



Optimal Credit Guarantee Scheme and SME Finance in Asia

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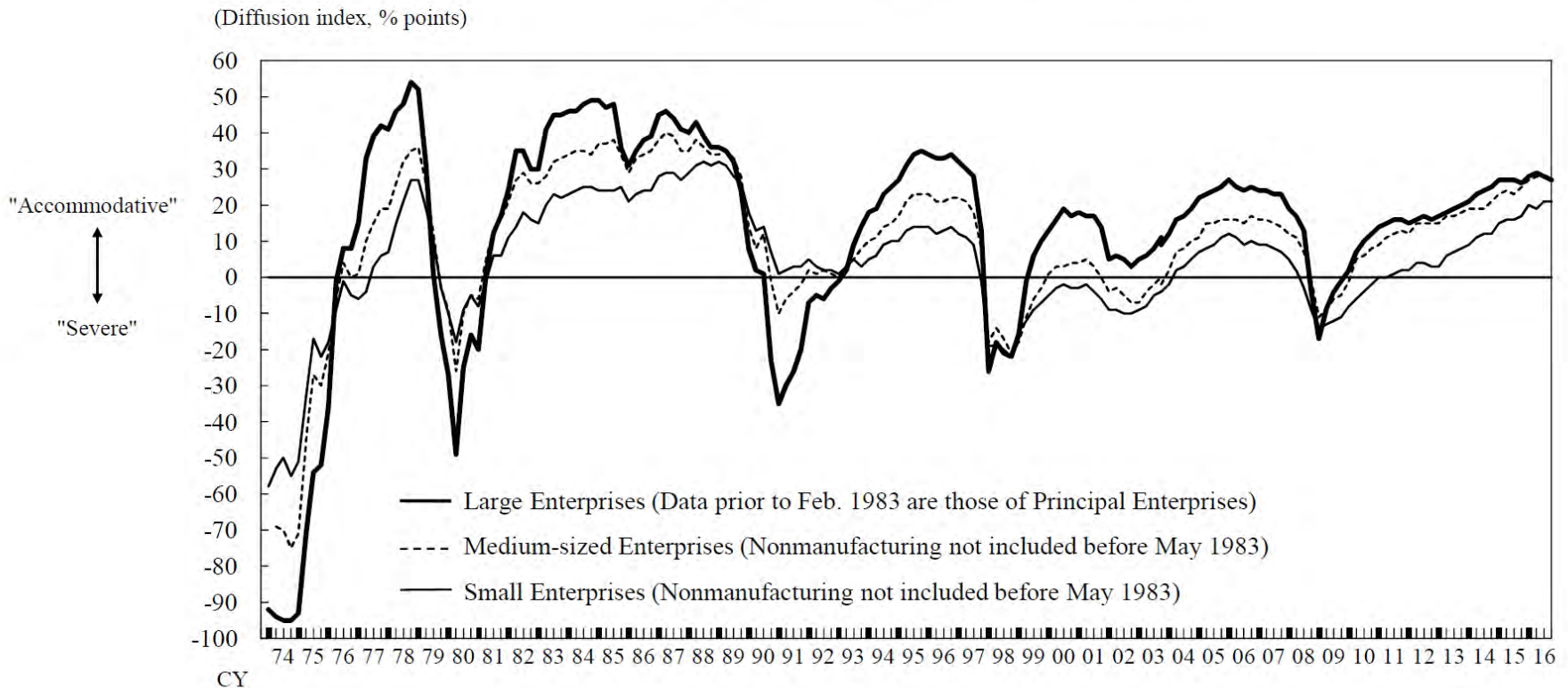
Outline

- I. SMEs' Difficulties in Raising Money in Asia**
- II. Credit Guarantee Schemes and SME Finance**
- III. Optimal Credit Guarantee Ratio**
- IV. Conclusion and the Policy Recommendations**
- V. Next step project**

