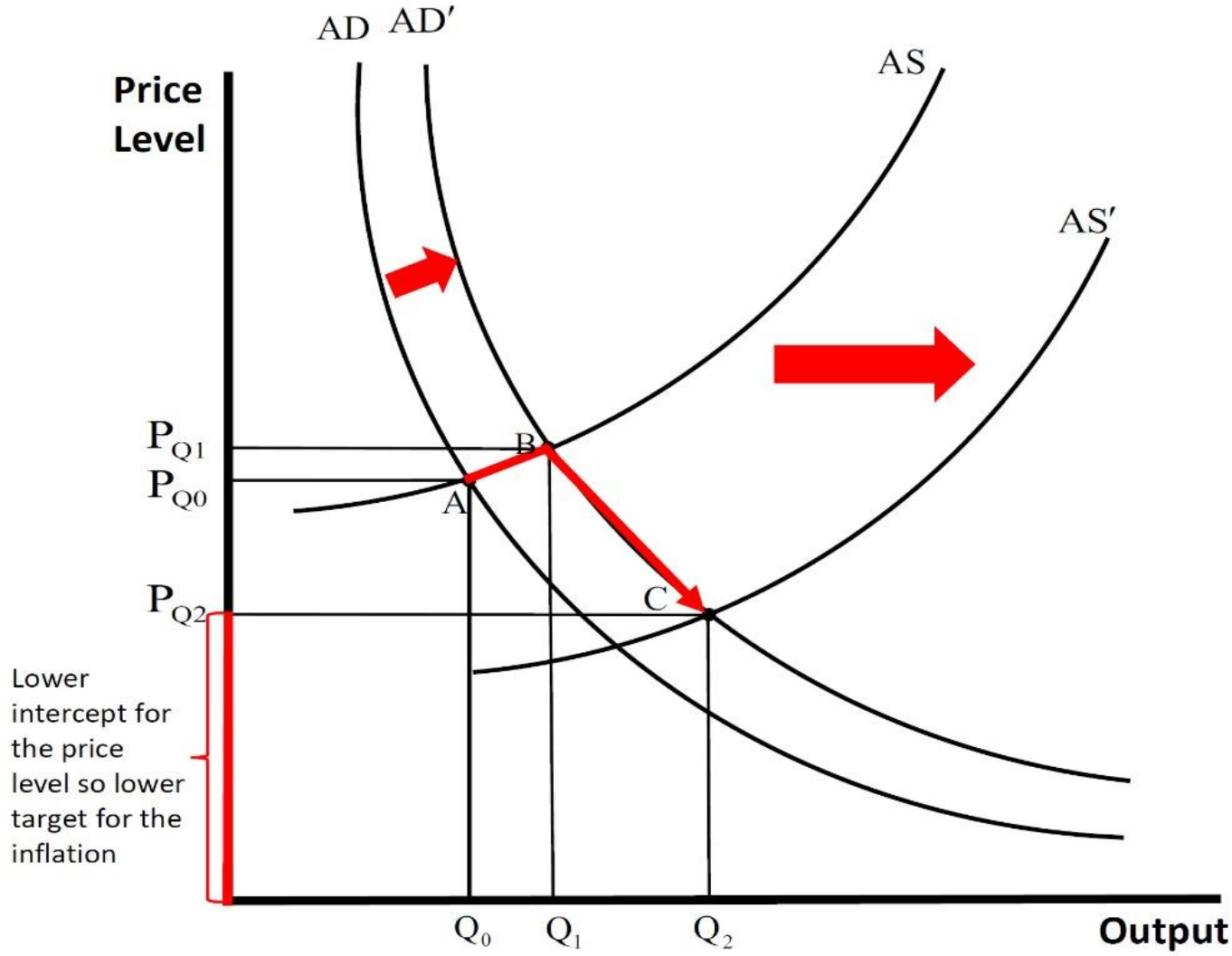
Changes in Japanese GDP

Figure: Trends of the Japanese GDP (1990 – 2014)



Note: For calculating the real GDP, GDP deflator of Japan used. Real GDP is seasonally adjusted by the X-12 quarterly seasonal adjustment method. Source: Nikkei Needs

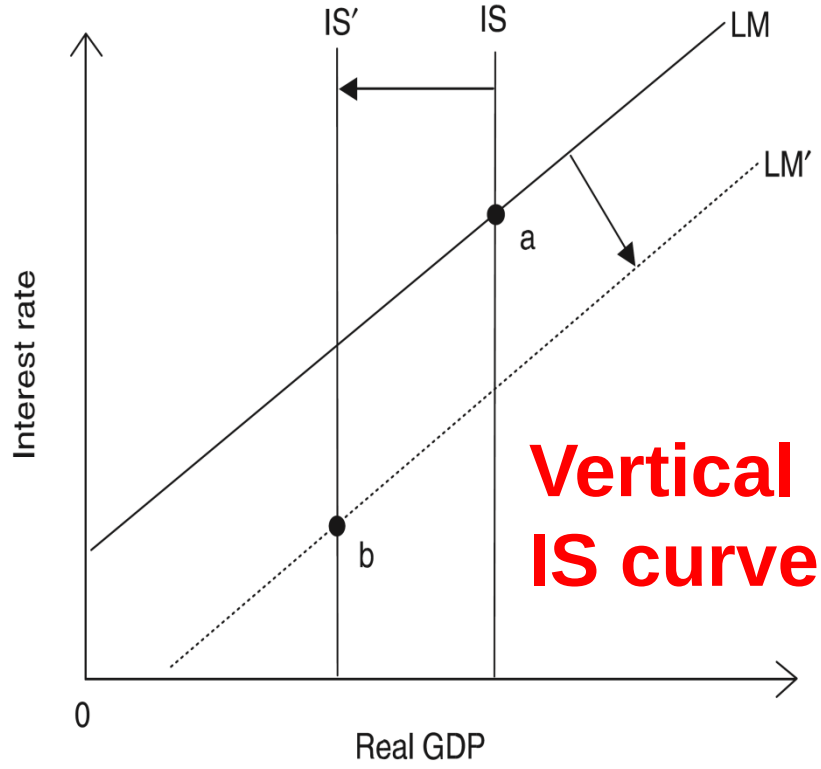
Target rate of inflation, lower oil price, 2% → lower rate

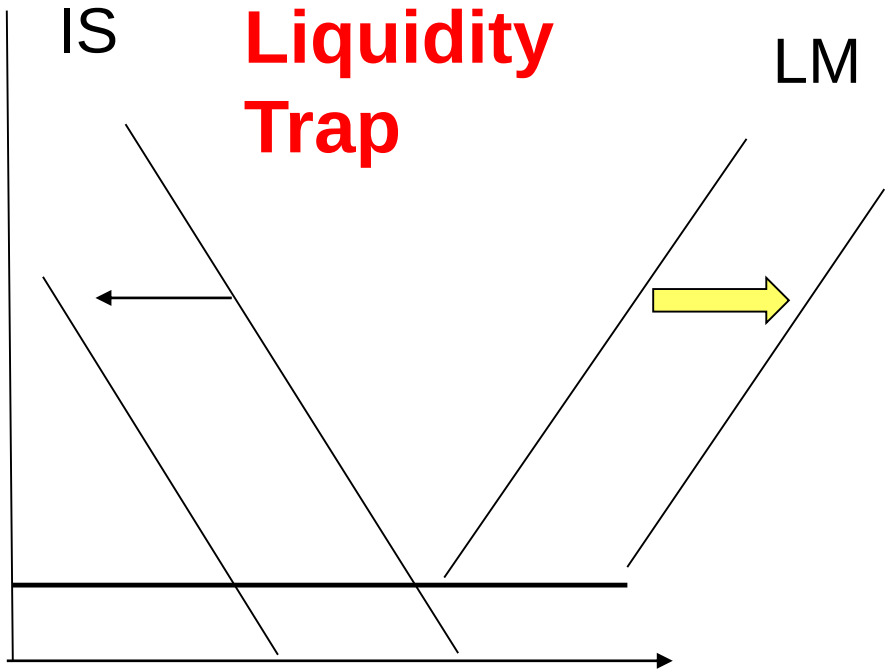


Causes of Japan's long-term recession

Problem of **Vertical IS curve** rather than **Liquidity trap**

Figure: The ineffectiveness of Monetary Policy in Japan





Source: Yoshino and Sakakibara (2002).

Vertical IS curve

$$y = \alpha - \sigma(i - p) + u_{is} \quad \text{(IS equation)}$$

$$m - p = \beta + \phi y - \lambda i + u_{lm} \quad \text{(LM equation)}$$

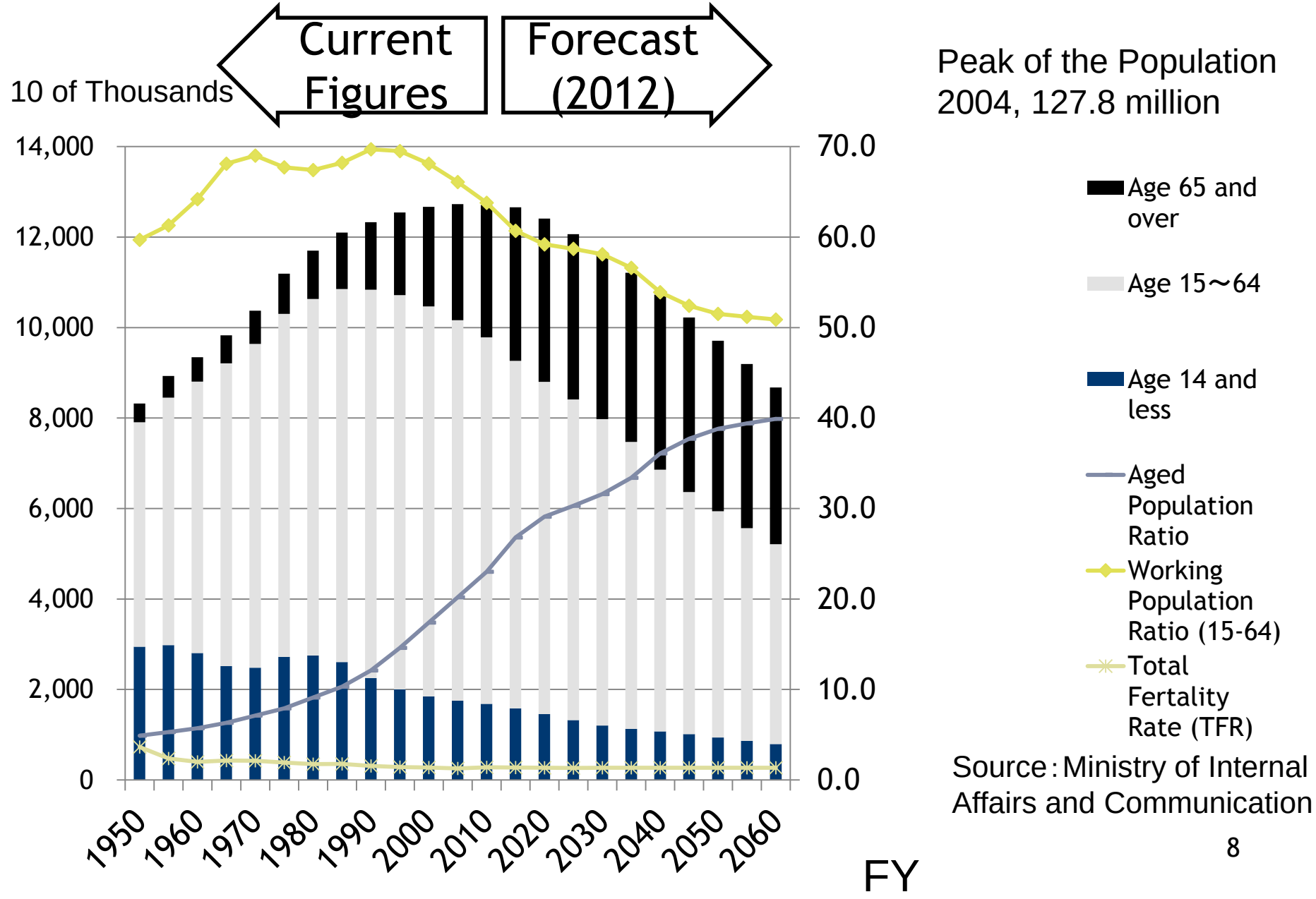
Table 5. Empirical result

Sample: 1990Q2-2013Q4

Eq.	Dependent variable	Explanatory Variable	Coefficient	Std. Error	t-Statistic	Prob.
IS	y_t	α	-0.16	0.08	-1.98*	0.049
		$(i-p)_t$	-0.0002	0.0004	-0.53	0.60
		y_{t-1}	1.01	0.007	147.63**	0.00
	R-squared= 0.99, adjusted R-squared=0.99, Durbin-Watson Stat.=1.70, **Std. Error** of regression=0.01					
LM	$(m-p)_t$	β	0.02	0.19	0.11	0.91
		y_t	0.70	0.26	2.67**	0.008
		i_t	-0.025	0.009	-2.72**	0.007
		$(m-p)_{t-1}$	0.99	0.006	171.06**	0.00
	R-squared= 0.99, adjusted R-squared=0.99, Durbin-Watson Stat.=1.93, **Std. Error** of regression=0.03					

Note: Estimation Method: Iterative Seemingly Unrelated Regression, IS stands for "investment-saving", LM is "liquidity preference–money supply". Std. Error is Standard error, Prob. is the probability

Population Aging of Japan



Source：Ministry of Internal Affairs and Communication

Productivity based wage rate

1, Seniority wage system of Japan

2, Postpone retirement age

1950s, Age 55 → 59

2015, Age 60 or 65 → 85, 88

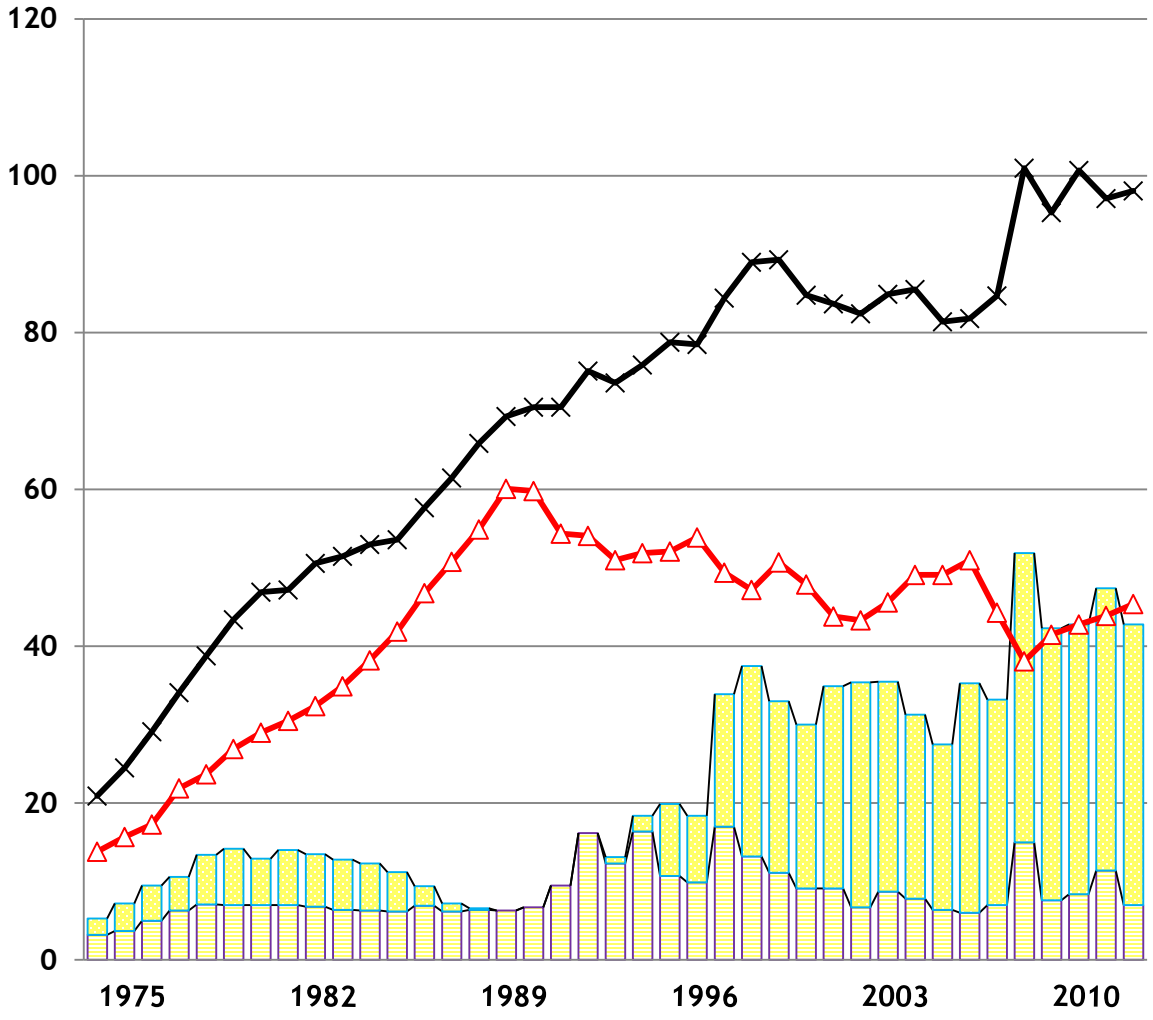
3, Job market for elderly people

4, Robot

5, Female participation

6, Sufficient child care system

Trends in General Account Tax Revenues, Total Expenditures and Government Bond Issues



