

Infrastructure Structure Finance and Economic effects of Infrastructure

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Close Friendship with Indian Scholars

Head of the national statistical system in India

Pronab SEN (Classmate 35 years ago)

Secretary, Ministry of Statistics & Programme Implementation,



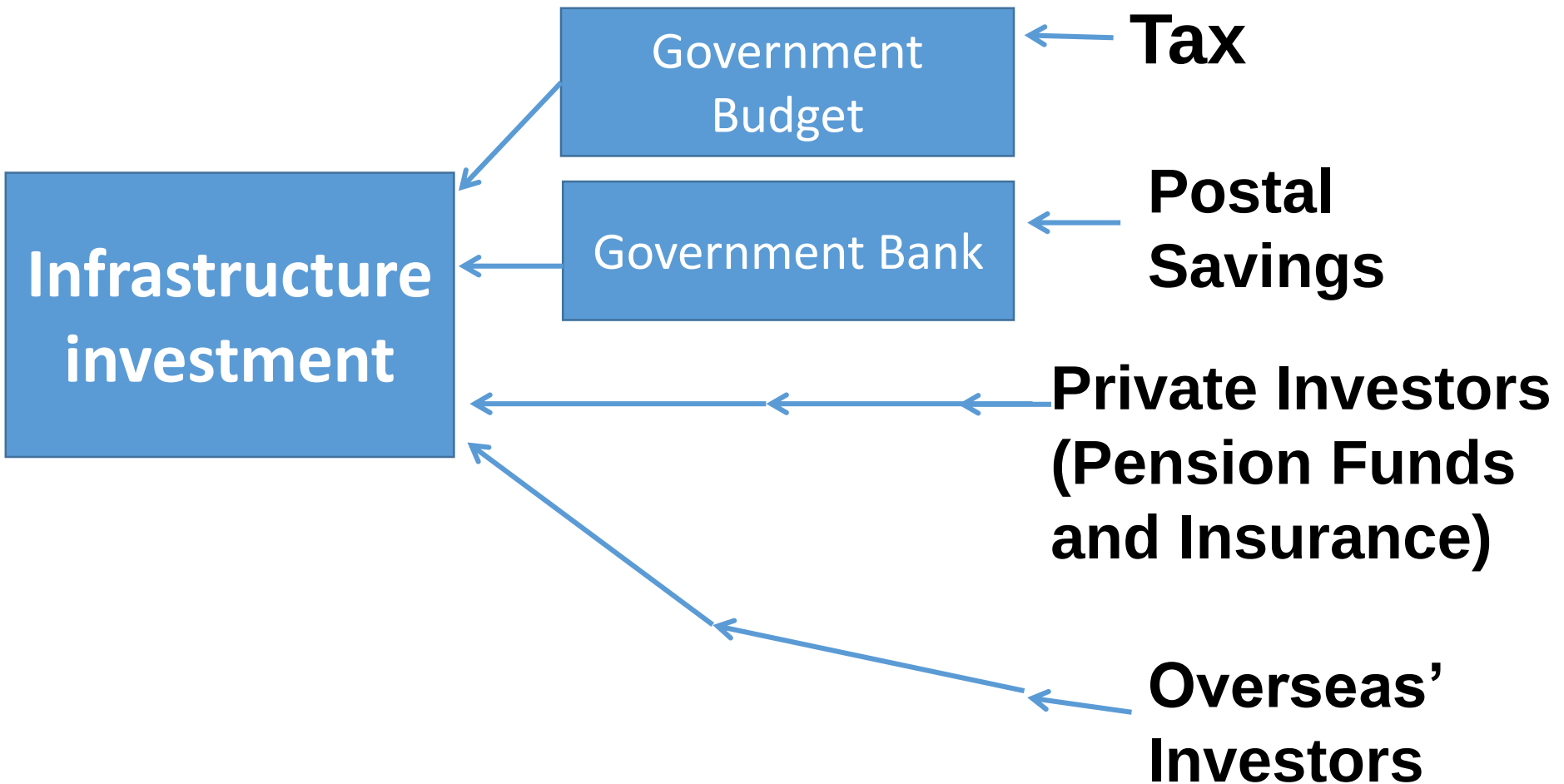
Nagesh Revankar (State University of New York)

<Classroom at University>

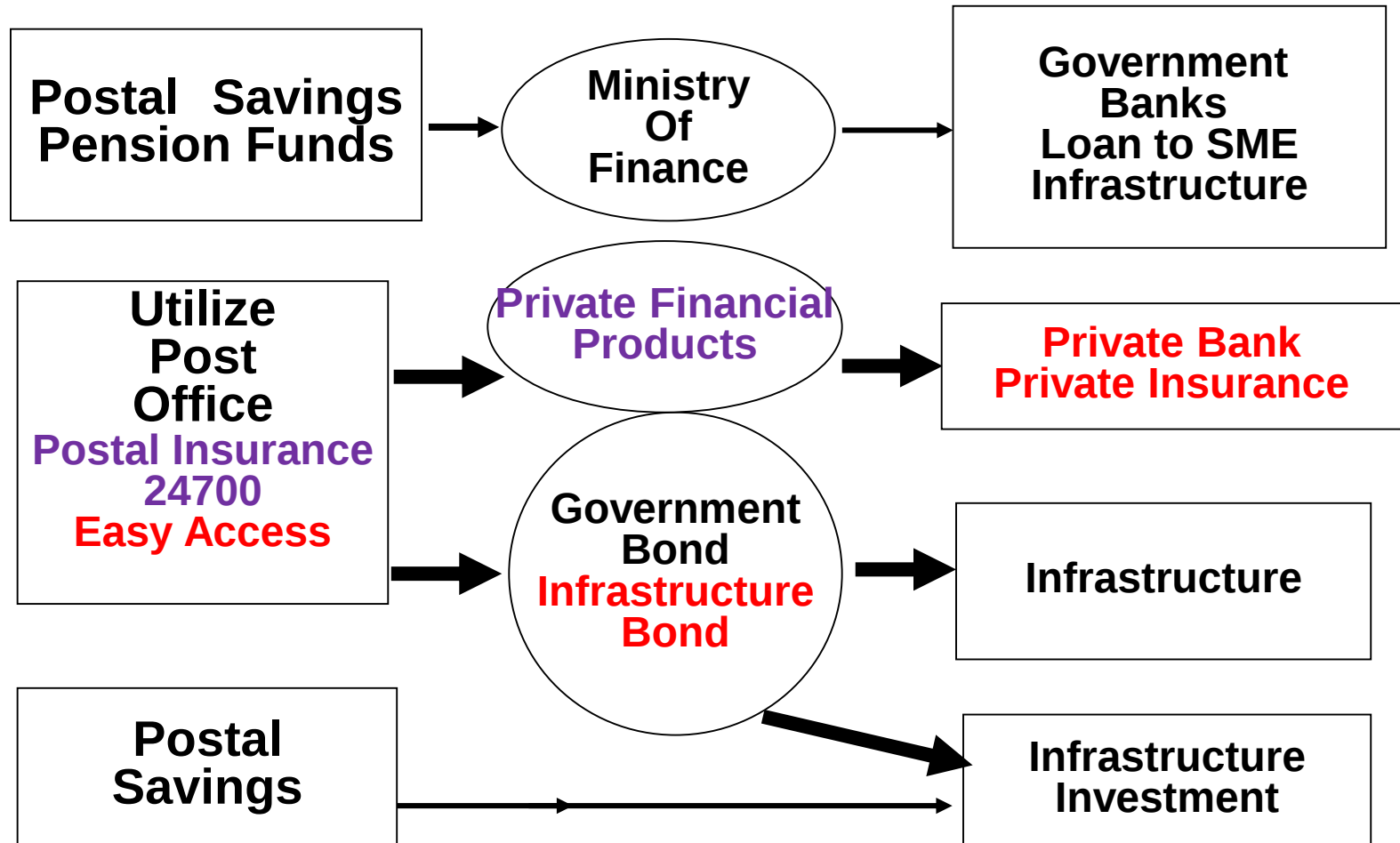
- (1) Indian students always ask questions
- (2) Japanese students are quiet
- (3) How do you grade your course ? Prefers [A+]
- (4) International conferences
- (5) Indian Student – teach at Swedish university

