Economic Effect of Infrastructure : macroeconomic effects and microeconomic effects

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Economic Effect of Infrastructure Investment

(1) Macroeconomics analysis
(2) Micro-data approach

Sources of Finance for Infrastructure Investment

(1) by tax payers' money;

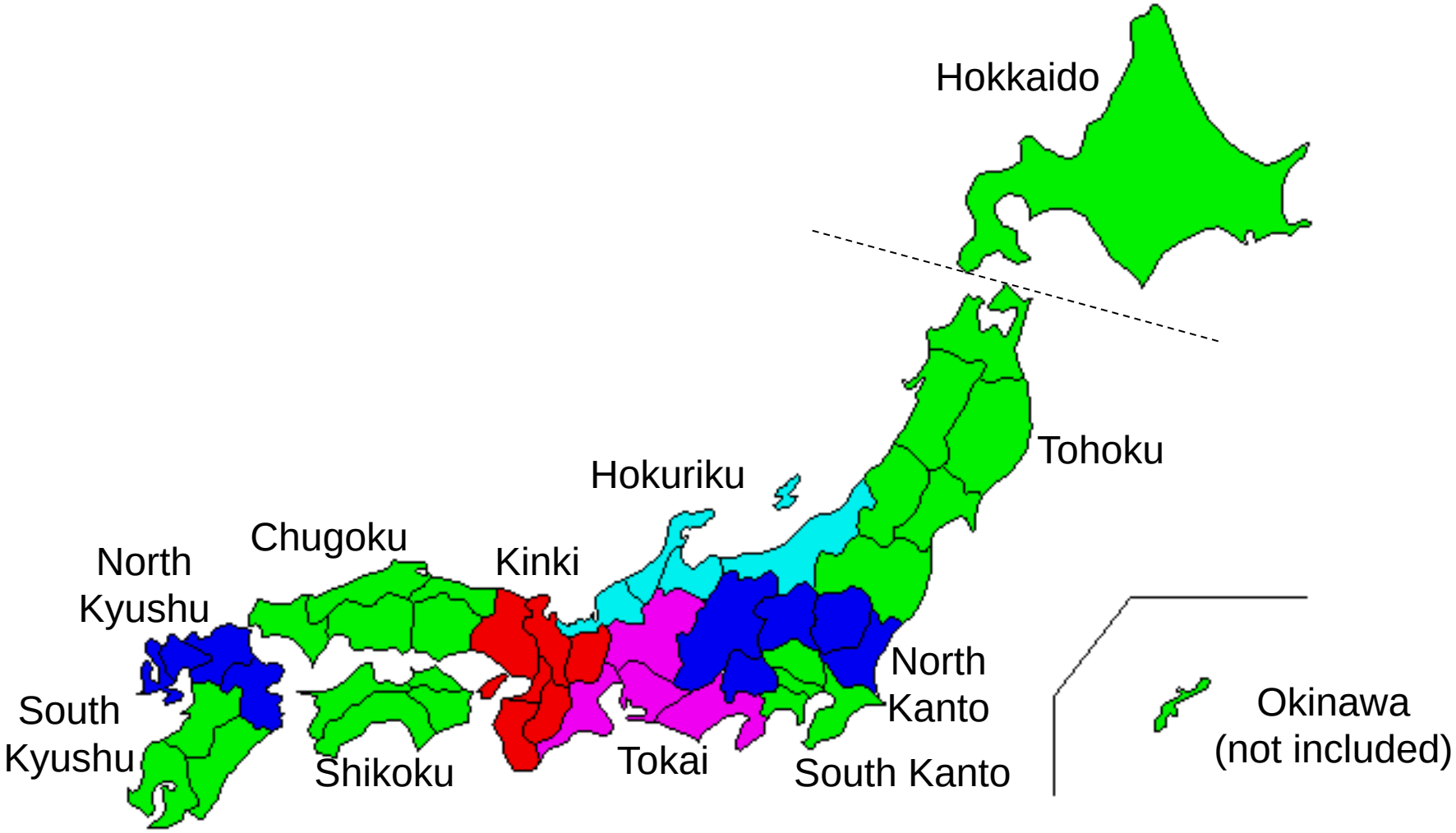
(2) use of national savings (or postal savings);
- → Financial Inclusion
- → Fiscal Investment and Loan Program

(3) issue bond to construct infrastructures;
- → general obligation bond, project bond

(4) Public-Private-Partnership
- → Too much borrowing from overseas might become the burden for the future. Accumulation of domestic Savings

Which Method will induce better performance of infrastructure ?

Map of Japan from the North to the South



Economic Effect of Public Capital

$$Y_t = f(Kp_t, E_t, Kg_t)$$

Simultaneous regression of

Translog Production Function and Labor Share Function

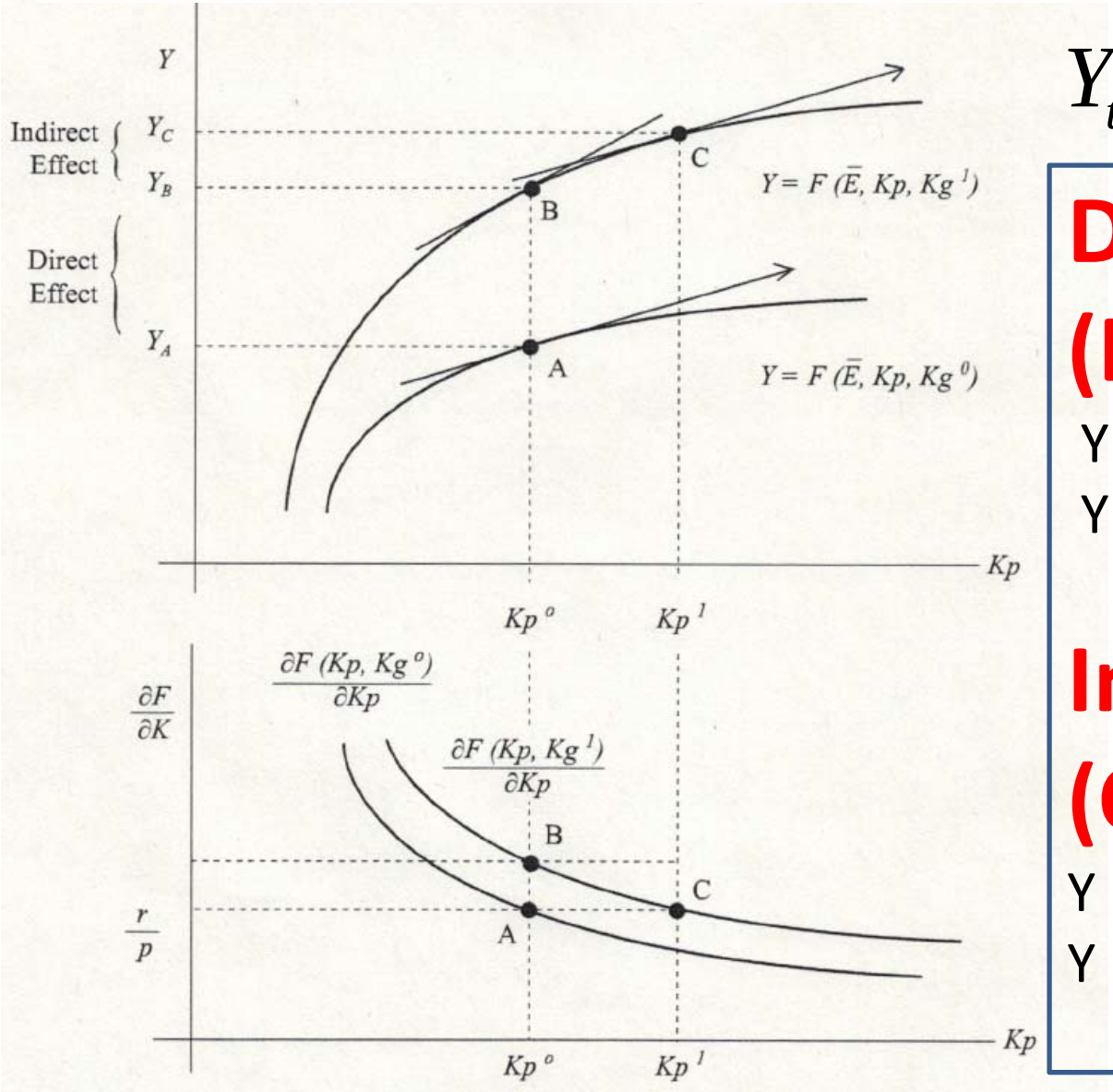
$$\ln Y = \alpha_0 + \alpha_1 \ln Kp + (1 - \alpha_1) \ln E + \alpha_3 \ln Kg$$

$$+ \ln Kp \left(-\frac{1}{2}\beta_2 \ln Kp + \beta_2 \ln E + \beta_3 \ln Kg\right)$$

$$+ \ln E \left(-\frac{1}{2}\beta_2 \ln E - \beta_3 \ln Kg\right) + \frac{1}{2}\beta_6 - (\ln Kg)^2$$

$$S_E = \frac{wE}{pY} = \frac{\partial \ln Y}{\partial \ln E} = (1 - \alpha_1) + \beta_2 \ln Kp - \beta_2 \ln E - \beta_3 \ln Kg$$