Special Deficit-Finanicing Bond Issues

Construction Bond Issues

Tax Revenue

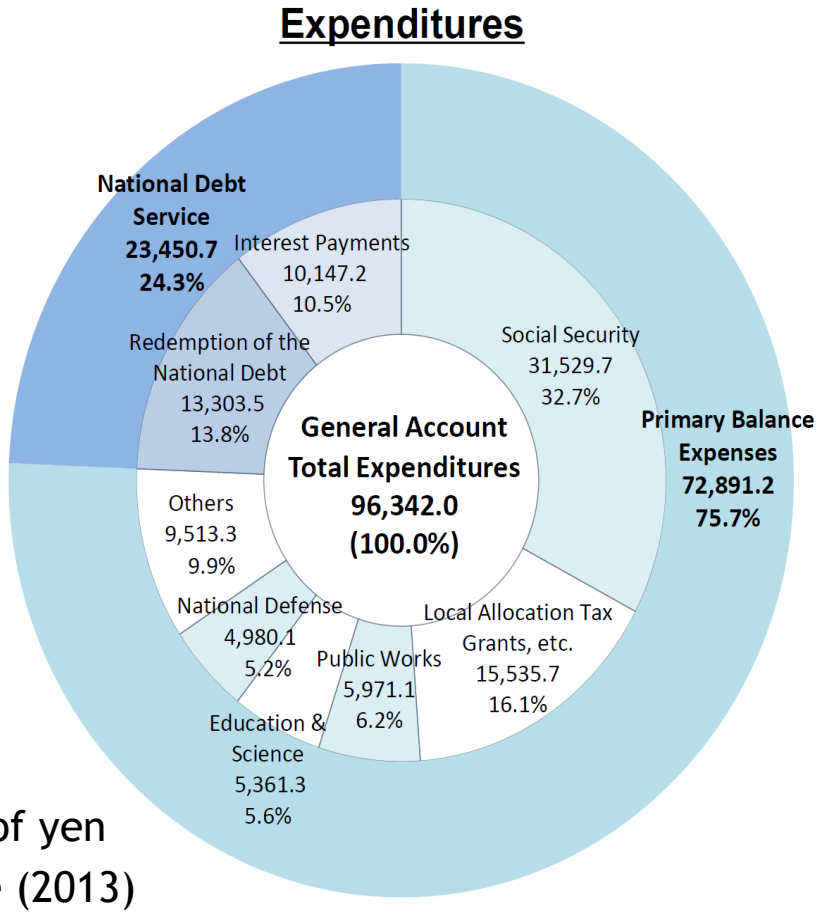
Total Expenditure

Source: MOF

Increase of Social Welfare Spending

Transfers from central to local governments

Figure: General Account Budget for FY 2015

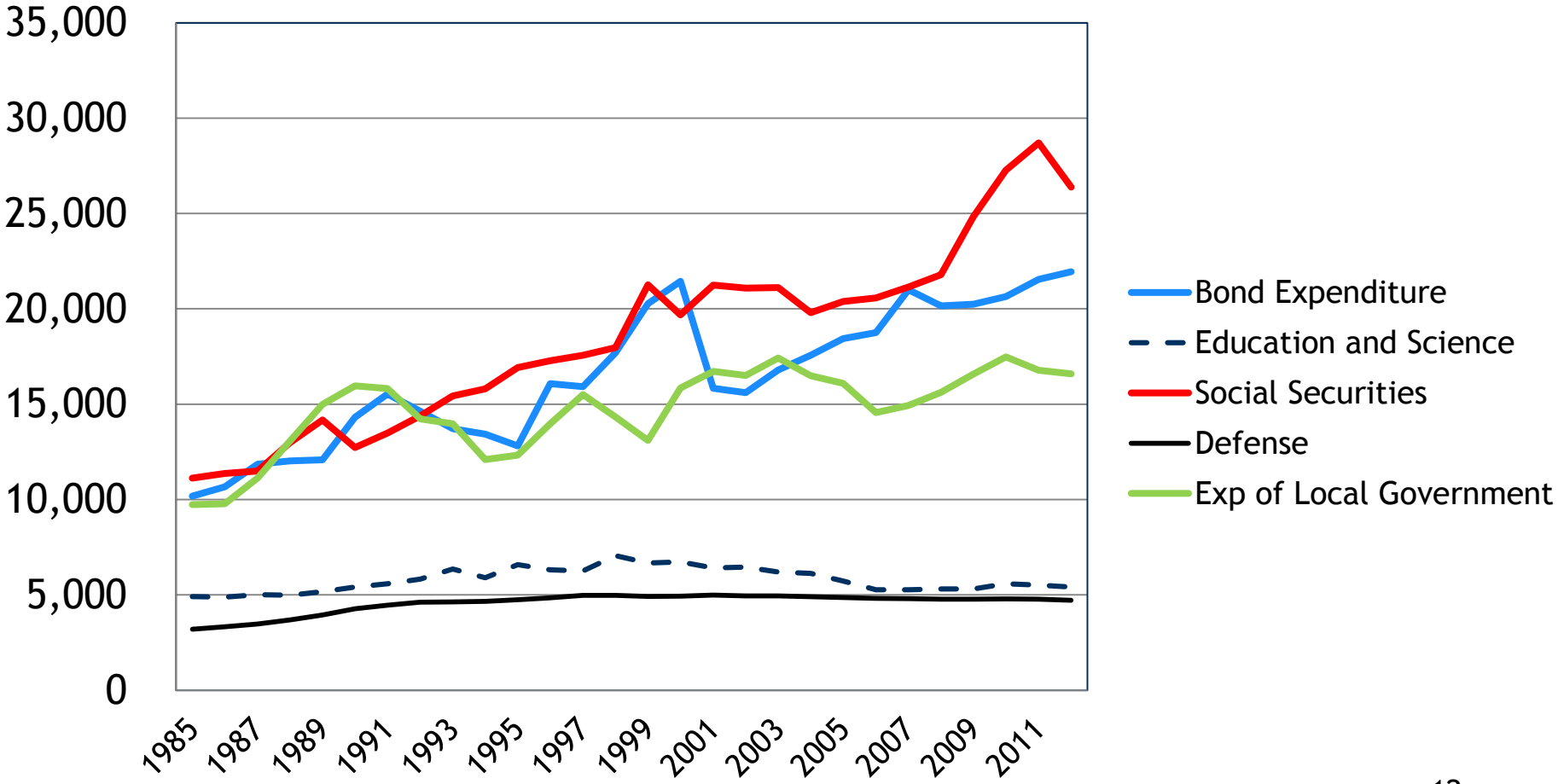


Note: Units are in billions of yen

Source: Ministry of Finance (2013)

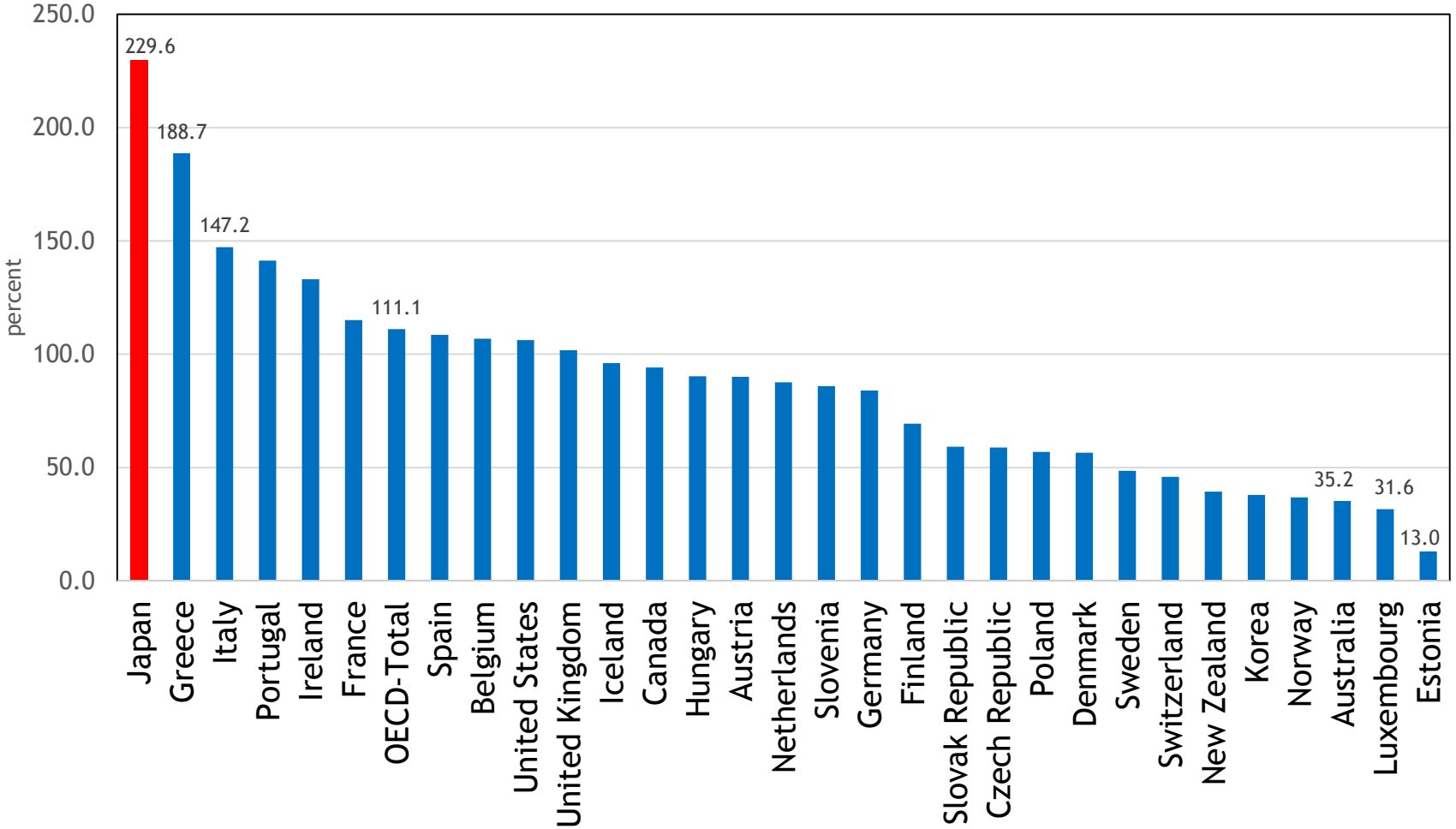
Increase of Social Welfare Spending

Figure: Budget Allocation of Central Government (Japan, 1985-2012)



Source: MOF Unit=billion yen

Gross Debt/GDP ratio, 2014
Selected OECD Countries



Source: OECD Economic Outlook

Japan's Debt /GDP Ratio

1995	2014
95.1%	229.6%

Greece Debt / GDP Ratio

1995	2014
101.2%	188.7%

Source: OECD Economic Outlook

Holders of Government bonds

Holders of Japanese Government Bonds (JGB)	% of total	Holders of Greek Government Bonds	% of total
Banks and postal savings	45	Overseas investors	33
Life and non-life insur.	20	Domestic investors	21
Public pension funds	10	European Central Bank	18
Private pension funds	4	Bilateral Loans	14
Bank of Japan	8	Social pension funds	6
Overseas investors	5	IMF	5
Households	5	Greek domestic funds	3
Others	3		

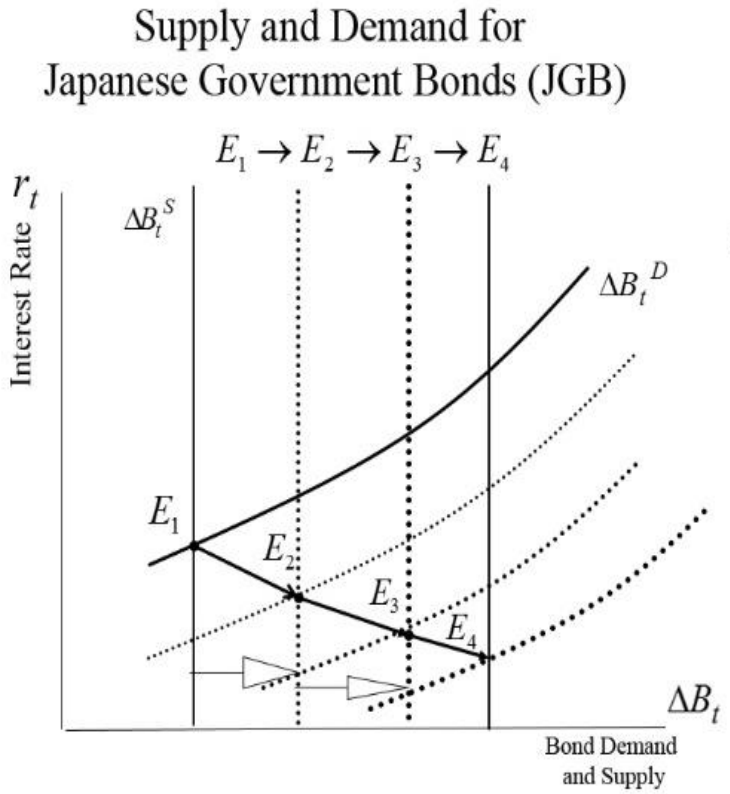
Japanese Debt, 92% are held by Domestic Investors (2014)

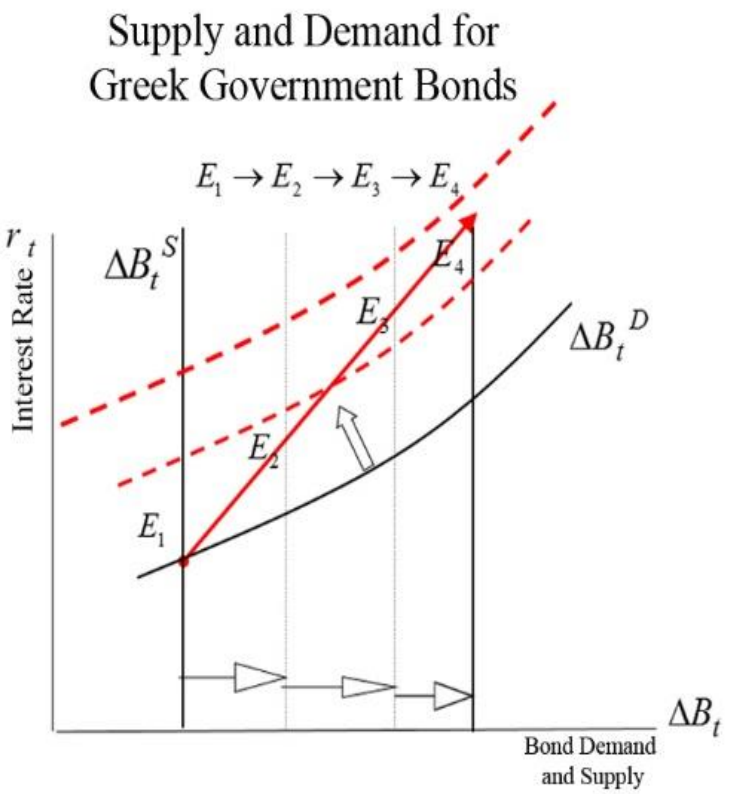
HOLDERS	%
Banks and Postal Savings	27.8%
Bank of Japan	**21.2%**
Life and Non-life Insurances	19.3%
Overseas' Investors	8.5%
Public Pension funds	6.4%
Private Pension Funds	3.4%
General Government	2.6%
Households	2%
Others	1.5%

Stable bond market of Japan

The Difference between Japan and Greece

The Government Bond Markets (Japan and Greece)





Source: Yoshino and Mizoguchi (2013).

