ESG/Green Investment and Green Bond

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All the statements are based on my own views which do not reflect views of affiliated institutions

Outlines

(1) ESG Investment

Environmental, **S**ocial, **G**overnance

(2) Green bond

(3) Green Central Bank

(4) Environmental consciousness

Reputation

(5) ESG Investment and Stock Price

(6) Green projects

The way to bring private sector finance

(i) Large scale projects

(ii) Hometown Investment Trust Funds

December 1, 2021,Budapest, Hungary, Central European Green Finance Conference

Magyar Nemzeti Bank

presents

Yoshino Naoyuki

with the **International Green Finance Lifetime Achievement Scientific Award**

for the groundbreaking achievements reached in the scientific research in the field of green finance.

György H Matolcsy
Governor of the
Magyar Nemzeti Bank,
the Central Bank of Hungary

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Csaba Kandrács
Deputy Governor of the
Magyar Nemzeti Bank,
the Central Bank of Hungary

01.12.2021

SDG Investments: 17 Goals (UN)

Sustainable Development Goals

Millennium Development Goals

ESG: Environment, Social and Governance

The evaluation methodologies and criteria for ESG scores vary from one evaluating organization to another.

(1) some agency uses its own criteria to evaluate a company's ESG efforts,

(2) some agency assign a score based on the degree of disclosure,

(3) some agency uses a score based on whether or not the company has an ESG policy,

(4) some agency uses a score based on actual ESG activities such as carbon dioxide reduction by judging from performance, and so on.

It raises issues whether ESG scores actually reflect ESG activities and outcomes by companies (Chatterji et al. 2009, Drempetic et al. 2019).

Table 1: ESG scores and evaluation methodologies of major ESG rating agencies

ESG Scores	Overview of Rating Methodology
Bloomberg ESG Disclosure Scores	Evaluating by degree of ESG disclosure
FTSE Russell's ESG Ratings	Evaluating by ESG risks based on disclosure and commitment to policy development and improvement
ISS Quality Score	Evaluating governance (board composition, shareholder and takeover defenses, compensation and remuneration, and audit and risk monitoring)
MSCI ESG Ratings	Evaluating by 37 key ESG issues
RobecoSAM Corporate Sustainability Assessment	Evaluating by economy, environment and society. Governance is included in the economy.
Sustainalytics' ESG Risk Ratings	Evaluating by ESG measures, disclosures, and the level of the problem
Thomson Reuters ESG Scores	Evaluating by 10 categories (environment [resource use, emissions, and innovation], society [employees, human rights, local communities, and product responsibility], and governance [management, shareholders, and CSR strategy]).

Source: Bloomberg, ESG rating organization websites, and Yuyama *et al*. (2020).

Table 2: Examples of ESG/SDG-related standard development movements in different countries.

	Standard Development Movement
EU	Through the EU Taxonomy, the criteria for classifying economic activity as environmentally compatible or not have been established
China	Develop a green industry guidance catalog and green standards to be applied nationally
International Organization for Standardization (ISO)	Moves to set standards for greenhouse gases, environmental performance, and green finance

Source: MUFJ Research and Consulting (2020).

Current ESG investment distorts asset allocation

1, **Traditional asset allocation :**

two parameter approach

(i) Rate of return (R), (ii) Risks (σ^2)

2, **ESG component is added for the asset allocation**

(iii) ESG (or GEEN) multi-factor model

Reputation, Image of the company, Credit rating

3, **ESG criteria is different from one consulting company to another**

4, **Each Investor changes its' asset allocation based on specific criteria of ESG provided by consultant**

Two Parameter Approach: Markovitz and Sharpe

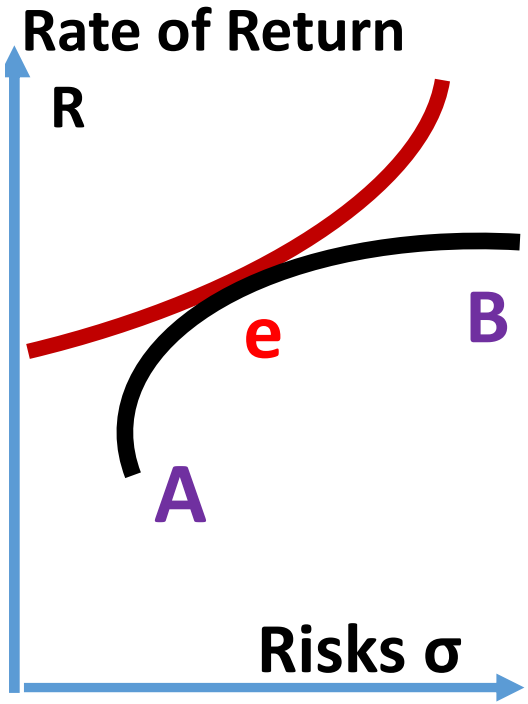
Return (R) and Risk (σ)

$$\mathrm{U}(R_t, \sigma_t^2, ESG_t) = R_t - \beta\sigma_t^2 + \gamma(ESG_t)$$

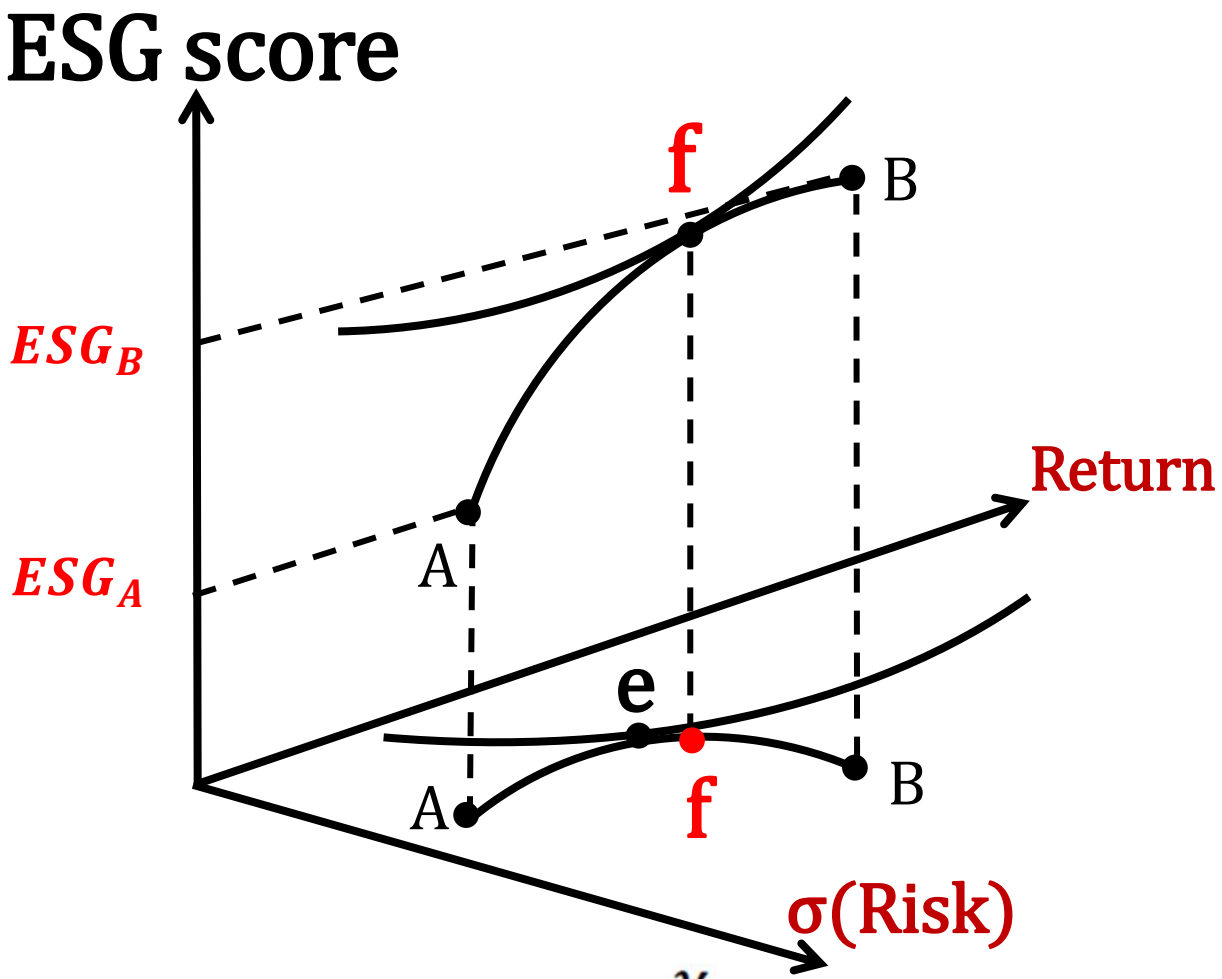
$$\text{s.t. } R_t = \alpha_t R_t^A + (1-\alpha_t)R_t^B$$

$$\sigma_t^2 = \alpha_t^2(\sigma_t^A)^2 + (1-\alpha_t)^2(\sigma_t^B)^2$$

$$ESG_t = \alpha_t(ESG_t^A) + (1-\alpha_t)(ESG_t^B)$$



$$\alpha_t = \frac{\frac{1}{2\beta}(R_t^A - R_t^B) - (\sigma_t^B)^2 - \sigma_t^{AB} + \frac{\gamma}{2\beta}(ESG_t^A - ESG_t^B)}{(\sigma_t^A)^2 - (\sigma_t^B)^2 - 2\sigma_t^{AB}}$$