Explanation of Direct and Indirect Effects



$$Y_t = f(Kp_t, E_t, Kg_t)$$

Direct Effect (B ← A)

Y ← highway construction

Y ← Kg

Indirect Effects (C ← B)

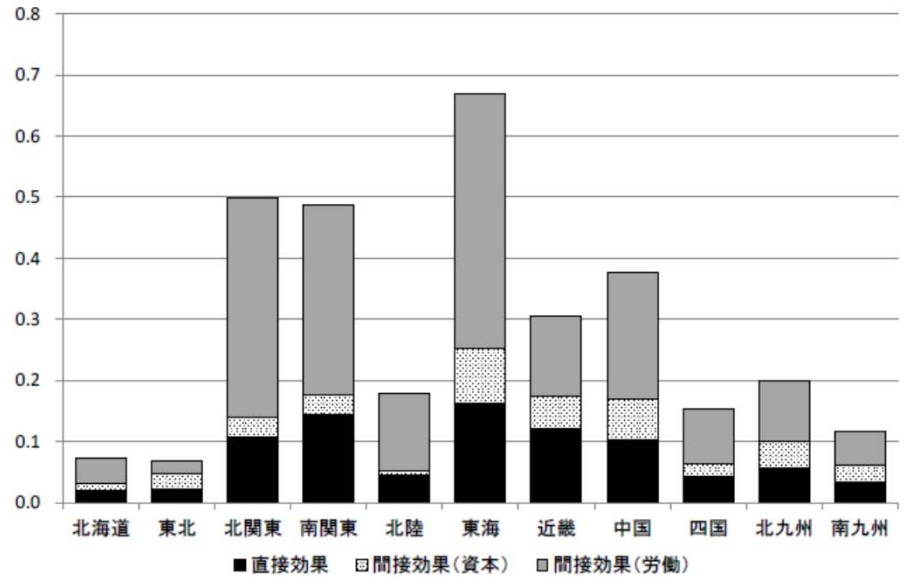
Y ← New company ← Kg

Y ← New employment ← Kg

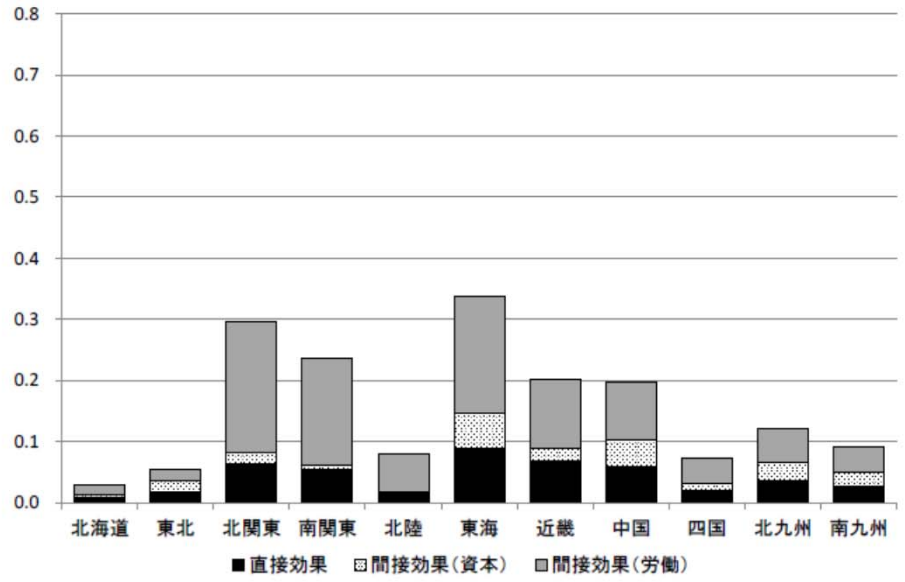
Economic Effect of Infrastructure Investment (Manufacturing Industry)

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



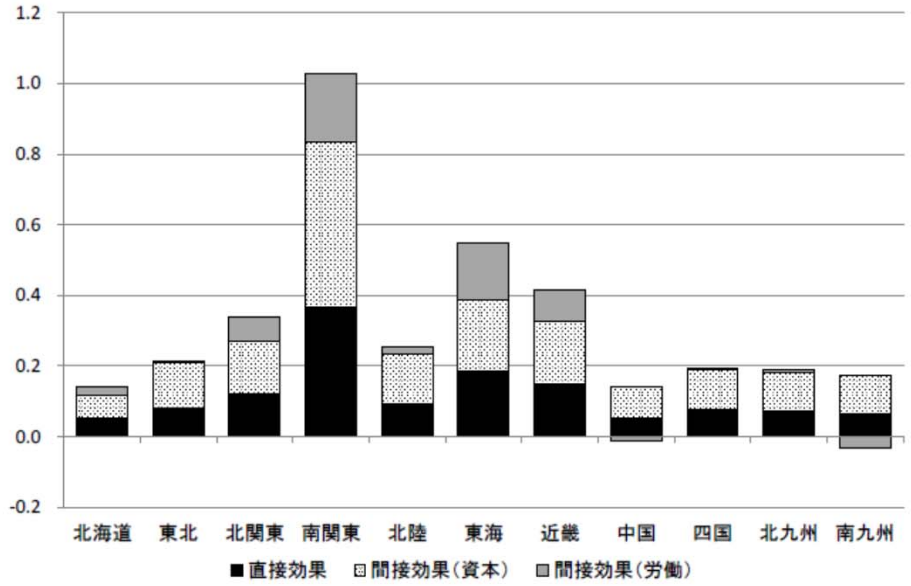
(2) 2010 年度



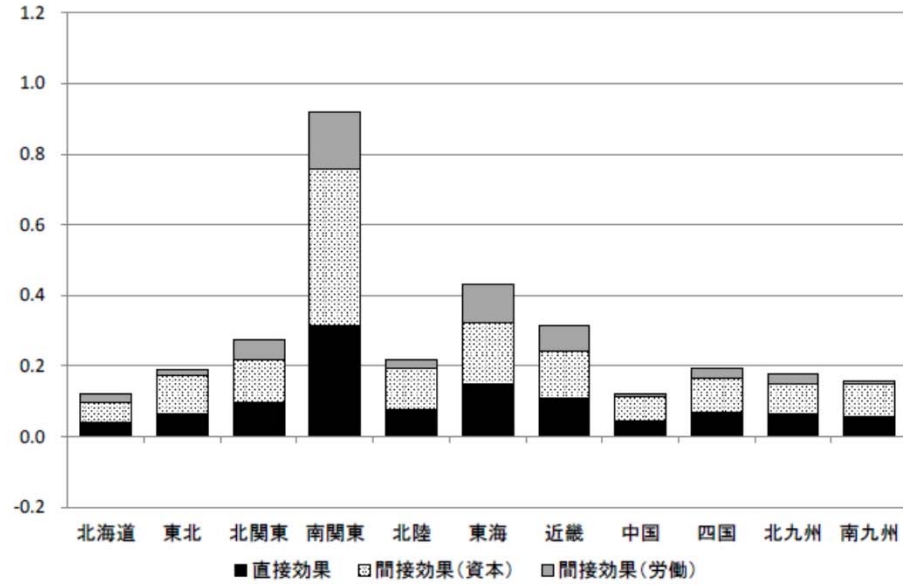
（出所）Nakahigashi-Yoshino (2015)

Economic Effect of Infrastructure (Services Industry)