Changes in Japan's Money Flow

High Growth Period

Households Savings → Corporate → Capital

Investment Stock

S → I → K

Recent Period

Corporate Savings → Government → **Elderly people**

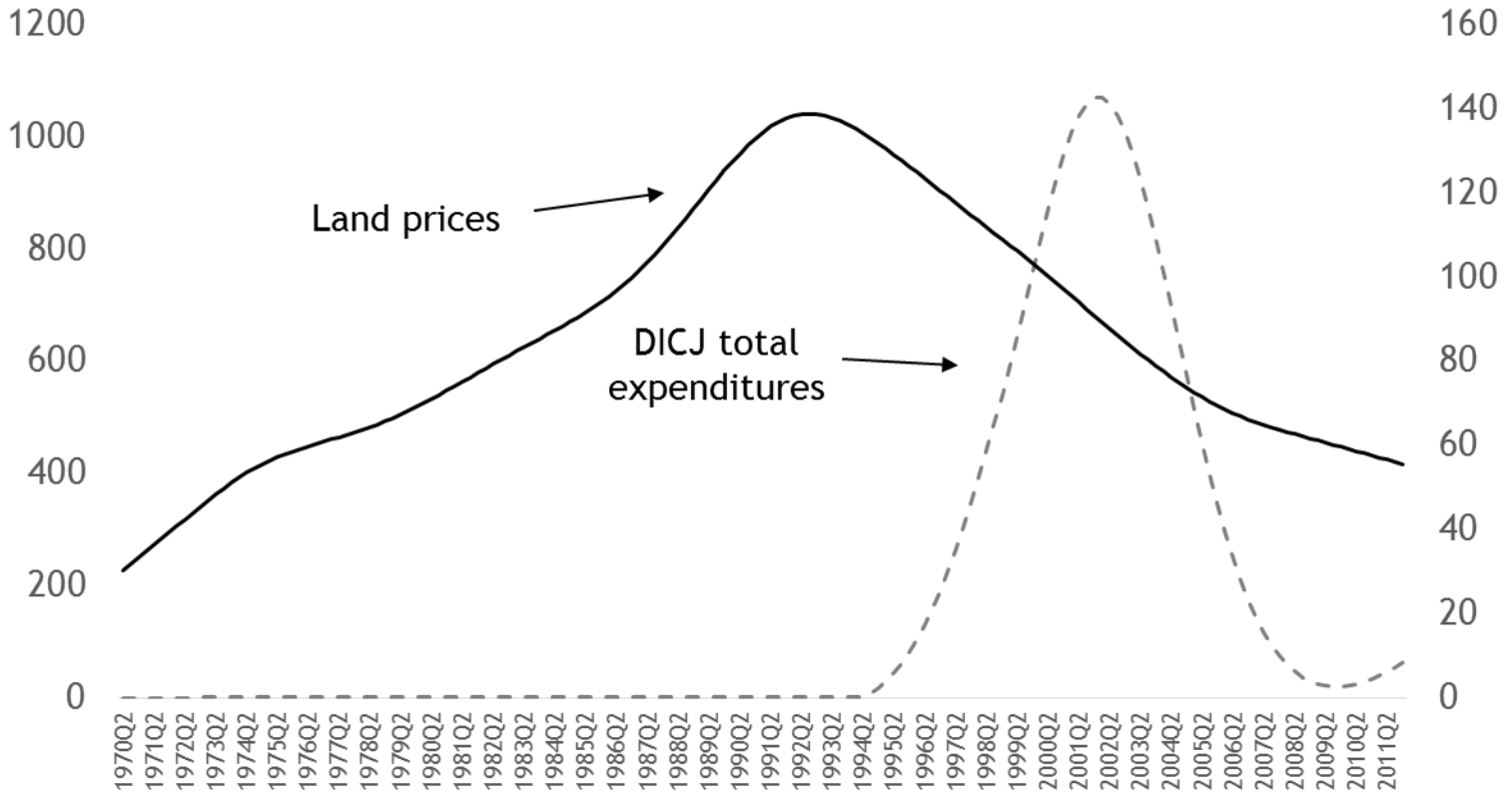
S → G → Social Welfare

Abolish Retirement Age
Increase working population
Pension payment will start 65 or later
Wage rate be based on marginal productivity
SME and Startup business finance
Hometown Investment Trust Funds

Asset Price Bubbles of Japan of late 1980s

Land Price of Japan

Figure: Land price and deposit insurance of Japan's (DICJ) financial assistance for banking failures



Source: Yoshino, Taghizadeh-Hesary and Nili (2013)

Bank Loan Supply Curve

Revankar and Yoshino (2008)

Excessive Contractionary Monetary Policy

Table: Estimated Loan Supply Function

Dependent Variable (bank loan)	Period I (1982-1989)	Common Coefficient entire period	Period II (1990-1995)
Bank deposit		0.66	
		(19.69)	
Market share		0.43	
		(1.48)	
Loan Rate- Call Rate	16.29		21.35
	(2.61)		(3.03)
Call Rate	8.564		6.755
	(2.57)		(2.904)
BIS-ratio		8.66	
		(2.35)	
Rival Bank's Previous Period Loan	0.07		0.04
	(3.67)		(2.33)
Land Price	0.12		-1.76
	(2.56)		(-1.45)
Constant		-36.30	
		(-0.87)	
Adjusted-R^2 0.892, Hausman Statistic, CHI-SQUARE=0.923, P-Value=0.820			

Japanese banks loan supply behavior

Excessive Contractionary Monetary Policy

Revankar and Yoshino (2008)

- Effectiveness of the interest rate policy diminished during 1990-1995 compared to 1982-1989.
- BIS capital requirement rule discouraged Japanese banks to lend money to SMEs and start up business and risky sectors.
- During the bubble period increasing of the land price pushed the bank loans upward and as a consequence Japanese banks were willing to lend more.
- Japanese banks decided their bank loans supply by looking at other banks' behaviour, for example Sumitomo bank.

Causes of Japan's long-term recession

Bank failures (182 banks went into bankrupt)

Four reasons for bank failures in Japan:

(i)Too much concentration on lending to specific sectors (such as the construction and real estate sectors)

(ii)Regional recessions struck regional banks with lending mainly in stressed regions

(iii)Mismanagement and fraudulent lending

(iv)Failure in securities investment and a lack of investment knowledge.

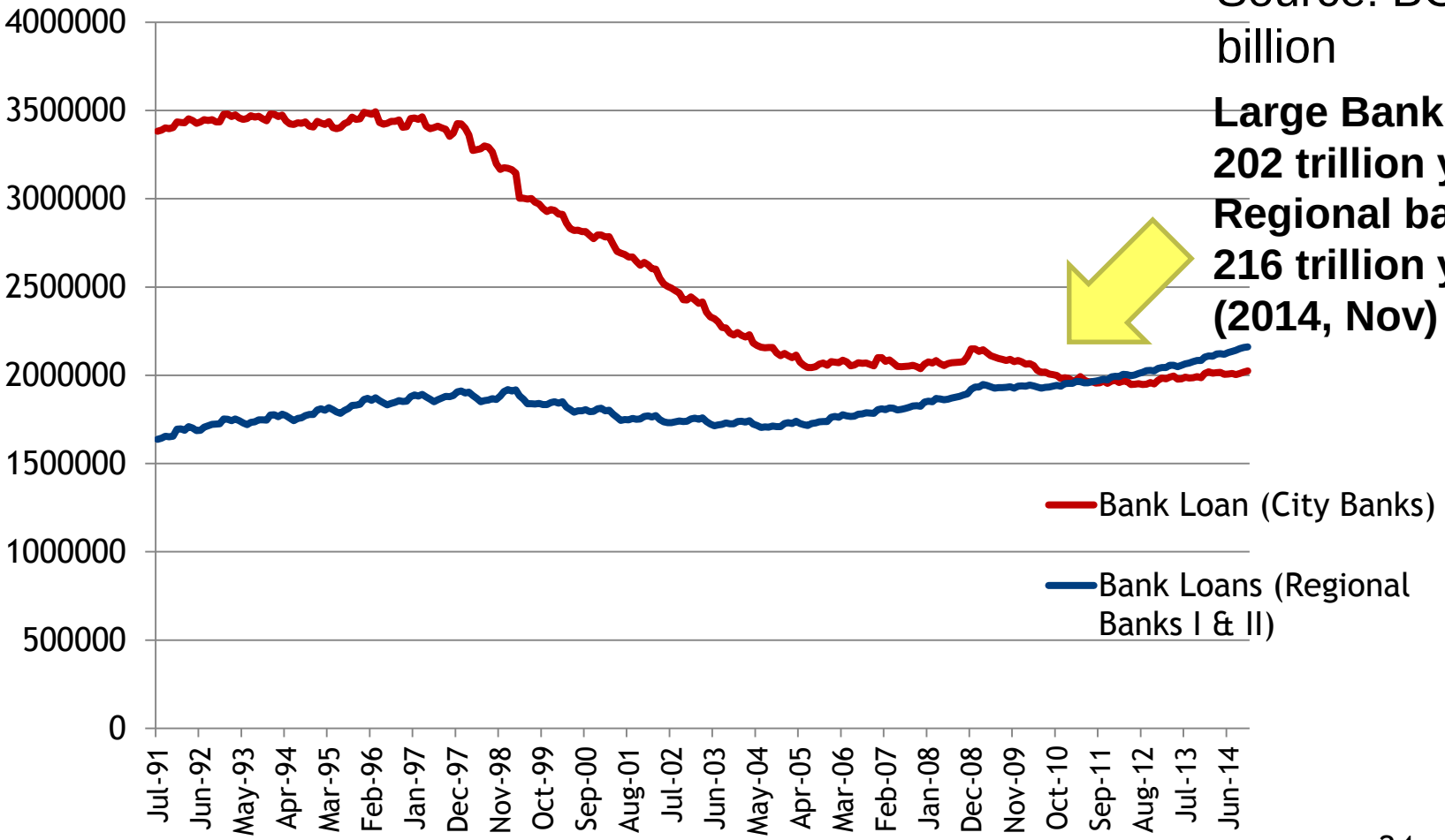
Table 1. Estimates of Optimal Minimum Capital Requirement Ratios for Japan, United States and Canada

(1) Japan	
$\theta^* = -2.20\%$	1998 Q1 - 2008 Q4
(2) USA	
$\theta^* = +4.42\%$	2002 Q4 - 2007 Q4
$\theta^* = -1.116\%$	2001 Q1 - 2002 Q4
(3) Canada	
$\theta^* = +0.37\%$	2003 Q1 - 2004 Q4
$\theta^* = +0.96\%$	2006 Q1 - 2007 Q4

Bank Loans of Japan

Source: BOJ
billion

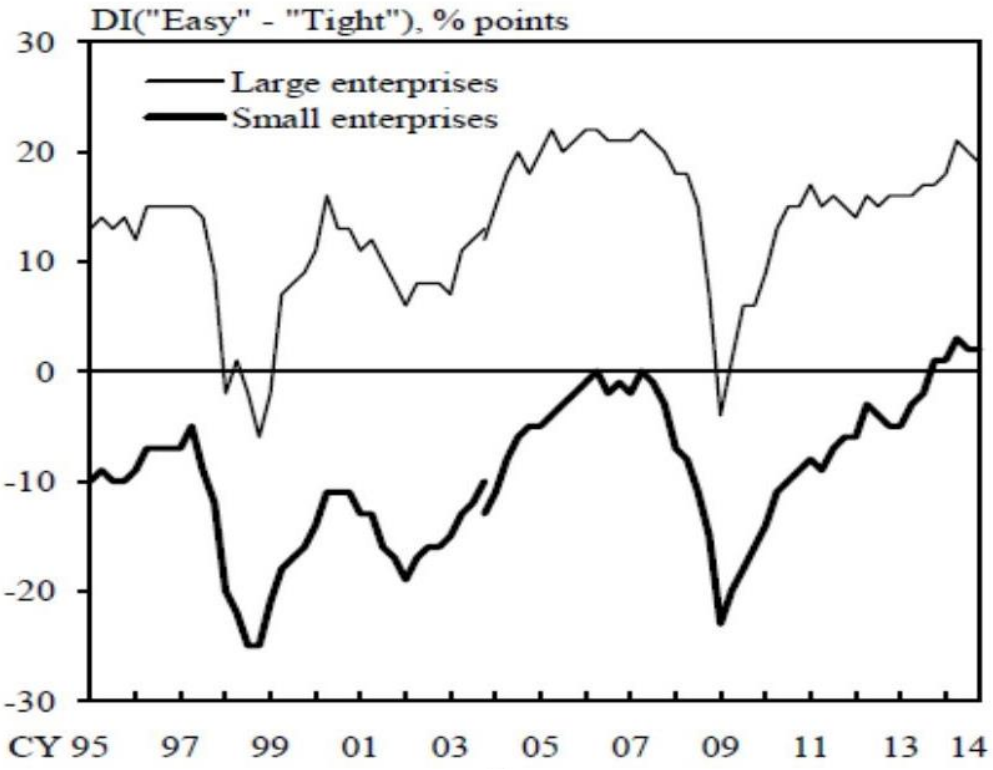
Large Banks : 202 trillion yen
Regional banks: 216 trillion yen (2014, Nov)



SMEs' and Start ups difficulty to raise money

Bank Lending to SMEs

Figure: Access to Finance by SMEs and Large Firms in Japan



Notes: DI = Diffusion index, CY = Commercial year
Source: Yoshino and Taghizadeh-Hesary (ADBI WP, Lost Decade of Japan, 2015)

Marginal Productivity of Public Capital
(in Japan)

Period(FY)	1956–60	1961–65	1966–70	1971–75	1976–80	1981–85
Direct Effect	0.696	0.737	0.638	0.508	0.359	0.275
Indirect Effect(Private Capital)	0.453	0.553	0.488	0.418	0.304	0.226
Indirect Effect(Labor Input)	1.071	0.907	0.740	0.580	0.407	0.317
Private Capital	0.444	0.485	0.452	0.363	0.294	0.262

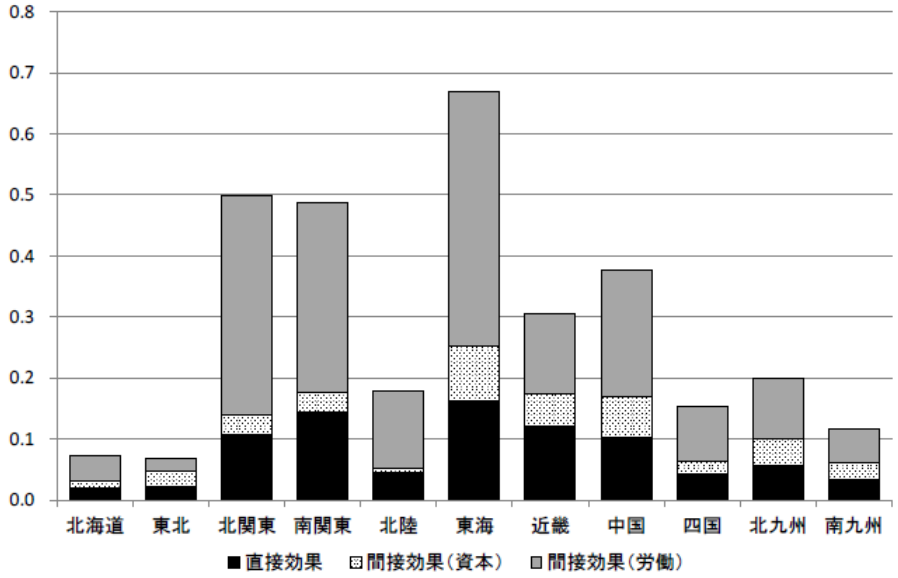
Period(FY)	1986–90	1991–95	1996–00	2001–05	2006–10
Direct Effect	0.215	0.181	0.135	0.114	0.108
Indirect Effect(Private Capital)	0.195	0.162	0.122	0.100	0.100
Indirect Effect(Labor Input)	0.192	0.155	0.105	0.090	0.085
Private Capital	0.272	0.242	0.219	0.202	0.194

(C) 2014 Yoshino & Nakahigashi

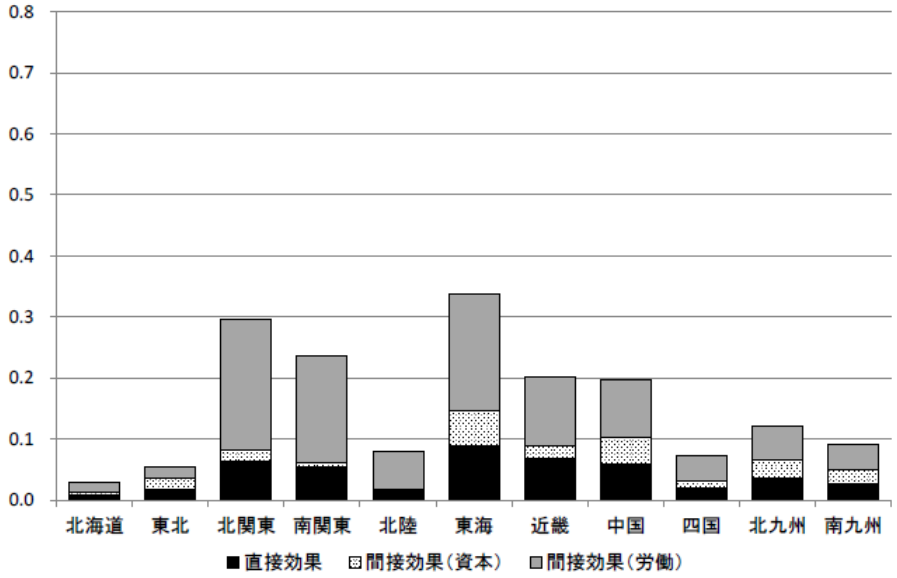
Economic Effect of Infrastructure Investment (Manufacturing Industry)