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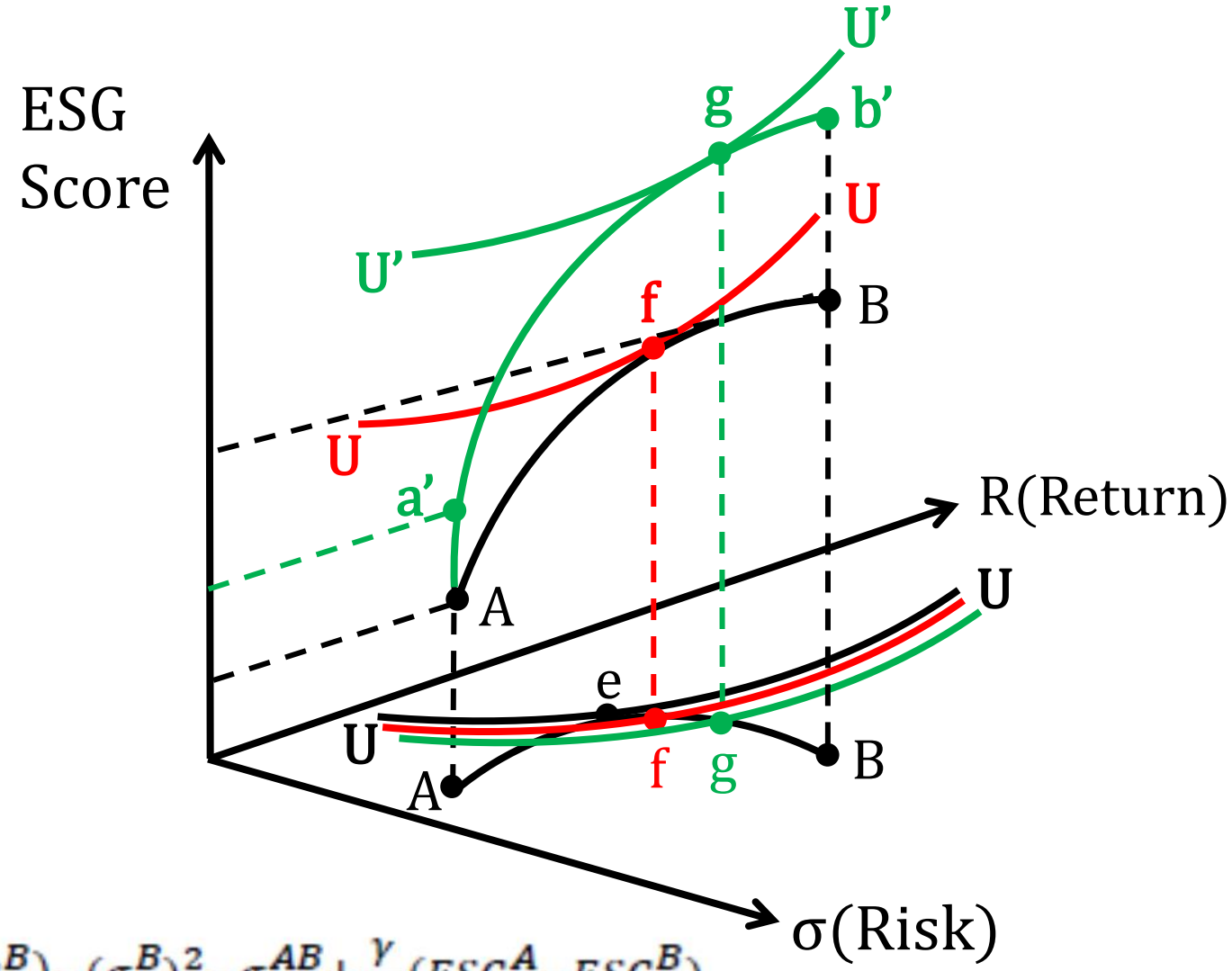


$$\alpha_t = \frac{\frac{1}{2\beta}(R_t^A - R_t^B) - (\sigma_t^B)^2 - \sigma_t^{AB} + \frac{\gamma}{2\beta}(ESG_t^A - ESG_t^B)}{(\sigma_t^A)^2 - (\sigma_t^B)^2 - 2\sigma_t^{AB}}$$

Empirical Analysis of Asset Allocation including ESG scores

Table 4. Empirical application of the theory

EGS Score	Optimal portfolio without ESG considerations	Rating agency (1)	Rating agency (2)	Rating agency (3)
ESG score of company A	-	8.6	9.6	2.9
ESG score of company B	-	1.8	1.3	3.9
Value of α	0.57	0.71	0.74	0.54

- **The allocation of assets between A and B changes which ESG rating agencies' ESG score is used for the portfolio allocation.**
- **The higher ESG score value is the higher α, and thus the higher the investment allocation. For example, since Rating agency (2) is the highest ESG score for Company A, investors following this rating will have the highest allocation to Company A.**
- **On the other hand, Rating agency (3) is lower for Company A than for Company B, resulting in a smaller investment allocation.**
- **If we do not take into account the ESG score, the investment allocation to Company A is 0.57**

Optimal portfolio allocation can be achieved by taxing wastes

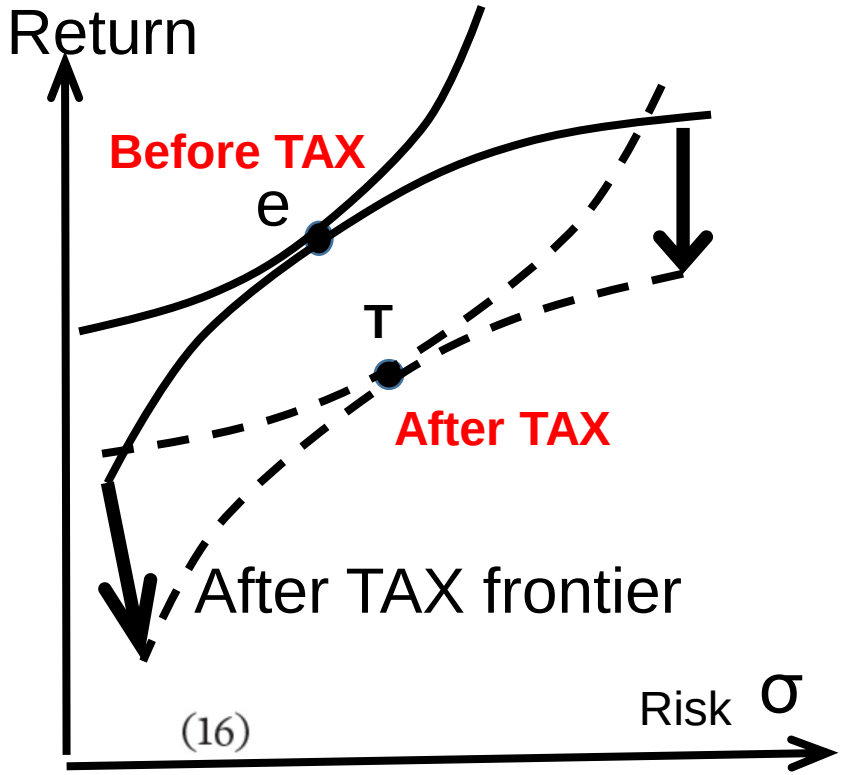
1, By taxing wastes such as CO2, NOX, Plastics etc. by identical international tax rate, the investors can only look for "rate of return" and "risks" as they were conventionally focused on.

2, International taxation will lead to optimal asset allocation and achieve sustainable growth

$$U(\tilde{R}_t, \tilde{\sigma}_t^2) = \tilde{R}_t - \beta \tilde{\sigma}_t^2$$

$$T_t^A = \frac{t_1(CO_{2\,t}^A) + t_2(NO_{X\,t}^A)}{Y_t^A}$$

$$T_t^B = \frac{t_1(CO_{2\,t}^B) + t_2(NO_{X\,t}^B)}{Y_t^B}$$



$$\tilde{R}_t^A = R_t - T_A \qquad (16)$$

$$\tilde{R}_t^B = R_t - T_B \qquad (17)$$

Equations (16) and (17) show the after-tax rate of return of company A and company B. We can compute the optimal allocation of assets between company A and company B as in equations (18) and (19), which show the optimal rate of return and risks, respectively:

$$\tilde{R}_t = \tilde{\alpha}_t \tilde{R}_t^A + (1 - \tilde{\alpha}_t)\tilde{R}_t^B \qquad (18)$$

$$\tilde{\sigma}_t^2 = \tilde{\alpha}_t^2(\tilde{\sigma}_t^A)^2 + (1 - \tilde{\alpha}_t)^2(\tilde{\sigma}_t^B)^2 + 2\tilde{\alpha}_t(1 - \tilde{\alpha}_t)\tilde{\sigma}_t^{AB} \qquad (19)$$

Satellite Photo can monitor CO2 exposures, solar power panels, size of Green area etc.

Green Credit Rating (Example)

Credit Rating	Greenness(%)	CO_2	NOx	Plastic	N_2O etc
AAA	100 ~ 90	AAA	AAA	AAA	·····
AA	90 ~ 80	A	AA	AAA	·····
A	80 ~ 70	A	AA	BBB	·····
BBB	70 ~ 60	BBB	BB	A	·····
BB	60 ~ 50	BB	BB	BB	·····
B	50 ~ 40	B	B	B	·····
CCC	40 ~ 30	CCC	B	CCC	·····
CC	30 ~ 20	CC	C	CCC	·····
C	20 ~ 10	C	C	C	·····

Monographic Section

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ESG/Green Investment and Allocation of Portfolio Assets[1]

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Covid-19 and Optimal Portfolio Selection for Investment in Sustainable Development Goals

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s, Graduate School of Economics, Keio University, Tokyo, Japan

Greenness, mood, and portfolio allocation: A cross-country analysis

Muhammad Zubair Mumtaz[a,b,*], Naoyuki Yoshino[c]

Environmental Challenges 5 (2021) 100325

$$U_t = R_t - \beta\sigma_t^2 + \gamma(Mood_t)X(Greenness_t)$$

Returns, risk, greenness, mood, and portfolio allocation .

	Developed countries		Developing countries		
	Japan	South Korea	Malaysia	Indonesia	Philippines
R_A	3.38%	5.46%	7.61%	6.35%	8.44%
R_B	7.93%	8.03%	13.03%	3.94%	12.84%
σ_A^2	2.44%	6.52%	10.38%	8.34%	11.45%
σ_B^2	13.87%	13.09%	15.83%	4.03%	14.48%
$Greenness_A$	−0.0156	−0.0361	−0.2012	−0.4334	−0.2102
$Greenness_B$	−0.0146	−0.0351	−0.1977	−0.3103	−0.2512
$Mood$	120	104	57	44	39
α	0.64	0.62	0.52	0.56	0.55
$\acute{\alpha}$	0.83	0.75	0.67	0.68	0.69
$\acute{\alpha}-\alpha$	0.19	0.13	0.15	0.12	0.14

June 2018
Green Bond Principles
Voluntary Process Guidelines for Issuing Green Bonds

International Capital Market Association

ICMA Paris Representative Office
62 rue la Boétie
75008 Paris
France

Tel: +33 1 70 17 64 70

greenbonds@icmagroup.org

- **renewable energy** (including production, transmission, appliances and products);
- **energy efficiency** (such as in new and refurbished buildings, energy storage, district heating, smart grids, appliances and products);
- **pollution prevention and control** (including reduction of air emissions, greenhouse gas control, soil remediation, waste prevention, waste reduction, waste recycling and energy/emission-efficient waste to energy);
- **environmentally sustainable management of living natural resources and land use**

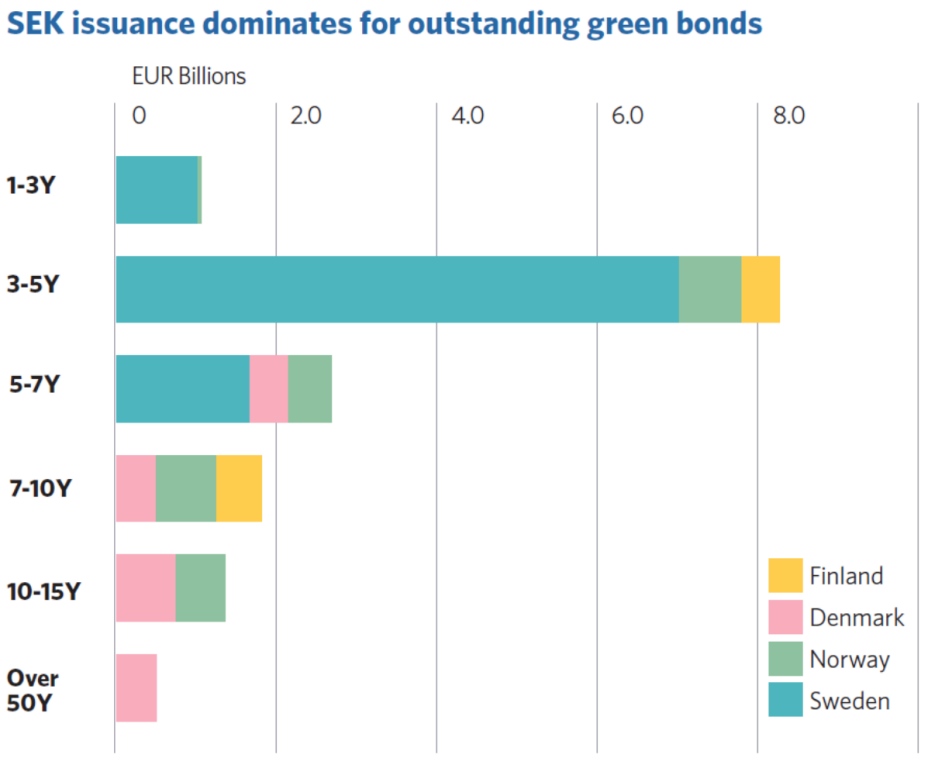
Green Bond Principles (GBP) 2018

(i) renewable energy
(ii) energy efficiency
(iii) pollution prevention and control
(iv) environmentally sustainable management of living natural resources and land use
(v) terrestrial and aquatic biodiversity conservation
(vi) clean transportation
(vii) sustainable water and wastewater management
(viii) climate change adaptation
(iX) eco-efficient and/or circular economy adapted products, production technologies and processes
(X) green buildings which meet regional, national or internationally recognized standards or certifications.