-----Infrastructure Finance-----

Accumulation of long term domestic saving



Use of Post office to promote Private Insurance



Long term and Patient investors are required

- 1, Bank deposits – Bank loans (2-5 years)
- 2, Life insurance (20 years, 30 years)
- 3, Pension funds (20, 30, 40 years)

Long term financing

- 4, Utilize post office network in India
- 5, Post office receives commissions and fees
- 6, Sell private bank deposits and insurance
- 7, Financial education has to be developed

Figure 8. Actual Lesson Time/High School

High School Grade 10

0 hours About 1 to 5 hours About 6 to 10 hours More than 10 hours



High School Grade 11

0 hours About 1 to 5 hours About 6 to 10 hours More than 10 hours



High School Grade 12

0 hours About 1 to 5 hours About 6 to 10 hours More than 10 hours



School Teachers --- They are not economists

- 1, School teachers – only save at banks**
- 2, They do not have background of economics**
- 3, Primary schools – Homemaking course**
- 4, Graduates from Education department**
- 4, Junior high school teachers**

History, Geography,

5, Not much time is allocated to financial education

➔ Internet lectures by specialists

Public-Private Partnership (PPP)

Experience of Japan's Failure (3rd Sector Projects)

(1) No Risk Sharing

Private sector did not take responsibility

All the losses come to the government sector

(2) Capable men did not come to the project

Private sector did not send powerful person

(3) Easy going project

Government expenses were reduced

(4) Accumulated debt projects

Public Private Partnership (PPP)

(1) Risk sharing between private and public sector

Risks were taken by government

(2) Incentive to cut costs and to increase revenue are lacking

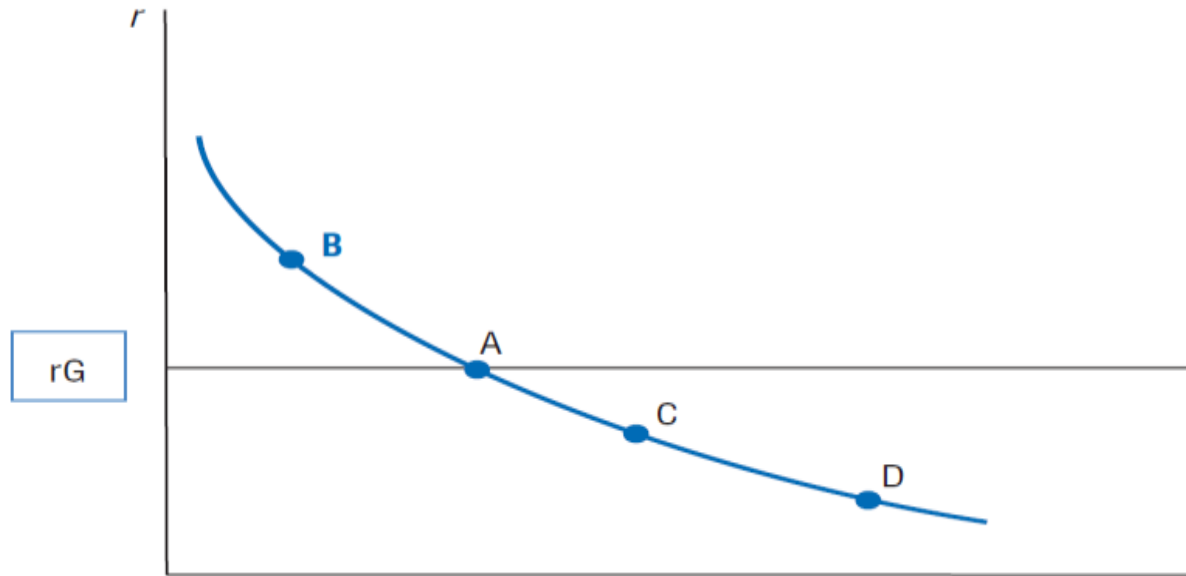
→ Avoid political intervention

→ **Bonus payment for employees**

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

(4) Goals of infrastructure investment
Indirect effects = spill over effects

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	



Risks Associated with Infrastructure

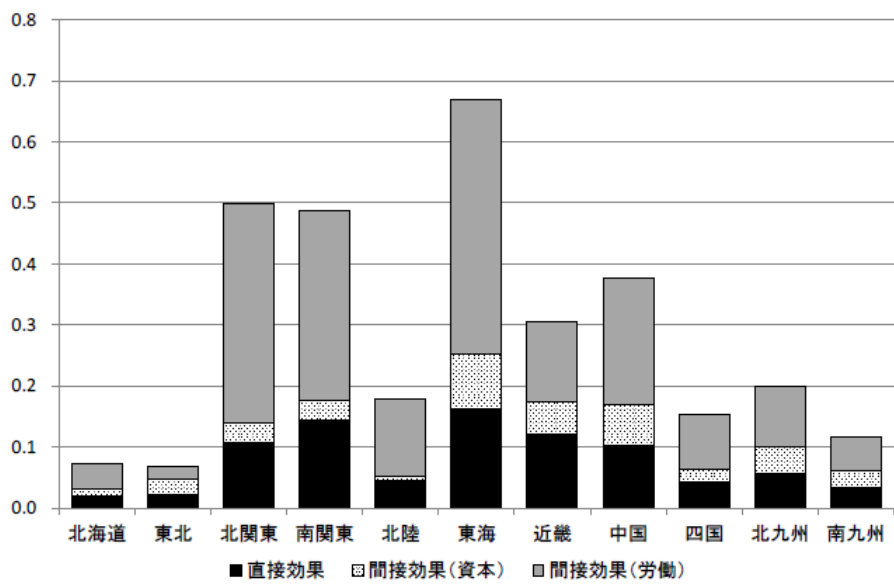
- 1、**Risk sharing** between private and public
- 2、Too much reliance on **overseas' money**
→ future burden for the country
- 3、Bankable projects or not ?
- 4、**Various Risks** (political risk, operational risk, demand risk, ex-post risk, maintenance risk, earthquakes, natural disaster risk)