図 1　第 2 次産業における社会資本の生産力効果の変化

(1) 1990 年度



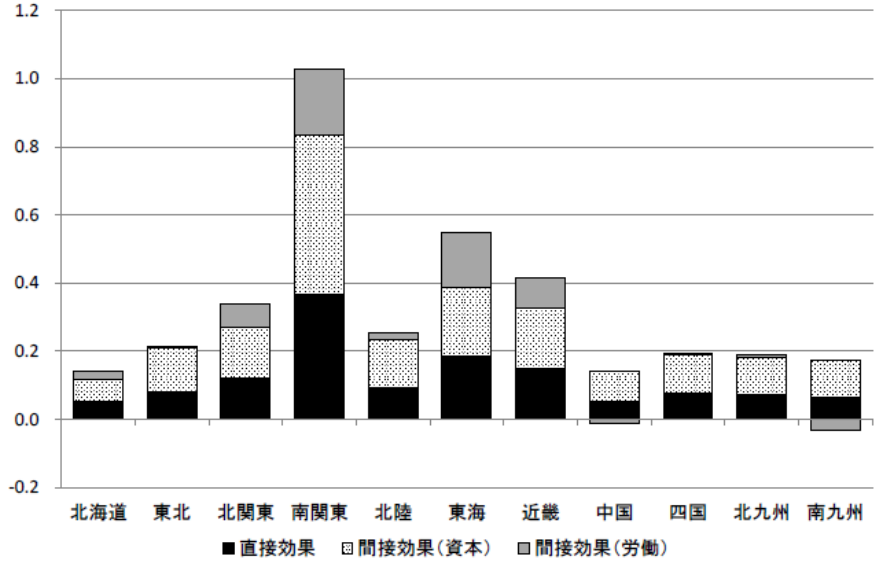
(2) 2010 年度



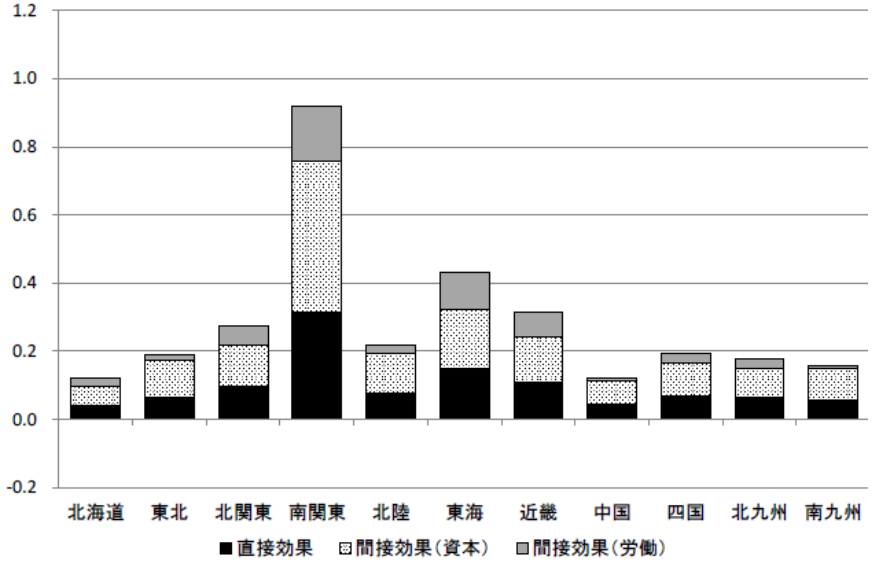
（出所） Nakahigashi-Yoshino (2015)

Economic Effect of Infrastructure (Services Industry)

(1) 1990 年度



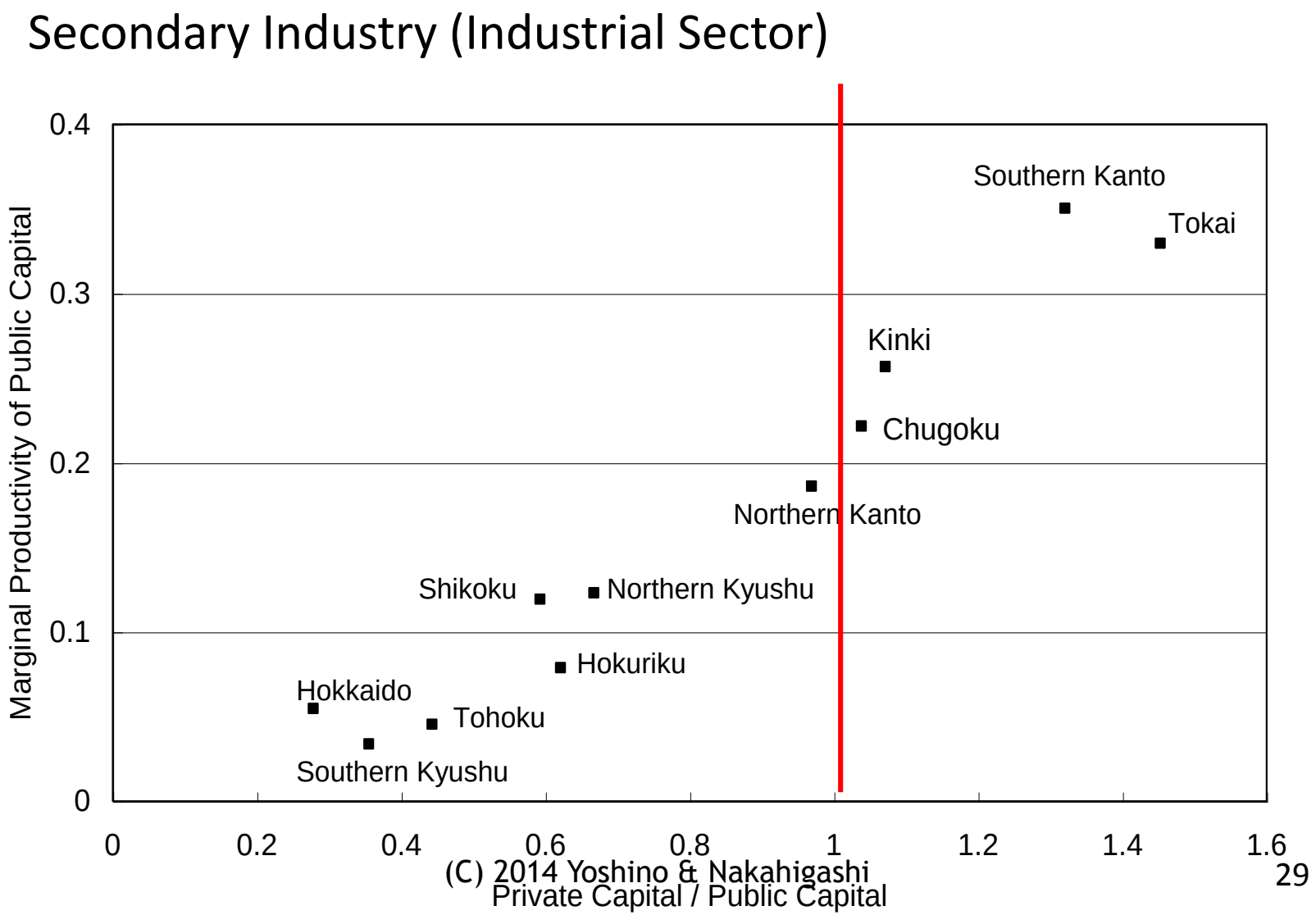
(2) 2010 年度



（出所） Nakahigashi-Yoshino (2015)

Effectiveness of Public Capital Stock

- "Private capital/Public capital ratio" to "Marginal productivity of Public capital" -



(C) 2014 Yoshino & Nakahigashi

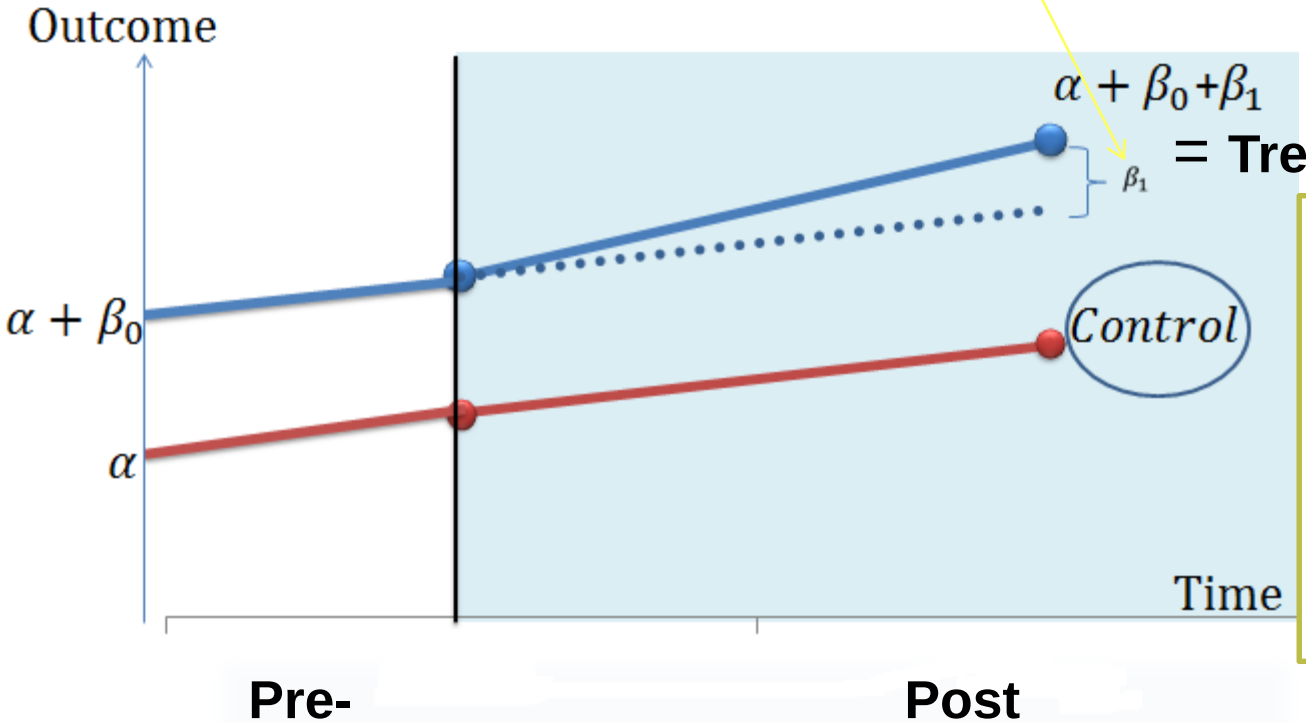
Thailand (Effectiveness of Infrastructure Investment)

		Private capital	Public capital	Direct effect	Indirect effect Capital	Indirect effect Labor
Agriculture, forest, hunting and fishing						
	1971-1980	0.971	0.778	0.086	0.618	0.074
	1981-1990	0.912	0.516	0.107	0.323	0.087
	1991-2000	0.859	0.101	0.068	-0.059	0.092
	2001-2012	0.814	-0.185	0.018	-0.293	0.090
Manufacturing						
	1971-1980	0.710	0.526	0.191	0.111	0.224
	1981-1990	0.623	0.426	0.163	-0.004	0.266
	1991-2000	0.554	0.409	0.135	0.190	0.083
	2001-2012	0.631	0.902	0.173	1.081	-0.351

Method: Difference-in-Difference (DiD) Analysis

$$\text{Outcome} = \alpha + \beta_0 D + \sum_{t+2}^{t-4} \beta_1 D \times T + \varepsilon$$

where: D = 1 (Treatment group) T = Treatment period
D = 0 (Control group)



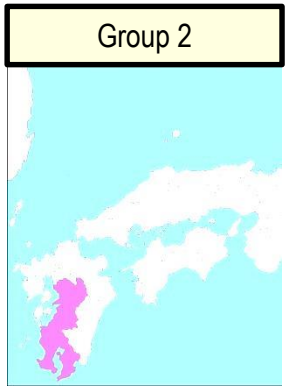
Assumption:

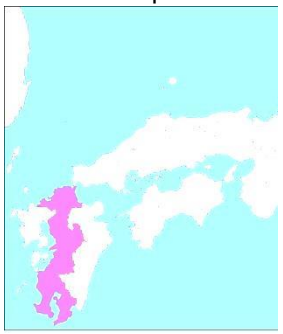
Equal trends between Treatment and Control groups

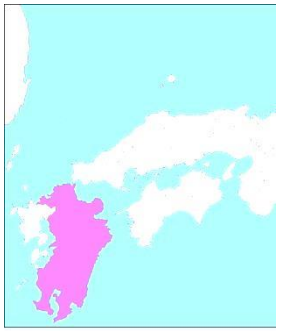
Japanese Bullet Train

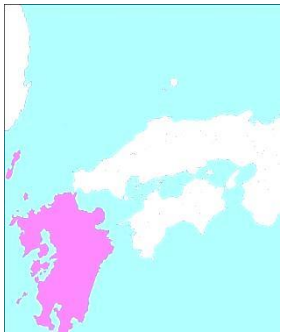
Japanese Bullet Train

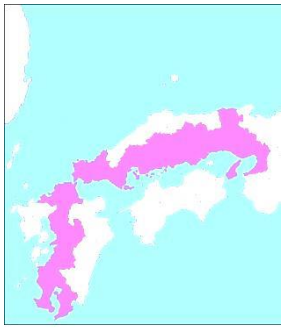
Estimation results by group of prefectures

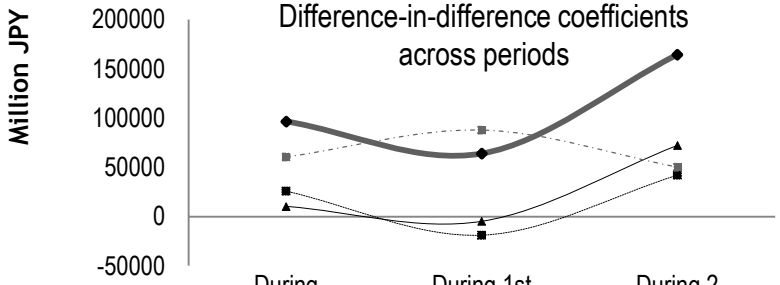




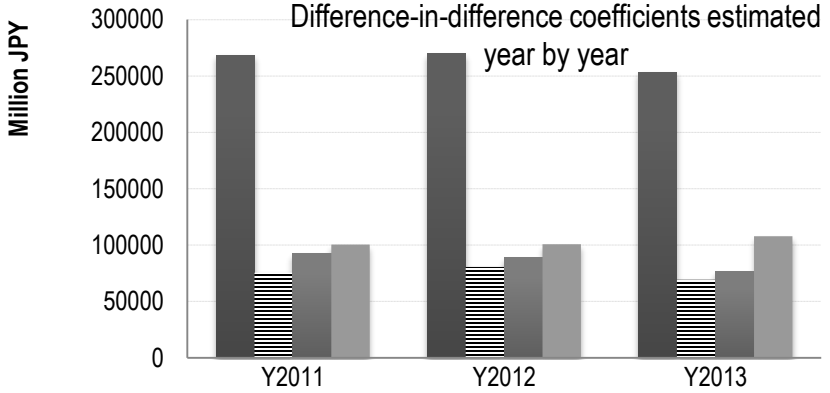








	During Construction Period [1991-2003]	During 1st Phase of Operation [2004-2010]	During 2 Phase of Operation [2011-2013]
Total Tax	96603	64067	164541
Personal Income Tax	25723	-19033	42035
Corporate Tax	10350	-4772	72330
Other Taxes	60529	87872	50176



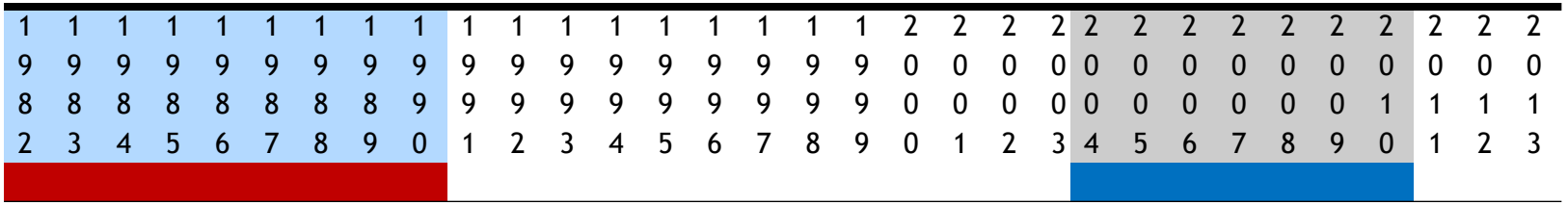
	Y2011	Y2012	Y2013
Total Tax	268644	270262	253343
Personal Income Tax	75582	80472	69234
Corporate Tax	92720	89082	76302
Other Taxes	100341	100707	107805

Note: Numbers for tax revenue amount adjusted for CPI with base year 1982. Pre-shinkansen construction period covers years from 1982 to 1990. Non-affected groups include rest of the prefectures

Treated groups: Group 2: Kagoshima, Kumamoto
Group 3: Kagoshima, Kumamoto, Fukuoka
Group 5: Kagoshima, Kumamoto, Fukuoka, Oita, Miyazaki
Group 7: Kagoshima, Kumamoto, Fukuoka, Oita, Miyazaki, Saga, Nagasaki
Group Con.: Kagoshima, Kumamoto, Fukuoka, Yamaguchi, Hiroshima, Okayama, Hyogo, Osaka

Impact of Kyushu Shinkansen Rail on CORPORATE TAX revenue during 1st PHASE OF OPERATION period

{2004-2010} , mln. JPY (adjusted for CPI, base 1982)



Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Treatment2	-4772.54				
	[-0.2]				
Number of tax payers	5.8952514*	5.8957045*	5.896112*	5.8953585*	5.8629645*
	[1.95]	[1.95]	[1.95]	[1.95]	[1.91]
Treatment3		-15947.8			
		[-0.87]			
Treatment5			-13250.4		
			[-1.06]		
Treatment7				-6883.09	
				[-0.7]	
TreatmentCon					-28030.8
					[-0.65]
Constant	-665679	-665418	-665323	-665358	-658553
	[-1.35]	[-1.35]	[-1.35]	[-1.35]	[-1.32]
N	799	799	799	799	799
R2	0.269215	0.269281	0.269291	0.269241	0.269779
F	1.934589	2.106448	2.074548	2.100607	8.497174