Source: The Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds, ICMA, June 2018

Green bond issues in Nordic Countries, Example

Sweden		10,239
State Bank	SBAB Bank	397
	Swedish Export Credit	444
LGFA	Kommuninvest	1,511
Bank	Nordea Bank	500
	SEB	500
	Swedbank	500
Local government	City of Gothenburg	601
	City of Lunds	77
	City of Malmö	131
	City of Norrköping	62
	City of Västerås	76
	Örebro Kommun	133
	Region Skåne	124
	Stockholms Läns Landsting	518
Agri/Forestry	Södra Skogsägarna	107
	Svenska Cellulosa AB	170
Agri/Forestry GBE	Sveaskog	213



Green Banking

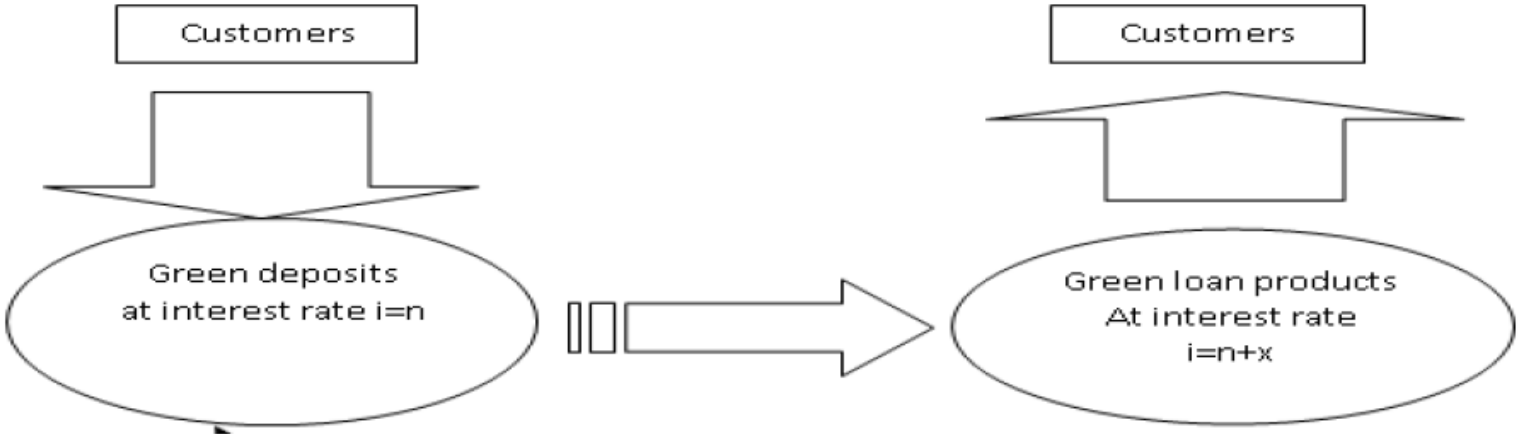
Ecology & Safety
ISSN 1314-7234, Volume 9, 2015

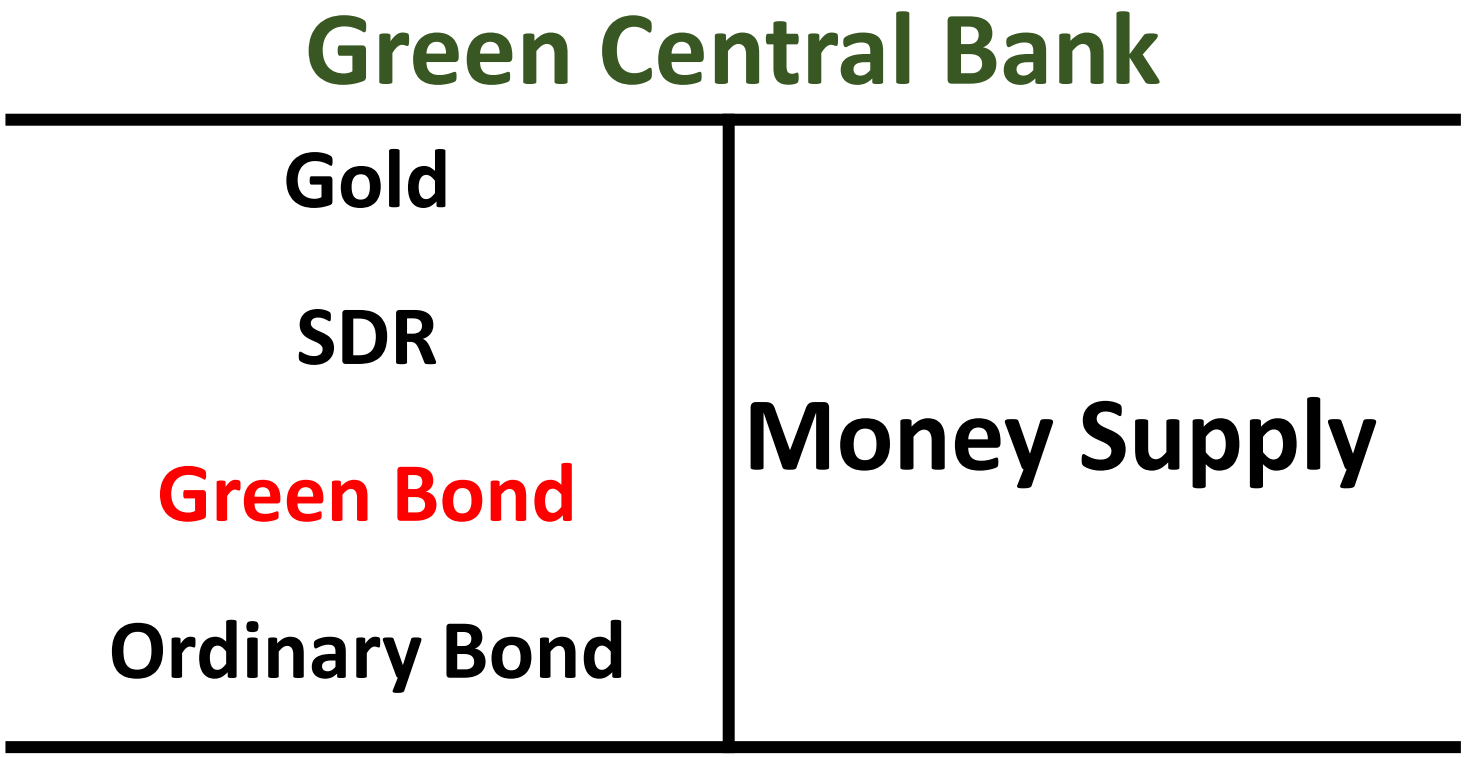
Journal of **International Scientific Publications**
www.scientific-publications.net

GREEN BANKING – DEFINITION, SCOPE AND PROPOSED BUSINESS MODEL

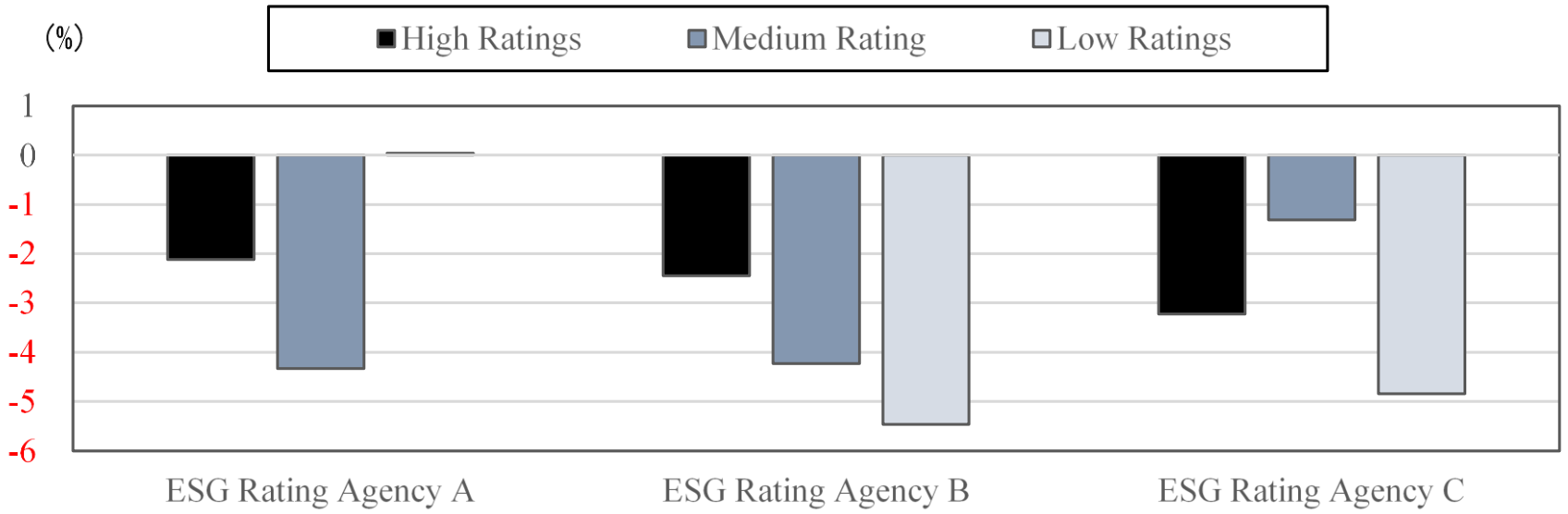
Virginia Zhelyazkova, Yakim Kitanov

VUZF University, 1, Gusla Str., Sofia




Green Central Bank
Gold
SDR
Green Bond
Ordinary Bond
Money Supply

ESG and Stock Price : Relations



Note: Only stocks covered by each ESG rating agency are aggregated. The estimation period is the first quarter of 2020 (December 30, 2019 to March 31, 2020).

