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Indonesia Development Forum 2017

Fighting Inequality for Better Growth

Jakarta, 9-10 August 2017

Latent Effect of Corruption to Decentralization Choice and Competitiveness Nexus
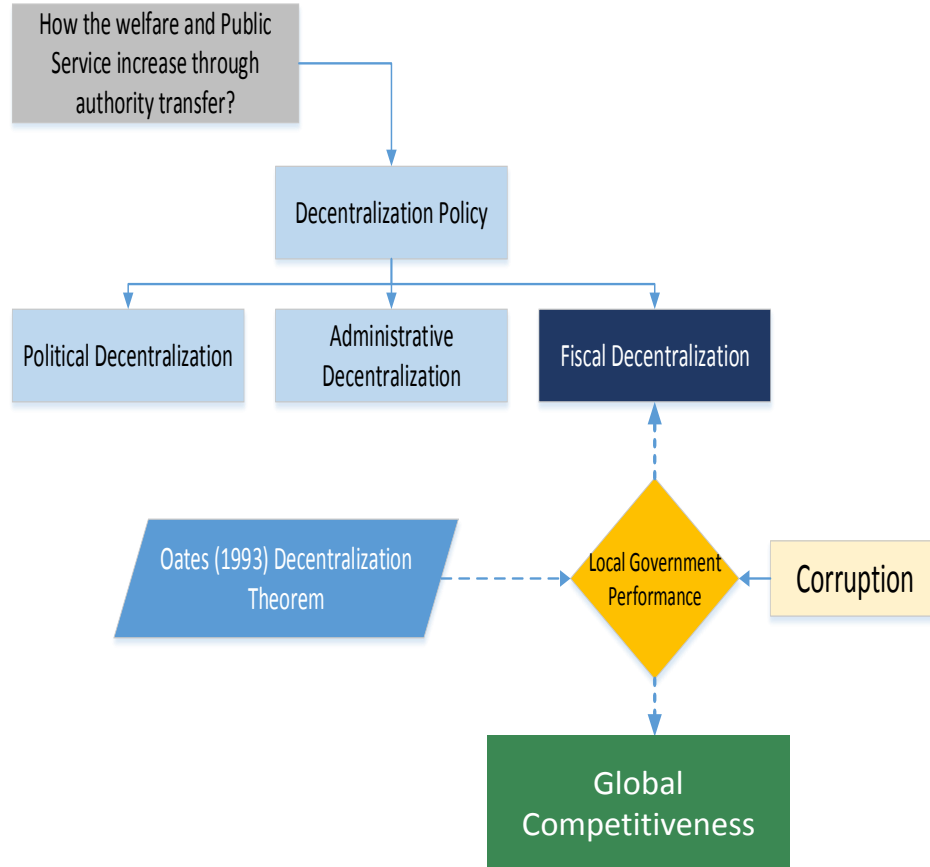
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Backround & Research Motivation

Depart from motivation: Is it necessary for central government to decentralize their public service authority to local government?

If yes, What is the best form of decentralization that optimally increase welfare?

Does good governance contributes to increase welfare in decentralized way?

How we measure welfare? Introduction to global competitiveness

Why Global Competitiveness?

Global Competitiveness: the set of institutions, policies, and factors that determine the level of productivity of a country (World Economic Forum, 2015)

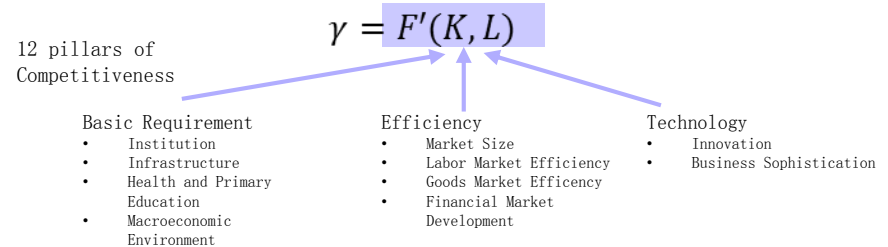New set of measurement to reflect growth and return of capital.