(1) 1990 年度



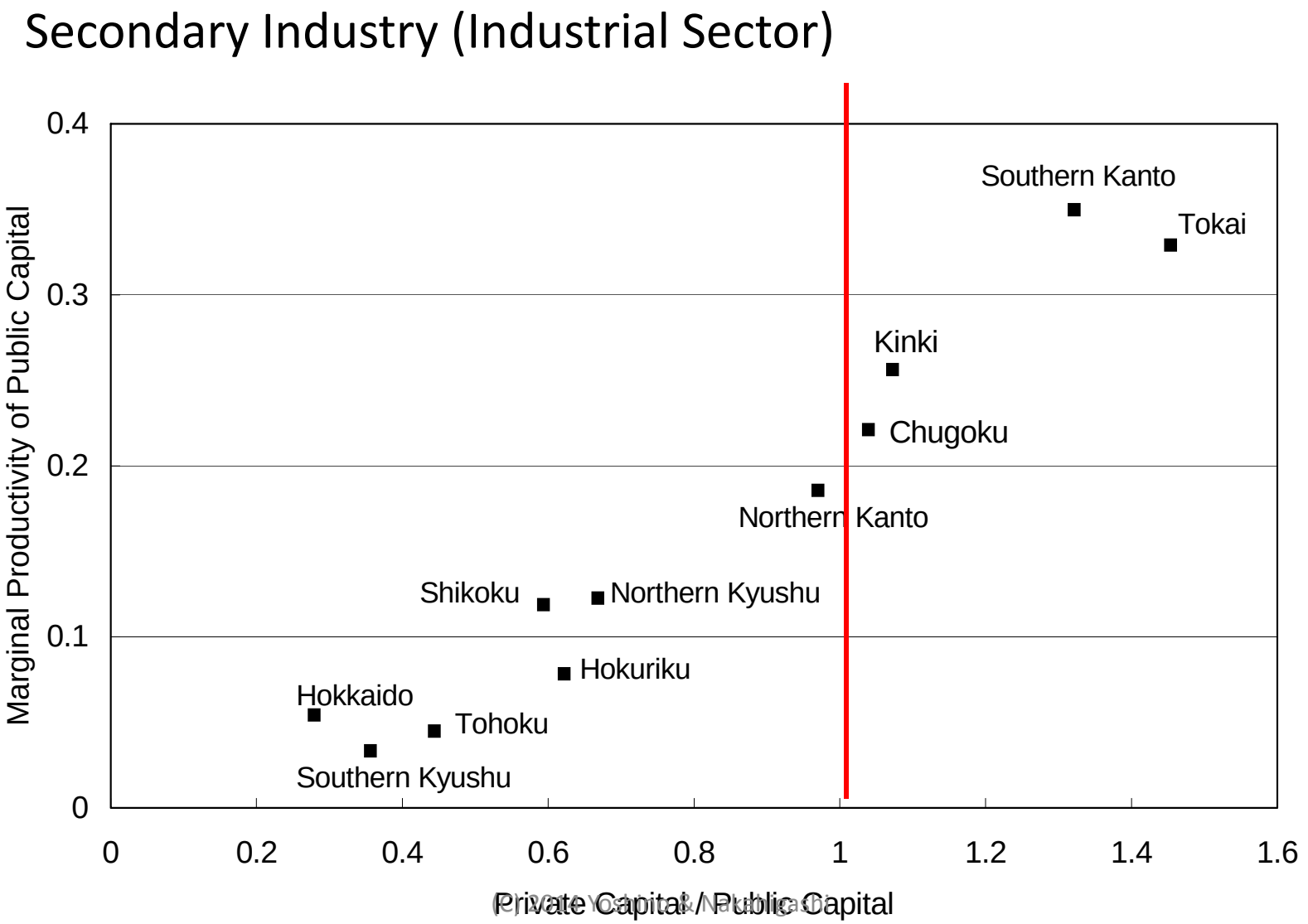
(2) 2010 年度



(出所) Nakahigashi-Yoshino (2015)

Effectiveness of Public Capital Stock

- “Private capital/Public capital ratio” to “Marginal productivity of Public capital” -



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

Thailand: Economic Effect of Infrastructure

(1) Output Elasticity

	Private capital	Public capital	Direct effect	Indirect effect	
				Capital	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
Services					
1971-1980	0.724	-0.013	0.013	-0.071	0.045
1981-1990	0.700	-0.016	0.010	-0.072	0.046
1991-2000	0.678	-0.168	-0.013	-0.264	0.110
2001-2012	0.610	-0.241	-0.019	-0.524	0.303

(2) Marginal Productivity

	Private capital	Public capital	Direct effect	Indirect effect	
				Capital	Labor
Agriculture, forest, hunting and fishing					
1971-1980	0.249	0.363	0.039	0.290	0.034
1981-1990	0.316	0.145	0.030	0.091	0.024
1991-2000	0.281	0.024	0.013	-0.006	0.017
2001-2012	0.222	-0.025	0.003	-0.039	0.012
Manufacturing					
1971-1980	0.343	0.267	0.097	0.056	0.115
1981-1990	0.331	0.204	0.078	-0.003	0.128
1991-2000	0.232	0.220	0.075	0.076	0.070
2001-2012	0.264	0.447	0.085	0.535	-0.173
Services					
1971-1980	0.241	-0.017	0.017	-0.092	0.058
1981-1990	0.252	-0.017	0.011	-0.078	0.050
1991-2000	0.197	-0.140	-0.010	-0.223	0.093
2001-2012	0.163	-0.179	-0.014	-0.391	0.227

Micro Case Study - Philippine micro data

1, Evaluation of the ‘highway effect’ on tax and non-tax revenues using as case study the Southern Tagalog Arterial Road (STAR) in Batangas Province, Philippines

2, Evaluation is carried out using a quasi-experimental approach via a difference-in-difference (DiD) analysis

Case Study: Southern Tagalog Arterial Road (STAR)

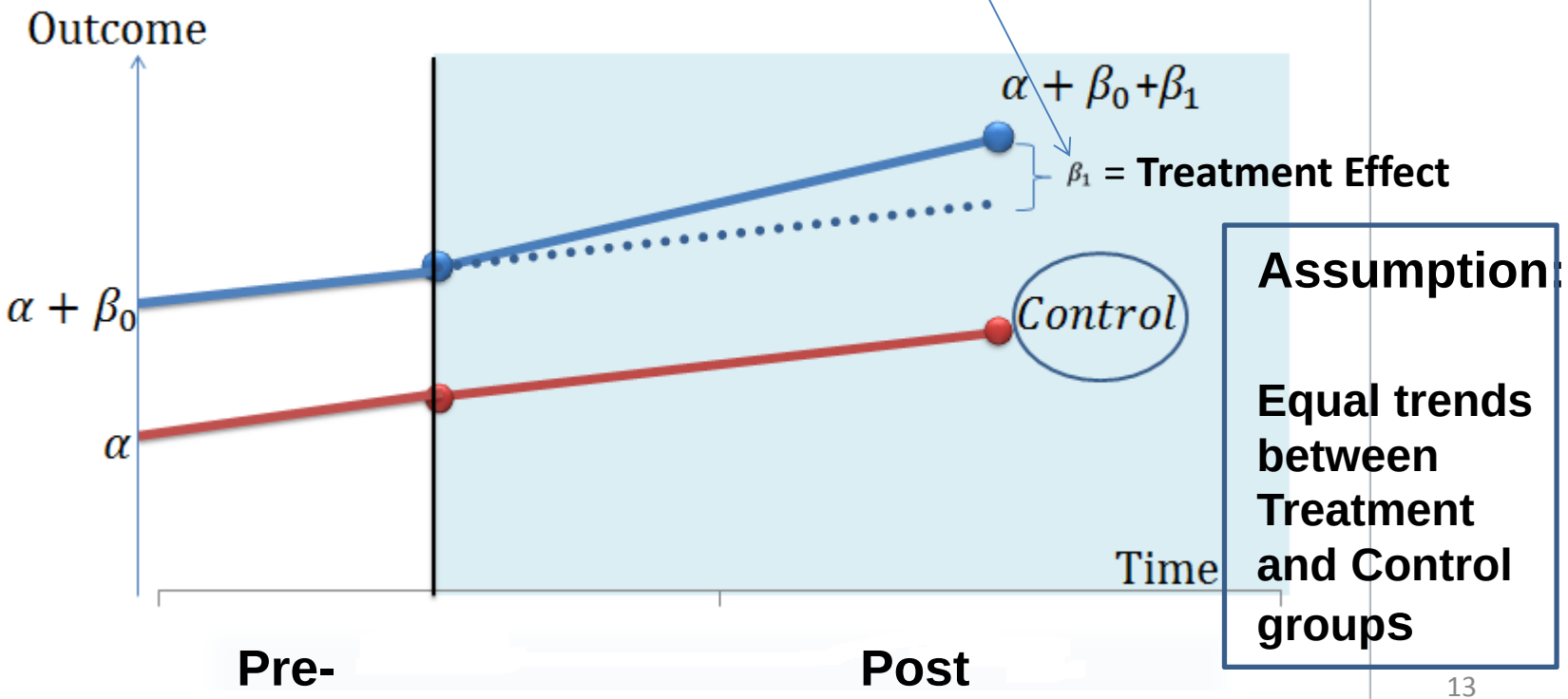
- The Southern Tagalog Arterial Road (STAR) project in Batangas province, Philippines (south of Metro Manila) is a modified Built-Operate-Transfer (BOT) project.

- The 41.9 km STAR tollway was built to improve road linkage between Metro Manila and Batangas City, provide easy access to the Batangas International Port, and thereby accelerate industrial development in Batangas and nearby provinces.