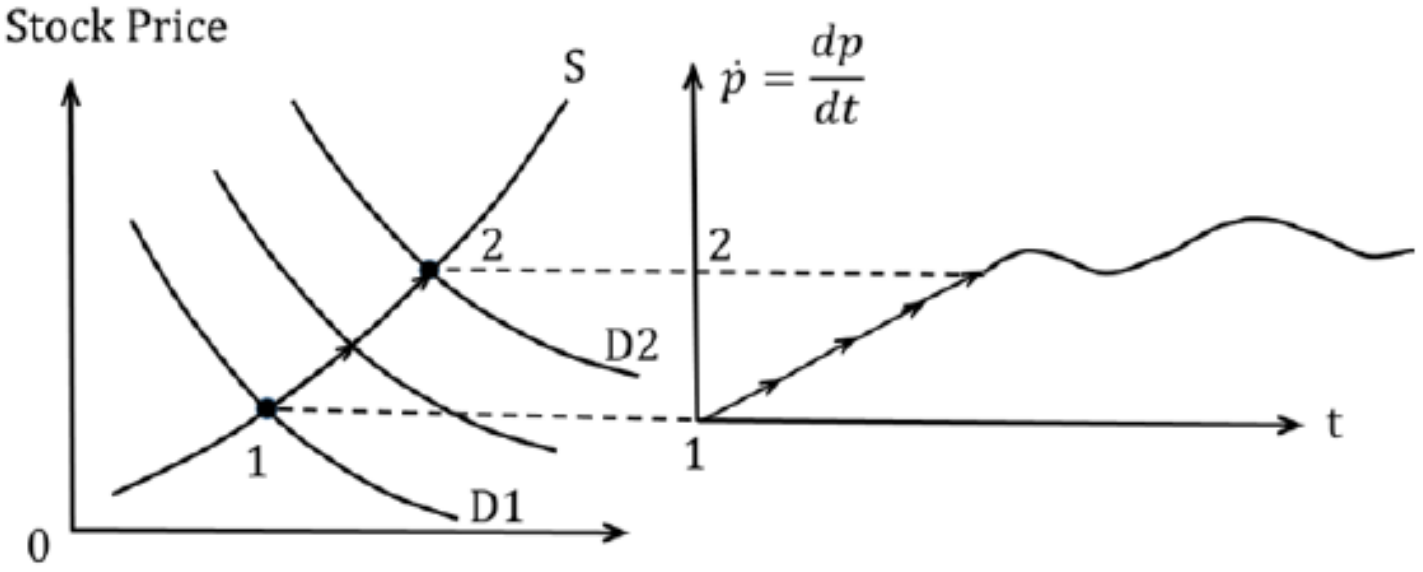
Source: Authors' calculations from Bloomberg data.

Figure 6: ESG score (high-medium-low quintile) and stock returns (first quarter of 2020)

ESG investment and Stock Price

$$\frac{dp}{dt} = \dot{p} = \lambda\{D(R, \sigma, ESG - \underline{ESG}) - S(r, Y)\} \tag{29}$$

$$\frac{dp}{dt} = \dot{p} = \lambda\{D(R, \sigma) - S(r, Y)\} \tag{30}$$



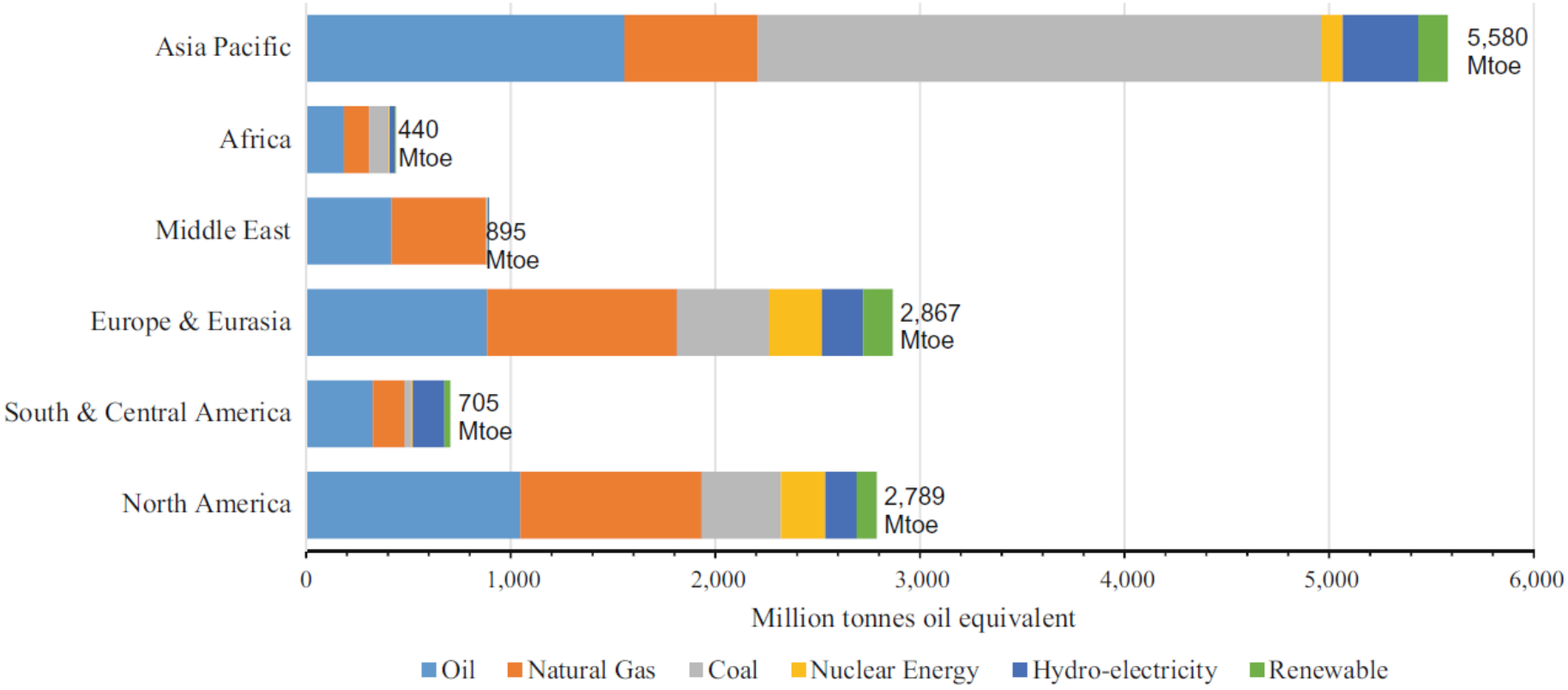
Infrastructure Investment Needs by Sector, 2016-2030

($ billion in 2015 prices)

Sector	Baseline estimates		
	Investment Needs	Annual average	% share to total
Power	**11689**	**779**	**51.8**
Transport	**7796**	**520**	**34.6**
Telecommunications	**2279**	**152**	**10.1**
Water and Sanitation	**787**	**52**	**3.5**
Total	**22551**	**1503**	**100**

Source: Meeting Asia's Infrastructure Needs, ADB (2017)

Energy Sources



Green energy projects categorized into two groups based on scale:

A) large projects, such as Hydro-power:
B) Community type green energy project (Hometown Crowd Funds)

Large projects can be financed by **i) insurance and pension funds,** that have long-term Financing.

Bank loans are not so much suitable for these project, because energy projects are long-term (10-20 years),
However bank deposits are short to medium-term (1-5 years).

Hydropower plant

Figure 5.4: Debt Service in Selected Developing Asian Economies, 2019 and 2020

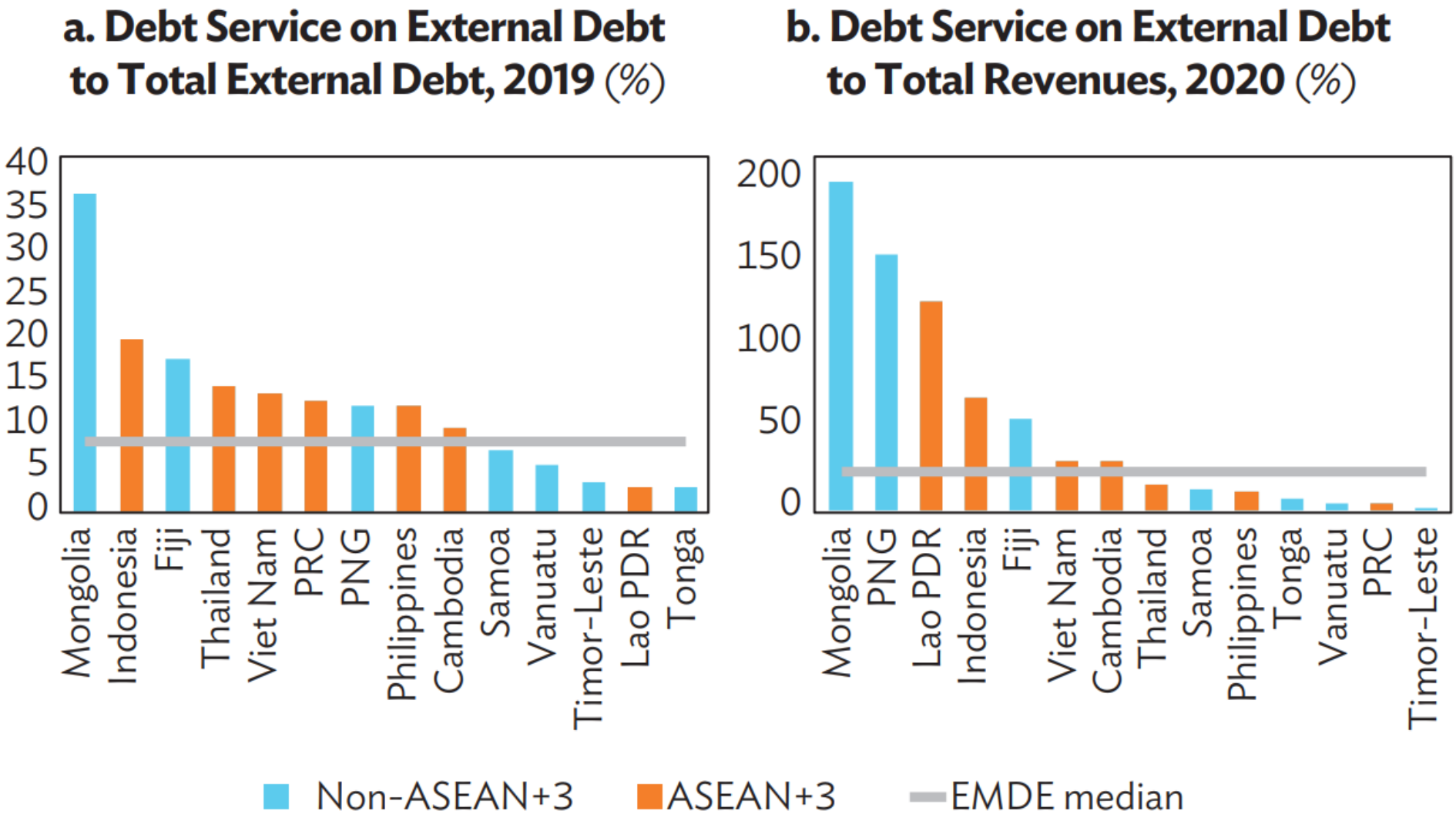
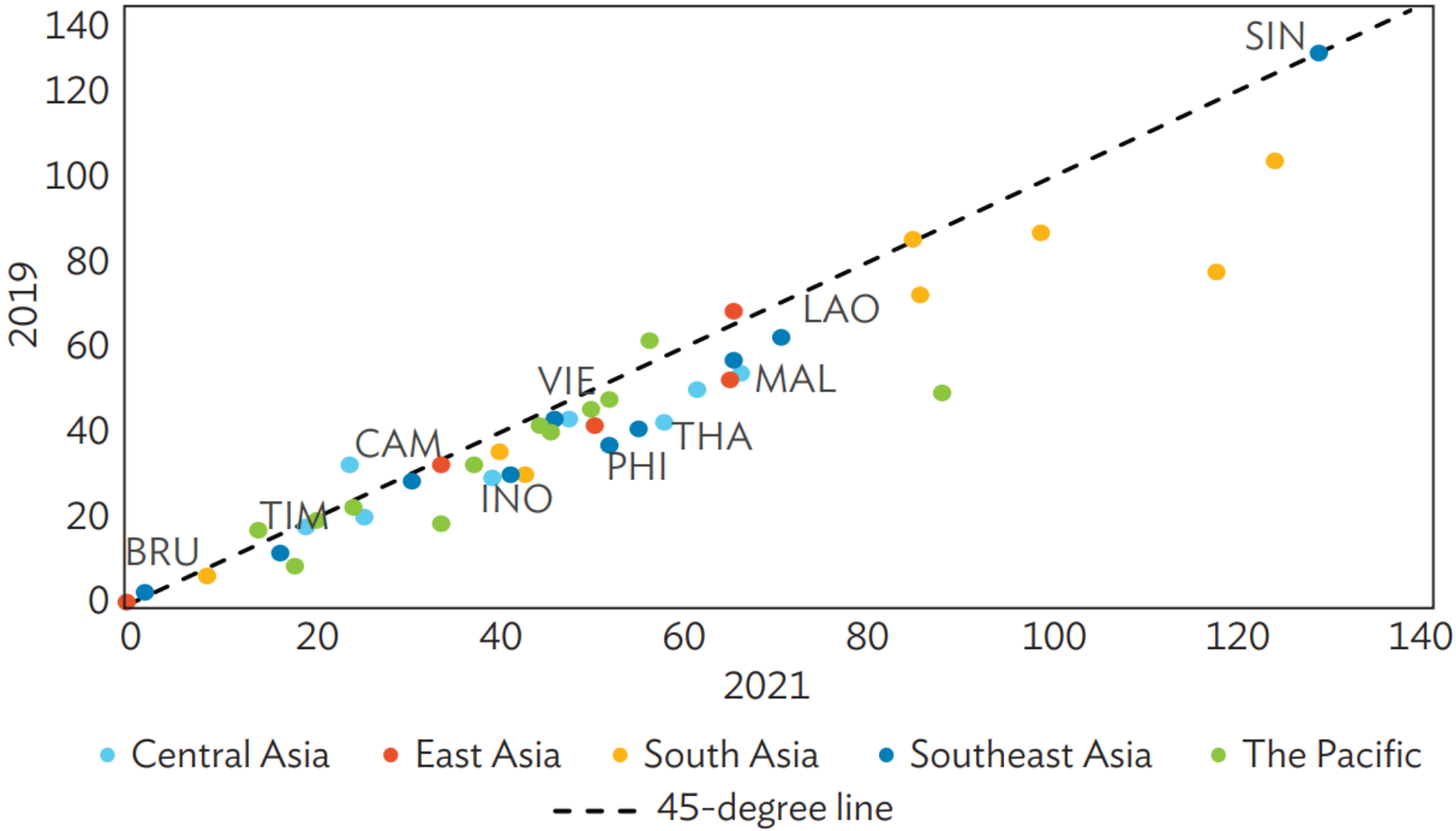