Economic Effect of Infrastructure Investment

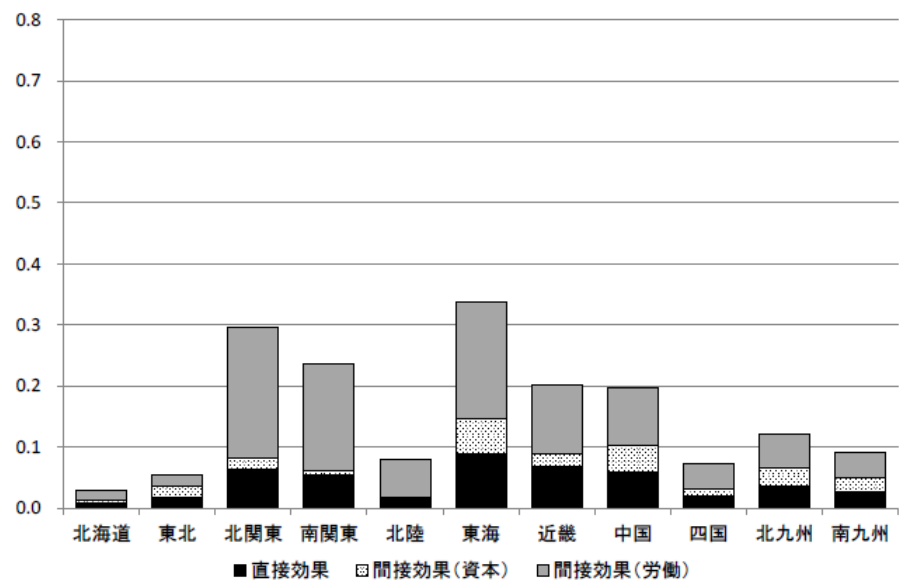
Regional Disparities (Manufacturing Industry)

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

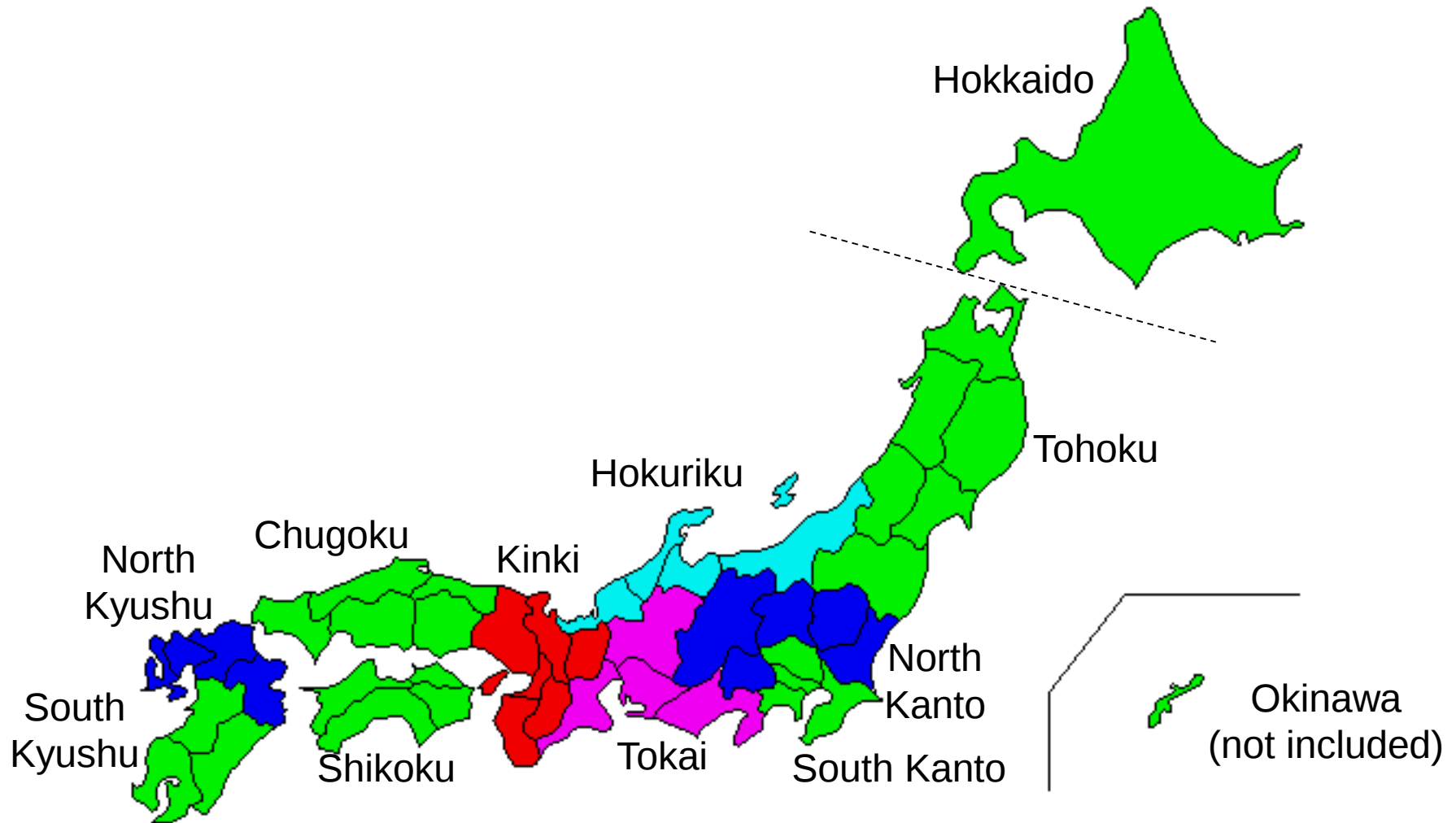


(2) 2010 年度



(出所) Nakahigashi-Yoshino (2015)

Map of Japan from the North to the South



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

The production technology of the private sector is represented by the following production function.

$$Y = f(K_p, L, K_G) \quad (1)$$

where Y denotes output (in value added) in the private sector. The output is produced by combining private capital stock, K_p , labor input, L , and infrastructure stock, K_G .

In this paper, we assume the translog production function.

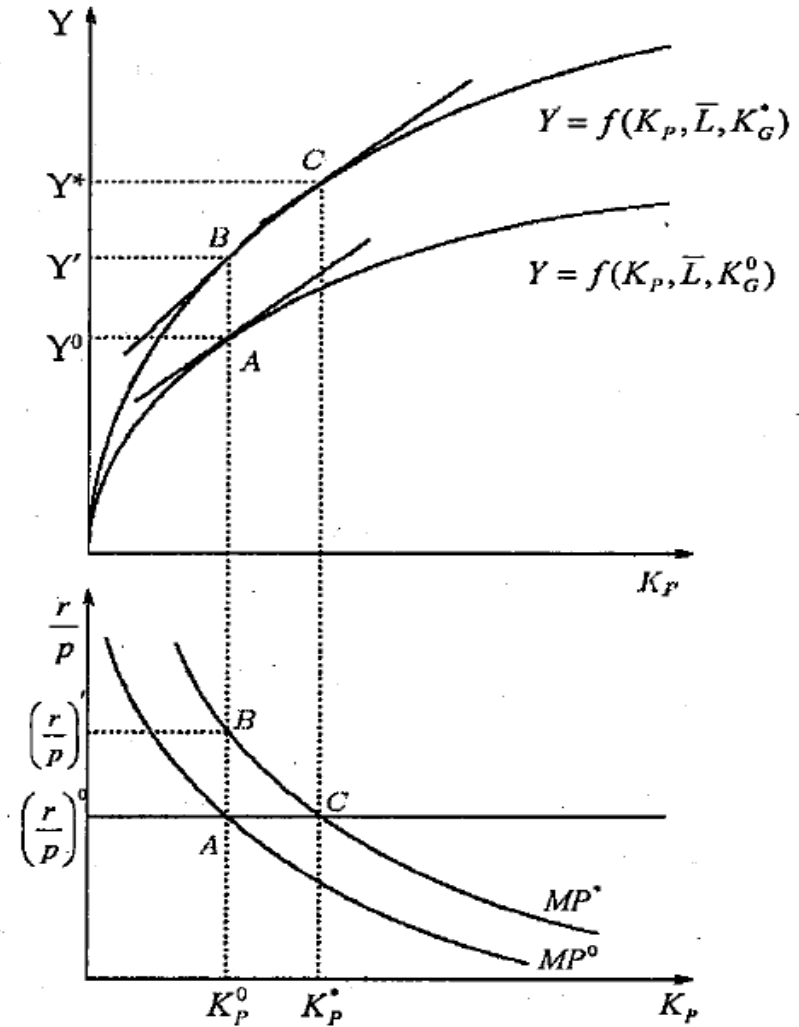
$$\begin{aligned} \ln Y = & \alpha_0 + \alpha_K \ln K_p + \alpha_L \ln L + \alpha_G \ln K_G \\ & + \beta_{KK}(1/2)(\ln K_p)^2 + \beta_{KL} \ln K_p \ln L + \beta_{KG} \ln K_p \ln K_G \\ & + \beta_{LL}(1/2)(\ln L)^2 + \beta_{LG} \ln L \ln K_G + \beta_{GG}(1/2)(\ln K_G)^2 \end{aligned} \quad (2)$$