COMPOSITION OF GROUPS

Group2	**Group5**
Kagoshima	Kagoshima
Kumamoto	Kumamoto
	Fukuoka
Group3	Oita
Kagoshima	Miyazaki
Kumamoto	
Fukuoka	
	GroupCon
Group7	Kagoshima
Kagoshima	Kumamoto
Kumamoto	Fukuoka
Fukuoka	Osaka
Oita	Hyogo
Miyazaki	Okayama
Saga	Hiroshima
Nagasaki	Yamaguchi

Note: Treatment2 = Time Dummy {1991-2003} x Group2. etc. t-values are in parenthesis. Legend: * p<.1; ** p<.05; *** p<.01. Clustering standard errors are used, allowing for heteroscedasticity and arbitrary autocorrelation within a prefecture, but treating the errors as uncorrelated across prefectures

Impact of Kyushu Shinkansen Rail on CORPORATE TAX revenue during 2nd PHASE OF OPERATION period

{2011-2013} , mln. JPY (adjusted for CPI, base 1982)

1	1	1	1	1	1	1	1	1	1	1	1	19	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
9	9	9	9	9	9	9	9	9	9	9	9	94	9	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0
8	8	8	8	8	8	8	8	9	9	9	9		9	9	9	9	9	0	0	0	0	0	0	0	0	0	1	1	1
2	3	4	5	6	7	8	9	0	1	2	3		5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3

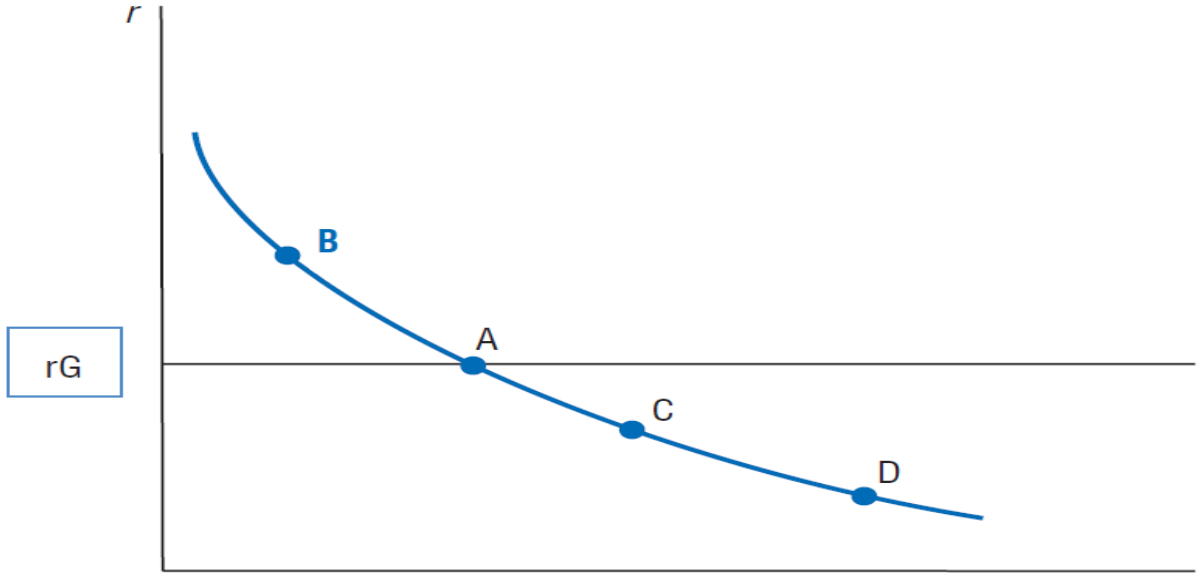
Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Treatment2	72330.012**				
	[2.2]				
Number of tax payers	5.5277056***	5.5585431***	5.558603***	5.5706545***	5.9640287***
	[3.13]	[3.14]	[3.14]	[3.14]	[3.07]
Treatment3		104664.34*			
		[2]			
Treatment5			82729.673**		
			[2.1]		
Treatment7				80998.365**	
				[2.34]	
TreatmentCon					179632
					[1.58]
Constant	-568133.98**	-573747.28**	-574245.87**	-576867.56**	-642138.87**
	[-2.07]	[-2.08]	[-2.08]	[-2.09]	[-2.1]
N	611	611	611	611	611
R2	0.350653	0.352058	0.352144	0.352874	0.364088
F	5.062509	5.486197	5.351791	5.431088	16.55518

COMPOSITION OF GROUPS

Group2	Group5
Kagoshima	Kagoshima
Kumamoto	Kumamoto
	Fukuoka
Group3	Oita
Kagoshima	Miyazaki
Kumamoto	
Fukuoka	
	GroupCon
Group7	Kagoshima
Kagoshima	Kumamoto
Kumamoto	Fukuoka
Fukuoka	Osaka
Oita	Hyogo
Miyazaki	Okayama
Saga	Hiroshima
Nagasaki	Yamaguchi

Note: Treatment2 = Time Dummy {1991-2003} x Group2. etc. t-values are in parenthesis. Legend: * p<.1; ** p<.05; *** p<.01. Clustering standard errors are used, allowing for heteroscedasticity and arbitrary autocorrelation within a prefecture, but treating the errors as uncorrelated across prefectures

Expected rates of return on project bonds vs. benchmark yield



	No Efforts	Efforts to improve
No Efforts	(50, r) Operating company, Inestors	(50, αr) Operating company, Investors
Efforts to improve	(100, r) Operating company	(100, αr) Operating Company, Investors

Public Private Partnership (PPP)

(1) Risk sharing between private and public sector

(2) Incentive cut costs and to increase revenue

→ Avoid political intervention

→ Bonus payment for employees who run infrastructure

(3) Many projects could be started by PPP

→ Utilize domestic savings

→ life insurance and Pension funds (long term)

(4) Indirect Effects are important (tourism, manufacturing, agriculture, services)

Risks Associated with Infrastructure

1, Risk sharing between private and public

2, too much reliance on overseas' money

→ future burden for the country

3, Loans vs Investment

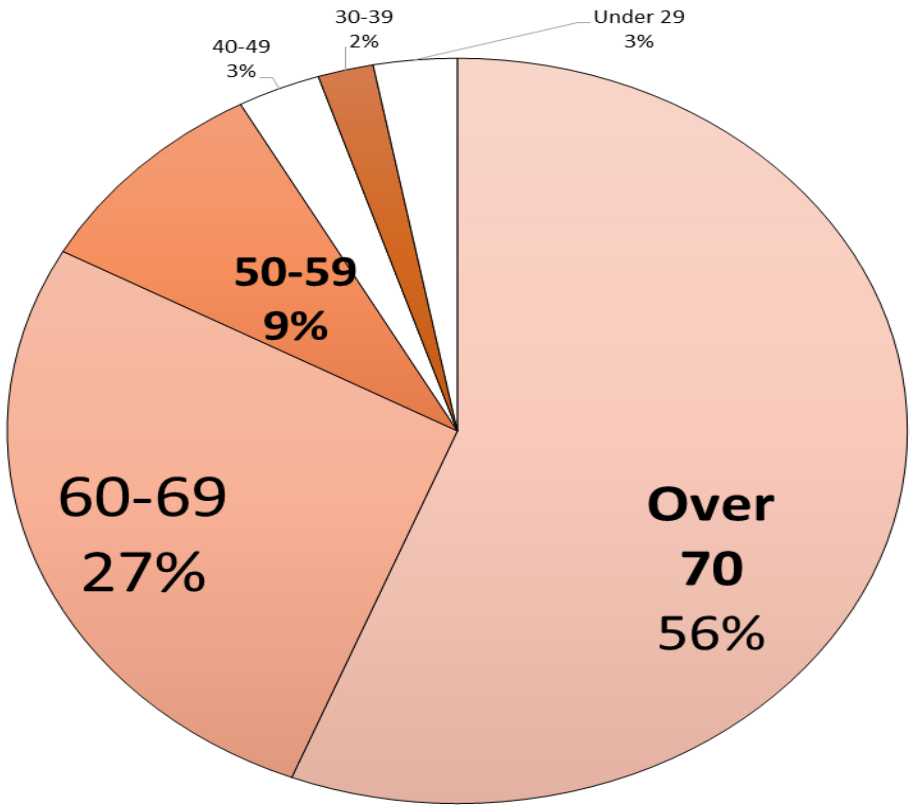
4, bankable projects or not ?

5, Various Risks (political risk, operational risk, demand risk, ex-post risk, maintenance risk, earthquakes, natural disaster risk)

Population aging (farmers in Japan)

Leasing of farm land

lands are kept on owned by elderlies



Growth Strategy

1, Make old people to keep on working,

Productivity based wage rate, Not seniority wage system

2, Since Japan's population is aging, the government will encourage greater female participation in the labor force, in part by improving child care facilities.

3, The government will ensure SMEs have access to easy financing for research and development.

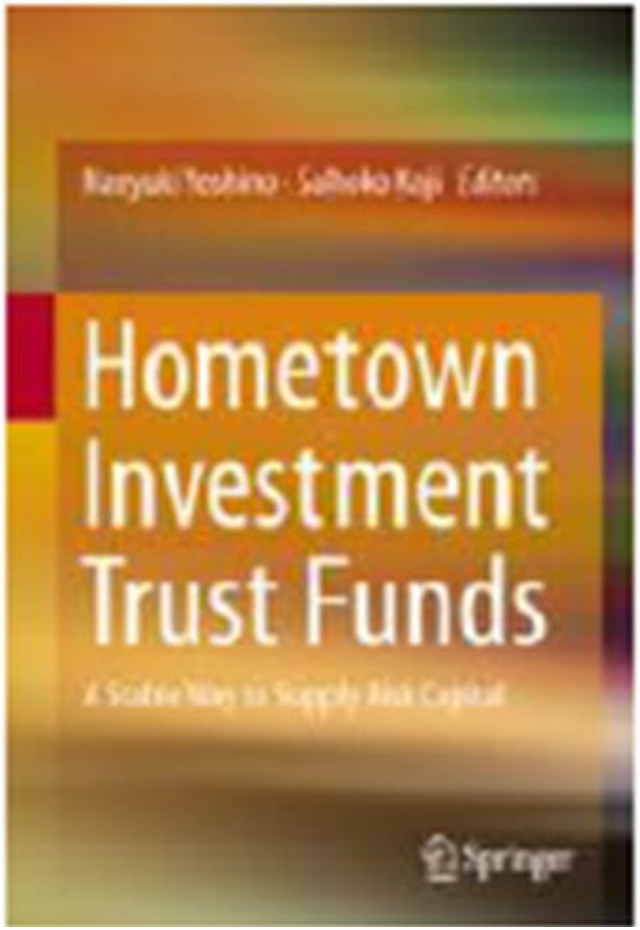
4, The farming population is aging and the government will provide sufficient funds to ensure an efficient and competitive agricultural sector. Leasing system of farm land and Hometown Investment Trust Funds

5, Hometown Investment Trust Funds

SMEs, Startup companies, Agricultural farmers, Solar power

Possible Solutions

Start up businesses, farmers



Hometown Investment Trust Funds

A Stable Way to Supply Risk Capital

Yoshino, Naoyuki; Kaji Sahoko (Eds.)
2013, IX, 98 p. 41 illus.,20 illus. in color

Available Formats:

ebook

Hardcover **Japan, Cambodia**

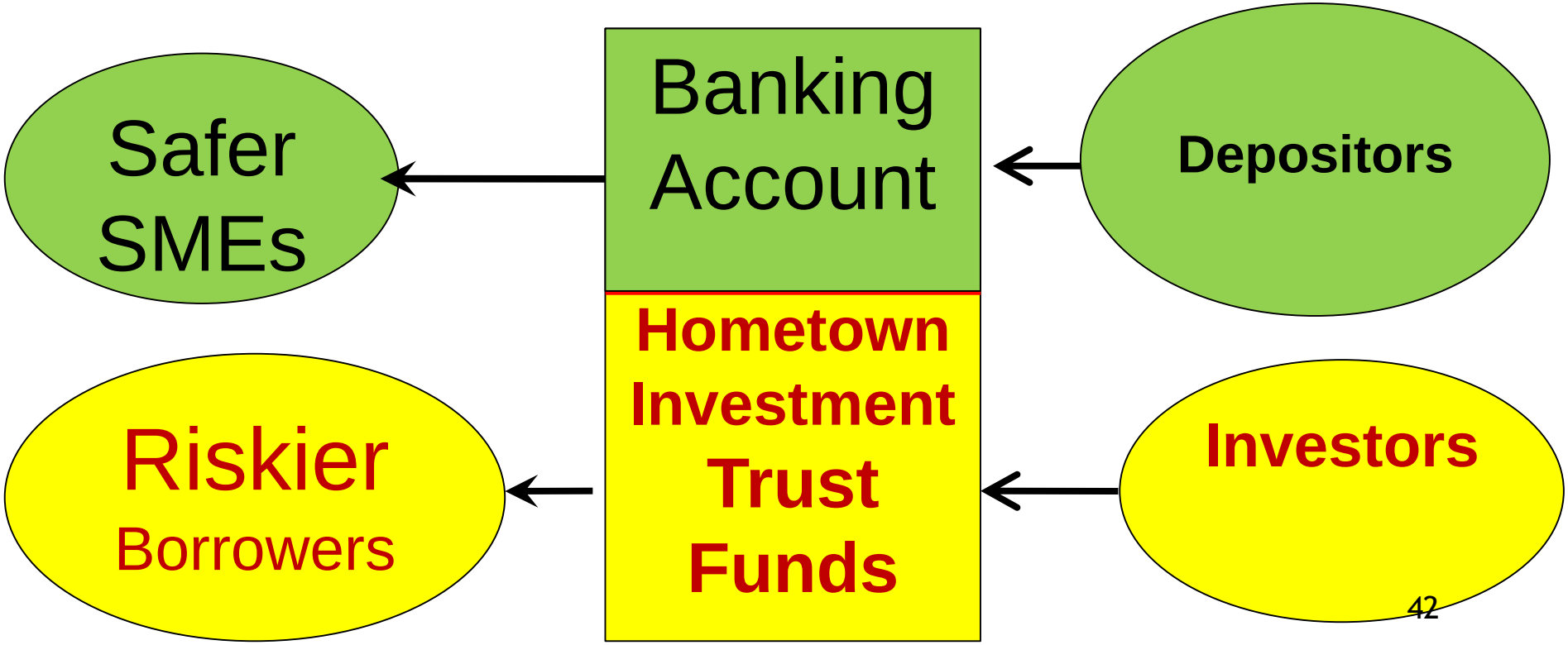
Springer **Vietnam, Peru**

Bank-based SME financing and regional financing to riskier borrowers

1, Bank Loans to relatively safer borrower

2, Hometown Investment Trust Funds/

E-Finance, Internet financing



Investment in SMEs and start up businesses

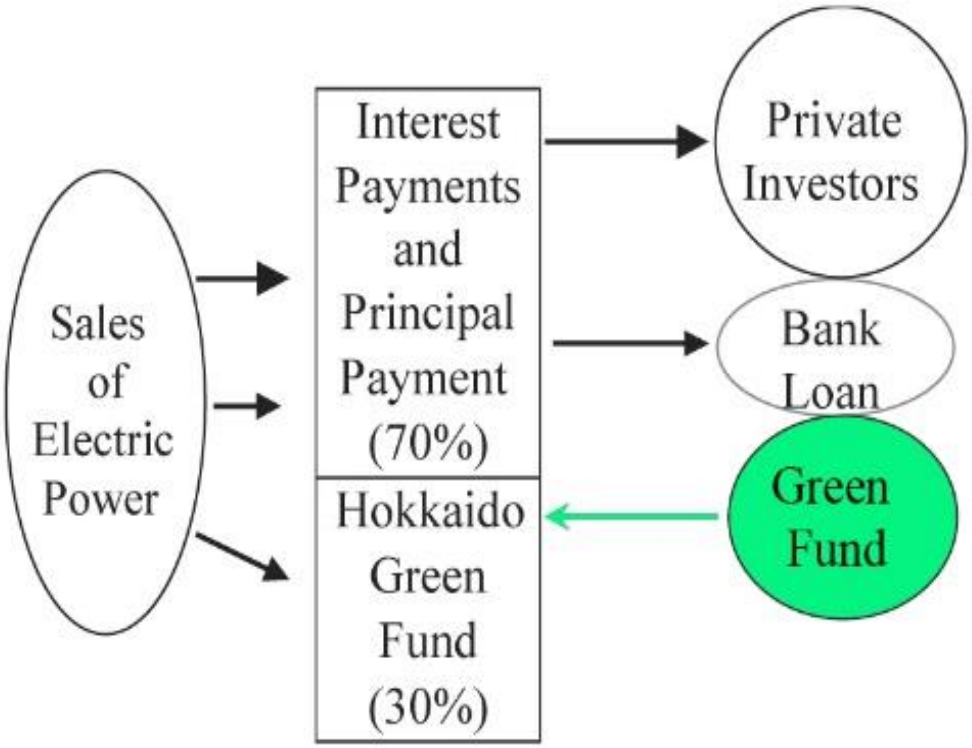
Agricultural Funds

Beans and Wine


おひさま発電所
「さんぽちゃん1号」
明
星

Injection of Private Money by use of Hometown Investment Trust Funds

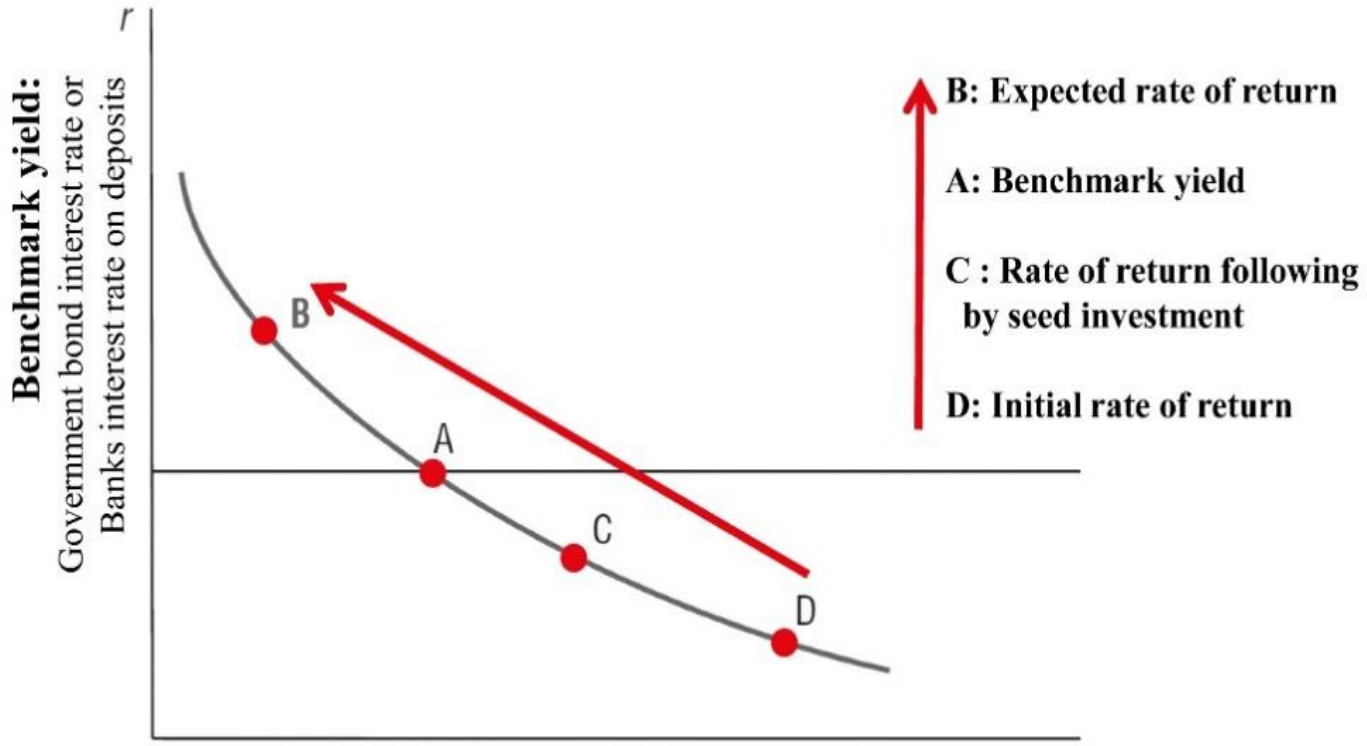
Wind Power Trust Fund of Japan



Source: Yoshino (2013)

Productivity Improvement

Rate of Return on Each Project



Source: Yoshino (2014)

Two Types of Investors

1, Community Type Infrastructure

- Hometown Investment Trust Funds
  - Wind power Generator Funds
  - Japanese Wine Fund
  - Local Airport
  - Agricultural Sector

2, Large Projects and Professional Investors

- Pension Funds
- Insurance companies
- Mutual Funds

Brown fields

Not green field

Reference: Cargill and Yoshino: "Postal Savings and Fiscal Investment in Japan". Oxford University Press

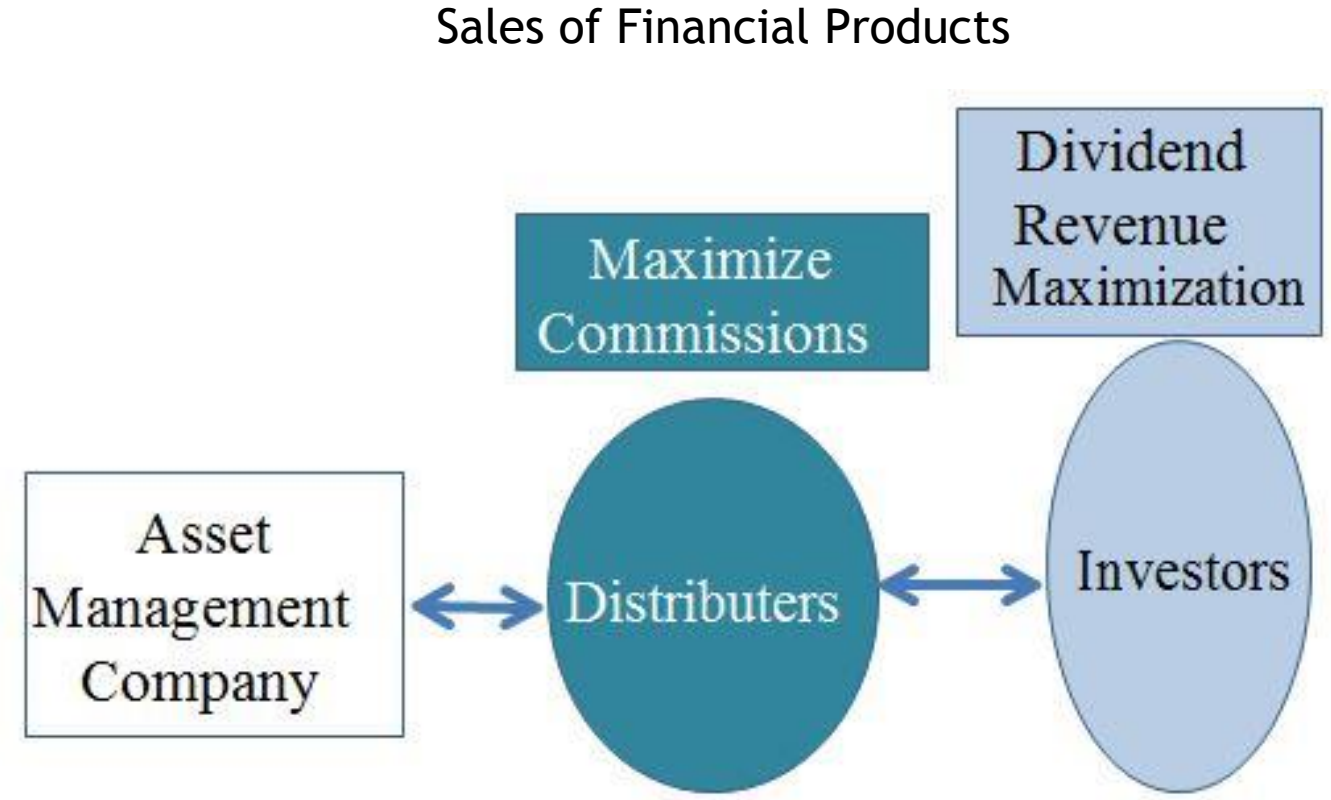
ADBI Working Paper Series

Optimal Fiscal Policy Rule for Achieving Fiscal Sustainability: A Japanese Case Study

Naoyuki Yoshino, Tetsuro Mizoguchi,
and Farhad Taghizadeh-Hesary

Commissions and Fees of Distributors

Necessity for Review of Asset Management Fees



Source: Yoshino (2013)

Longer term Investment achieves higher rate of return

A_0=100

	Gross return on investment		Net return of investors		Sales Charges		Trust Remunerations
No transaction during the period	R 28.87	=	π 10.70	+	τ 2.45	+	ε 15.72
Switching funds every 2.9 years	R 28.19	=	π 3.29	+	τ 9.86	+	ε 15.04
Switching funds every 2.5 years	R 28.19	=	π 1.33	+	τ 11.82	+	ε 15.04
Switching funds every 2.0 years	R 27.8	=	π −0.26	+	τ 13.41	+	ε 14.65

Period 2000.1 ～ 2013.12

Purpose of holding mutual funds (Survey 2014)

USA	(i)	91%	Retirement
	(ii)	49%	Reduce taxable income
	(iii)	49%	Emergency
Japan	(i)	36.7%	No specific reason, Recommended by retailers
	(ii)	30.4%	Prepare for after retirement
	(iii)	17.7%	Asset Diversification

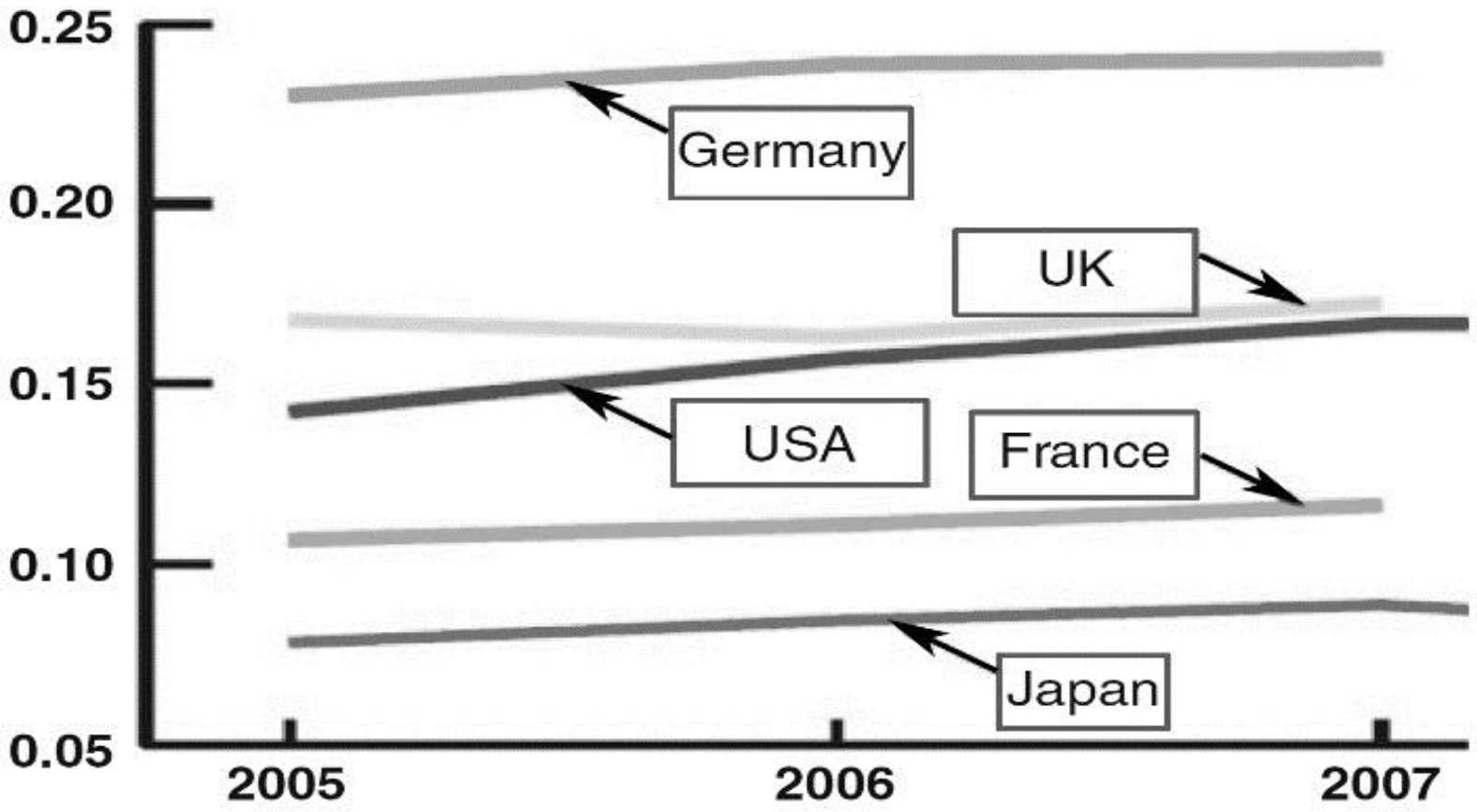
Period of holding mutual funds

(Survey USA2004, JPN2014)

USA	42%	Longer than 10years
	27%	6 to 10 years
	27%	1 to 5 years
Japan	40.7%	No specific period
	21.0%	3 years- 5 years
	14.8%	2 years- 3 years

Low Rate of Return of Japan

Figure: Performance of Asset Management



Source: Yoshino (2013)

3. THE REVISED DOMAR CONDITION AND BOHN'S CONDITION COMBININED WITH THE BOND MARKET

The Domar condition and Bohn's condition are often used to determine whether budget deficits are sustainable or not.

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

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

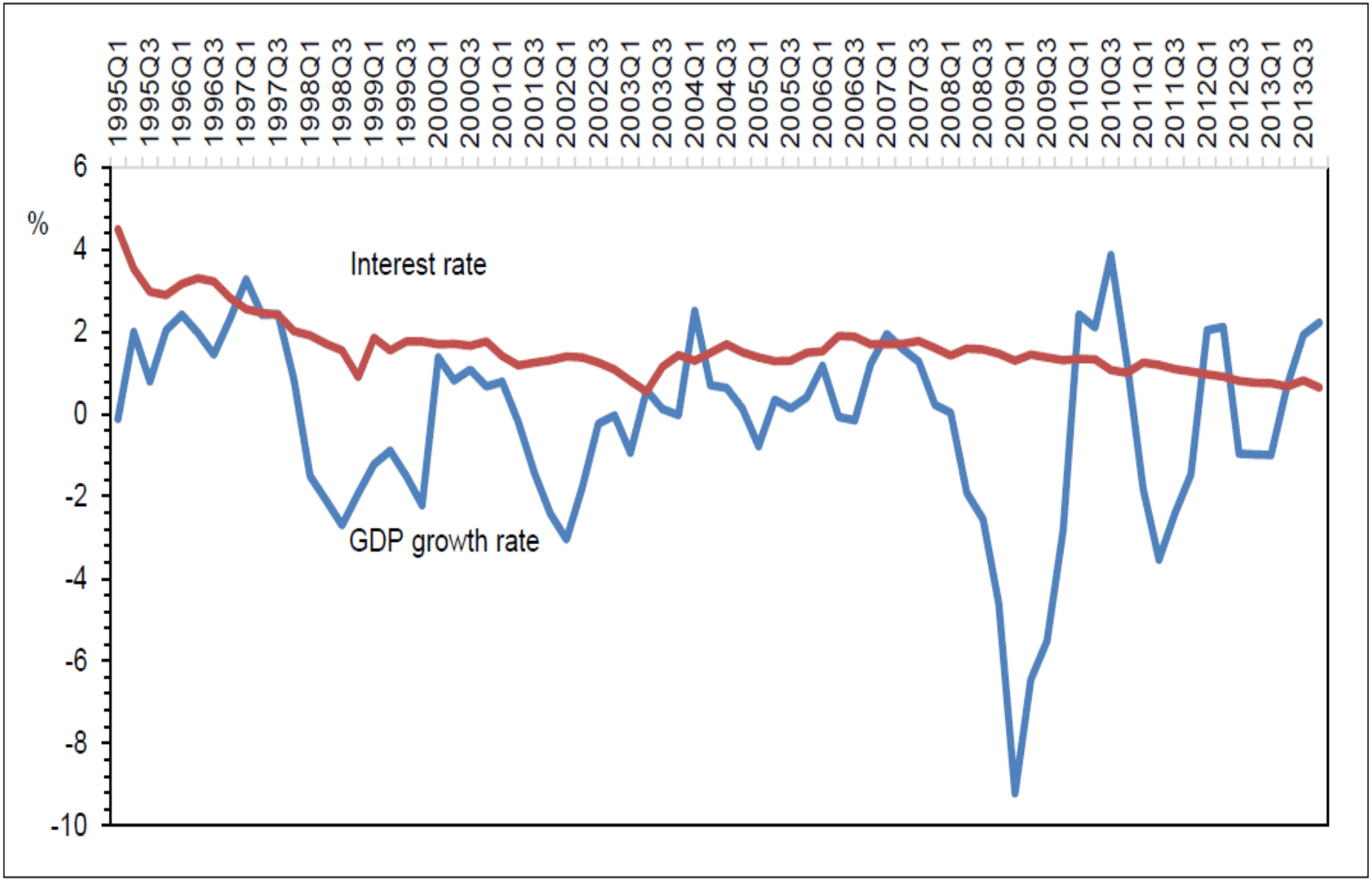
Equation (1) states that government spending (G_t) + interest payments $(r_t B_{t-1})$ = new issue of government bonds (ΔB_t) + tax revenue (T_t).