Figure 5.10: Comparing Public Debt in 2019 and 2021



BRU = Brunei Darussalam, CAM = Cambodia, INO = Indonesia, LAO = Lao PDR, MAL = Malaysia,

PPP = Public Private Partnerships

Realizing The Potential of Public Private Partnerships to Advance Asia's Infrastructure Development

Akash Deep
Jungwook Kim
Minsoo Lee

ADB (2019)

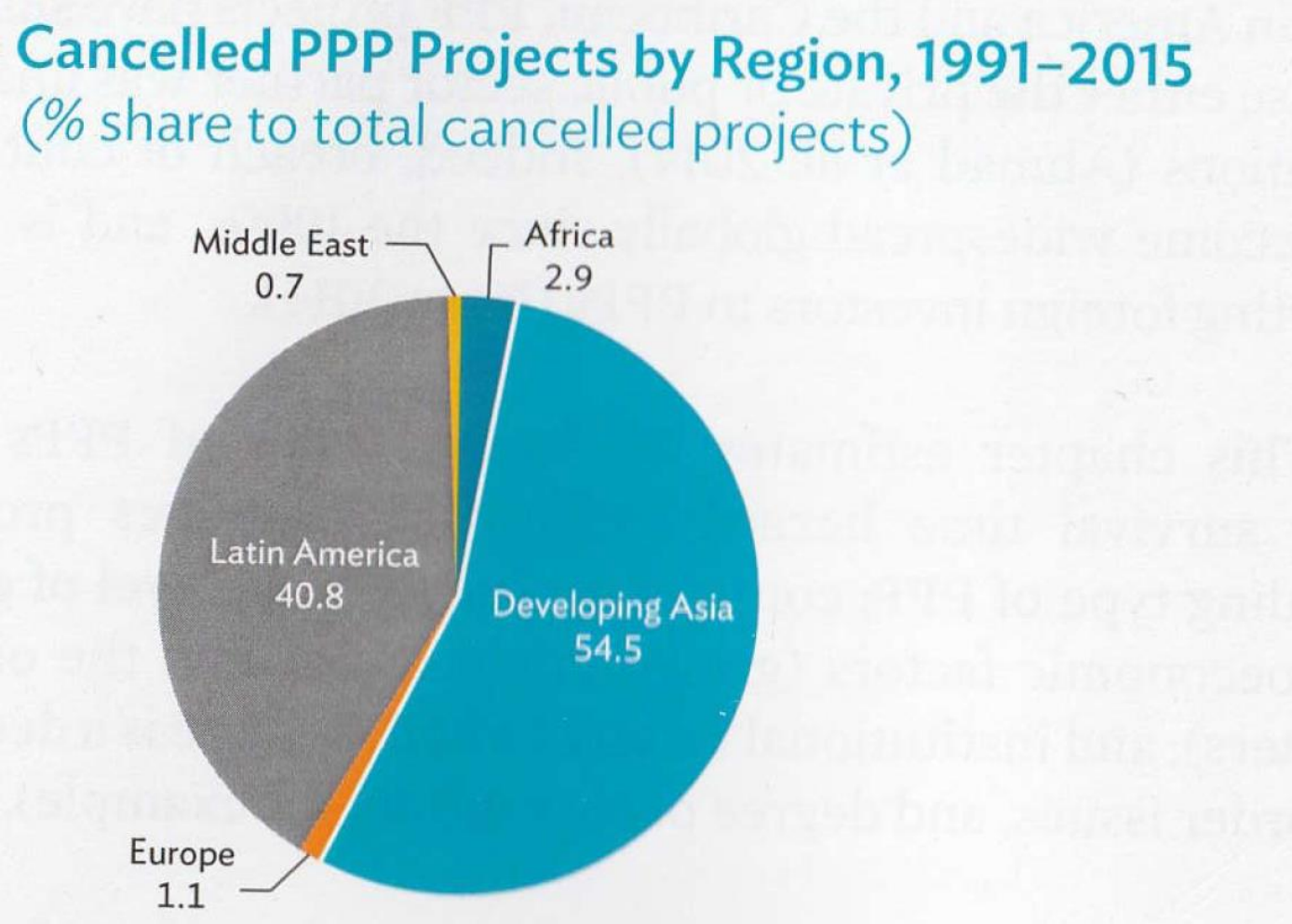
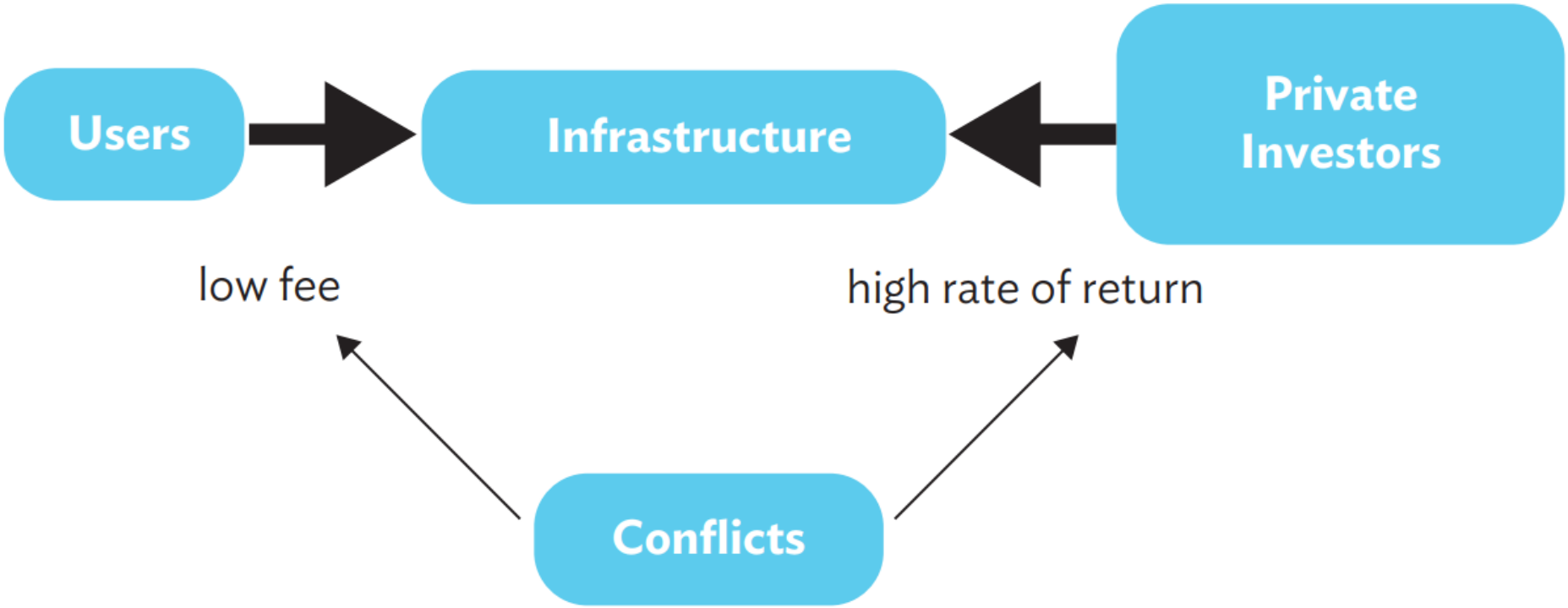
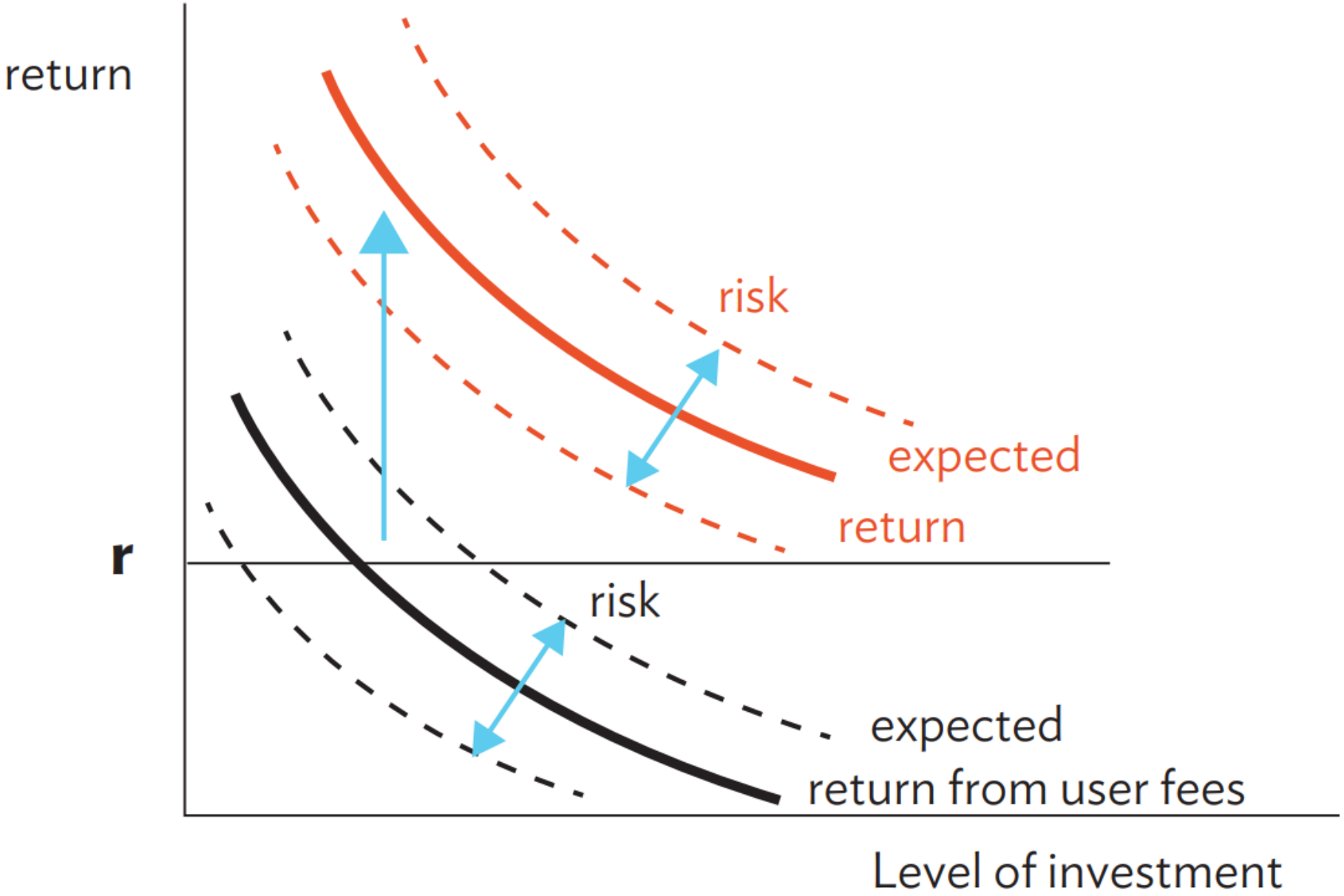