Figure 3: Direct Effect and Indirect Effect

$$\frac{dY}{dK_G} = \frac{\partial Y}{\partial K_G} + \frac{\partial Y}{\partial K_P} \frac{\partial K_P}{\partial K_G} + \frac{\partial Y}{\partial L} \frac{\partial L}{\partial K_G} \quad (9)$$

Here, the effect of infrastructure is divided into three parts; the first term on the right hand side of equation (9) represents *direct effect*; the second term is the *indirect effect* on output with respect to the resulting change in the input of private capital and the third term is the *indirect effect* on output with respect to the resulting effect on labor input.

The equation (9) is graphically represented in Figure 3, which illustrates the relationship between private capital and output, given fixed labor input in the private sector. The similar graph may be obtained for the relationship between labor input and output, given fixed private capital. The bottom panel shows in terms of marginal productivity the same relationship shown in the top panel.



Source: Yoshino and Nakajima(ed.)(1999)
Figure 3-3

Thailand (Effectiveness of Infrastructure Investment)

		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

Case Study: Southern Tagalog Arterial Road (STAR) , Philippines

- 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.

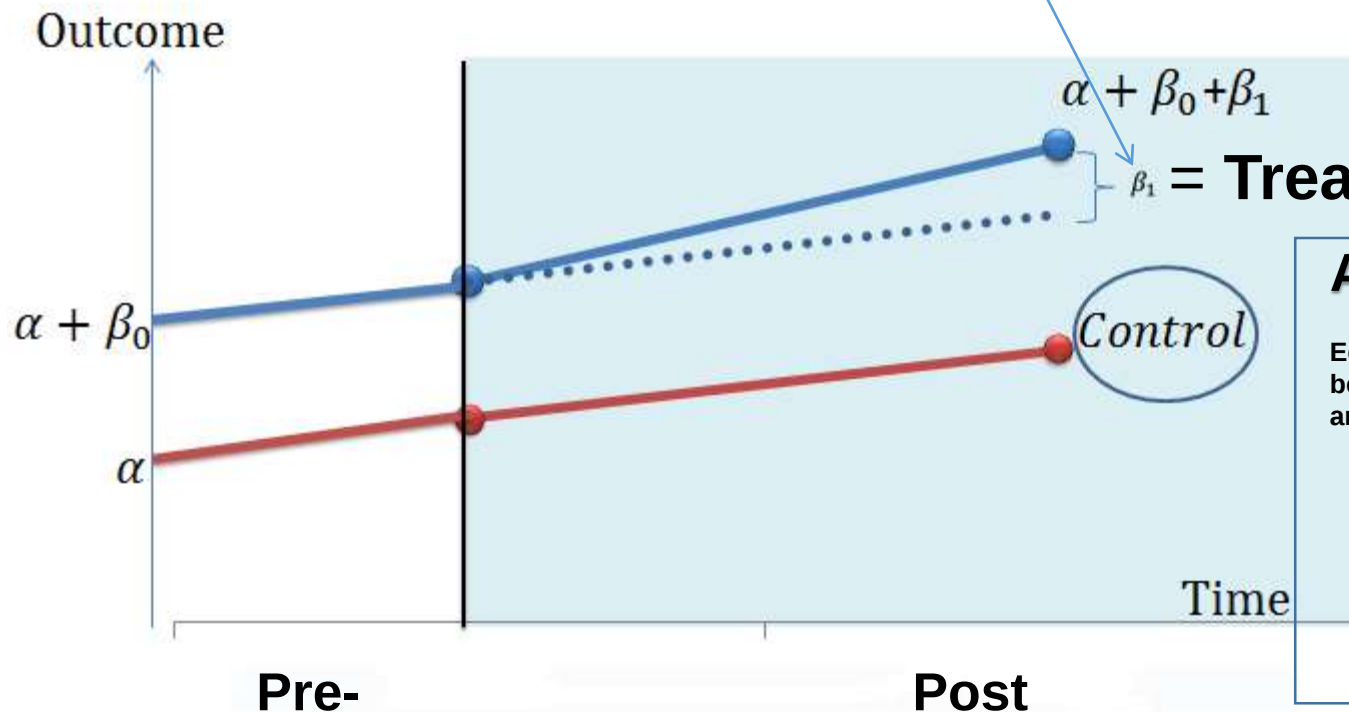


Method: Difference-in-Difference (DiD) Analysis

$$\text{Outcome} = \alpha + \beta_0 D + \sum_{t=-4}^{t-1} \beta_1 D \times T + \varepsilon$$

where: $D = 1$ (Treatment group)
 $D = 0$ (Control group)

$T = \text{Treatment period}$



Assumption:

Equal trends
between Treatment
and Control groups

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	1.5535 (1.263)	0.736 (0.874)	1.067 (1.316)	0.438 (1.407)	1.372 (1.123)	0.924 (1.046)	0.990 (1.095)	0.364 (1.028)
Treatment D × Period _{t+2}	0.421** (0.150)	-0.083 (0.301)	1.189*** (0.391)	0.991** (0.450)	0.248*** (0.084)	-0.019 (0.248)	0.408*** (0.132)	-0.010 (0.250)
Treatment D × Period _{t+1}	0.447** (0.160)	0.574*** (0.118)	1.264*** (0.415)	1.502*** (0.542)	0.449** (0.142)	0.515*** (0.169)	0.317** (0.164)	0.434** (0.167)
Treatment D × Period _{t0}	0.497*** (0.128)	0.570** (0.223)	1.440*** (0.417)	1.641*** (0.482)	0.604** (0.183)	0.642*** (0.181)	0.350 (0.271)	0.422 (0.158)
Treatment D × Period _{t-1}	1.294** (0.674)	0.387 (0.728)	2.256** (0.957)	1.779** (0.470)	1.318** (0.649)	0.838* (0.448)	0.959 (0.714)	0.197 (0.560)
Treatment D × Period _{t-2}	1.163* (0.645)	0.336 (0.594)	2.226** (0.971)	1.804** (0.531)	1.482** (0.634)	1.044** (0.413)	0.941 (0.704)	0.247 (0.531)
Treatment D × Period _{t-3}	1.702* (0.980)	0.450 (0.578)	2.785** (1.081)	2.070*** (0.544)	1.901*** (0.630)	1.238*** (0.369)	1.732*** (0.598)	0.676 (0.515)
Treatment D × Period _{t-4} , forward	2.573*** (0.900)	1.100 (0.758)	3.428*** (0.928)	2.560*** (0.350)	2.288*** (0.563)	1.509*** (0.452)	2.030*** (0.607)	0.787 (0.745)
Construction		2.283** (1.172)		1.577 (1.196)		1.207 (0.855)		1.942* (1.028)
Constant	14.69*** (0.408)	-2.499 (8.839)	14.18*** (0.991)	2.230 (9.094)	13.66*** (0.879)	4.597 (6.566)	13.08*** (0.649)	-1.612 (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