Stage of development based on competitiveness

Less Competitive   Competitive

Factor Driven → Efficiency Driven → Technology Driven
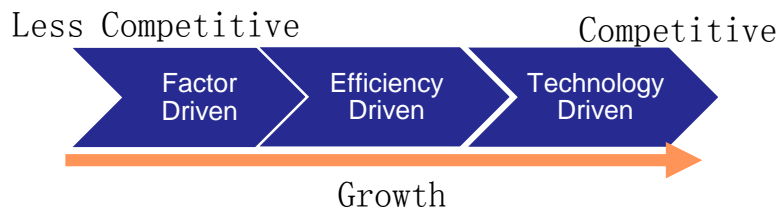
Growth

GCI is calculated using weighting average of different components that may explain level of productivity.
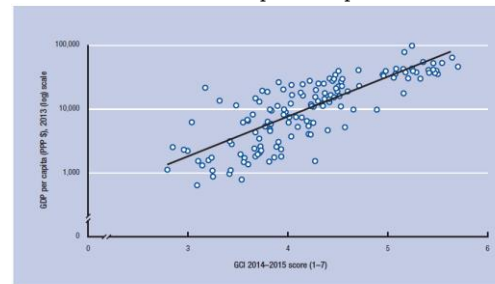
In long run productivity is most fundamental factor to explain difference of prosperity

The optimal growth by competitiveness condition ($\gamma *$)

$$\gamma = F'(K, L)$$

12 pillars of Competitiveness

Basic Requirement
- Institution
- Infrastructure
- Health and Primary Education
- Macroeconomic Environment

Efficiency
- Market Size
- Labor Market Efficiency
- Goods Market Efficency
- Financial Market Development

Technology
- Innovation
- Business Sophistication

Does Global Competitiveness Index Reflect Growth?

Relation of GCI and GDP per Capita

Relation of GCI and Net Growth Rate
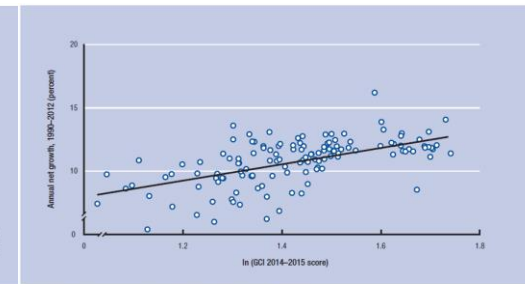
Source: Sala-I-Martin et al (2015)

Aim of GCI is to estimate the actual level of productivity

Following Sala-I-Martin et al (2015), GCI`s estimate of the determinants of competitiveness fundamentally shape the medium long run growth rate of an economy and its level of prosperity is validated on statistical level

3

Analysis of Corruption Effect on Linking Fiscal Decentralization and Global Competitiveness

We look for *previous research* about relating fiscal decentralization and global competitiveness through corruption, then using *benchmark from theory and previous study*, we try to test our research hypotheses.

Basic Model

Fiscal Decentralization Choice vs Corruption

Minimization expenditure problem under decentralization regime:

$$\min_{g_c, g_l} \theta = \varrho g_l + \varsigma g_c \text{ s.t}$$

$$g = g_l^{\varepsilon} g_c^{1-\varepsilon}$$

Interior solution lead to optimal expenditure portion of central & local;

$$\frac{g_c}{g_l} = \frac{\left[\frac{\varepsilon\varsigma}{(1-\varepsilon)\varrho}\right]^{-\varepsilon} \cdot g}{\left[\frac{\varepsilon\varsigma}{(1-\varepsilon)\varrho}\right]^{1-\varepsilon} \cdot g} = \frac{(1-\varepsilon)\varrho}{\varepsilon\varsigma}$$

That can be characterized by fiscal decentralization (x) with corruption parameter;

$$\chi = \frac{\varepsilon\varrho}{(1-\varepsilon)\varsigma + \varepsilon\varrho}$$

Which tell us marginal effect of corruption (ς) is negative

Corruption vs Competitiveness

I characterize competitiveness as marginal return to capital that explain difference of productivity in each country:

$$\gamma = \frac{\dot{c}}{c} = \frac{1}{\sigma}(f'(k) - \rho)$$

f' (k) expressed as function of tax rate.

$$f'(k) = (1-\alpha)(1-\tau)(\tau)^{\frac{\alpha}{1-\alpha}}$$

assuming revenue only from tax:

$$\tau.y = \theta = \varrho g_l + \varsigma g_c$$

$$\tau.y = \left[\frac{\varsigma}{1-\varepsilon}\right]\left[\frac{(1-\varepsilon)\varrho}{\varepsilon\varsigma}\right]^{\varepsilon} \cdot g \quad \Rightarrow \quad \tau.y = \Gamma.g$$

Barro (1990) describe optimal growth condition by $\quad \tau^* = \frac{g}{y} = \frac{\tau}{\Gamma}$

Then competitiveness is characterized as;

$$f'(k) = (1-\alpha)\left(1 - \frac{\tau}{\Gamma}\right)\left(\frac{\tau}{\Gamma}\right)^{\frac{\alpha}{1-\alpha}}$$

Marginal effect of Γ is ambiguous (has positive and negative effect). Under FOC, τ become either 0 or a function that divided by Γ. Since marginal effect of corruption (ς) to Γ is positive then marginal effect of corruption to competitiveness is negative.