Figure 5.6: Conflict of Interest between Users and Investors



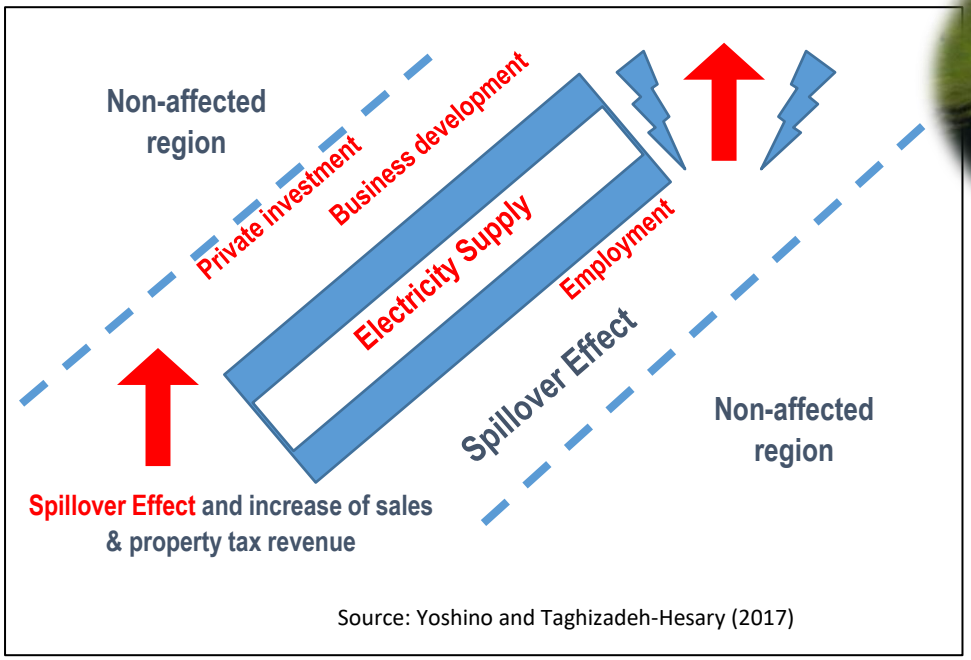
Source: Authors.

Figure 5.2: Expected Rate of Return and Risk Profile of Project Bonds versus Benchmark Yield



Injection of Increased tax revenues from the spillover effect into energy projects in order to increase the rate of return for private investors

Spillover effects of electricity supply



Source: Yoshino and Taghizadeh-Hesary (2017)

Journal of Infrastructure, Policy and Development (2020) Volume 4 Issue 2.
DOI: 10.24294/jipd.v4i2.1236

ORIGINAL ARTICLE

Financing infrastructure using floating-interest-rate infrastructure bond†

Naoyuki Yoshino[1], Dina Azhgaliyeva[2] and Ranjeeta Mishra[2]*

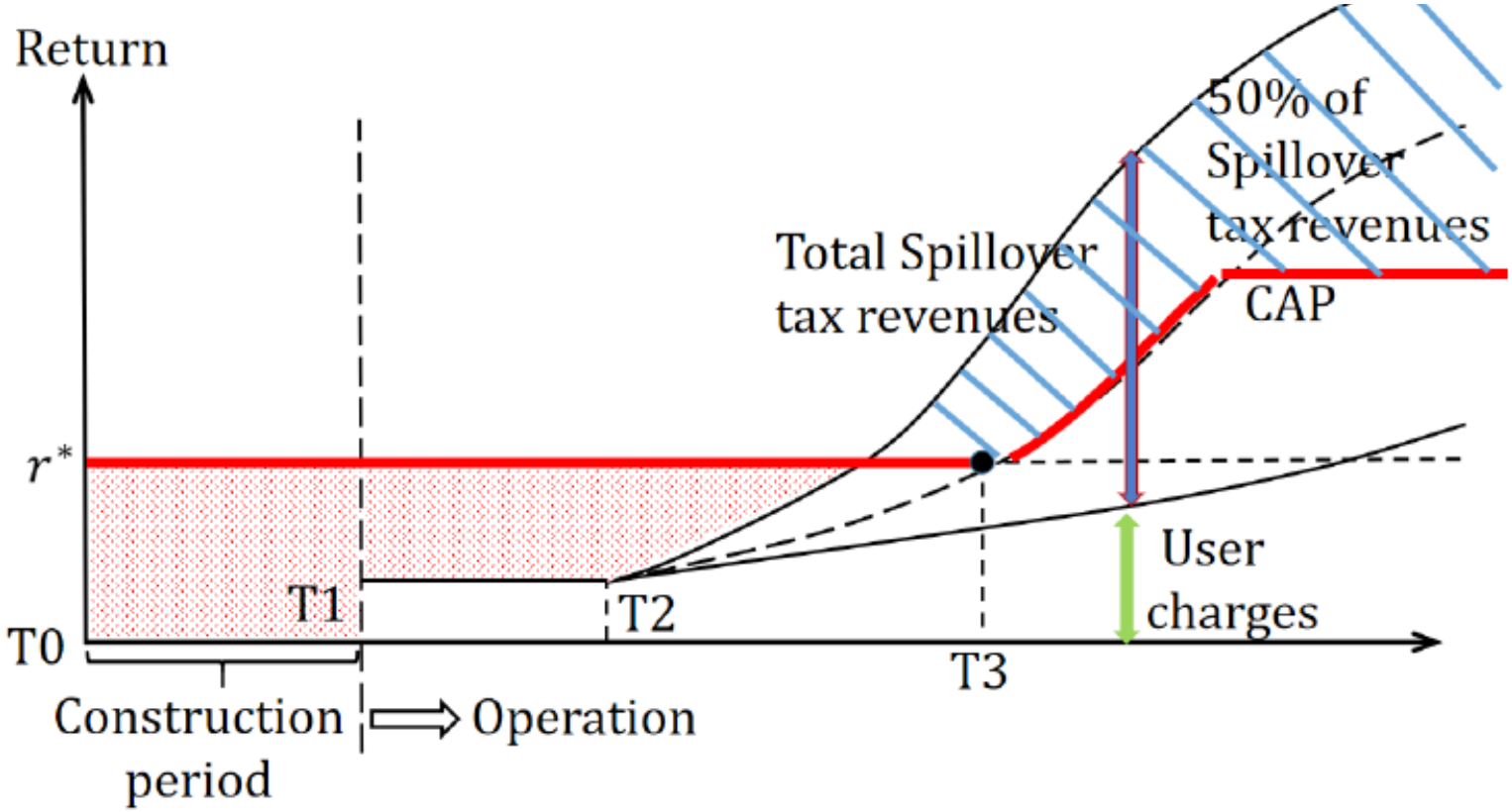


Figure 4. The proposed floating-rate infrastructure bonds to make spillover tax return in practice.