表 8 フィリピンの STAR 高速道路の影響のない地域と比較した事業税の増加額

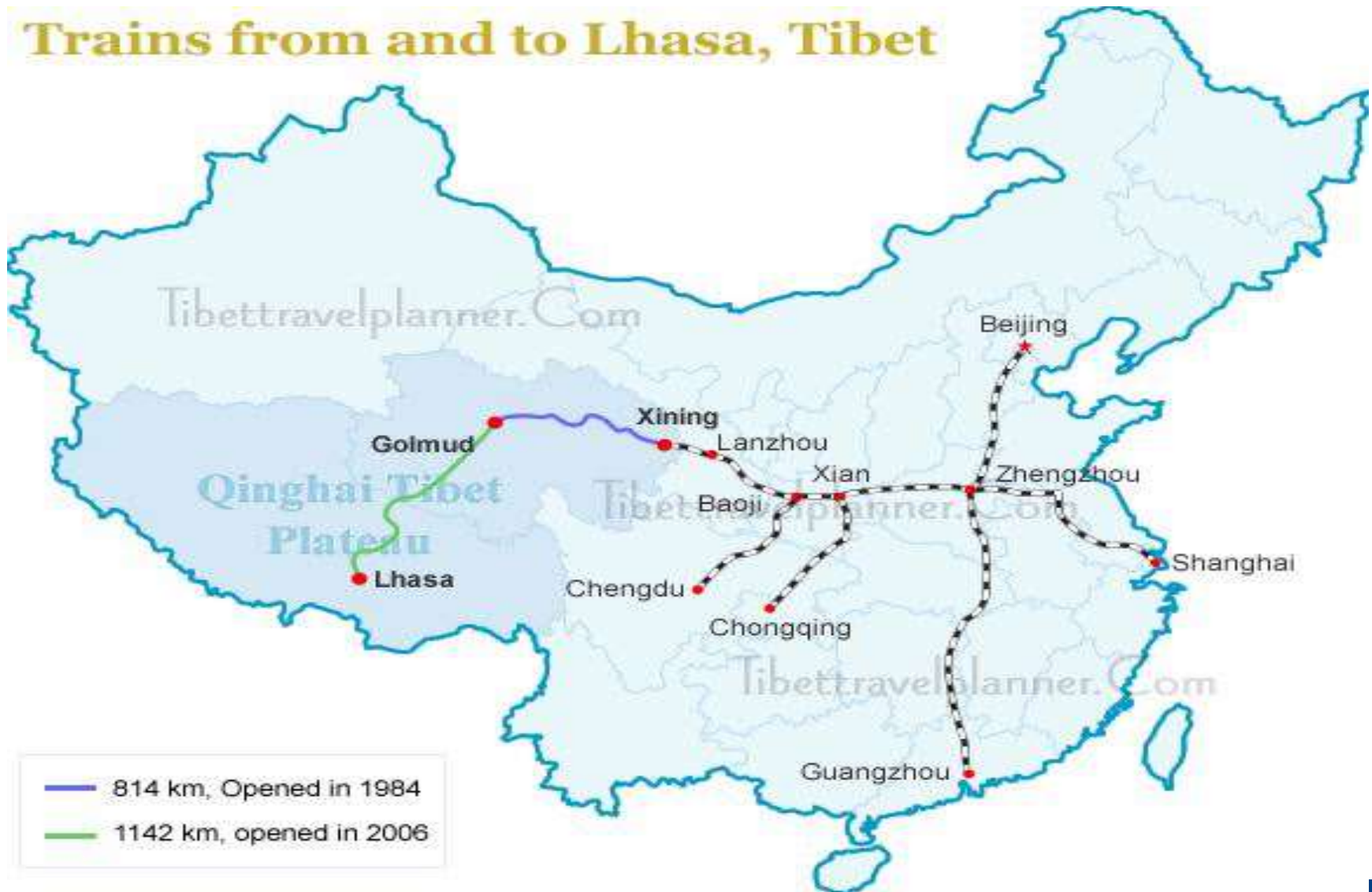
(単位：100 万ペソ)