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

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

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

Figure 5: The Real GDP Growth Rate and the Long-term Interest Rate in Japan



$$YD_t = Y_t - T_t + r_t^B B_{t-1} = C_t + S_t$$
$$\text{where } S_t = \Delta B_t + \Delta M_t + \Delta W_t^D \quad (6)$$

Savings(S_t) = Government bonds(ΔB_t) + money demand (ΔM_t) + domestic deposits(ΔW_t^D).

$$I_t = i_0 - i_1 r_t \quad \text{Investment Function} \quad (7)$$
$$C_t = c_0 + c_1 YD_t \quad \text{Consumption Equation}^1 \quad (8)$$
$$\Delta W_t^D = d_0 + d_1 YD_t + d_2 r_t \quad \text{Deposit equation} \quad (9)$$

From Equations (6)-(9), we have the IS-balance equation.

$$(1 - c_1)Y_t - c_1 r_t^B B_{t-1} + i_1 r_t = c_0 + i_0 + G_t - c_1 T_t \quad \text{IS-Balance} \quad (10)$$

We assume that investment in the private sector will be financed by deposits in the banking sector. For convenience, with regards to the banking sector's behavior, it is simply assumed that savings are used for the purpose of investment.

$$\Delta W_t^D = I_t \quad \text{Saving-Investment Equilibrium} \quad (11)$$

By using Equations (10) and (11), we obtain income and the interest rate in the short-run equilibrium as follows:

$$Y_t^* = \frac{1}{\Delta}\{(d_1 + i_1)c_0 + d_1 i_0 + i_1 d_0 + (d_1 + i_1 + d_1 i_1)G_t - ((d_1 + i_1)c_1 + d_1 i_1)T_t + ((d_1 + i_1)c_1 + d_1 i_1)r_t^{B^*} B_{t-1}\} \quad (12)$$

$$r_t^* = \frac{1}{\Delta}\{(1 - c_1)(i_0 - d_0) - d_1(c_0 + i_0) - d_1 G_t + d_1 T_t - d_1 r_t^{B^*} B_{t-1}\} \quad (13)$$

where $\Delta = (1 - c_1)(d_2 + i_1) - d_1 i_1$ and $r_t^{B^*} = \frac{G_t - T_t - b_0 - \Delta M_t}{b_1 - B_{t-1}}$.

The objective function of the government is set as:

$$L(B_t, Y_t, G_t, T_t, \Delta B_t) = \frac{1}{2}w_1(B_t - B_t^*)^2 + \frac{1}{2}w_2\left(Y_t - Y_t^f\right)^2 + \frac{1}{2}w_3(G_t - G_{t-1})^2 + \frac{1}{2}w_4(T_t - T_{t-1})^2 + \frac{1}{2}w_5(\Delta B_t - \Delta B_t^*)^2 \quad (14)$$

The government aims to stabilize government debt (B_t) as close as possible to its desired level, with GDP (Y_t) close to the full employment level of GDP (Y_t^f), and with a smooth change of government spending (G_t), smooth change of taxation (T_t), and smooth change of the flow of bonds (ΔB_t). Here w_i $(i = 1, \cdots, 5)$ are the policy weights the government can set.

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).

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

The first-order conditions are:

$$\frac{\partial L}{\partial G_t} = w_1(B_t - B_t^*)\left(\frac{\partial B_t}{\partial G_t}\right) + w_2\frac{\partial Y_t}{\partial G_t}\left(Y_t - Y_t^f\right) + w_3(G_t - G_{t-1}) + w_5(\Delta B_t - \Delta B_t^*)\left(\frac{\partial \Delta B_t}{\partial G_t}\right) = 0^2 \quad (15)$$

$$\frac{\partial L}{\partial T_t} = w_1(B_t - B_t^*)\left(\frac{\partial B_t}{\partial T_t}\right) + w_2\frac{\partial Y_t}{\partial T_t}\left(Y_t - Y_t^f\right) + w_4(T_t - T_{t-1}) + w_5(\Delta B_t - \Delta B_t^*)\left(\frac{\partial \Delta B_t}{\partial T_t}\right) = 0^3 \quad (16)$$

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

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

Government Spending Rule (17)

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

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

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.

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

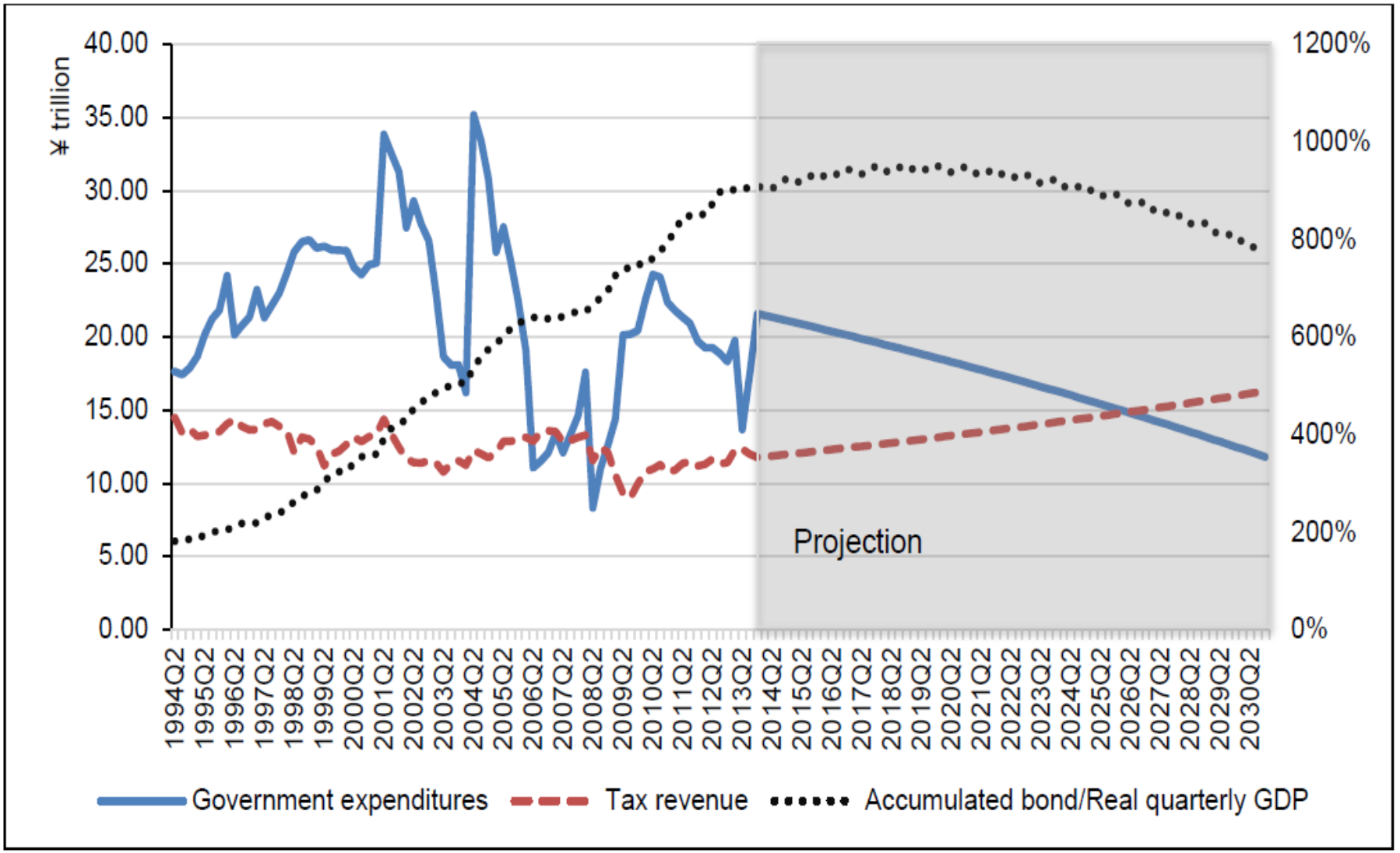
Bohn's Condition

- $PB_t = g_t - t_t$ 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 "transvesarity condition".

Figure 10: Government Expenditure and Tax Revenue



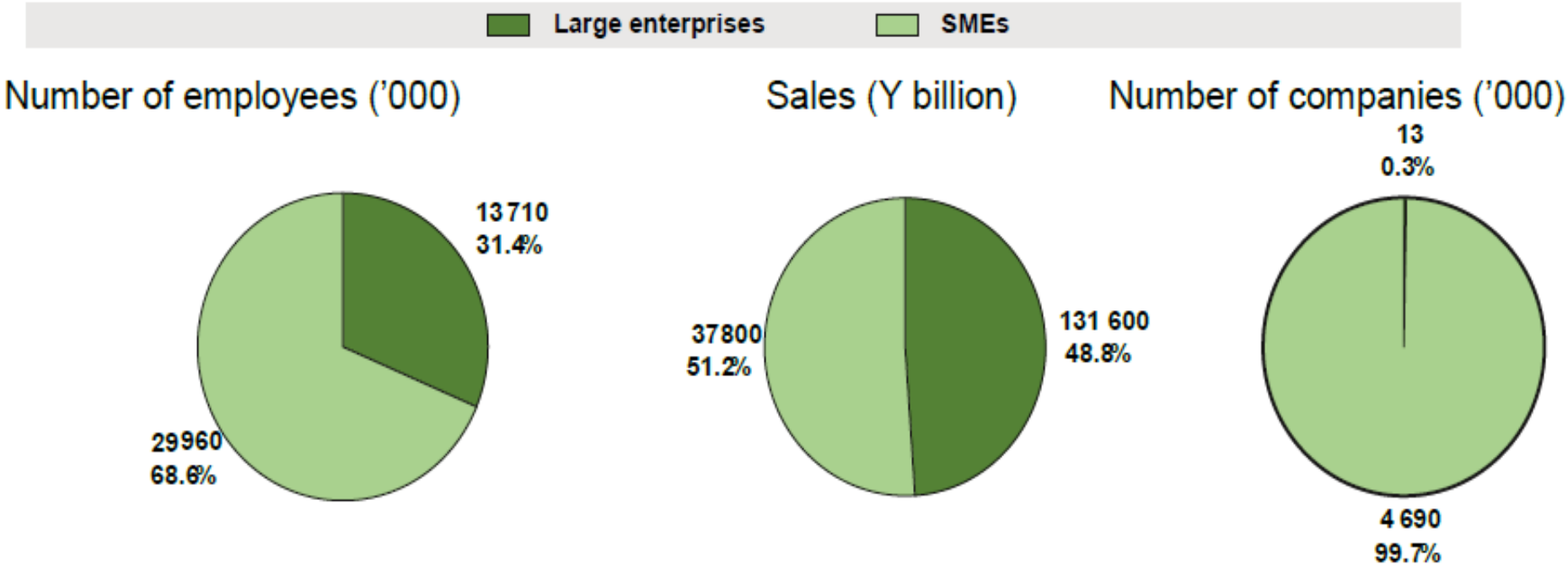
Asia-Pacific Development Journal *Vol. 21, No. 2, December 2014*

ANALYTICAL FRAMEWORK ON CREDIT RISKS FOR FINANCING SMALL AND MEDIUM-SIZED ENTERPRISES IN ASIA

*Naoyuki Yoshino and Farhad Taghizadeh-Hesary**

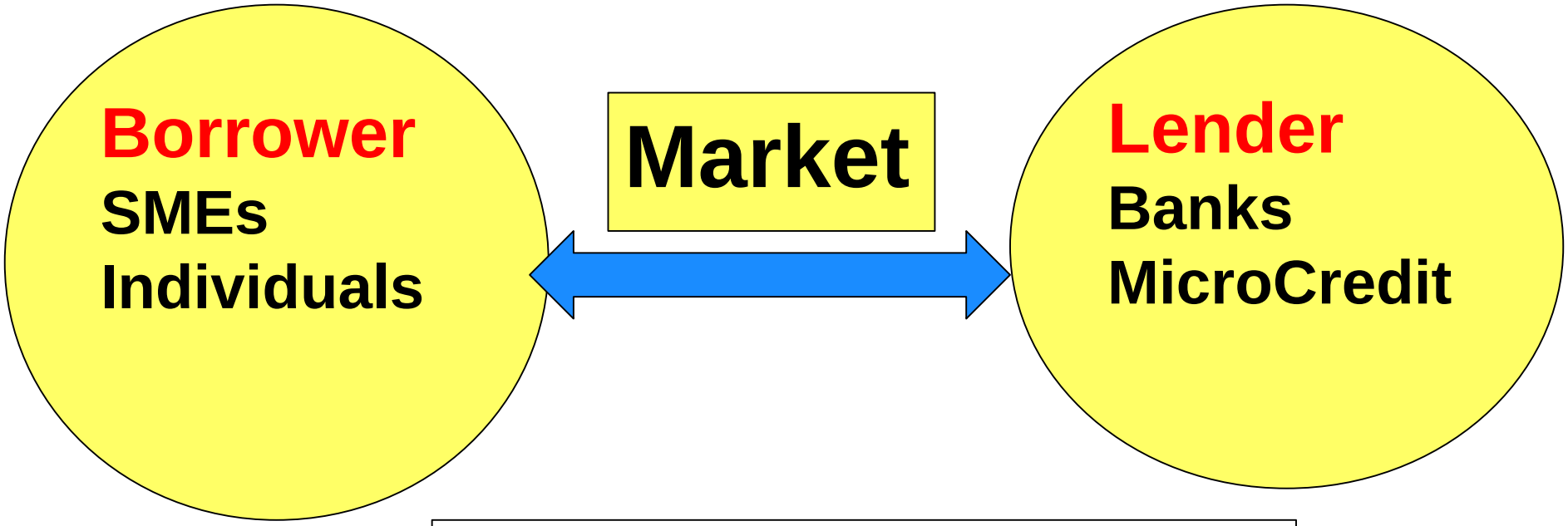
SMEs in Japan

Figure 3. Small and Medium-Sized Enterprises in Japan



Source: White Paper on SMEs, Japanese Government, METI, 2011.