I. SMEs' Difficulties in Raising Money in Asia

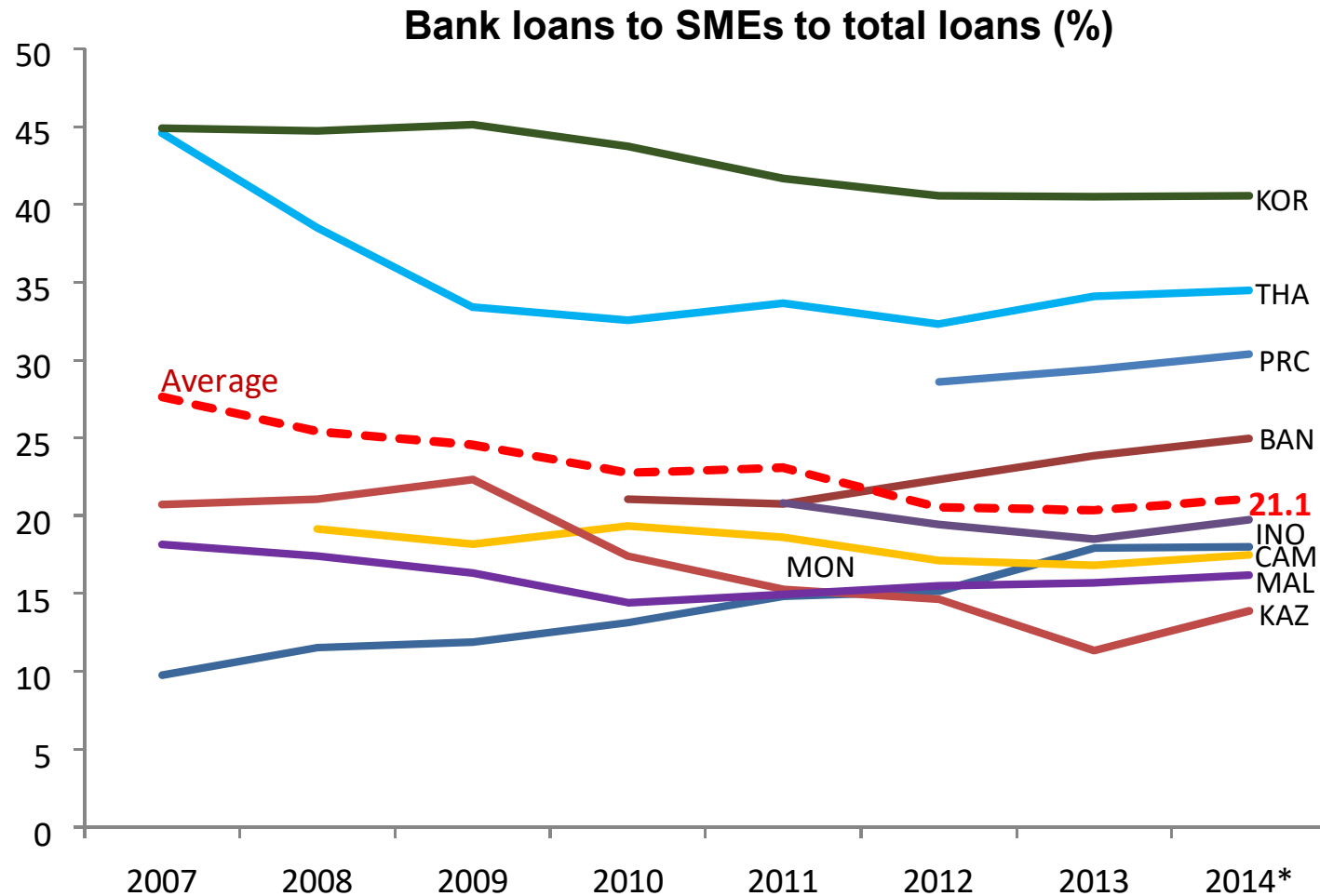
I. SMEs' Difficulties in Raising Money

Lending Attitude of Financial Institutions



Bank of Japan (2016) – TANKAN

Limited bank lending to SMEs in Central Asia is a Challenge

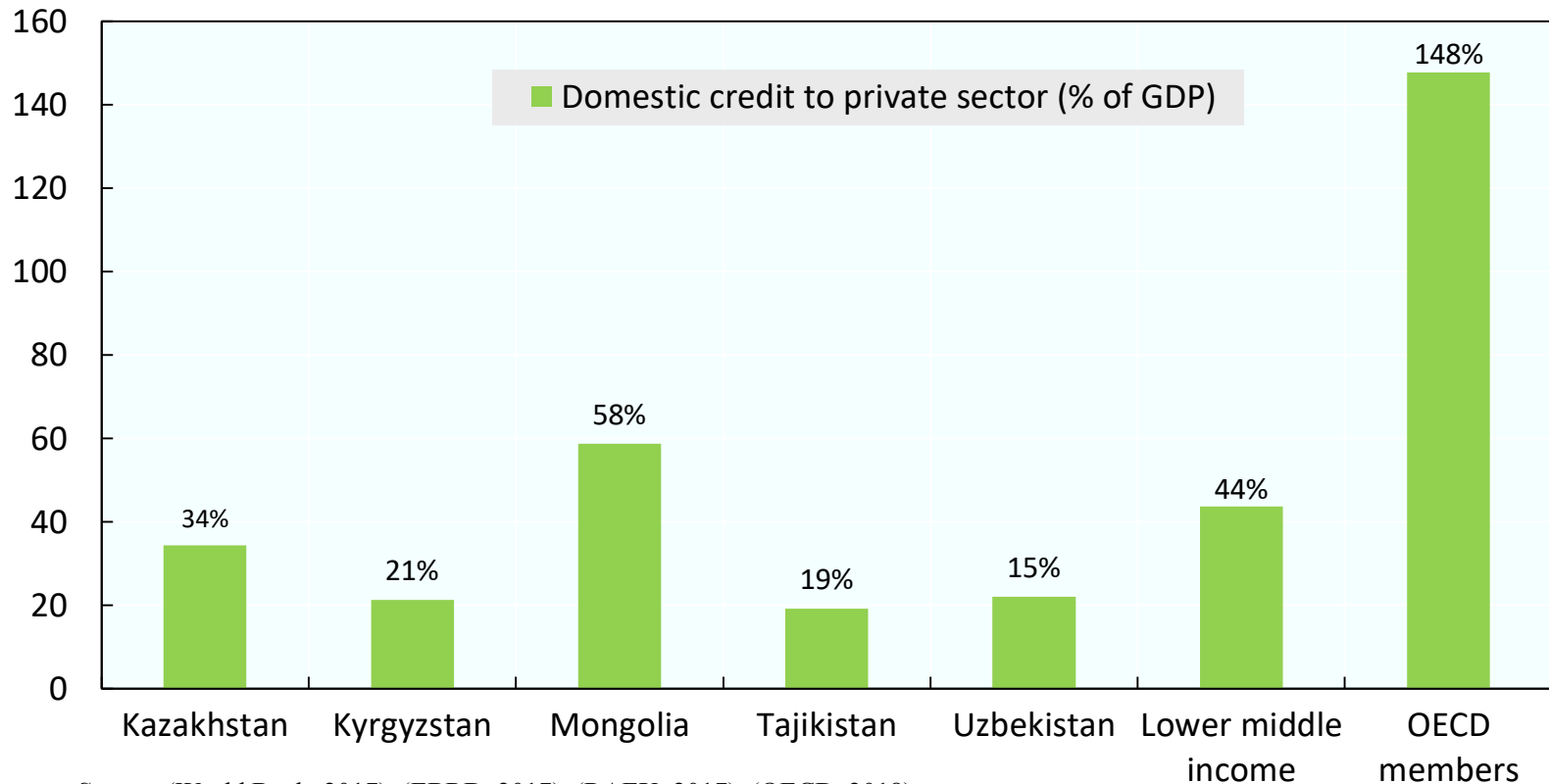


BAN = Bangladesh, PRC = People's Republic of China, IND = India, INO = Indonesia, KAZ = Kazakhstan, KOR = Republic of Korea, MAL = Malaysia, MON = Mongolia, PHI = Philippines, SRI = Sri Lanka, and THA = Thailand.

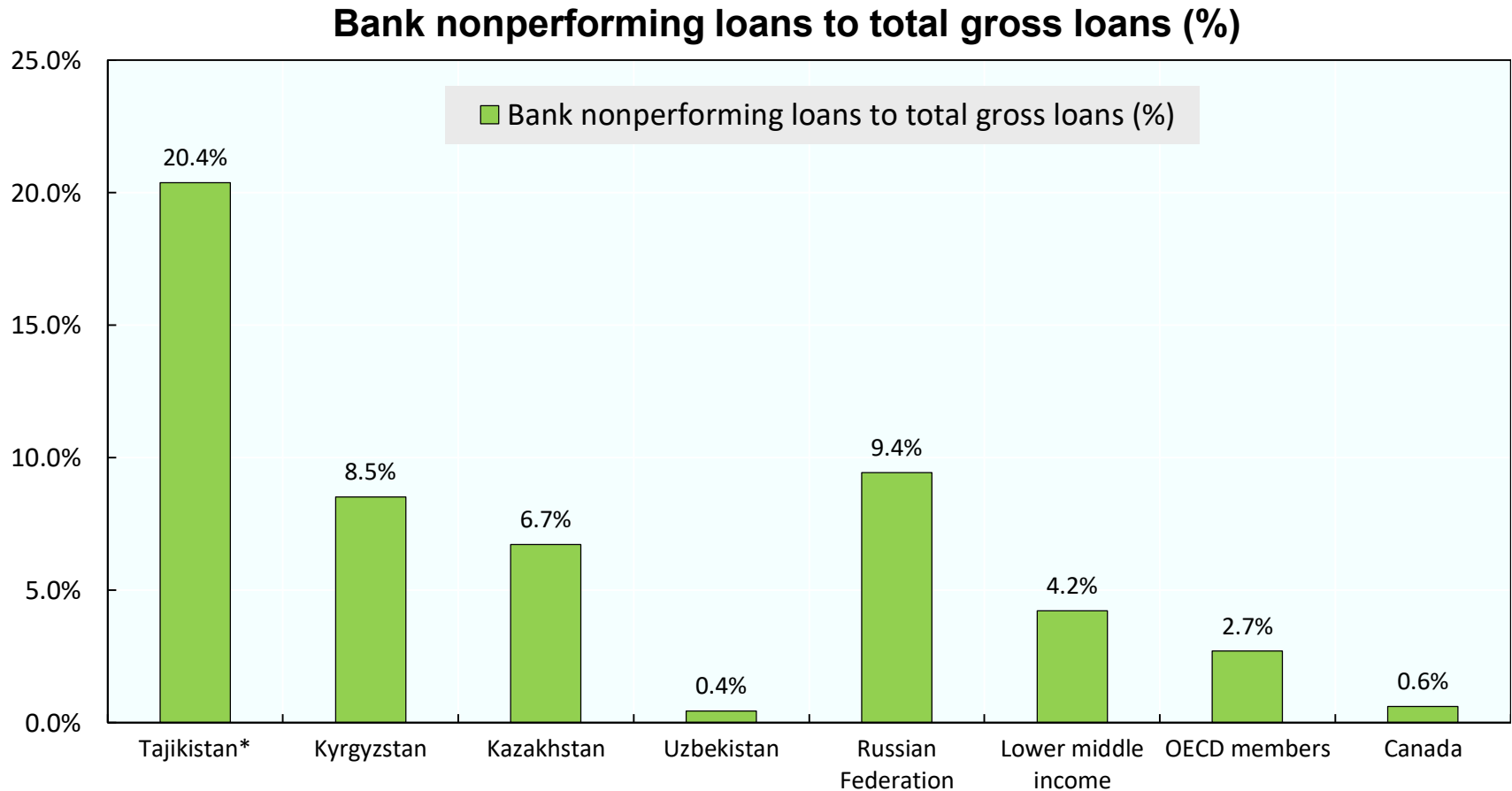
Source: Asia Finance Monitor (2015)

Credit to the private sector in Central Asia remains comparatively modest

Domestic credit to private sector in Central Asia



Non-performing loans remain high in the region

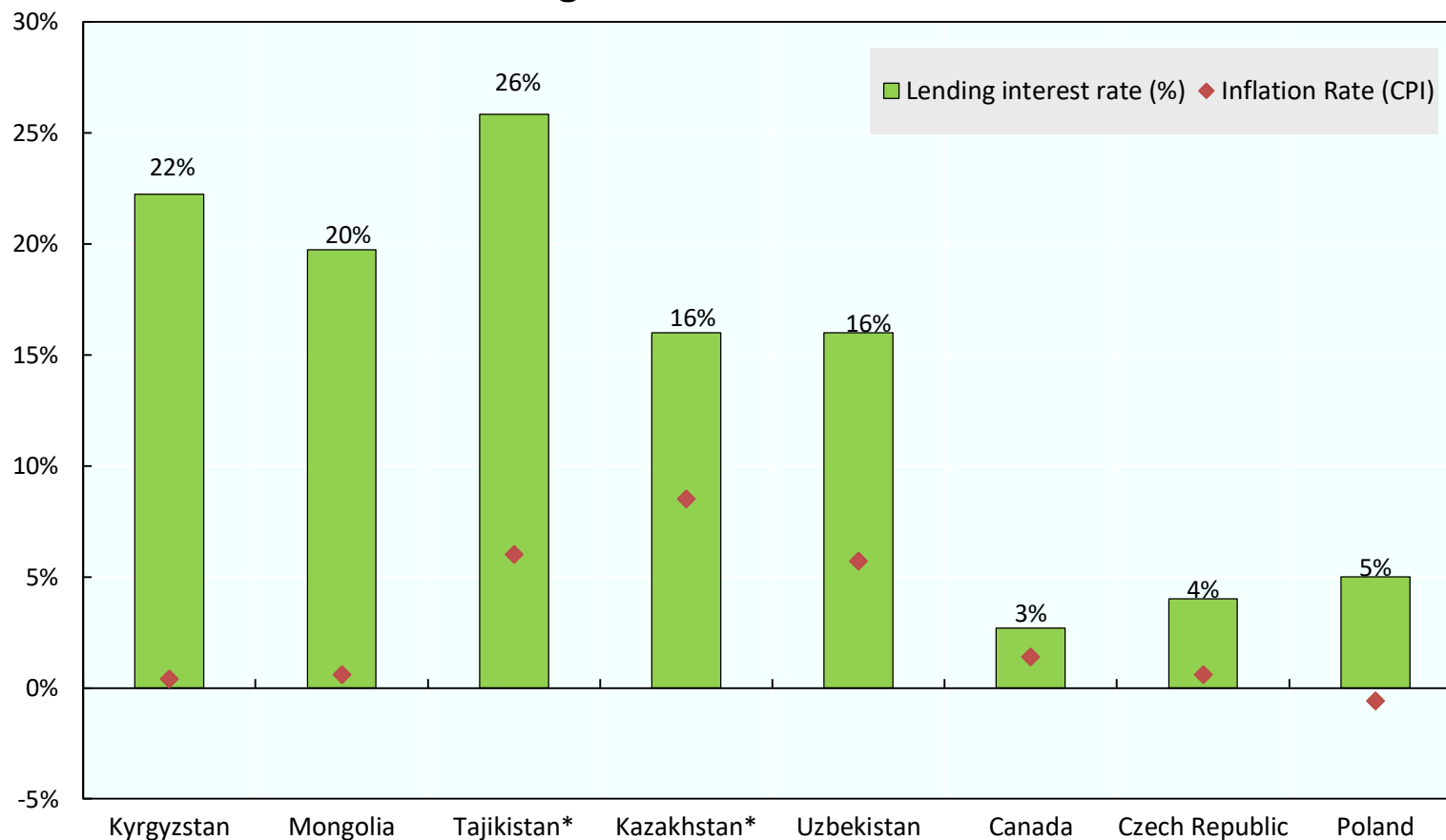


Note: * Data for Tajikistan is from 2014

Sources: (World Bank, 2017; Bank of Mongolia, 2016; OECD, 2018)