	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

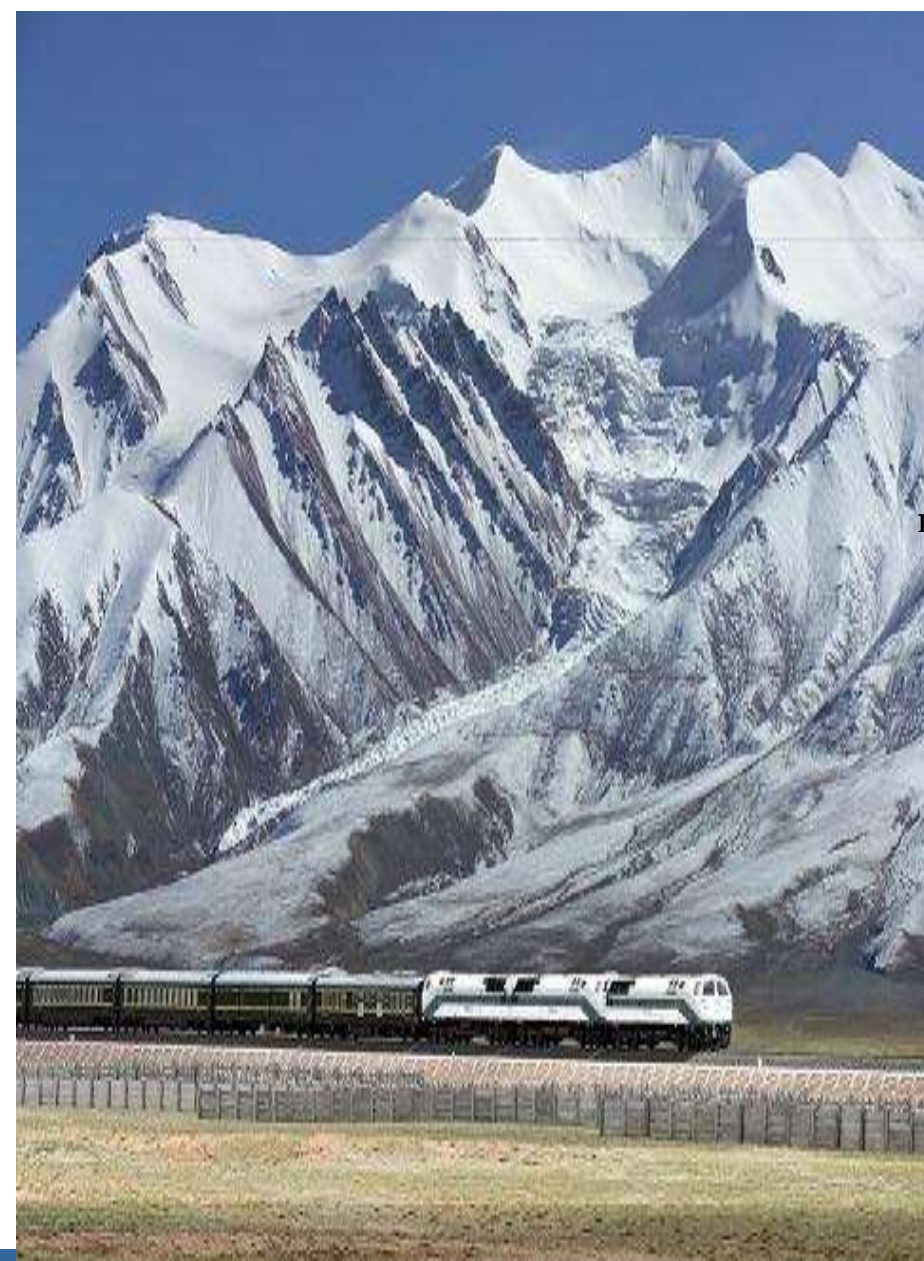
(出所) Yoshino and Pontines (2015)より筆者作成

Qinghai-Tibet Railway Map

Trains from and to Lhasa, Tibet



Tibet Railway



$R^2 =$

Source	SS	df	MS	Number of obs =	72
Model	8.28173613	6	1.38028935	F(6, 65) =	7.73
Residual	11.6075298	65	.178577382	Prob > F =	0.0000
Total	19.8892659	71	.280130506	R-squared =	0.4164
				Adj R-squared =	0.3625
				Root MSE =	.42258

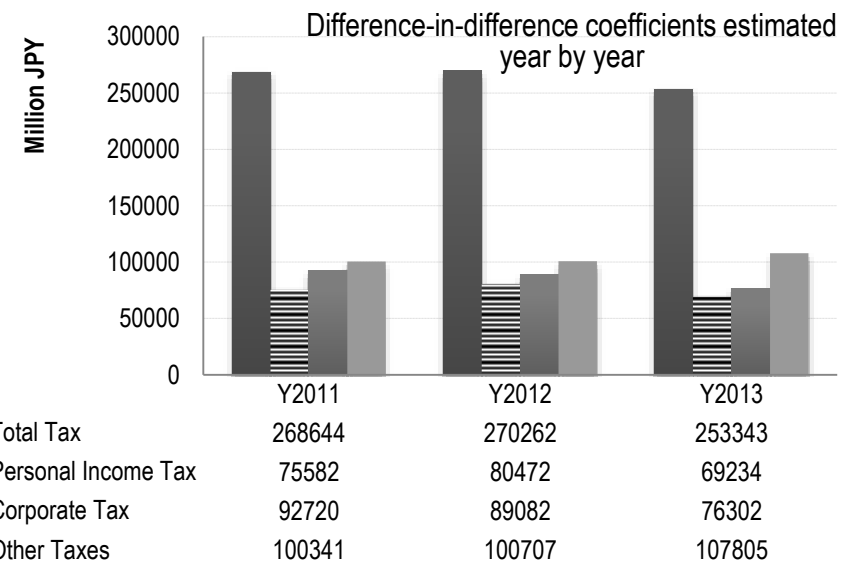
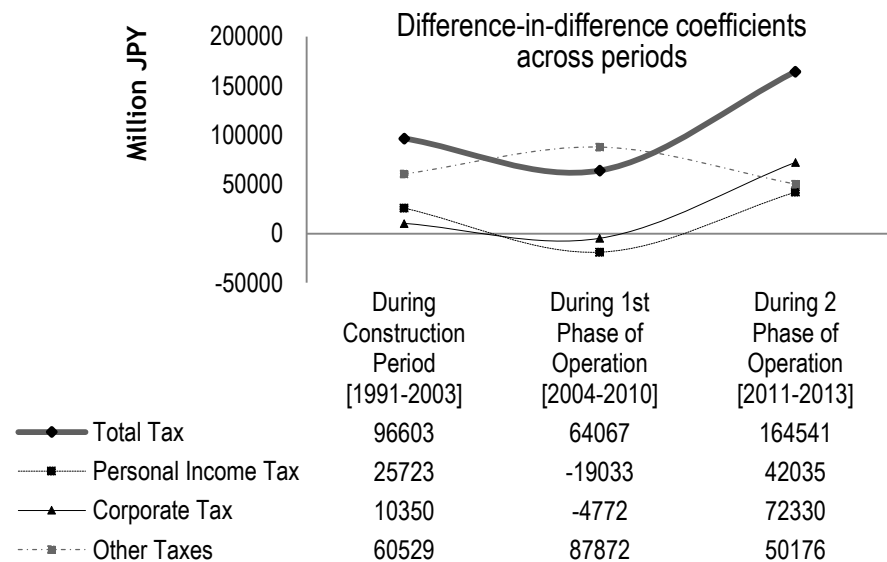
difference1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
govspending1	.0118414	.0028554	4.15	0.000	.0061389	.017544
population1	.0034233	.0013616	2.51	0.014	.000704	.0061426
population0	-.0102002	.0037957	-2.69	0.009	-.0177808	-.0026196
govspending0	-.0206841	.0055783	-3.71	0.000	-.0318248	-.0095435
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



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
THE TAX revenue during 1st PHASE OF OPERATION period
{2004-2010} , mln. JPY (adjusted for CPI, base 1982)**

[illegible]

						COMPOSITION OF GROUPS	
Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Group2	Group5
Treatment2	-4772.54 [-0.2]					Kagoshima Kumamoto	Kagoshima Kumamoto
Number of tax payers	5.8952514* [1.95]	5.8957045* [1.95]	5.896112* [1.95]	5.8953585* [1.95]	5.8629645* [1.91]	Group3 Kagoshima Kumamoto Fukuoka	Fukuoka Oita Miyazaki
Treatment3		-15947.8 [-0.87]					
Treatment5			-13250.4 [-1.06]				
Treatment7				-6883.09 [-0.7]			GroupCon Kagoshima
TreatmentCon					-28030.8 [-0.65]	Group7 Kagoshima Kumamoto Fukuoka Oita	Kagoshima Kumamoto Fukuoka Osaka Hyogo
Constant	-665679 [-1.35]	-665418 [-1.35]	-665323 [-1.35]	-665358 [-1.35]	-658553 [-1.32]		
N	799	799	799	799	799	Miyazaki	Okayama
R2	0.269215	0.269281	0.269291	0.269241	0.269779	Saga	Hiroshima
F	1.934589	2.106448	2.074548	2.100607	8.497174	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
E TAX revenue during 2nd PHASE OF OPERATION period
{2011-2013} , mln. JPY (adjusted for CPI, base 1982)**

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						COMPOSITION OF GROUPS	
Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Group2	Group5
Treatment2	72330.012** [2.2]					Kagoshima Kumamoto	Kagoshima Kumamoto
Number of tax payers	5.5277056*** [3.13]	5.5585431*** [3.14]	5.558603*** [3.14]	5.5706545*** [3.14]	5.9640287*** [3.07]	Group3 Kagoshima Kumamoto Fukuoka	Fukuoka Oita Miyazaki
Treatment3		104664.34* [2]					
Treatment5			82729.673** [2.1]				
Treatment7				80998.365** [2.34]			GroupCon Kagoshima
TreatmentCon					179632 [1.58]	Group7 Kagoshima Kumamoto Fukuoka Oita	Kumamoto Fukuoka Osaka Hyogo
Constant	-568133.98** [-2.07]	-573747.28** [-2.08]	-574245.87** [-2.08]	-576867.56** [-2.09]	-642138.87** [-2.1]	Miyazaki	Okayama
N	611	611	611	611	611	Saga	Hiroshima
R2	0.350653	0.352058	0.352144	0.352874	0.364088	Nagasaki	Yamaguchi
F	5.062509	5.486197	5.351791	5.431088	16.55518		