Various Private Financial Investors in Asia

1, **Banks --- Safer projects**

- Brown field (infrastructure)
- Invest into operation period
- Securitization after certain period of time
- Privatized projects by the government

2, **Insurance and Pension funds**

- Long term projects (10 years –20- 30 years)

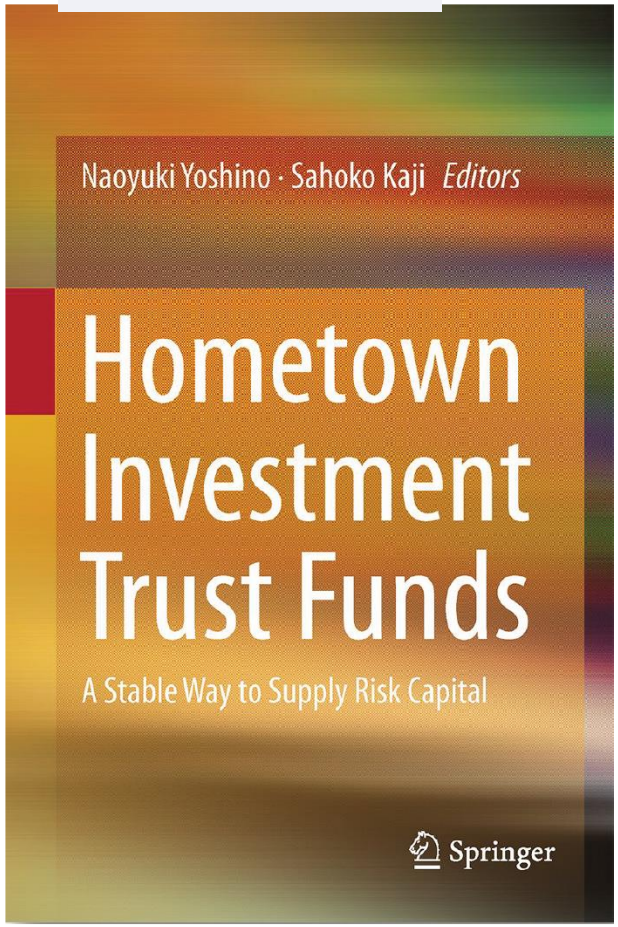
3, **Revenue Bonds (floating interest rate)**

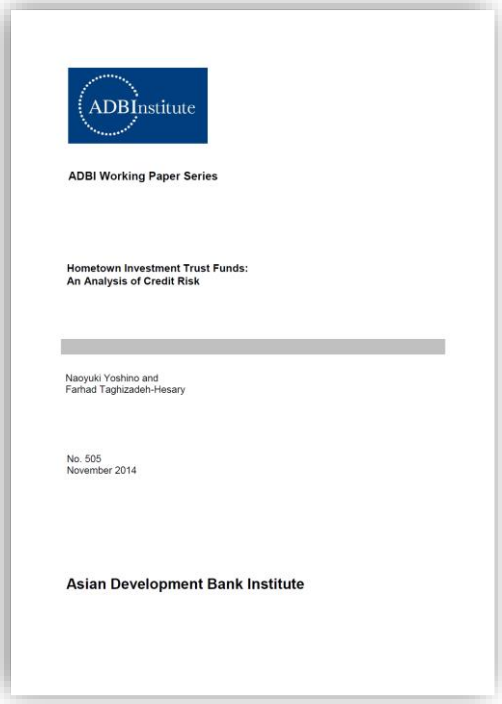
- uncertain income streams

4, **Equity Investments**

- Construction period and Green fields

Possible Solutions
by use of community funds
For Risky businesses





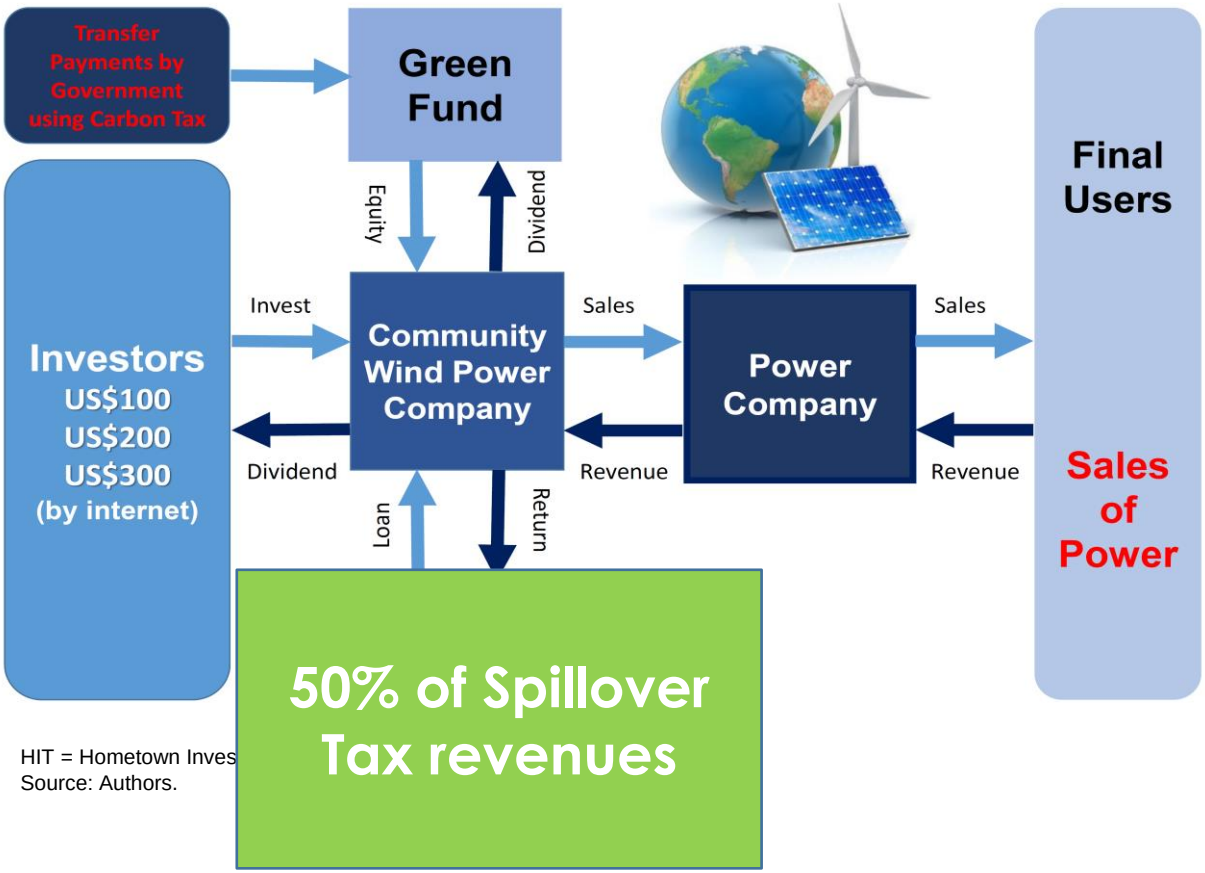
Hometown Investment Trust Funds

A Stable Way to Supply Risk Capital
Yoshino, Naoyuki; Kaji Sahoko (Eds.), 2013,

ADBI Working Paper Series

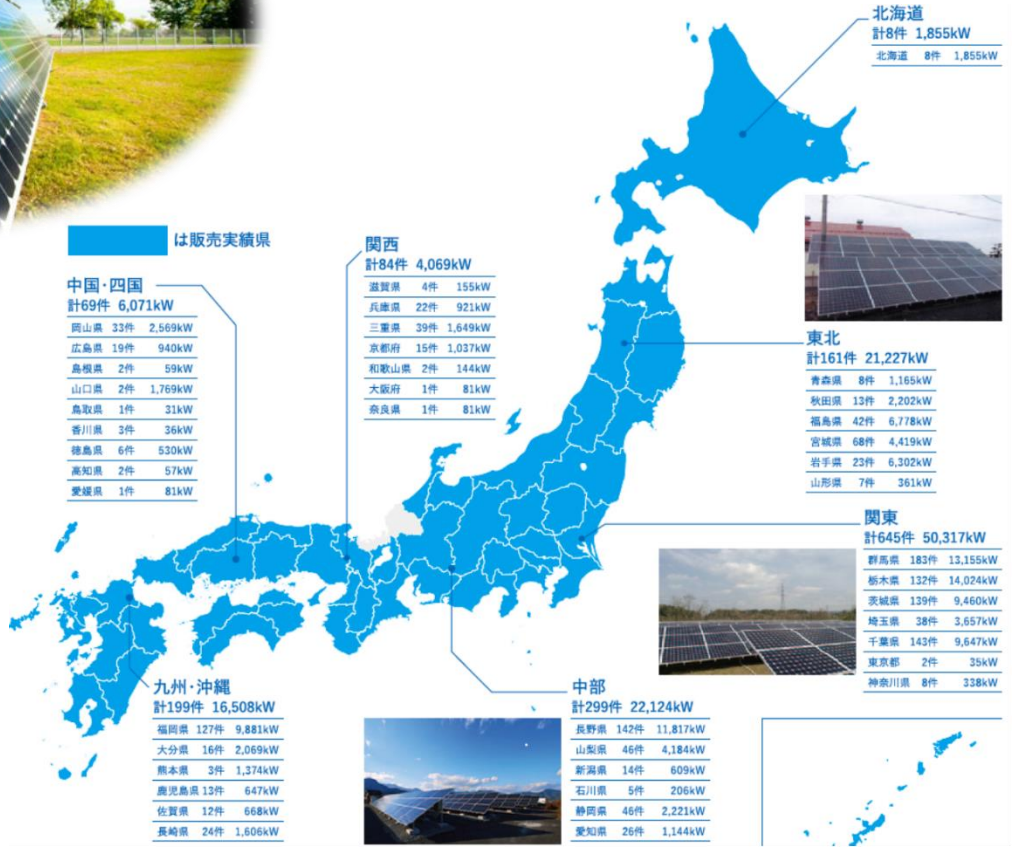
Naoyuki Yoshino and
Farhad Taghizadeh-Hesary

Financing Scheme for Renewable Energy Projects Using HITs and Injecting Carbon Tax

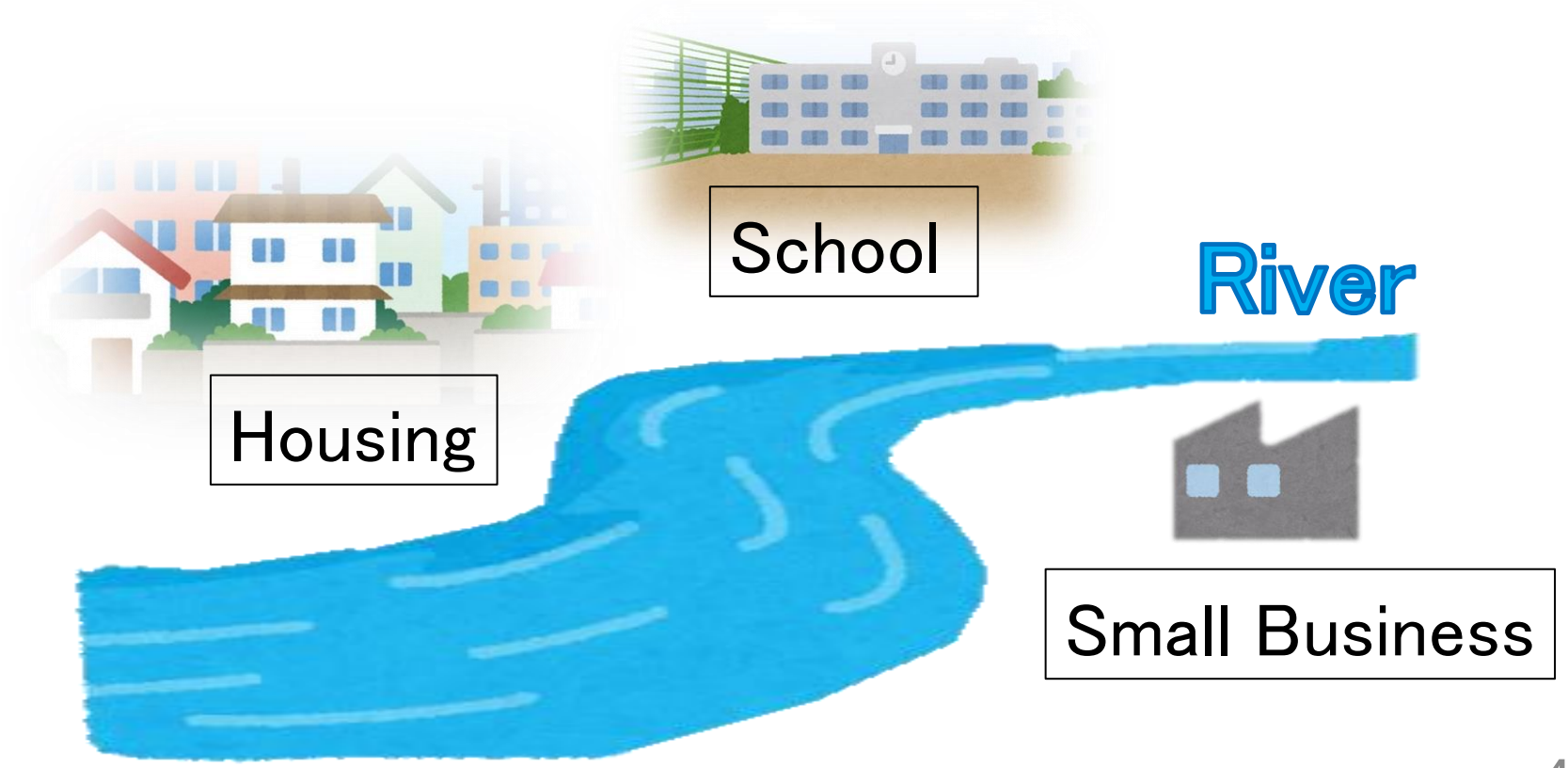


HIT = Hometown Inves
Source: Authors.