Credit conditions are tight with high interest rates in the region

Lending interest rate and inflation rate

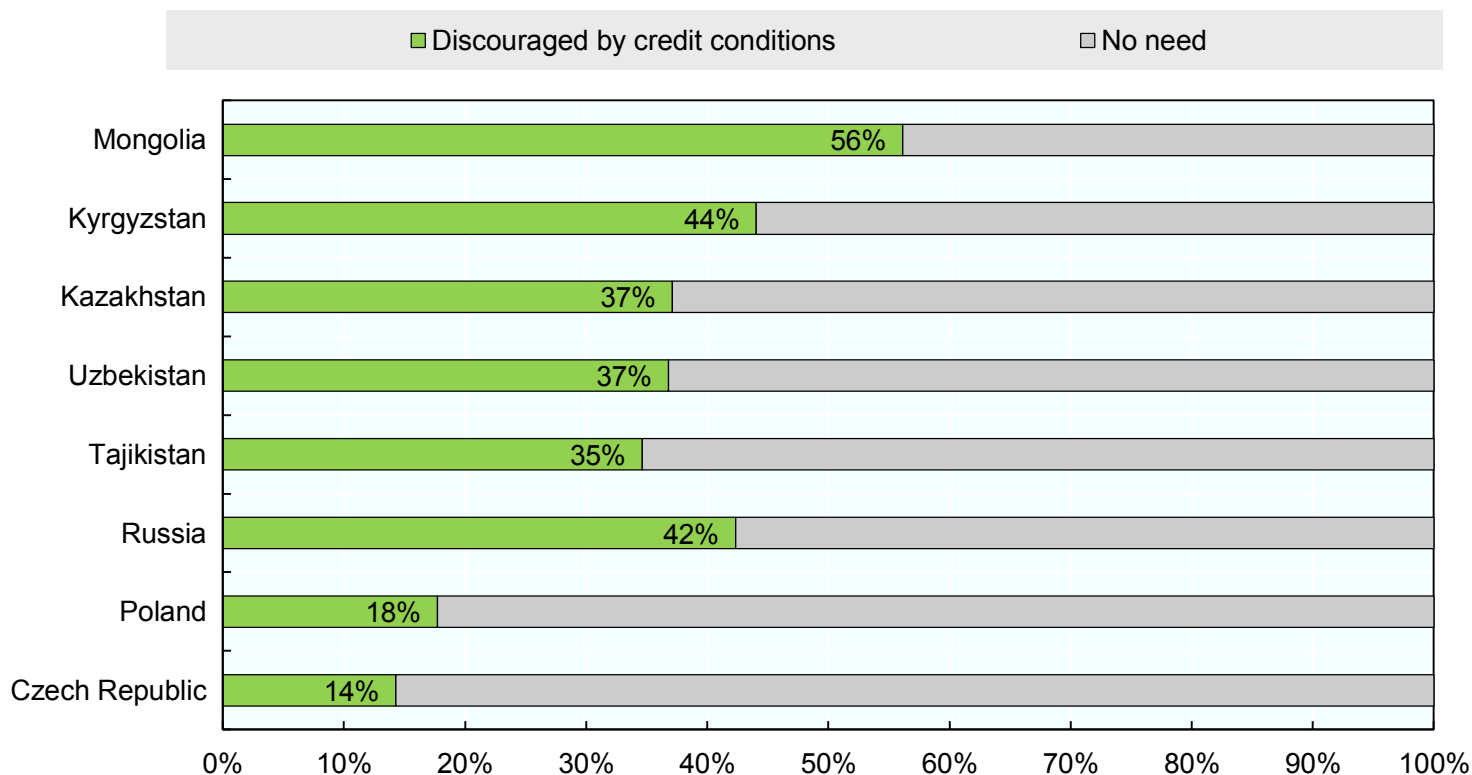


Note: *lending interest rates for Kazakhstan and Tajikistan (2015)

Source: (World Bank, 2017; CIA, 2018; State Committee of Uzbekistan on Statistics, 2018; Ministry of National Economy of Kazakhstan, 2017; OECD, 2018)

More than a third of SMEs are discouraged from applying loans due to tight credit conditions in the region, compared to less than a fifth in selected OECD countries.

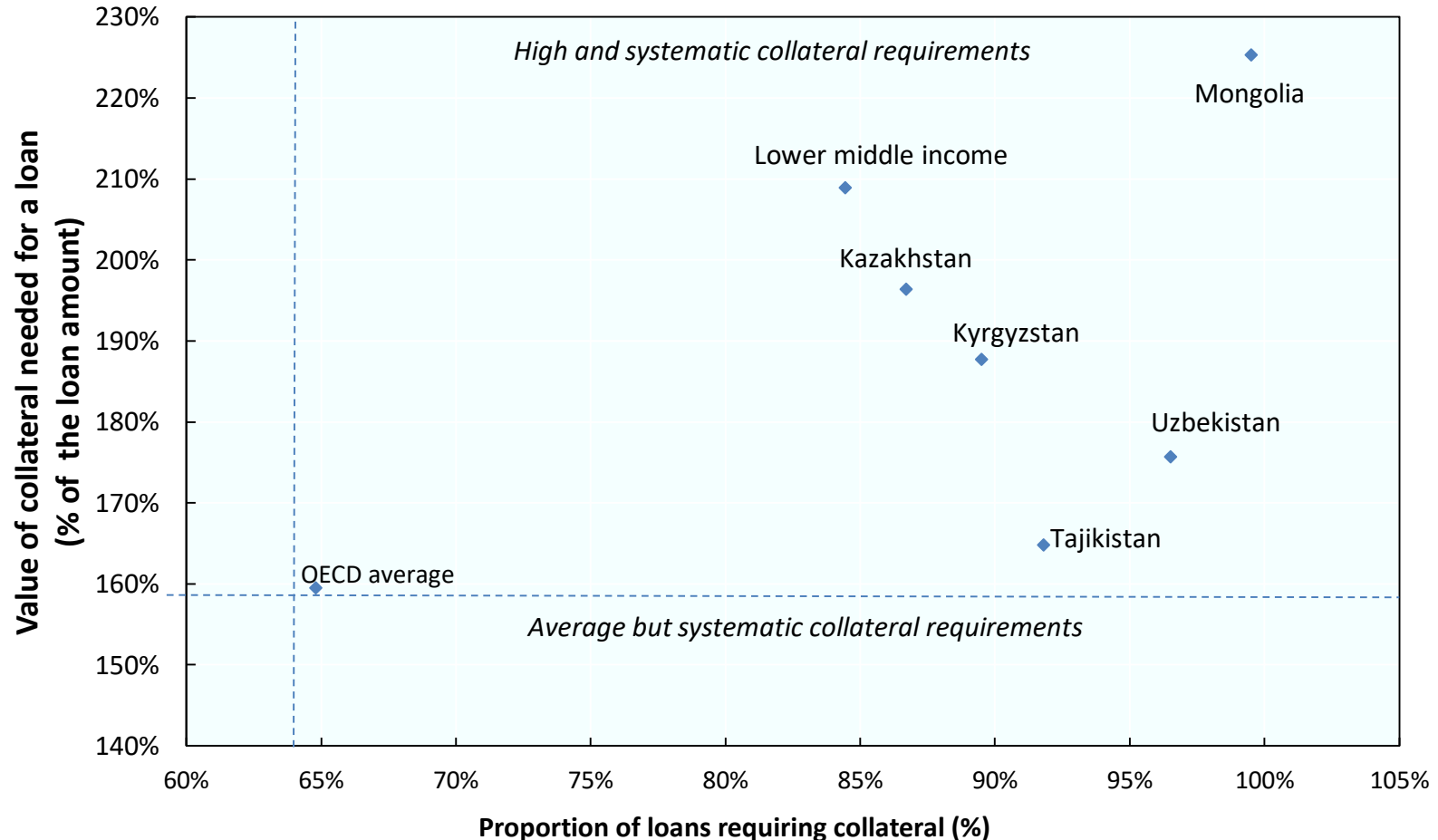
Percentage of SMEs that are discouraged to apply for a loan by credit conditions



Source: (EBRD, 2017; OECD, 2018)