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

Increase Spillover effects finance to **Start up businesses**

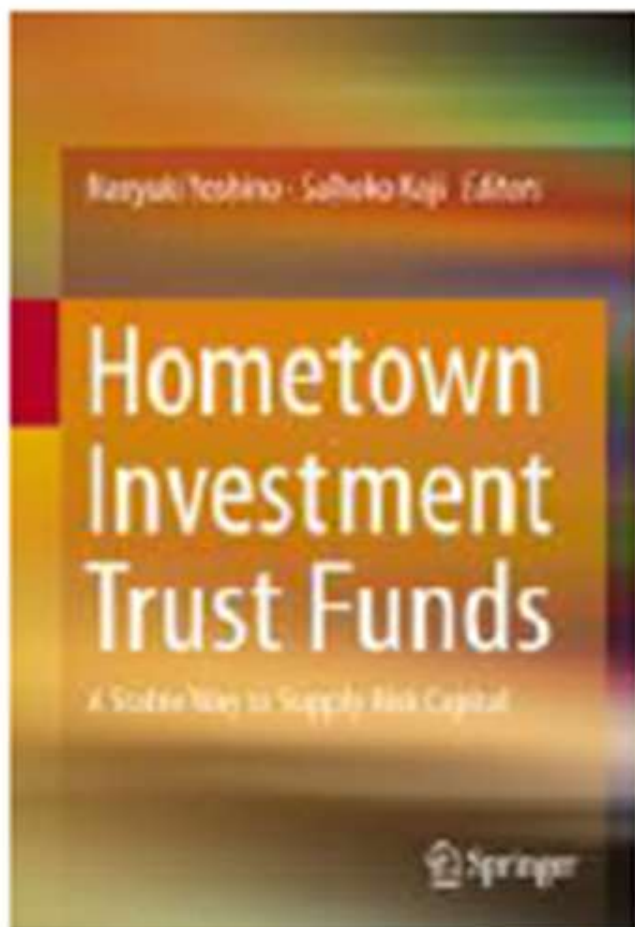
Hometown Investment

A Stable Way to Supply Risk Capital

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

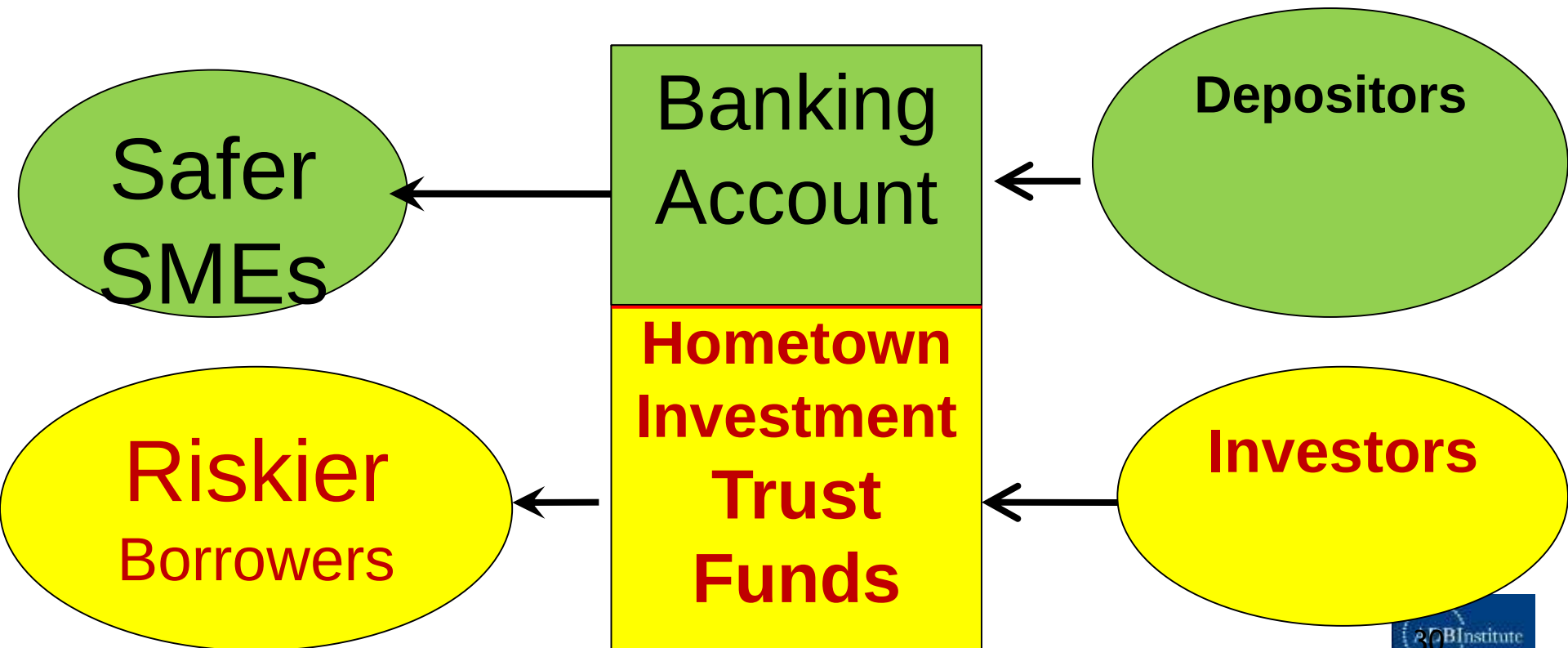
Available Formats:

ebook
Hardcover



How to increase spillover effects

Hometown Investment Trust Funds to startup businesses



Investment in start up businesses and SEMs

Purchase type and Investment type



すべてを失い再起を断念しようになった時の

Agricultural Funds

Beans and Wine



Regulation of Money Lenders in Rural Regions

1, Money lenders, Interest rate = 96% in Japan

2, License --- Banks

Registration --- Finance companies

3, New Finance Company Law

(i) Highest interest rate = 20%

(ii) Amount of borrowing < 1/3 of Income (Sales)