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)

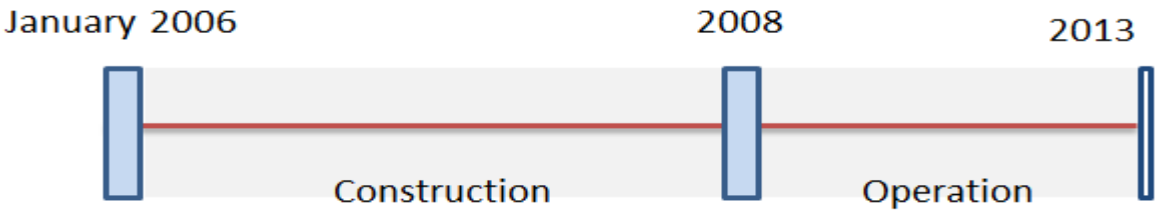


Assumption:

Equal trends between Treatment and Control groups

Method: Difference-in-Difference (DiD) Analysis

Timeline of STAR tollway:



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

- Inclusion of leads and lags
  - t + 2 $\rightarrow$ 2006 = 1, 0 elsewhere
  - t + 1 $\rightarrow$ 2007 = 1, 0 elsewhere
  - t_0 $\rightarrow$ 2008 = 1, 0 elsewhere
  - t - 1 $\rightarrow$ 2009 = 1, 0 elsewhere
  - t - 2 $\rightarrow$ 2010 = 1, 0 elsewhere
  - t - 3 $\rightarrow$ 2011 = 1, 0 elsewhere
  - t – 4 forward $\rightarrow$ 2012 = 1, 2013 = 1, 0 elsewhere

Outcome variable

- We employ data on **property tax revenues, business tax revenues, regulatory fees** and **user charges** of the cities and municipalities comprising Batangas Province, Philippines.

- The tax and non-tax revenues data were obtained from the Philippine Bureau of Local Government Finance (BLGF)

Difference-in-Difference Regression: Spillover

	(1) Property tax	(2) Property tax	(3) Business tax	(4) Business tax	(5) Regulatory fees	(6) Regulatory fees	(7) User charge	(8) User charge
Treatment D	1.55535	0.736	1.067	0.438	1.372	0.924	0.990	0.364
	(1.263)	(0.874)	(1.316)	(1.407)	(1.123)	(1.046)	(1.095)	(1.028)
Treatment D × $Period_{t+2}$	0.421**	-0.083	1.189***	0.991**	0.248***	-0.019	0.408***	-0.010
	(0.150)	(0.301)	(0.391)	(0.450)	(0.084)	(0.248)	(0.132)	(0.250)
Treatment D × $Period_{t+1}$	0.447**	0.574***	1.264***	1.502***	0.449**	0.515***	0.317**	0.434**
	(0.160)	(0.118)	(0.415)	(0.542)	(0.142)	(0.169)	(0.164)	(0.167)
Treatment D × $Period_{t0}$	0.497***	0.570**	1.440***	1.641***	0.604**	0.642***	0.350	0.422
	(0.128)	(0.223)	(0.417)	(0.482)	(0.183)	(0.181)	(0.271)	(0.158)
Treatment D × $Period_{t-1}$	1.294**	0.387	2.256**	1.779**	1.318**	0.838*	0.959	0.197
	(0.674)	(0.728)	(0.957)	(0.470)	(0.649)	(0.448)	(0.714)	(0.560)
Treatment D × $Period_{t-2}$	1.163*	0.336	2.226**	1.804**	1.482**	1.044**	0.941	0.247
	(0.645)	(0.594)	(0.971)	(0.531)	(0.634)	(0.413)	(0.704)	(0.531)
Treatment D × $Period_{t-3}$	1.702*	0.450	2.785**	2.070***	1.901***	1.238***	1.732***	0.676
	(0.980)	(0.578)	(1.081)	(0.544)	(0.630)	(0.369)	(0.598)	(0.515)
Treatment D × $Period_{t-4,}$ forward	2.573***	1.100	3.428***	2.560***	2.288***	1.509***	2.030***	0.787
	(0.900)	(0.758)	(0.928)	(0.350)	(0.563)	(0.452)	(0.607)	(0.745)
Construction		2.283**		1.577		1.207		1.942*
		(1.172)		(1.196)		(0.855)		(1.028)
Constant	14.69***	-2.499	14.18***	2.230	13.66***	4.597	13.08***	-1.612
	(0.408)	(8.839)	(0.991)	(9.094)	(0.879)	(6.566)	(0.649)	(7.84)
N	80	73	79	73	80	73	77	73
R^2	0.29	0.41	0.37	0.44	0.43	0.50	0.26	0.39

Clustered standard errors, corrected for small number of clusters; * Significant at 10%. ** Significant at 5%. *** Significant at 1%.

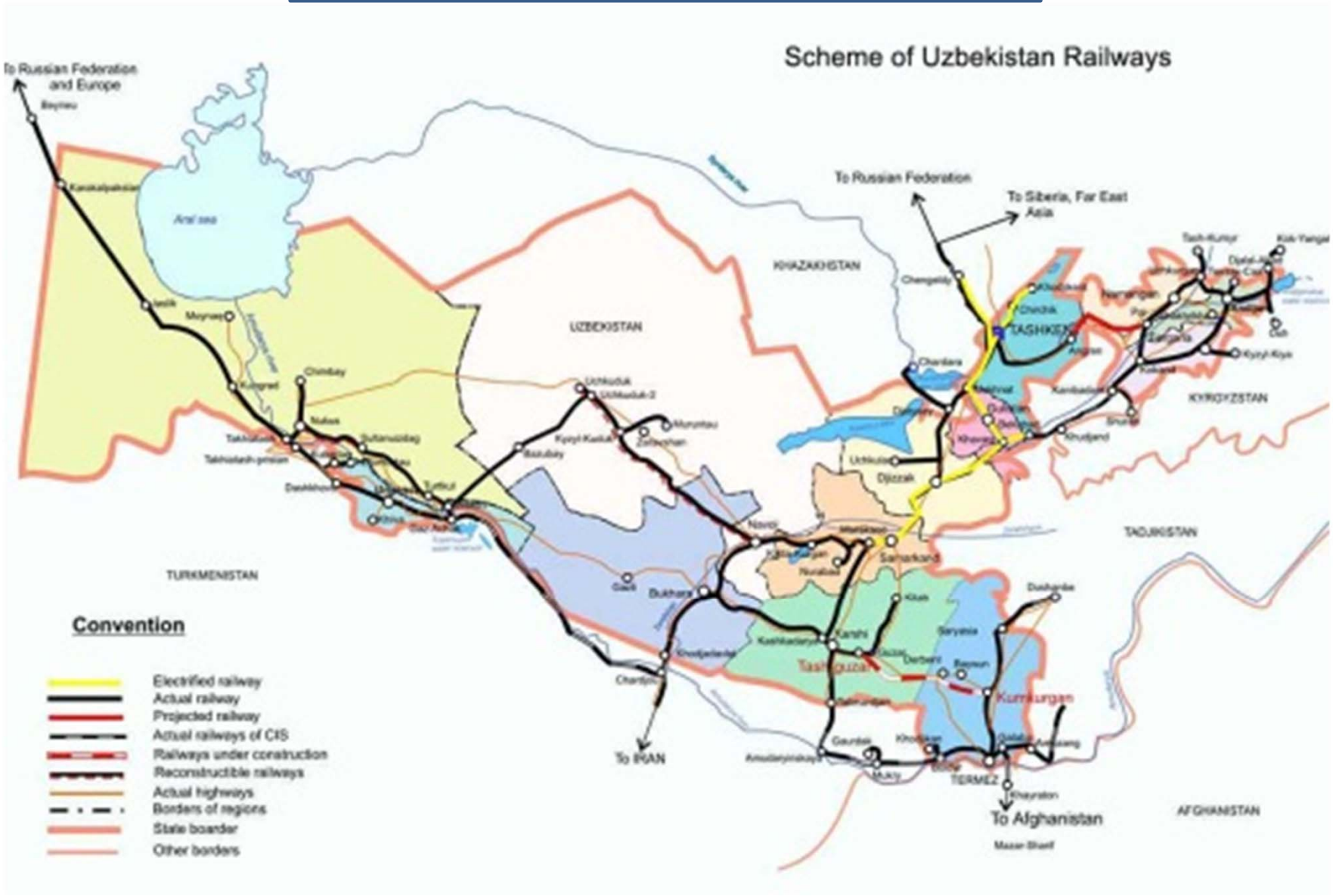
The Southern Tagalog Arterial Road (STAR) Philippines, Manila

（単位：100 万ペソ）

	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	t_{+4}以降
Lipa 市	134.36	173.50	249.70	184.47	191.81	257.35	371.93
Ibaan 市	5.84	7.04	7.97	6.80	5.46	10.05	12.94
Batangas 市	490.90	622.65	652.83	637.89	599.49	742.28	1208.61