High and systematic collateral requirements limit access to finance for SMEs

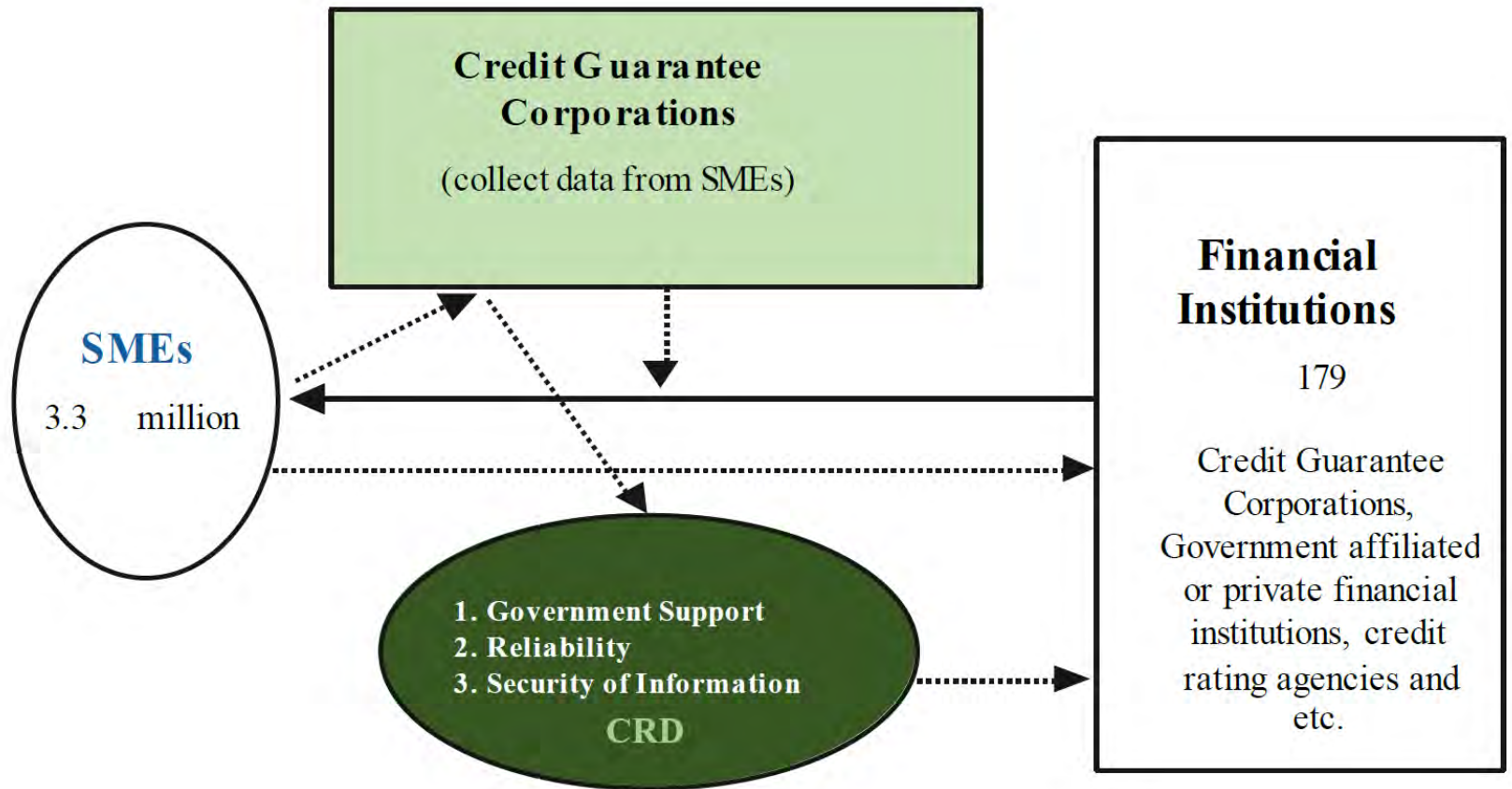
Figure 5. Collateral requirements in Central Asia



Source: (EBRD, 2017; World Bank, 2017; OECD, 2018)

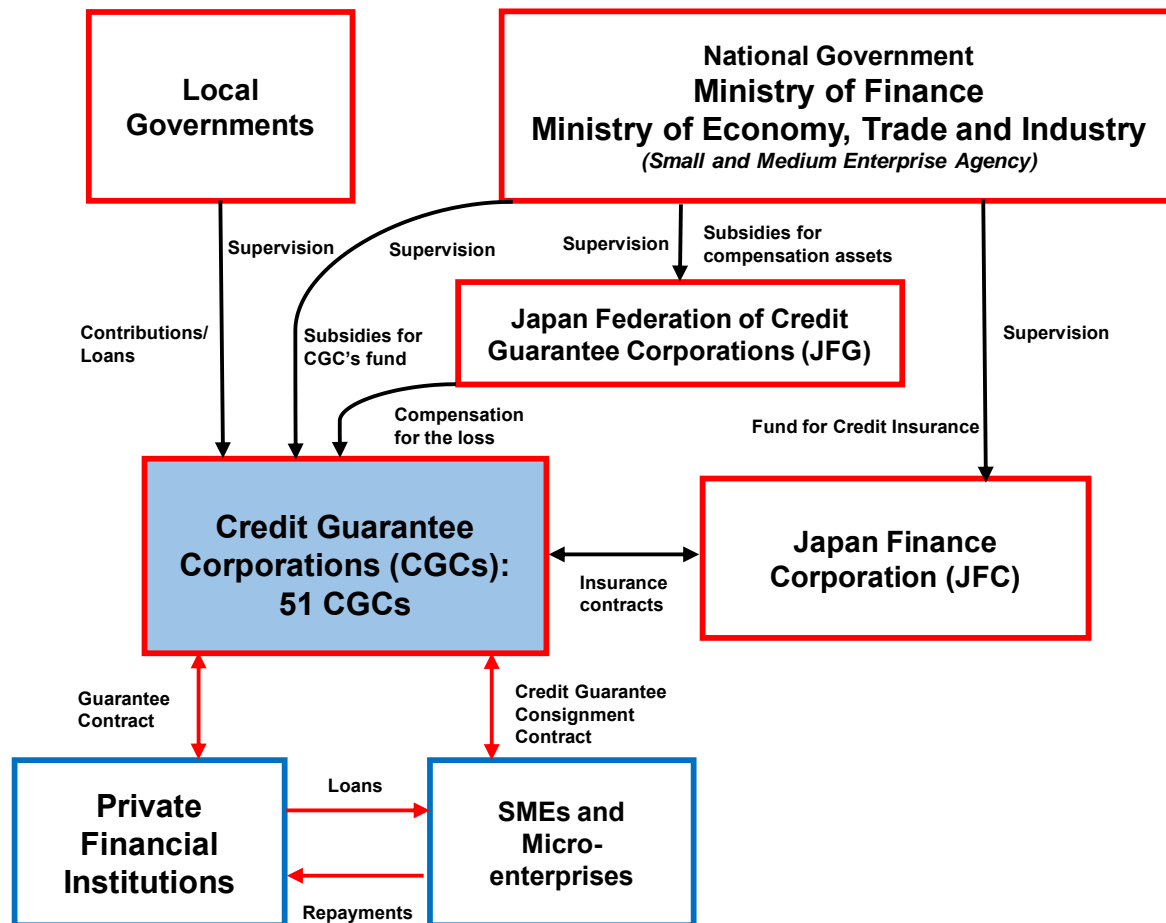
II. Credit Guarantee Schemes and SME finance

SMEs, CRD, CGCs and Banks



Source: Yoshino and Taghizadeh-Hesary (2015)

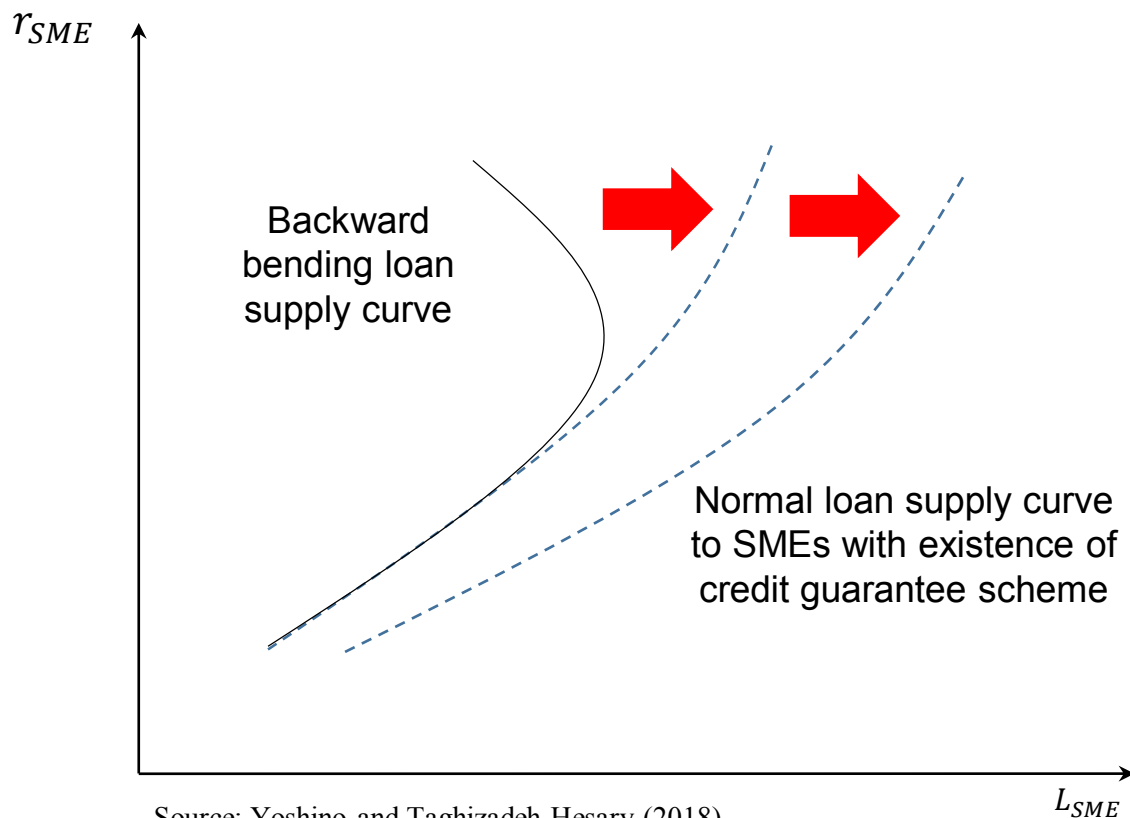
Example: Credit Guarantee Scheme of Japan