Solar Power projects in Japan



Spillover Effect of Community Based Hydro Power



Structure of Wind Power Fund

249 people participated (donation and investment)

Total cost of one wind power = 2 million US $

5% extra price is charged = (1+0.05)X PE

People should reduce Energy consumption by 5%

so that total energy costs remain the same

<Bank Loans to environmental projects>

Revenue : **sales price**

of electric power supply

cannot set the price

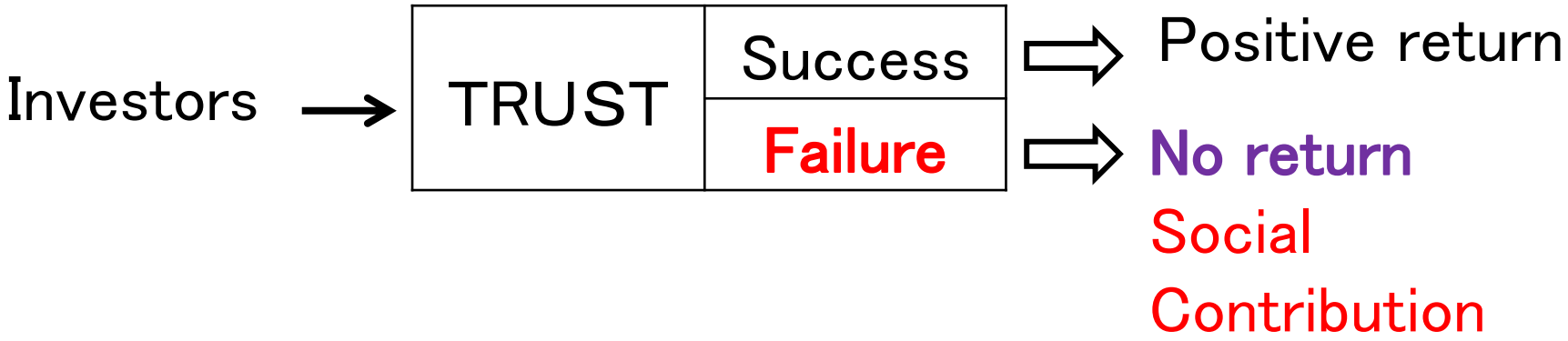
based on MC

(Price=MC)

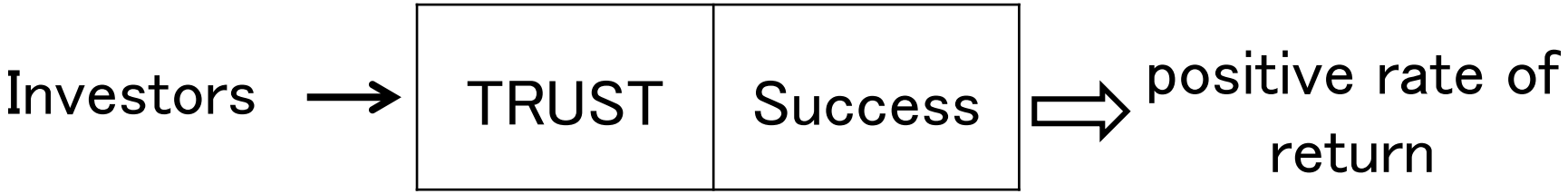
Traditional Banking

Bank Loans	Deposits	transaction account savings account
	Capital	

Not Necessarily High Rate of Return



Success Case: High Rate of Return



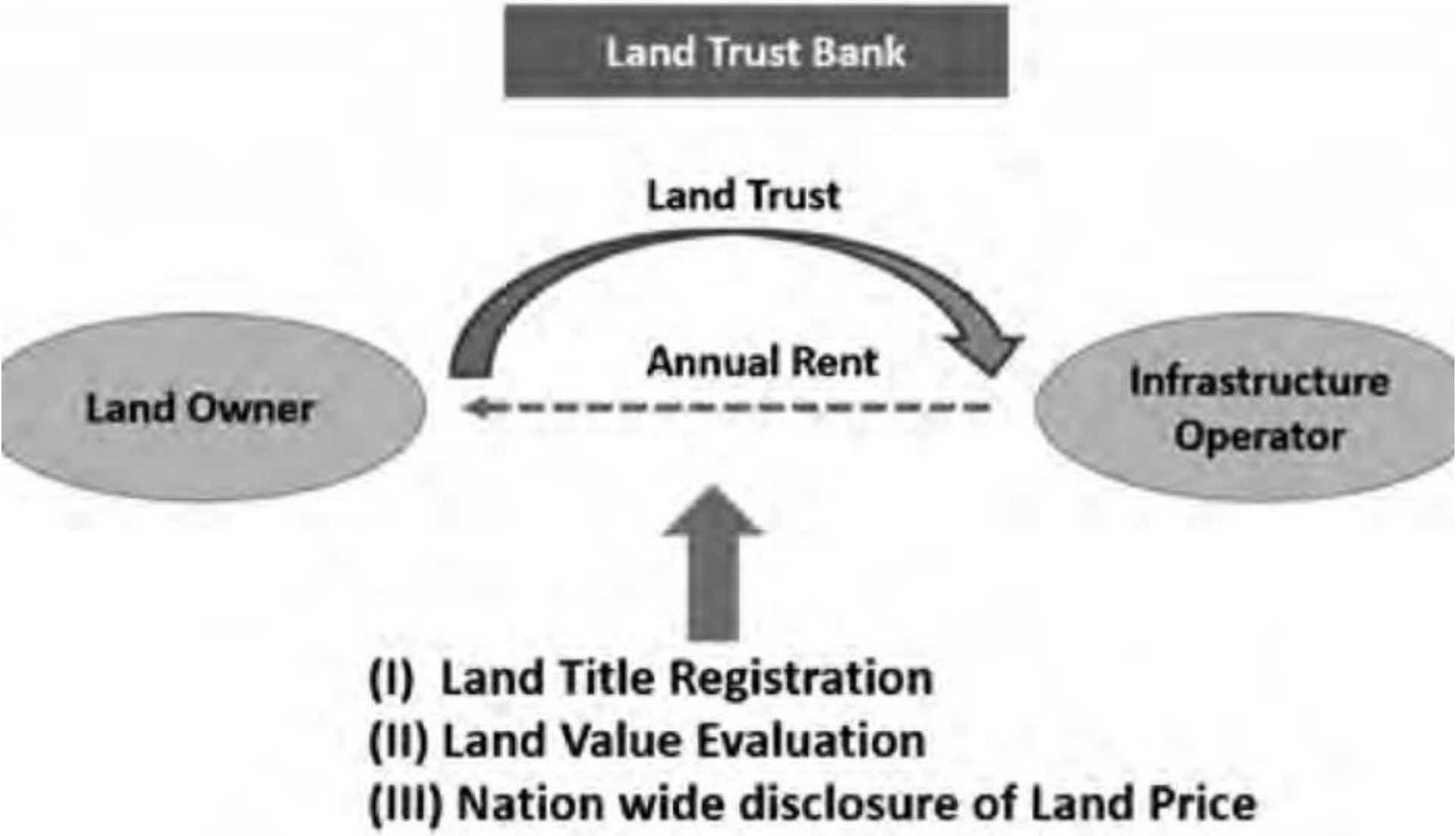
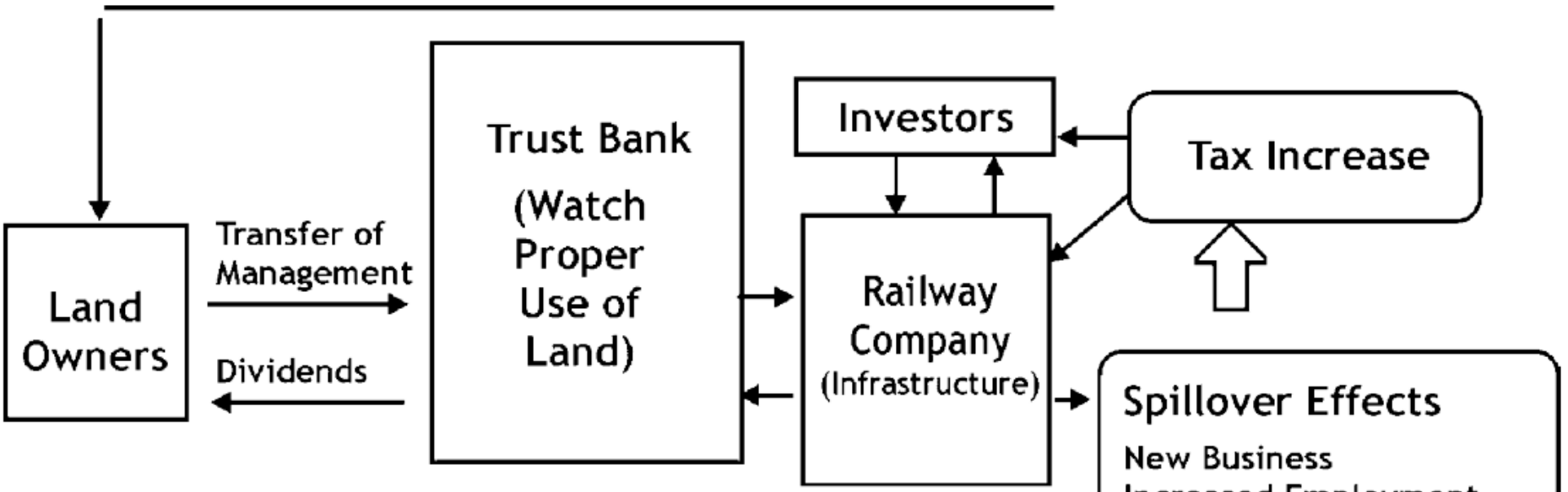


Figure 3: Land Trust Scheme



1. Reduction of Costs of Land Purchase
2. Leasing contract
3. Future tax revenues can be used for repayment
4. Land owners keep their ownership

Figure 2: Land Trust for Infrastructure Investment

Source: *Yoshino, N., Abidhadjaev, U., & Hendriyetty, N. (2019).*

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Thank you for your Attention

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All the statements are based on my own views which do not reflect views of affiliated Institutions.