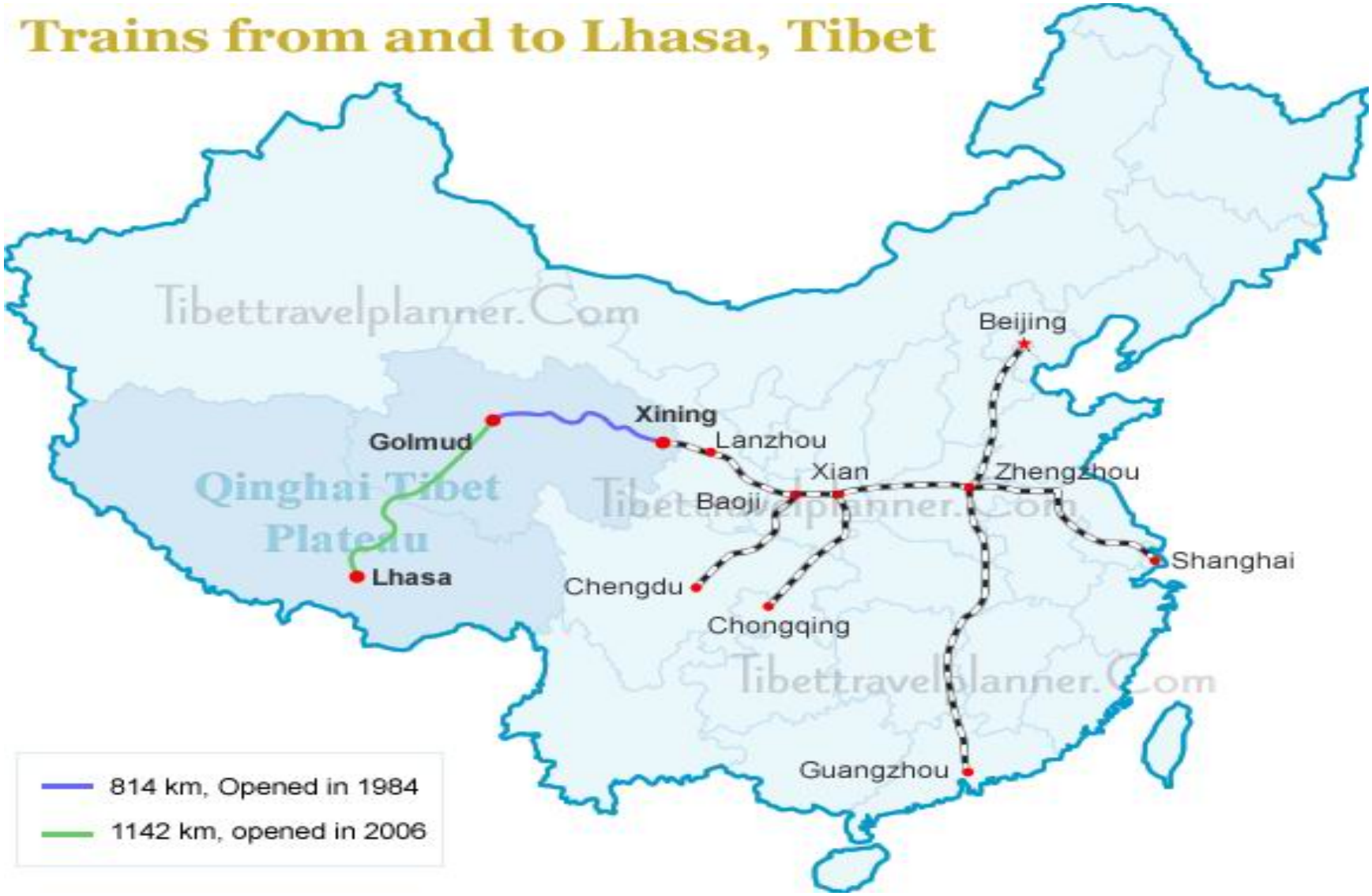
（出所） Yoshino and Pontines (2015)より筆者作成

Uzbekistan: Railway

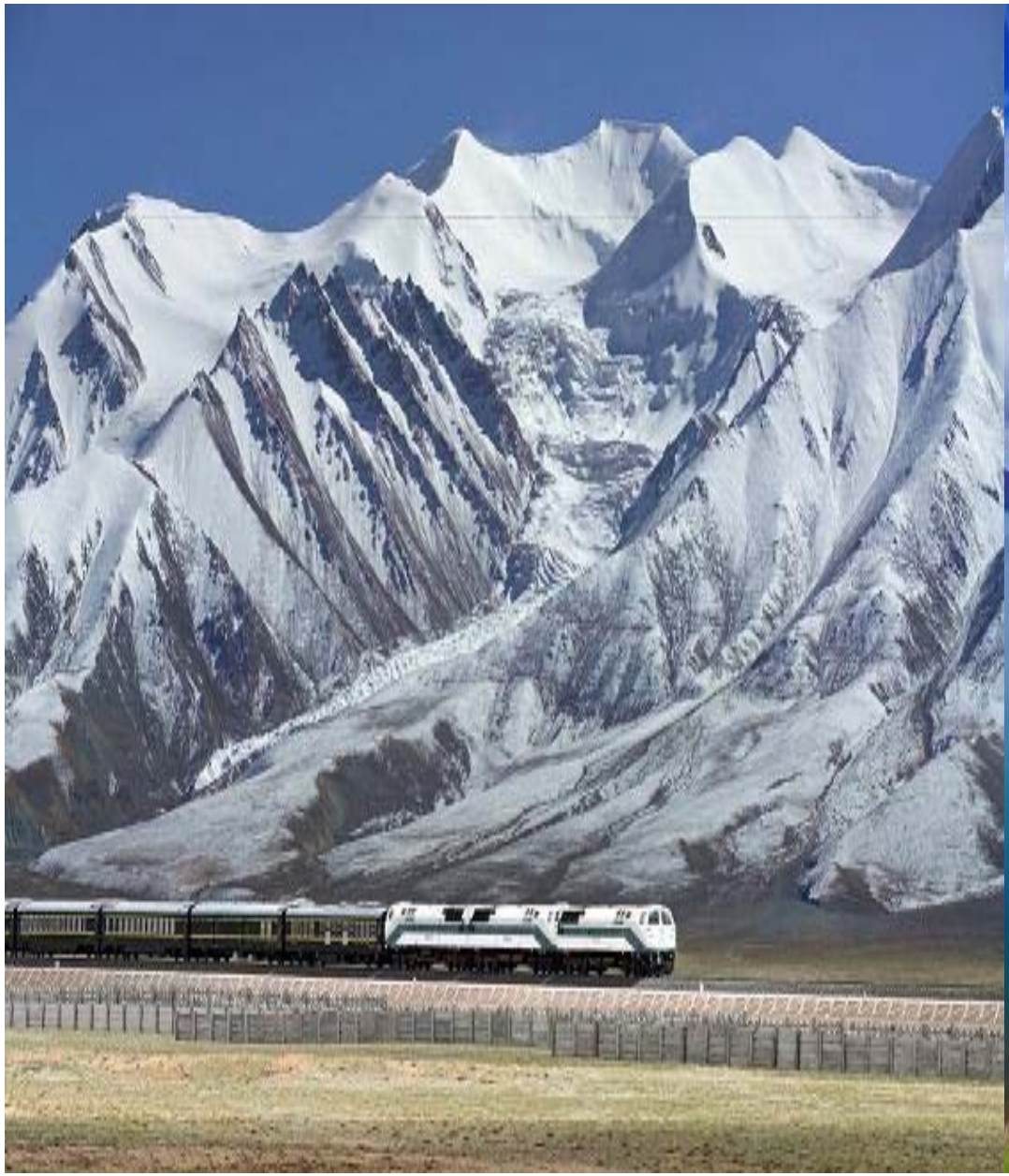


Regions	Out come	Pre-railway period	Post-railway period	Difference
Non-affected group	GDP growth rate	8.3	8.5	0.2
Affected Group	GDP growth rate	7.2	9.4	2.2

Qinghai-Tibet Railway Map



Tibet Railway



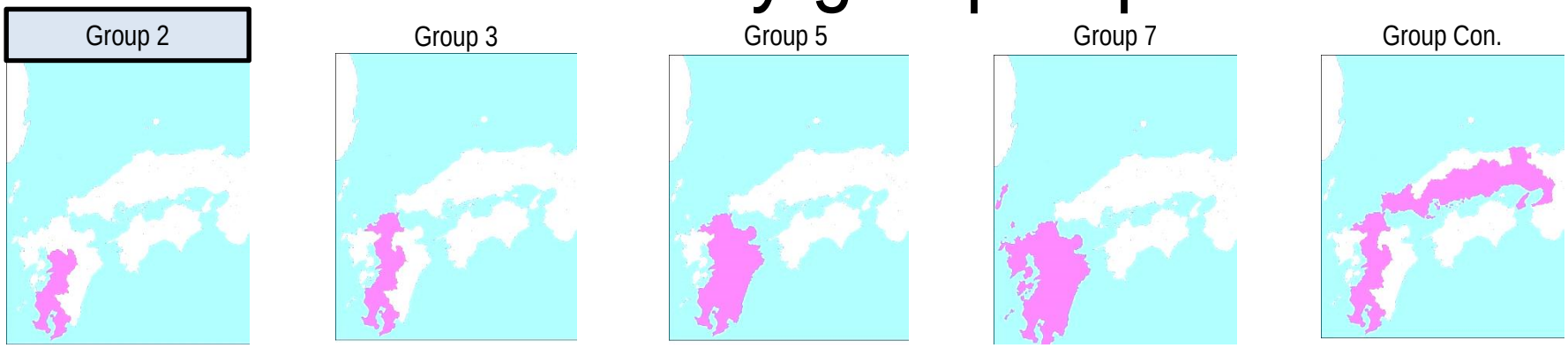
Source	SS	df	MS
Model	8.28173613	6	1.38028935
Residual	11.6075298	65	.178577382
Total	19.8892659	71	.280130506