Source: Japan Federation of Credit Guarantee Corporations (JFCG 2014)
Note: above figure is reproduced by the authors

CGS reduces the expected default loss of banks on SME loan and increase bank lending to SMEs

credit guarantee scheme and SME loan supply

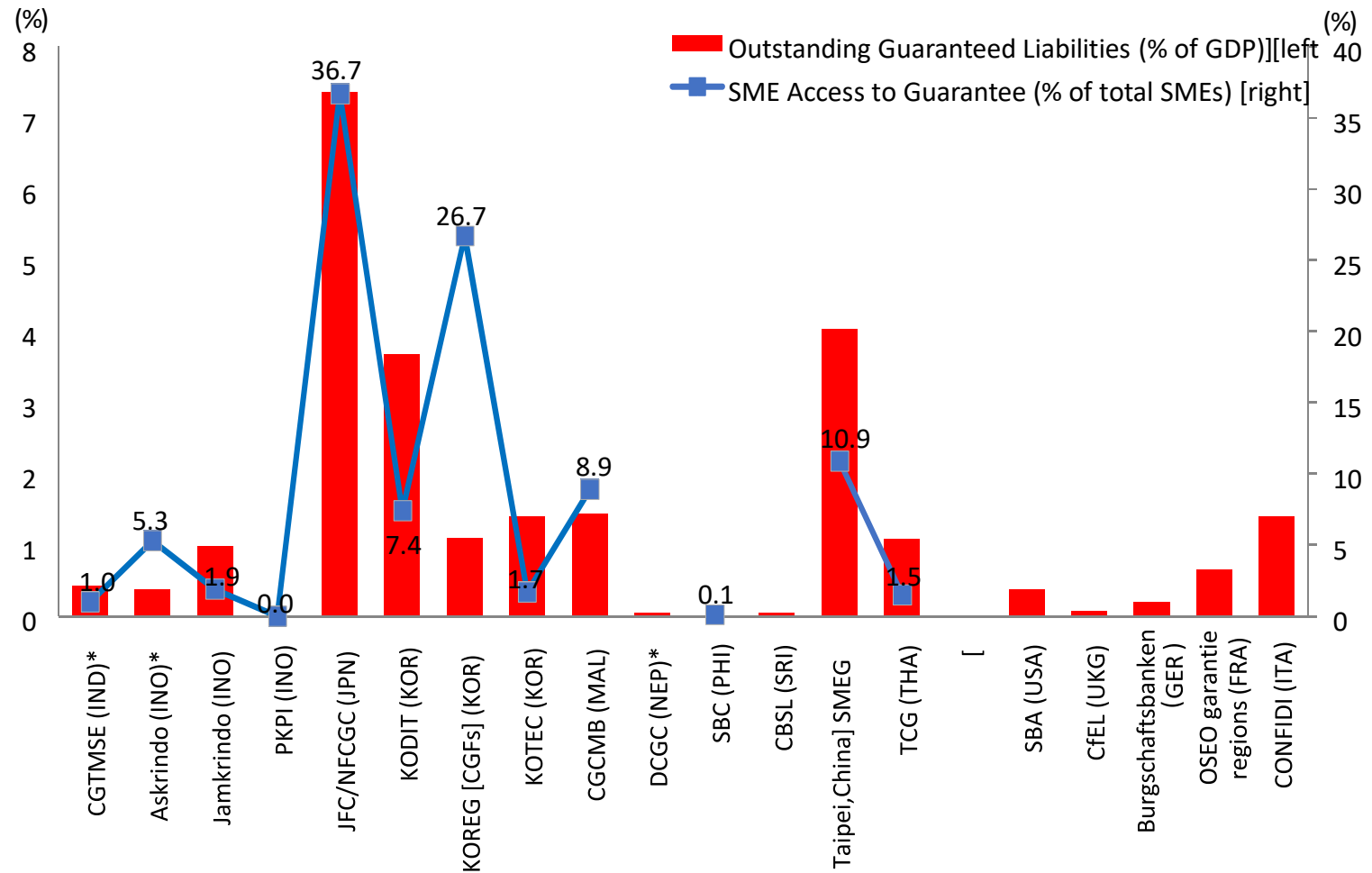


Source: Yoshino and Taghizadeh-Hesary (2018)

Note: r_{SME} = lending interest rate to SMEs; L_{SME} = amount of loan to SMEs

SME = small and medium-sized enterprises;

SMEs Access to Credit Guarantees



Source: ACSIC (2012), *The 25th Anniversary Publication of ACSIC – The 25-year History of ACSIC*

Japan

1. Following the introduction of credit guarantee scheme (CGS) in Japan in 1937, their use spread first throughout Europe and the Americas in the 1950s, and then to Africa, Asia and Oceania in the 1960s and 1970s.
2. At present, there are 51 CGCs, one for each prefecture and one in each of the cities of Nagoya, Yokohama, Kawasaki, and Gifu.
3. At the end of 2013, their total liabilities stood at approximately 30 trillion yen.

	2009	2010	2011	2012	2013
Number of SMEs	4,197,719	4,197,719	4,190,719	4,201,264	3,852,934
Number of companies using guarantees	1,591,726	1,573,067	1,543,847	1,502,972	1,458,434
Guarantee use rate	37.9%	37.5%	36.8%	35.8%	37.9%

* Number of SMEs taken from the "White Paper on Small and Medium Enterprises in Japan" compiled by the Small and Medium Enterprise Agency.

Source: Japan Federation of Credit Guarantee Corporations (JFG)

Eligible SMEs for the Credit Guarantee in Japan

CGCs define the scope of MSMEs eligible to receive credit guarantees as follows. MSMEs which either meet the requirements in terms of number of regular employees or paid-up capital as given in the table below are eligible for credit guarantees (excluding some special industries).

INDUSTRY	CAPITALIZATION	NUMBER OF EMPLOYEES
Manufacturing, etc.	Up to ¥300 million	300 or less
Wholesale	Up to ¥100 million	100 or less
Retail	Up to ¥ 50 million	50 or less
Services	Up to ¥ 50 million	100 or less
Health care, etc.	—	300 or less

Source: Japan Federation of Credit Guarantee Corporations (JFG)

Industries covered by the credit guarantee system are based on the industries designated by the enforcement regulation under the Small and Medium-sized Enterprise Credit Insurance Act. Agriculture, forestry, fisheries, financial industry are excluded.

Ceiling on Guarantee in Japan

	INDIVIDUALS / CORPORATIONS	COOPERATIVES, ETC.
General Guarantees	¥200 million	¥400 million
Guarantees without Collateral	¥ 80 million	¥ 80 million
Bond Guarantees	¥450 million	—

Source: Japan Federation of Credit Guarantee Corporations (JFG)