(iii) Minimum Capital requirement

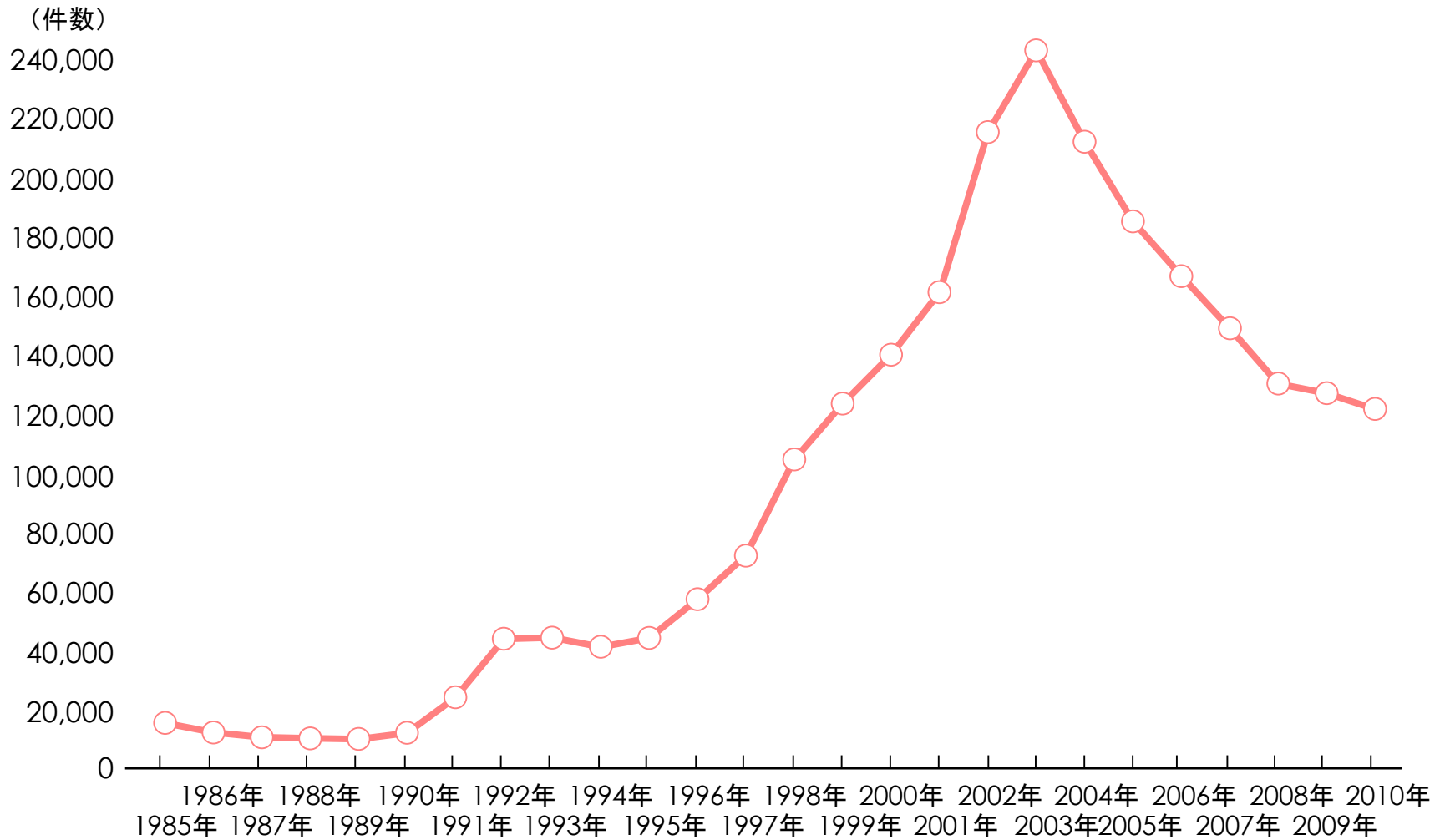
(iv) Paper test to run business

(v) Self regulatory organization was set up

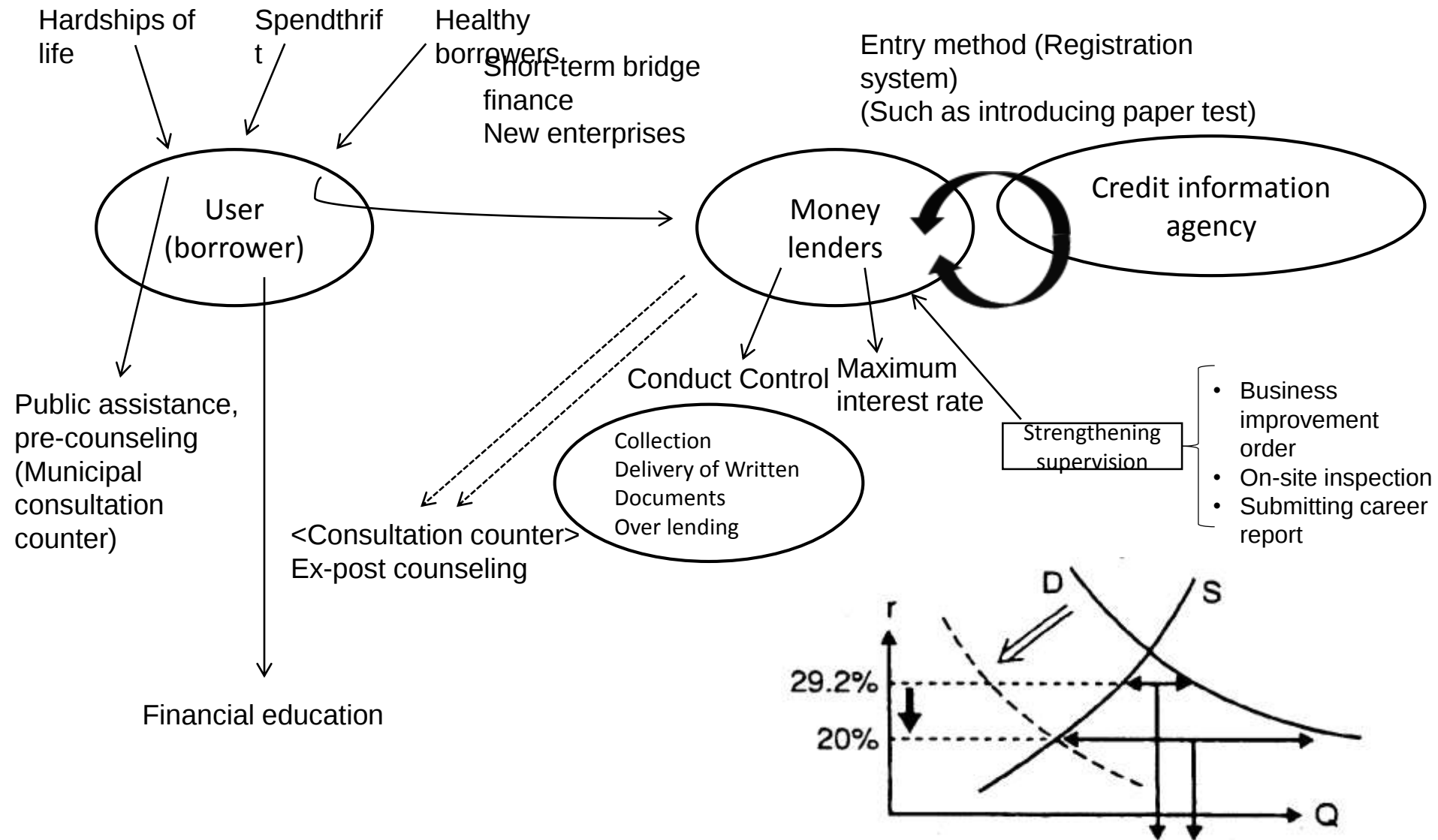
two steps of monitoring and supervision

(vi) Consumers' complaints (hotline)

Number of Individuals' Default



Full picture of Users, money lenders and market, surrounding the consumer credit



To black market?
(Tightening penalties to loan sharks)

Concluding Remarks

$$Y=AF(N, K_p, K_g)$$

Technology, Human capital,
Private capital, Infrastructure

Enhancing Infrastructure Investment and Financial Stability

Maintain macroeconomic and financial stability
Recycle savings into Investments

Supporting Equitable Growth

Improve income equality (Education, Tax System, Equal Opportunity)

Promoting Competitiveness and Innovation

Strengthen competitiveness of the agricultural sector, manufacturing and services sectors, SMEs and large firms

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