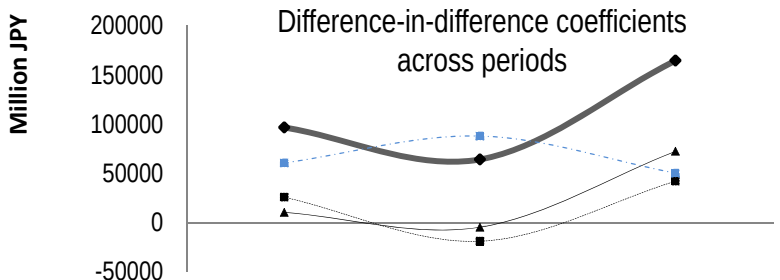
Number of obs	= 72
F(6, 65)	= 7.73
Prob > F	= 0.0000
R-squared	= 0.4164
Adj R-squared	= 0.3625
Root MSE	= .42258

difference1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
govspending1	.0118414	.0028554	4.15	0.000	.0061389	.017544
population1	.0034233	.0013616	2.51	0.014	.000704	.0061426
population0	-.0102002	.0037957	-2.69	0.009	-.0177808	-.0026196
govspending0	-.0206841	.0055783	-3.71	0.000	-.0318248	-.0095435
Dummy	.0924005	.2097625	0.44	0.661	-.3265242	.5113252
Dummy2	.061252	.1937049	0.32	0.753	-.3256034	.4481074
_cons	.4984291	.2045091	2.44	0.018	.0899961	.906862

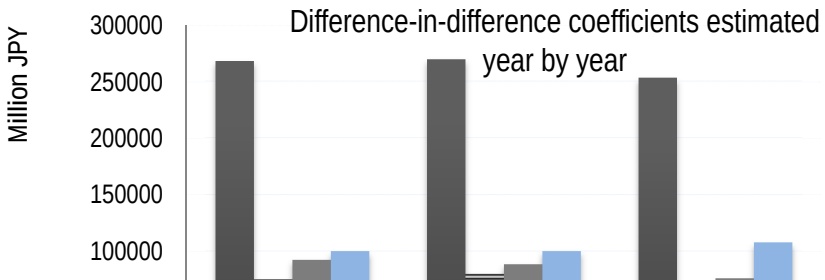
Japanese Bullet Train

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)

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

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 TOTAL 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	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	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	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	164541.57***				
	[5.66]				
Number of tax payers	8.1528323***	8.2376742***	8.2412487***	8.2576878***	9.3273719***
	[4.95]	[5.01]	[5.02]	[5.03]	[6.01]
Treatment3		273934.82***			
		[2.77]			
Treatment5			223106.98***		
			[3.22]		
Treatment7				194790.86***	
				[3.51]	
TreatmentCon					481536***
					[2.99]
Constant	-320534.96	-336110.37	-338106.87	-341873.71	-519965.94**
	[-1.25]	[-1.32]	[-1.32]	[-1.34]	[-2.13]
N	611	611	611	611	611
R2	0.11310939	0.11470055	0.11492312	0.11507375	0.12761938
F	16.041444	12.871521	13.244498	13.238033	18.620993

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 INCOME 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	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	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	0	1	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

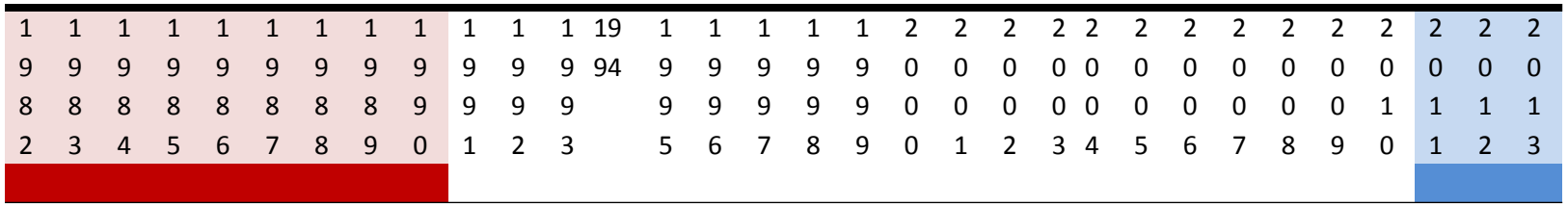
Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Treatment2	42035.05**				
	[2.34]				
Number of tax payers	4.6070796***	4.6273262***	4.6269034***	4.6331383***	4.977886***
	[6.95]	[6.96]	[6.96]	[6.96]	[8.11]
Treatment3		66498.461**			
		[2.41]			
Treatment5			51675.031**		
			[2.59]		
Treatment7				48690.336***	
				[3.01]	
TreatmentCon					151360.26**
					[2.59]
Constant	-327662.06***	-331368.37***	-331591.92***	-332963.61***	-390694.46***
	[-3.19]	[-3.21]	[-3.21]	[-3.21]	[-4.05]
N	611	611	611	611	611
R2	0.25643367	0.25707642	0.25708241	0.25729491	0.26673207
F	25.877405	26.362477	26.446053	27.90451	34.755158

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)



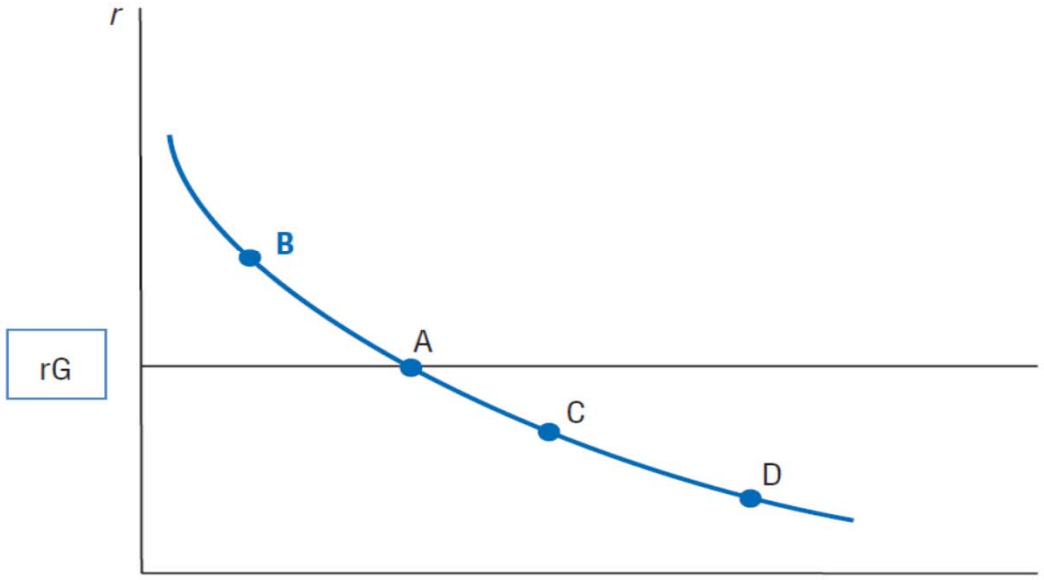
Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Treatment2	72330.012**				
	[2.2]				
Number of tax payers	5.5277056***	5.5585431***	5.558603***	5.5706545***	5.9640287***
	[3.13]	[3.14]	[3.14]	[3.14]	[3.07]
Treatment3		104664.34*			
		[2]			
Treatment5			82729.673**		
			[2.1]		
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** **Investors**	(50, αr) Operating company Investors
Efforts to improve	(100, r) Operating company Investors	(100, αr) Operating Company Investors