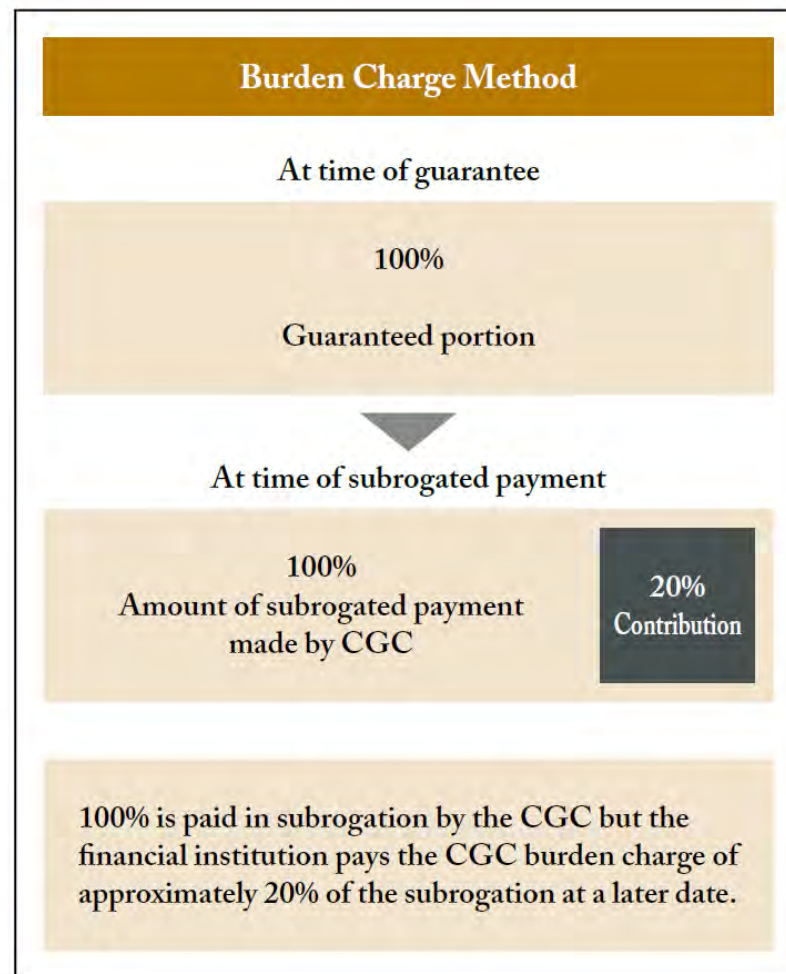
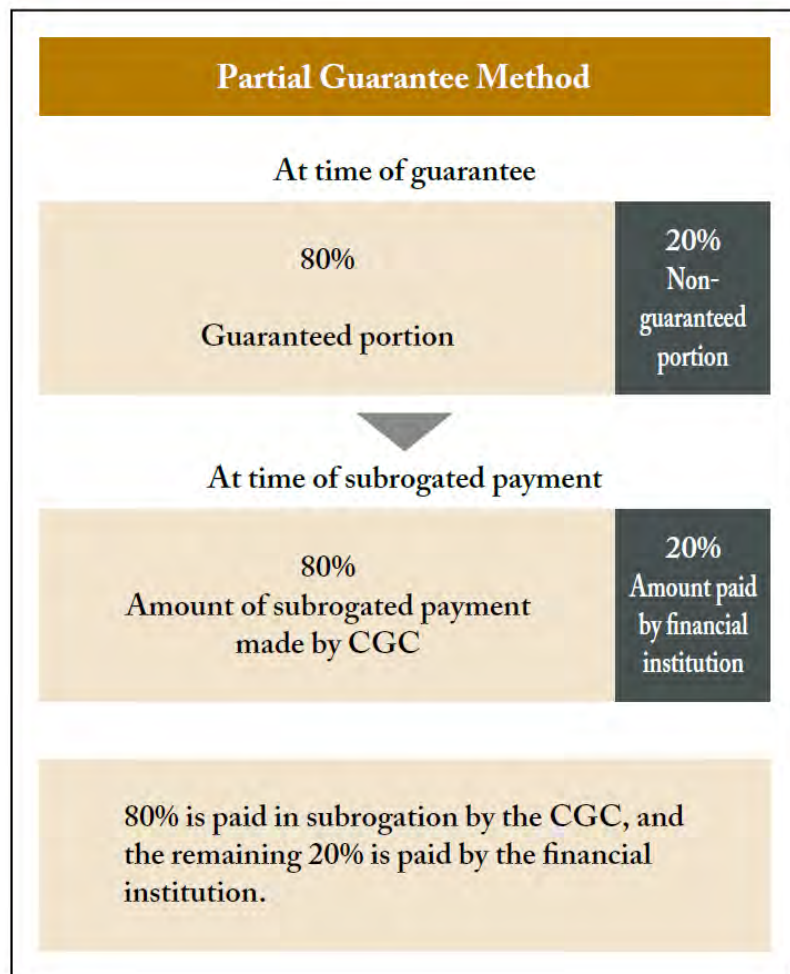
Credit Guarantee fee rate classification

Classification	1	2	3	4	5	6	7	8	9
Credit guarantee fee rate under Responsibility-sharing System	1.90	1.75	1.55	1.35	1.15	1.00	0.80	0.60	0.45
(Special Guarantee)	(1.62)	(1.49)	(1.32)	(1.15)	(0.98)	(0.85)	(0.68)	(0.51)	(0.39)
Credit Guarantee fee rate except Responsibility-sharing System	2.20	2.00	1.80	1.60	1.35	1.10	0.90	0.70	0.50
(Special Guarantee)	(1.87)	(1.70)	(1.53)	(1.36)	(1.15)	(0.94)	(0.77)	(0.60)	(0.43)

*1 "Special guarantees" mean revolving guarantee on discounting bill and other instruments, overdraft revolving guarantee and card loans of business operators.

*2 Credit guarantee fee rates applied to credit guarantee systems employing special insurance, or those to which the same credit guarantee fee rates are applied nationwide, etc. are determined separately.

Partial Guarantee



Source: Japan Federation of Credit Guarantee Corporations (JFG)

III. Optimal credit guarantee ratio

CREDIT GUARANTEE CORPORATION (CGC)

B) Optimal credit Guarantee Fee

- 1- What is the optimal credit guarantee fee that each group of SMEs should pay to CGC?
- 2- Should this rate be same in economic boom or recessions or whether vary?

A) Optimal Credit Guarantee Ratio

- 1- What is the optimal credit guarantee ratio for the CGC? (80%, 85% or???)
- 2- Should CGC provide same guarantee ratio for all lending institutions?
- Or should it be different based on the healthiness of the lending institutions?

Credit Guarantee fee payment

Credit guarantee coverage

Optimal Credit Guarantee Scheme



SME1



SME2

lending



A
BANK



B
BANK

(Lenders)

Research Questions

In the literature on loan guarantees has left three important questions unanswered:

- (i) What is the optimal credit guarantee ratio to fulfill government's goal for minimizing banks' nonperforming loans to SMEs while at the same time fulfilling the government policies for supporting SMEs?
- (ii) Should this rate be constant regardless of the macroeconomic status?
- (iii) Should this rate be same for all banks, or should it vary based on a bank's soundness?



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Optimal credit guarantee ratio for small and medium-sized enterprises' financing: Evidence from Asia

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Abstract

Difficulty in accessing finance is one of the critical factors constraining the development of small and medium-sized

Models for the Optimal Credit Guarantee Ratio

Policy Objective Function

$$U = w_1(L - L^*)^2 + w_2(\rho - \rho^*)^2$$

Loan Demand Function

$$L = l_o - l_1 r_L + l_2 Y^e$$

Banks Profit Maximization

$$\text{Max. } \Pi = r_L(L) L - \rho(g, Y, P_L, P_S, M, Z) L - r_D D - C(L, D)$$

$$\text{Subject to: Banks's Balance sheet } (1 - \rho)L + \rho L = D + A$$

Amount of loan in equilibrium

$$L = \frac{l_1}{2} \left[\frac{l_0}{l_1} + \frac{l_2}{l_1} Y^e - \rho(g, Y, P_L, P_S, M, Z) - r_D - \rho'_L \right]$$

Optimal Credit Guarantee ratio: g

$$g = -\frac{1}{\alpha_1 \left(\frac{w_1 l_1^2}{4} + w_2 \right)} \cdot w_1 \frac{l_1^2}{4} \left(\frac{l_0}{l_1} + \frac{l_2}{l_1} y^e - r_D - \rho'_L \right) + \frac{l_1}{2\alpha_1} L^* - \frac{w_2}{\alpha_1} \rho^* - \frac{\alpha_2}{\alpha_1} Y - \frac{\alpha_3}{\alpha_1} P_L - \frac{\alpha_4}{\alpha_1} P_S + \frac{\alpha_5}{\alpha_1} M + \frac{\alpha_6}{\alpha_1} Z$$

Depends on:

- Actual SME loans
- The desired SME loans
- The desired default risk ratio of loans
- Fixed demand for loan
- Deposit interest rate
- Expected GDP
- The weight for stabilizing the SME loans
- The weight for reducing the non-performing loan ratio
- Marginal increase of non-performing loans by increase of additional loans
- Price of Land, Price of stock, GDP, money supply,
- Financial profile of banks

Empirical Survey

Variables Examined for Bank's Soundness

No.	Symbol	Definition
1	L-D	Total loans/total deposits
2	PR-L	Properties/total loans
3	(SD+LD)-D	(Saving deposits + long-term deposits)/total deposits
4	A-L	Total assets/total loans
5	SC-L	Securities/total loans
6	CA-D	Cash/total deposits
7	CBR-D	Accounts receivable from central bank/total deposits
8	OBR-D	Accounts receivable from other banks/total deposits

Note: Properties are land, buildings, and other hard assets owned by banks. Securities include shares of corporate stock or mutual funds, bonds issued by corporations or governmental agencies, limited partnership units, and various other formal investment instruments that are negotiable and fungible. Accounts receivable from the central banks includes reserve requirement (or cash reserve ratio) and other sums that are normally in the form of cash stored physically in a bank vault (vault cash) or deposits made with a central bank. Accounts receivable from other banks are sums loaned to other banks.

Source: Yoshino, Taghizadeh-Hesary, Nili (2015)