Borrower, Lender and Market



Information Asymmetry
Especially SME market

Four Accounts by SME

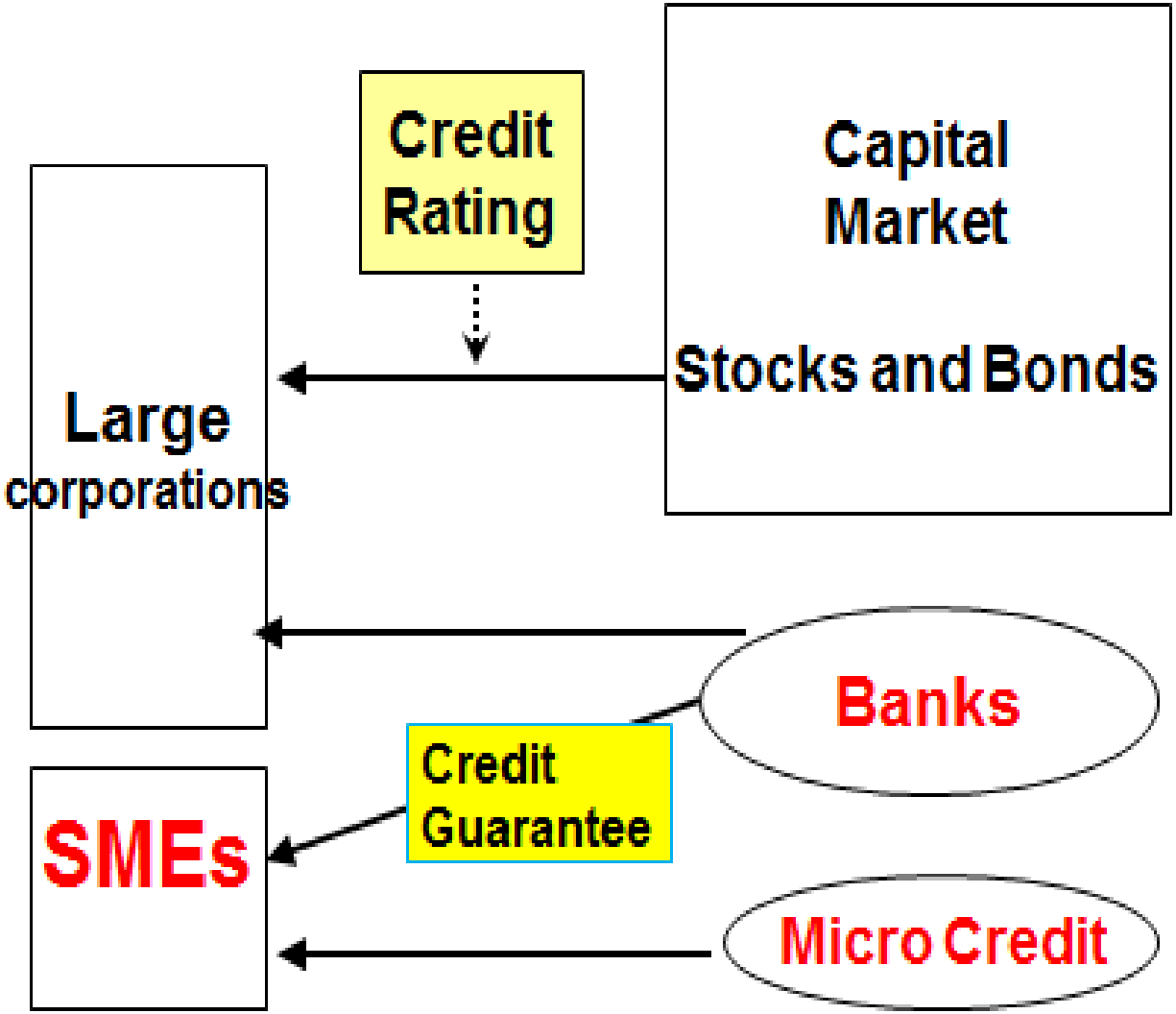
1, Account to show **Banks**

2, Account to show **tax authority**

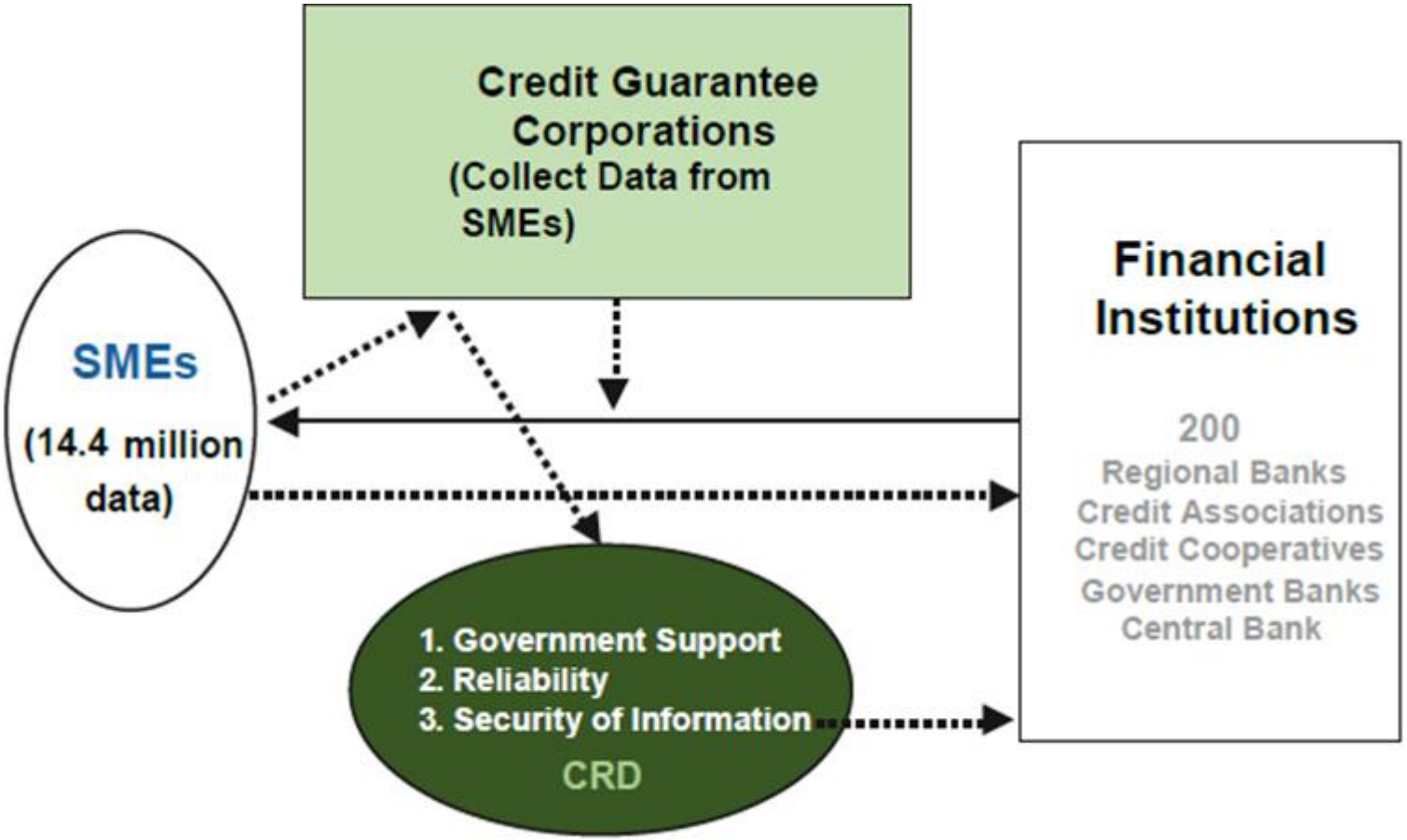
3, His own account

4, Account to show **his wife**

Lack of Data for SMEs



5.B Credit Risk Database of Credit Guarantee



Source: Yoshino (2012).

Analysis of SME credit risk using Asian data

- Selection of the variables
- Principal Component Analysis
- Cluster Analysis

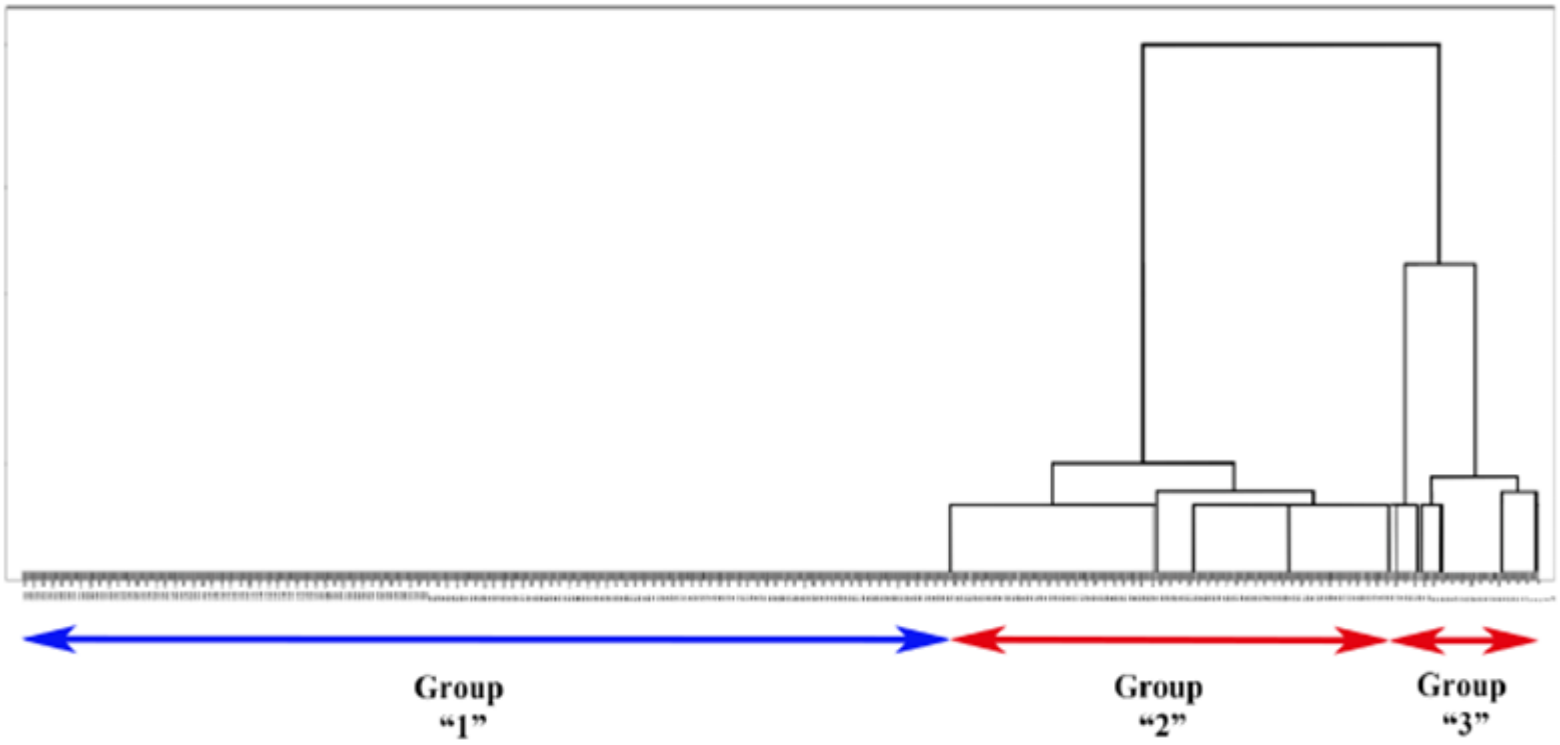
Examined Variable

No.	Symbol	Definition	Category
1	Equity_TL	Equity (book value)/total liabilities	Leverage
2	TL_Tassets	Total liabilities/total assets	
3	Cash_Tassets	Cash/total assets	Liquidity
4	WoC_Tassets	Working capital/total assets	
5	Cash_Sales	Cash/net sales	
6	EBIT_Sales	Ebit/sales	Profitability
7	Rinc_Tassets	Retained earnings/total assets	
8	Ninc_Sales	Net income/sales	
9	EBIT_IE	Ebit/interest expenses	Coverage
10	AP_Sales	Account payable/sales	Activity
11	AR_TL	Account receivable/total liabilities	

Note: Retained earnings = the percentage of net earnings not paid out as dividends, but retained by the company to be reinvested in its core business or to pay debt. It is recorded under shareholders' equity in the balance sheet. Ebit = earnings before interest and taxes. Account payable = an accounting entry that represents an entity's obligation to pay off a short-term debt to its creditors. The accounts payable entry is found on a balance sheet under current liabilities. Account receivable = money owed by customers (individuals or corporations) to another entity in exchange for goods or services that have been delivered or used, but not yet paid for. Receivables usually come in the form of operating lines of credit and are usually due within a relatively short time period, ranging from a few days to a year.

Cluster analysis: the average linkage method

Dendogram Using Average Linkage

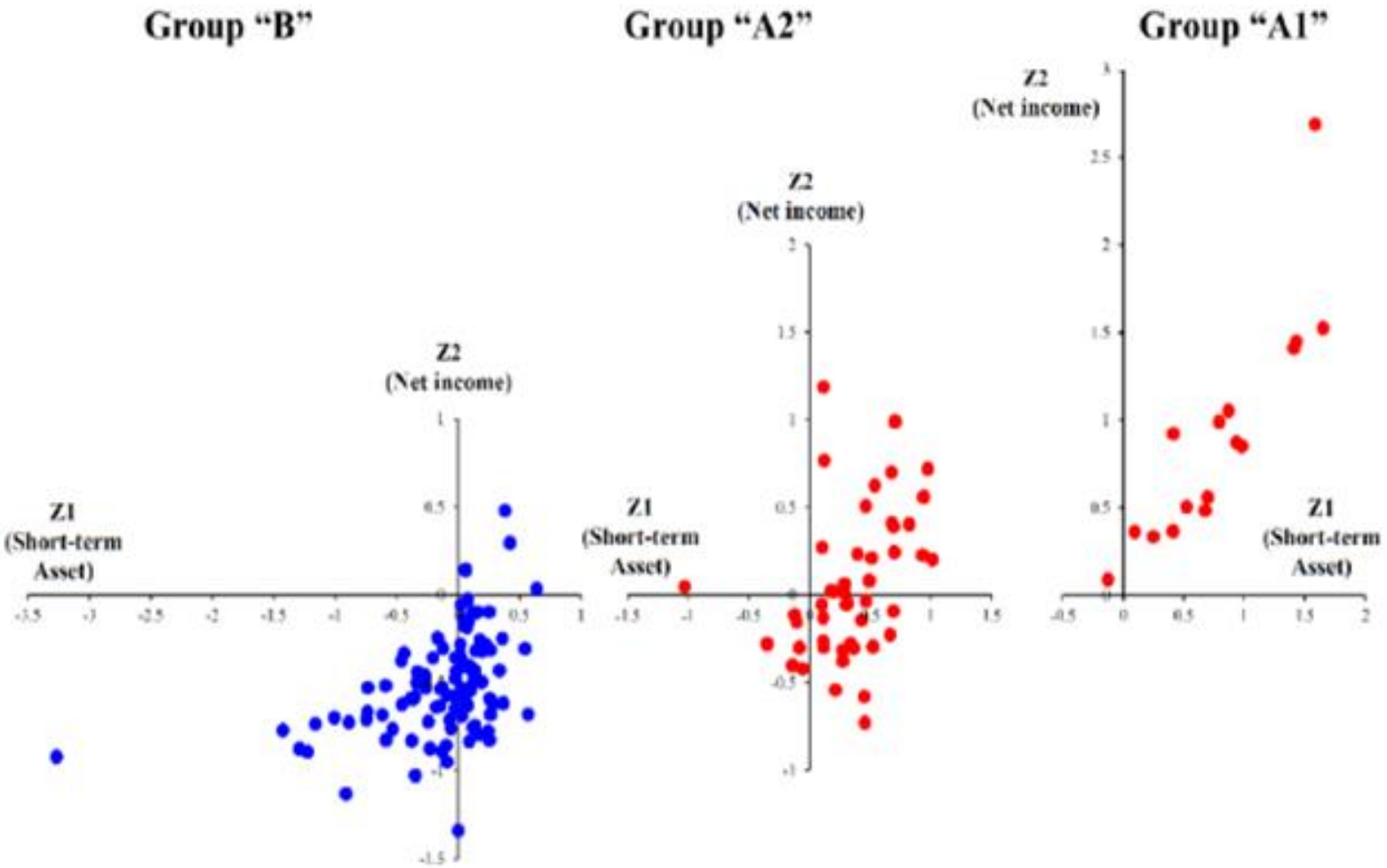


Factor Loadings of Financial Variables after Direct Oblimin Rotation

Variables (Financial Ratios)	Component			
	Z1	Z2	Z3	Z4
Equity_TL	0.009	0.068	0.113	**0.705**
TL_Tassets	-0.032	**-0.878**	0.069	-0.034
Cash_Tassets	-0.034	-0.061	**0.811**	0.098
WoC_Tassets	-0.05	**0.762**	0.044	0.179
Cash_Sales	**-0.937**	0.021	0.083	0.009
EBIT_Sales	**0.962**	0.008	0.024	-0.004
Rinc_Tassets	0.014	**0.877**	0.015	-0.178
Ninc_Sales	**0.971**	-0.012	0.015	0.014
EBIT_IE	0.035	0.045	**0.766**	-0.098
AP_Sales	**-0.731**	-0.017	-0.037	-0.016
AR_TL	0.009	-0.041	-0.104	**0.725**

Note: The extraction method was principal component analysis, The rotation method was direct oblimin with Kaiser normalization.

Grouping Based on Principal Component (Z1-Z2) and Cluster Analysis



Credit Rating for SMEs
by Use of SME Database

1, Credit Rating is only applicable to large companies

2, Credit Rating for SMEs based on SME Data

3, Three ranking of SMEs (Asian country)
Five ranking of SMEs (Japan's case)

4, SME data can produce default risk ratio

5, Risk based Interest rate

Financial Education for SMEs
Education Program and Textbooks

1, Financial Planners Association

Individual Borrowing

2, Central Bank of Japan

Text books, Educate School teachers

Regional Education Program

3, Various Financial Associations

Bankers Association, Stock Exchange

References

Yoshino, N. and Hirano (2011), "Pro-cyclicality of Basel Capital Requirement Ratio and Its Impact on Banks", Asian Economics Papers, 10-2, MIT Press.

Yoshino, N, and Hirano (2012), "Counter-cyclical Buffer of the Basel Capital Requirement and Its Empirical Analysis", Chapter 16, Current Developments in Monetary and Financial Law, Volume 6, International Monetary Fund.

Yoshino, N, (2012) "Global "Imbalances and the Development of Capital Flows among Asian Countries", OECD Journal: Financial Market Trends,

Yoshino, N. and S. Kaji (2013) Hometown Investment Trust Funds, Springer

Yoshino and Farhad Taghizadeh-Hesary (2014), "Monetary Policy and Lil Price fluctuations Following The Subprime Loan Crisis", International Journal of Economics and Finance, Vol.7, No.3, 2014.

Yoshino, N. and Farhad Tagizadeh-Hesary (2014), "Analytical Framework on Credit Risks For Financing Small and Medium-Sized Enterprises in Asia", Asia-Pacific Development Journal, United Nations UNESCAP, Vol.21, No.2.

Yoshino, N. and Farhad Taghzadeh-Hesary (2014), "An Analysis of Challenges Faced by Japan's Economy and Abenomics", The Japanese Political Economic, Vol.40, 2014.

Yoshino, Mizoguchi, Farhad (2015), " Optimal Fiscal Policy Rule for Achieving Fiscal Sustainability; A Japanese Case Study", No. 531 Asian Development Bank Institute, ADBI, Working paper, June 2015.

References

- McNelis, P and N, Yoshino (2012) "Macroeconomic Volatility under High Accumulation of Government Debt: Lessons from Japan", *Advances in Complex Systems*, Vol.15, Suppl. No.2, pp.1250057-1-1250057-29.
- Yoshino, N. and T. Mizoguchi (2010) "The Role of Public Works in the Political Business Cycle and the Instability of the Budget Deficits in Japan", *Asian Economic Papers*, Vol.9, No.1, pp. 94-112.
- Yoshino, N. and T. Mizoguchi (2013a) "Change in the Flow of Funds and the Fiscal Rules Needed for Fiscal Stabilization", *Public Policy Review*, Vol.8, No.6, pp.775-793.
- Yoshino, N. and T. Mizoguchi (2013b) "Optimal Fiscal Policy Rule to Achieve Fiscal Sustainability: Comparison between Japan and Europe", Presented at Singapore Economic Review Conference 2013.
- Yoshino, N and U. Vollmer (2014) "The Sovereign Debt Crisis: Why Greece, but not Japan?", *Asia Europe Journal*, June, Vol.12, Iss.3, pp.325-341.

Yoshino, Naoyuki (2010) "Financing Transport Infrastructure Investment", OECD (ed.), *Southeast Asian Economic Outlook 2010*, OECD Publishing

Yoshino, Naoyuki (2012) "Global Imbalances and the Development of Capital Flows among Asian Countries", *OECD Journal: Financial Market Trends*, Vol.2012/1, pp.81-112

Yoshino, Naoyuki and Victor Pontines (2015) "The Highway Effect on Public Finance: Case of the STAR Highway in the Philippines", *Asian Development Bank Institute (ADBI) Working Paper*, forthcoming

Yoshino, Naoyuki, Victor Pontines and Umid Abidhadjaev (2015) "Impact Evaluation of Infrastructure Provision on Public Finance and Economic Performance: Empirical Evidence from Philippines and Uzbekistan", *Asian Development Bank Institute (ADBI) Working Paper*, forthcoming.