Private Financing for Infrastructure

1, Financial Inclusion

Increase Domestic Savings

Sell private financial products though post office

Long term Savings: Insurance and Pension Funds

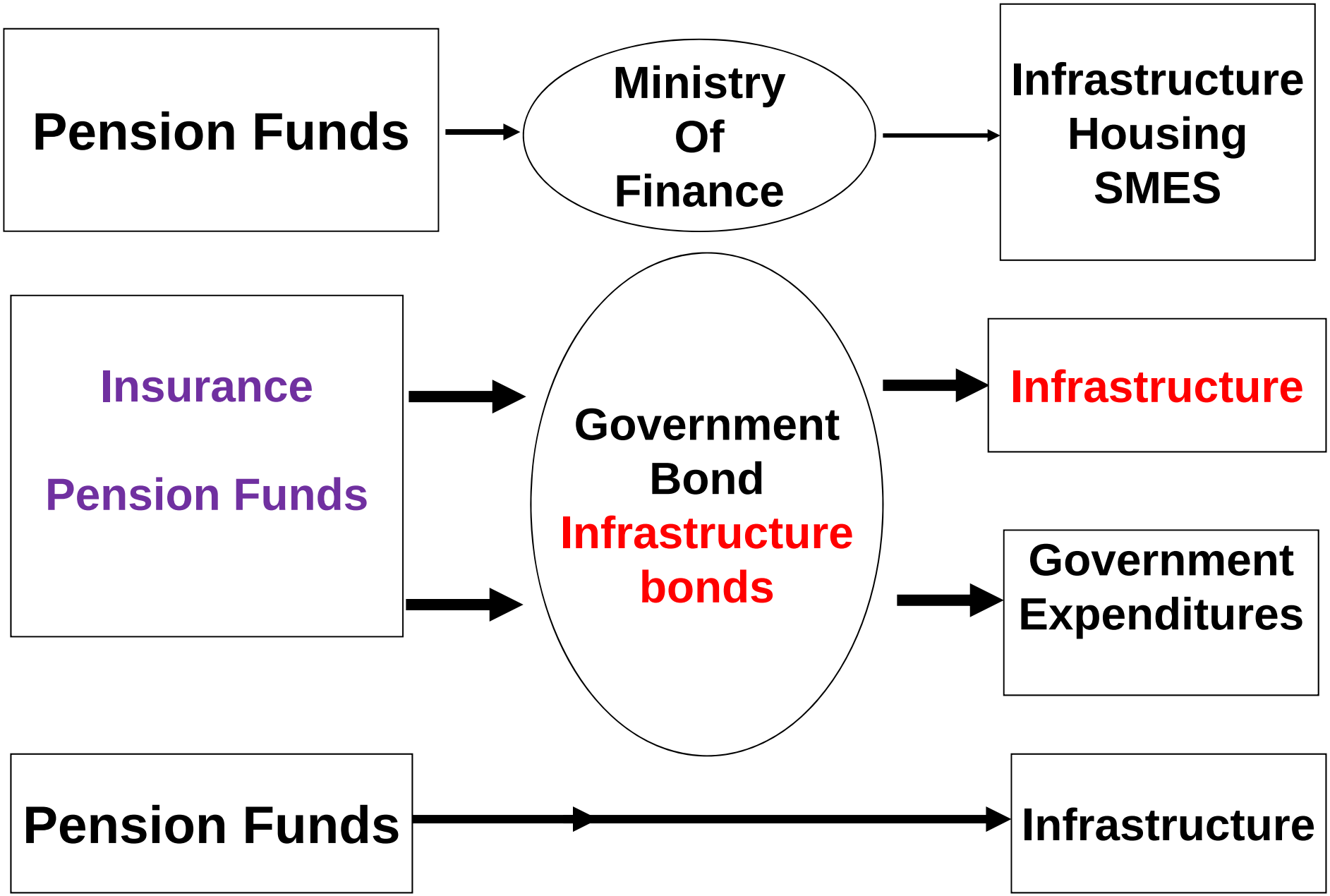
2, Too much reliance on overseas' money

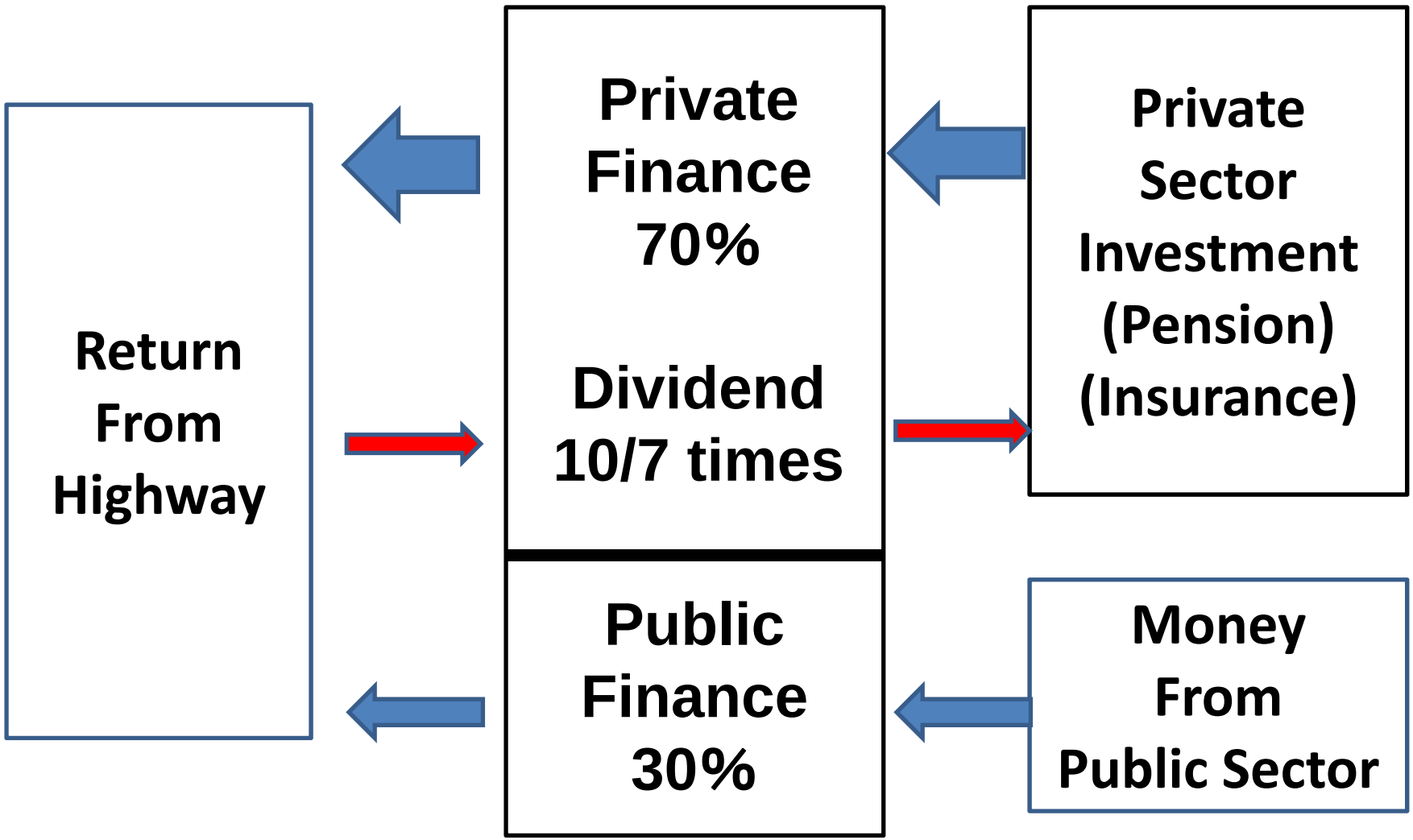
will lead to debt-overhang

3, Too much reliance on general budget

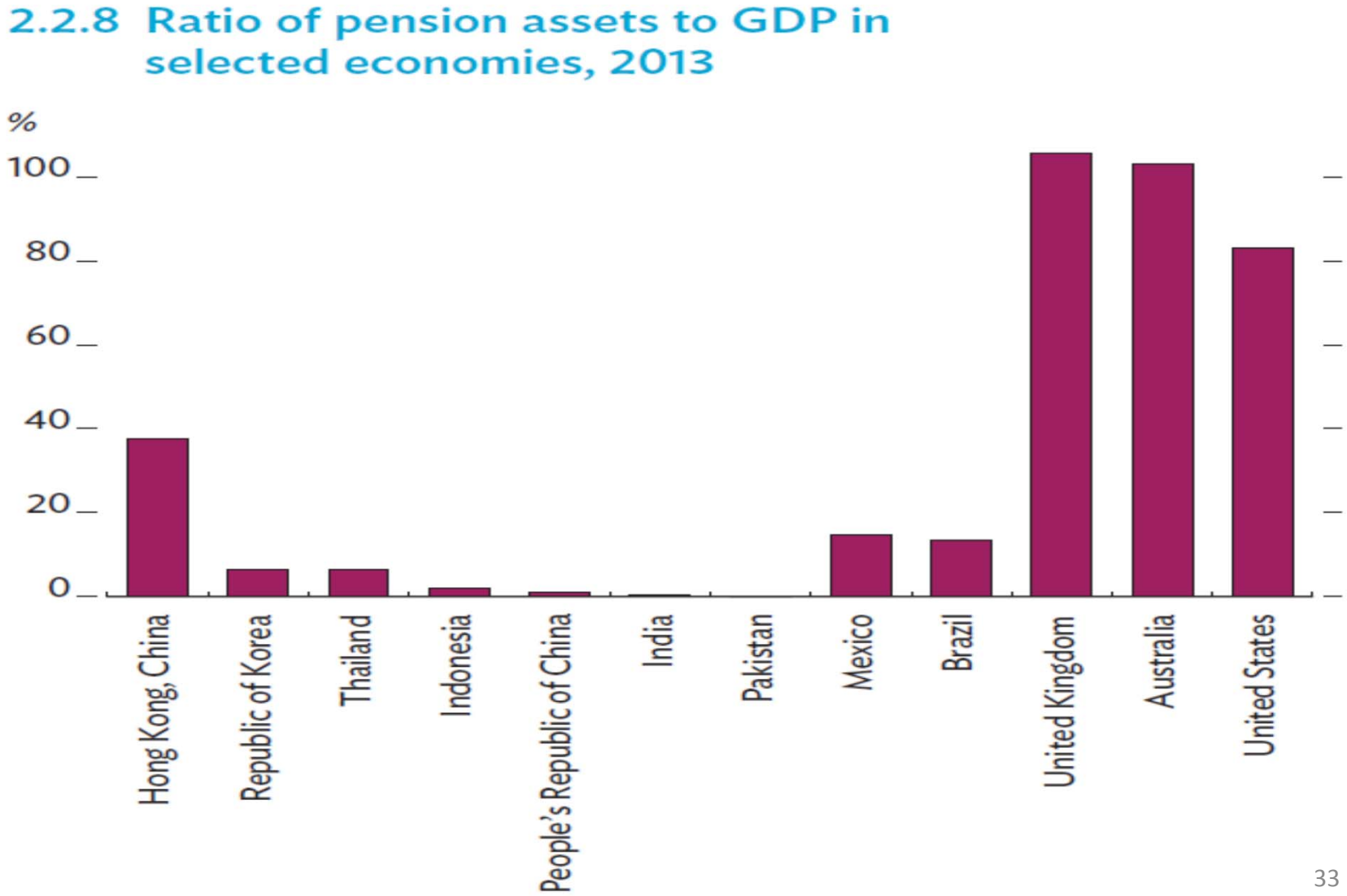
will lead to budget deficits

Use of Pension Funds




Private
Finance
70%
Dividend
10/7 times
Public
Finance
30%
Return
From
Highway
Private
Sector
Investment
(Pension)
(Insurance)
Money
From
Public Sector

Ratios of Pension Assets, Asian Development Outlook 2015

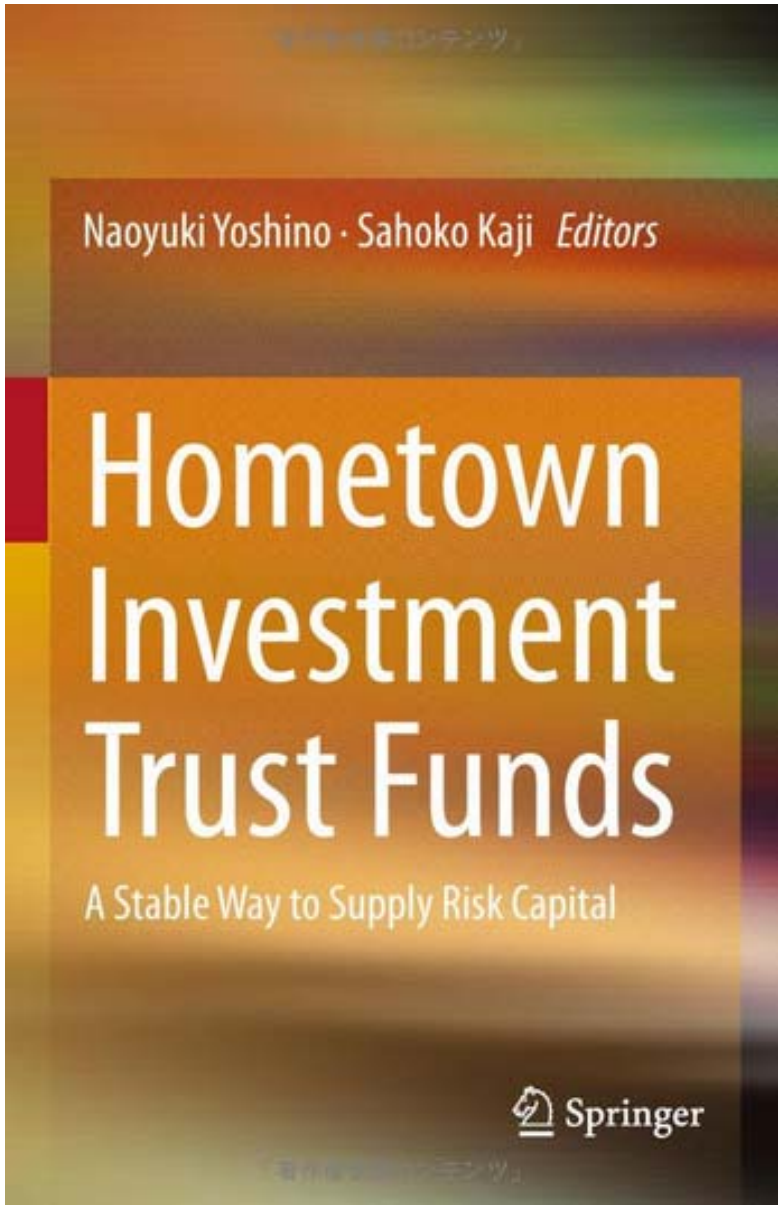


Community Infrastructure