Statistical Analysis of banks' balance sheet data

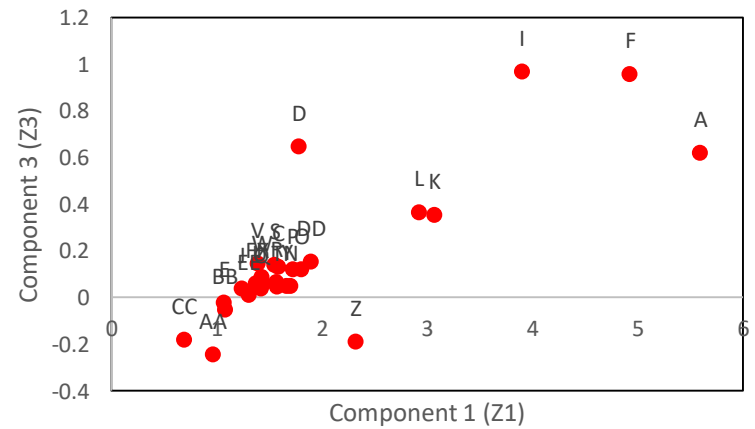
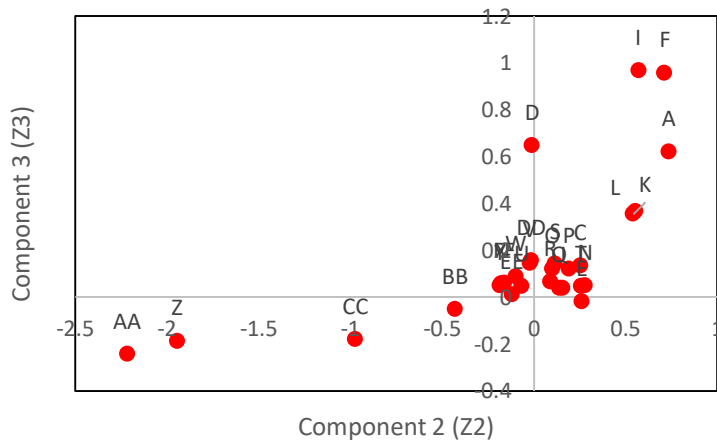
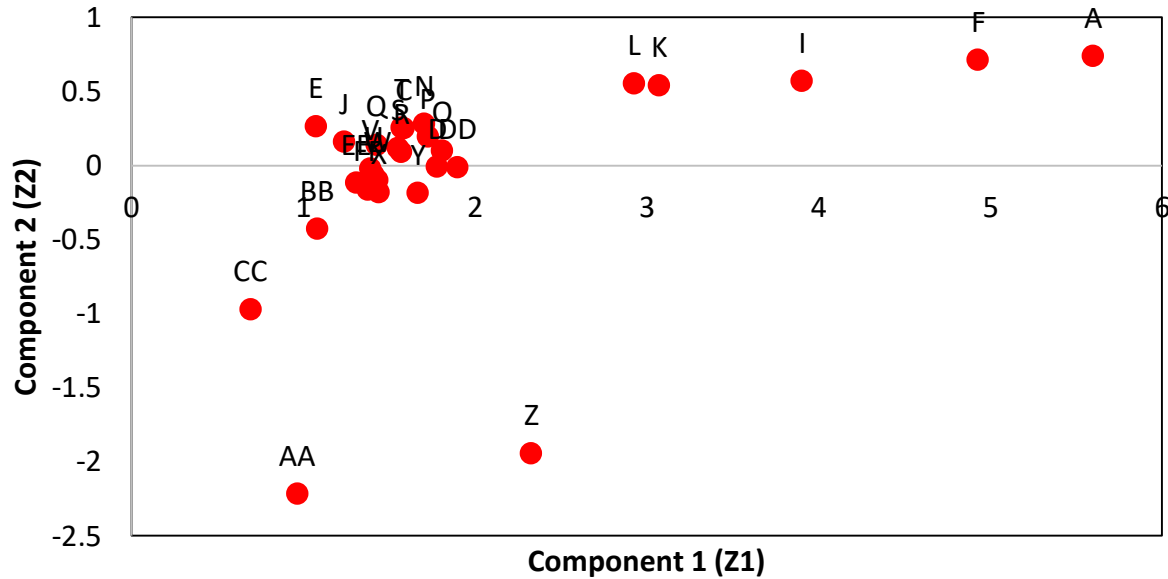
Factor Loadings of Financial Variables after Direct Oblimin Rotation

Variables (Financial Ratios of Banks)	Component		
	Z1	Z2	Z3
L-D	(0.238)	(0.912)	(0.143)
PR-L	0.042	0.190	0.780
(SD+LD)-D	(0.287)	0.819	(0.123)
A-L	0.987	0.083	0.130
SC-L	(0.096)	(0.140)	0.875
CA-D	0.379	(0.536)	0.039
CBR-D	0.954	(0.104)	(0.102)
OBR-D	0.981	(0.011)	(0.117)

() = negative.

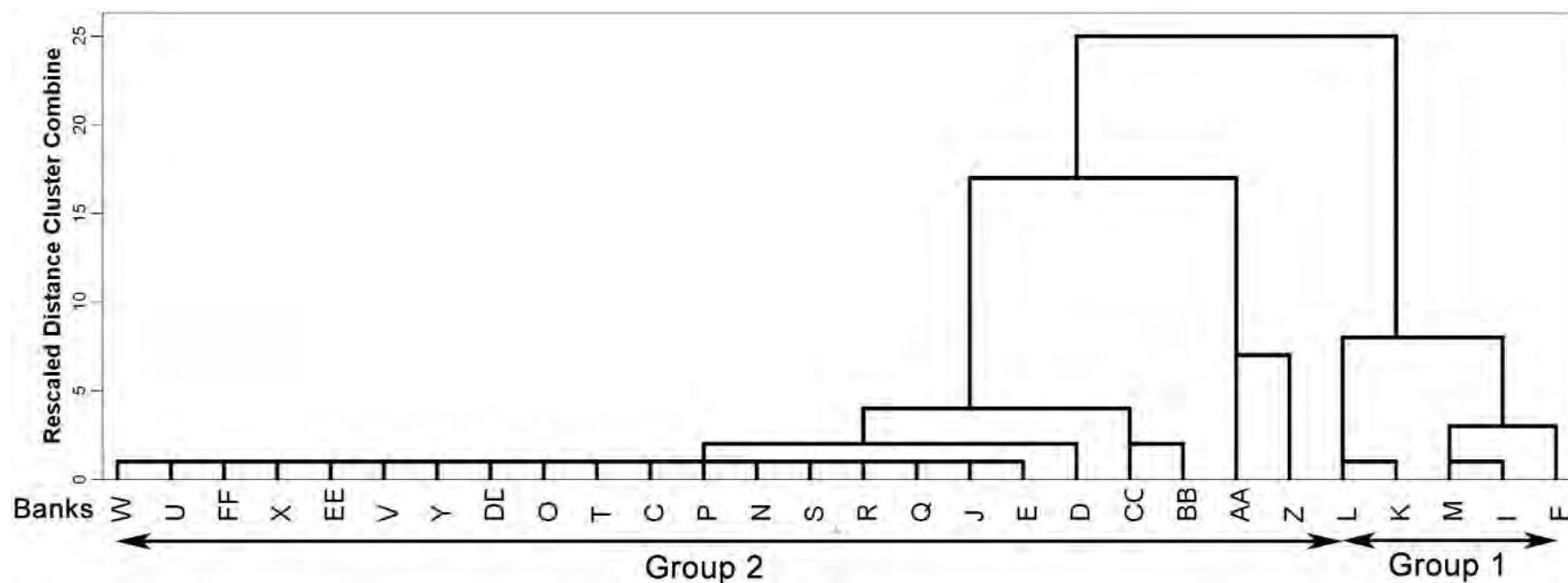
Note: The extraction method is principal component analysis. The rotation method is direct oblimin with Kaiser normalization.

Distribution of factors



Clustering

Dendrogram



Robustness Check for Three Sample Banks

Bank	Credit rank	Rank of L-D	Rank of PR-L	Rank of (SD+LD) -D	Rank of A-L	Rank of SC-L	Rank of CA-D	Rank of CBR-D	Rank of OBR-D
I	2	24	1	16	3	5	8	21	2
R	14	14	17	12	15	9	11	9	7
W	28	11	20	22	20	6	10	3	18

Calculated Optimal Credit Guarantee ratios

the optimal credit guarantee ratio in our model depends on three groups of factors:

1. macroeconomic variables

Group 1 of banks: 0.775

Group 2 of banks: 0.683

2. government policies,

3. banking profile.

These three groups consist of various variables including:

price of land, price of stock, gross domestic product (GDP), money supply, actual SME loans, fixed demand for loans, deposit interest rate, expected GDP, marginal increase of nonperforming loans by increase of additional loans, desired SME loans, desired default risk ratio of loan, weight for stabilizing the SME loans, weight for reducing the nonperforming loan ratio, and financial profile of banks.

Robustness Check of the Optimal Credit Guarantee Model

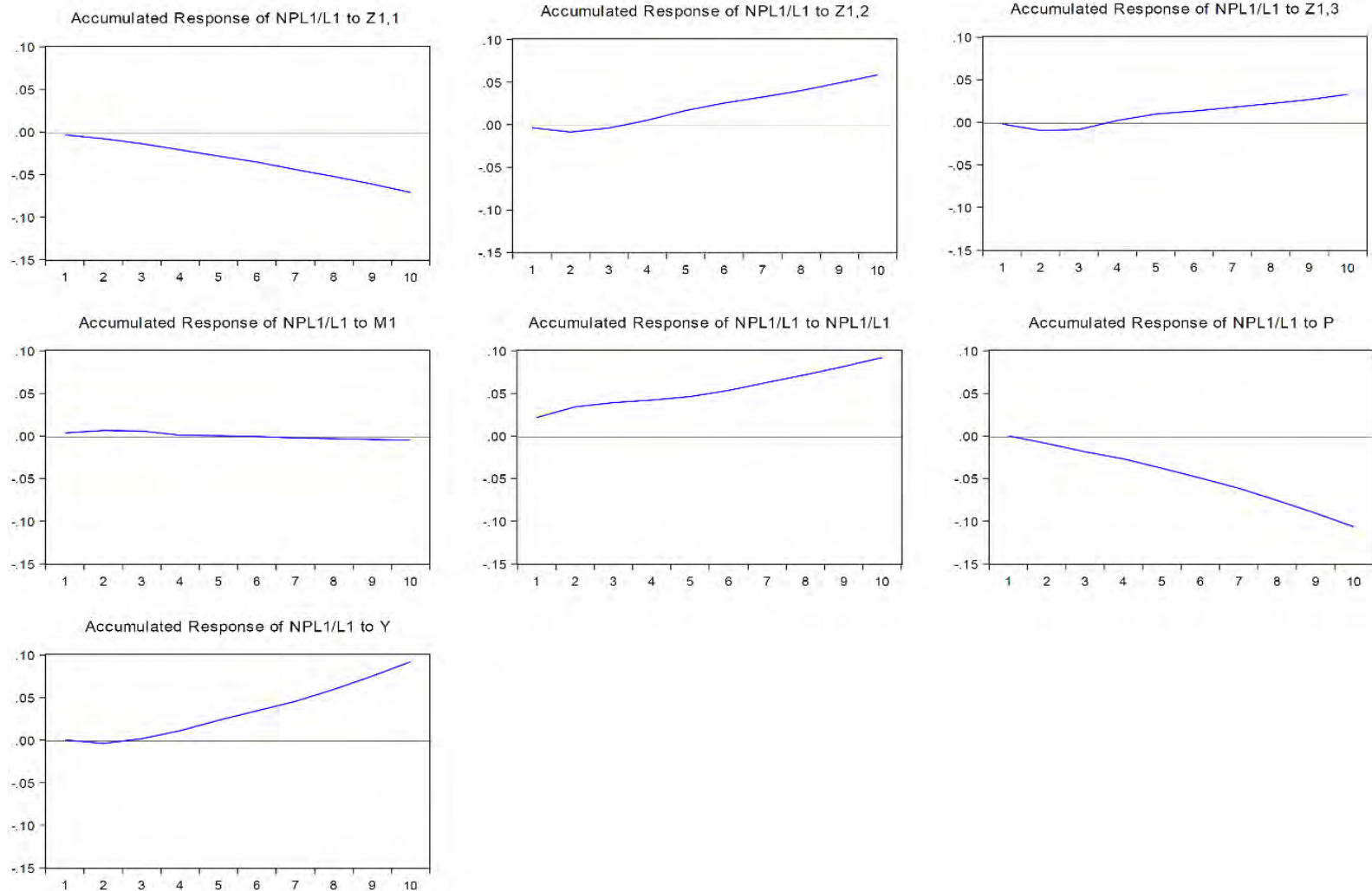
- Stationarity test
- Co-integration analysis
- VECM

$$V = (\rho, gdp, cpi, m1, Z_1, Z_2, Z_3)$$

$$\begin{aligned} d(\rho_1) = & \Phi_1[Z_{1,1}(-1) - 47.45 \rho(-1) - 33.89 P(-1) + 1.82 Y(-1) + 0.34 trend - 12.36] \\ & + \Phi_2[Z_{1,2}(-1) - 8.83 \rho_1(-1) - 5.43 P(-1) + 0.75 Y(-1) + 0.05 trend - 1.55] \\ & + \Phi_3[Z_{1,3}(-1) - 23.10 \rho_1(-1) - 17.63 P(-1) + 6.89 Y(-1) + 0.24 trend - 9.12] \\ & + \Phi_4[M(-1) - 0.92 \rho_1(-1) - 2.17 P(-1) + 2.35 Y(-1) + 0.03 trend - 1.59] \\ & + \Phi_5 d[Z_{1,1}(-1)] + \Phi_6 d[Z_{1,2}(-1)] + \Phi_7 d[Z_{1,3}(-1)] + \Phi_8 d[M(-1)] + \Phi_9 d[\rho_1(-1)] \\ & + \Phi_{10} d[P(-1)] + \Phi_{11} d[Y(-1)] + \Phi_{12} \end{aligned}$$

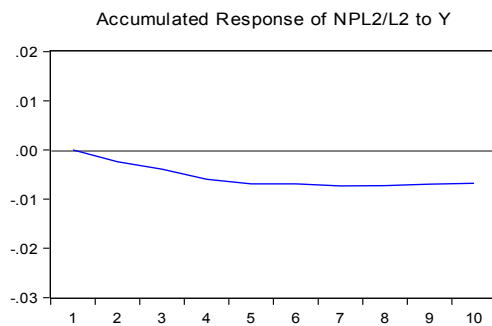
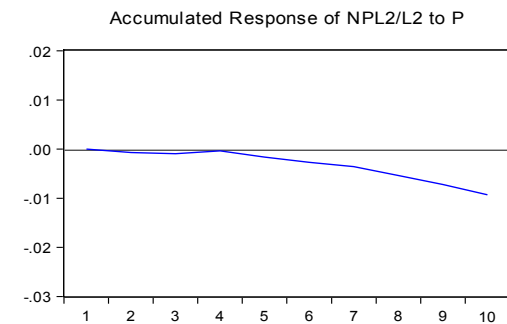
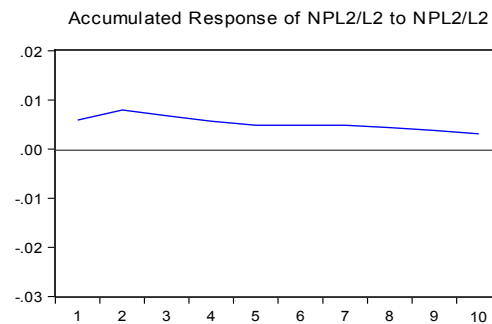
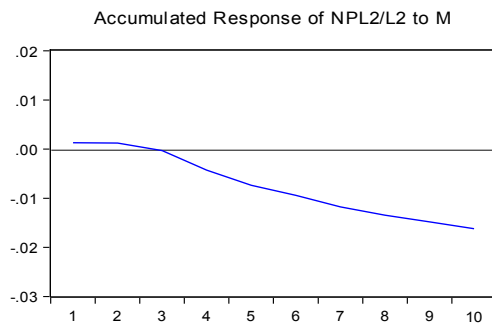
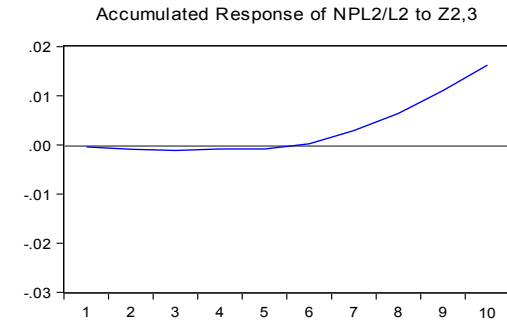
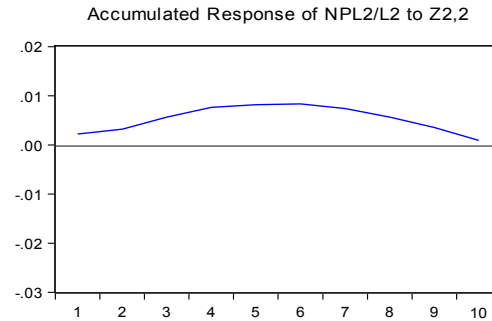
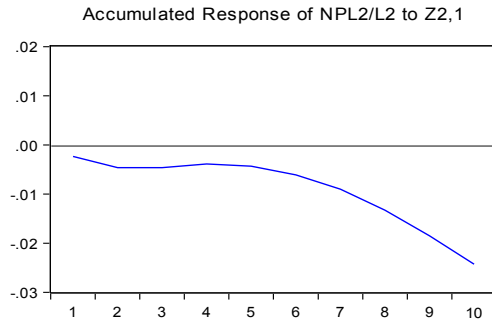
$$\begin{aligned} d(\rho_2) = & \Phi_{13}[Z_{2,1}(-1) + 0.67 Z_{2,2}(-1) - 3.90 Z_{2,3}(-1) + 0.03 M(-1) \\ & - 2.04 \rho_2(-1) - 1.11 P(-1) - 0.04 Y(-1) + 0.008 trend - 0.97] \\ & + \Phi_{14} d[Z_{2,1}(-1)] + \Phi_{15} d[Z_{2,2}(-1)] + \Phi_{16} d[Z_{2,3}(-1)] + \Phi_{17} d[M(-1)] \\ & + \Phi_{18} d[\rho_2(-1)] + \Phi_{19} d[P(-1)] + \Phi_{20} d[Y(-1)] + \Phi_{21} \end{aligned}$$

Impulse Response Analysis: Group 1 of banks



Impulse Response Analysis: Group 2 of banks

Accumulated Response to Cholesky One S.D. Innovations



IV. Conclusion and Policy Recommendations

Conclusion and Policy recommendations (1)

1. The public credit guarantee scheme is a tool to reduce the supply–demand gap in SME finance.
2. In order to avoid moral hazard and for increasing the effectiveness and sustainability of the CGS, adoption of the *optimal credit guarantee ratio* is needed
3. Optimal credit guarantee ratio is determined by three groups of variables: (i) government policies for NPL reduction and SME support, (ii) macroeconomic variables, and (iii) bank-level variables or banking behavior

Conclusion and Policy recommendations (2)

4. The optimal credit guarantee ratio should vary for each bank, or for each group of banks, based on their financial soundness.
5. Sound banks should receive a higher guarantee ratio from the government, and less healthy banks should receive a lower guarantee to avoid a moral hazard problem.
6. Moreover, this rate should vary based on economic conditions. Governments should lower the guarantee ratio in good economic conditions where the default risk of SME loans is reduced, and raise it in bad economic conditions to protect the SME financing and economic growth.

Next Step:

Measuring the optimal credit guarantee ratio and optimal credit guarantee fee for CAREC member countries (First case: **Kazakhstan**)

In Recent years DAMU fund in Kazakhstan had significant impact in increasing share of guaranteed loans to SMEs.

The share of “Damu” Fund credit in priority industries have been steadily increasing over the years to KZT574 bln in 2016 or 17% of the total credit. (DAMU, 2017).

Dosmagambet, Oskembayev, Taghizadeh-Hesary and Mukan (Forthcoming) found that the public credit guarantee scheme and financial system creditworthiness in Kazakhstan is vulnerable to oil price movements.

In order to have a sustainable credit guarantee scheme for Kazakhstan for securing the SMEs access to finance, it's important to adopt the optimal credit guarantee ratio and optimal credit guarantee fee.

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Forthcoming book, 2019

Unlocking SME Finance in Asia:

Roles of credit rating and credit guarantee scheme

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