- Wind power Generator Funds
- Agricultural Farmer's Trust Fund
- Start-up business finance
- Local airport
- SME Hometown Investment Trust Fund

Large Projects (highways, ports)

- Pension Funds,
- Insurance Funds
- Infrastructure Bond



Hometown Investment Trust Funds

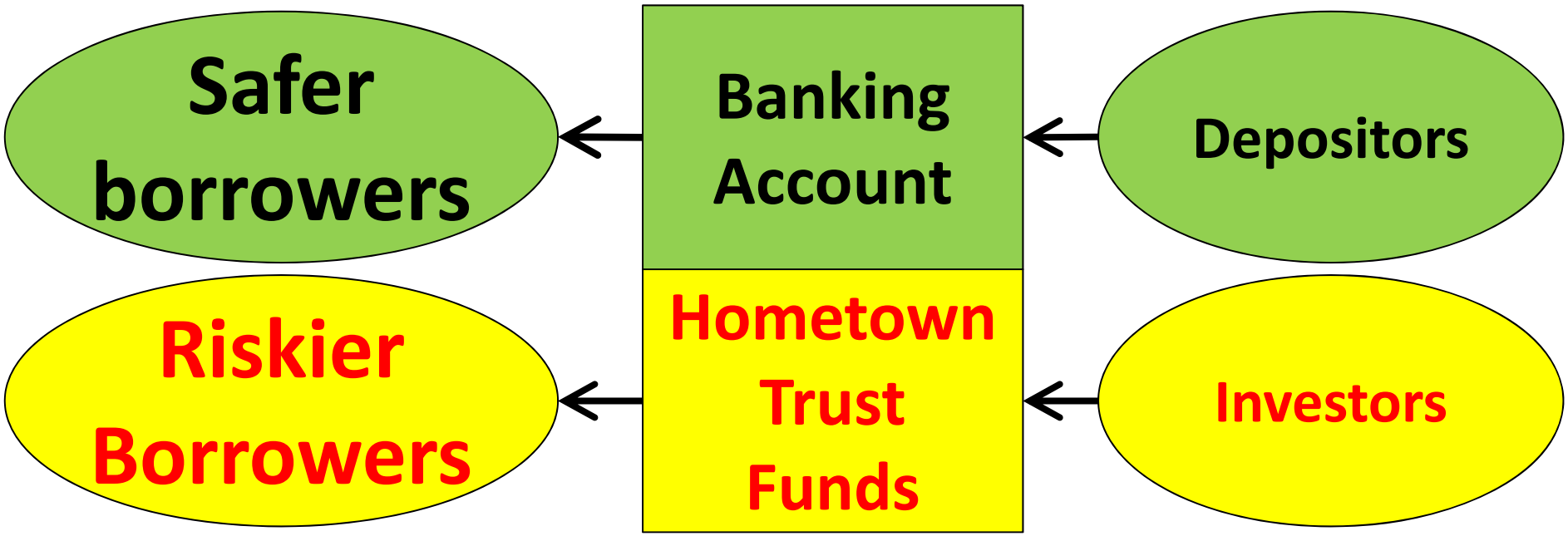
A Stable Way to Supply Risk Capital (i.e. knowledge base companies)

Naoyuki YOSHINO
Sahoko KAJI (ed.)


おひさま発電所
「さんぽちゃん1号」
明
星

Bank-based SME Financing and Regional Financing to Riskier Borrowers

(1) Bank Loans to relatively safer borrower
(2) Hometown Investment Trust Funds
E-Finance → Start-up business, SME



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)

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