Related Empirical Studies

Literature/Articles/Journals	Estimation Technique	Degree of Fiscal Decentralization	Level of Corruption	Growth (Competitiveness)
Akai and Sakata [2002], 50 states of USA	OLS (Cross-Section)	Increase	[none]	Increase
Davoodi and Zou (1997), 46 Country	Cross Section & Pooled OLS (FE)	Increase	[none]	Decrease (in developing country) Increase (?/Not sig. In developed country)
Lessman, Markwadt [2009], 194 countries in 1980-2009	Pooled OLS	Increase	[none]	Increase
Akai, Horiuchi and Sakata [2005], 50 states of USA (long run 1991-2000; short run 1998-2000)	OLS & IV-2SLS	[none]	Increase	Decrease
Eckardt,S [2008], performance of 173 Indonesia local governments (relationship between political accountability and public service performance)	OLS	[none]	Increase	Decrease
Fan,S.,Lin, C., and Treissman,D [2009], 80 countries linking political decentralization and Corruption (cost to firm and ease doing business)	MLE	Increase	Increase (bribery)	[none]
Arikan (2004), linking multiple measurement of decentralization and corruption	OLS & IV-2SLS	Increase (? Not Sig)	Decrease	[none]

6

Hypothesis Development

Fiscal Federalism:

Oates (1976) <u>Fiscal Decentralization Theorem:</u> "*Under homogenous situation for providing public service, always pareto optimum for local government delivers it instead central government.*"

<u>More decentralize</u> ➔ More efficient public service ➔ <u>economic growth increase, thus competitiveness</u>

Previous empirical evidence: Effect of fiscal decentralization to economic growth (competitiveness) is not certain

Characteristic of developed and developing country shows different relation of fiscal decentralization to economic growth. ⬅ Institutions problem? Matters of corruption

Treismann (2000) argues higher number of local government associated with frequent and costly bribery⬅ <u>Local government more corrupt.</u>

We should consider high number of local government ➔ higher decentralization

Barro (1990) and Granik, Saraceno (2012), in extent of endogenous growth model, presence of corruption shrink inverse-U curve of government spending and growth. ⬅ <u>Corruption retards economic growth, thus competitiveness.</u>

<u>High decentralization</u>➔High amount of local government ➔ Corruption increase ➔ <u>economic growth decrease, thus competitiveness</u>

Decentralization-Corruption-Growth nexus become complicated, is there any perquisite condition when decentralization increase competitiveness ⬅ corruption matters?
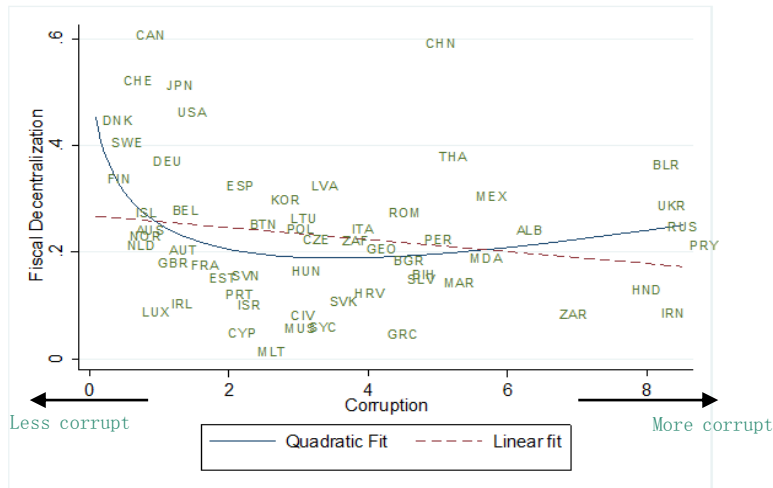
Global Competitiveness, Fiscal Decentralization and Corruption
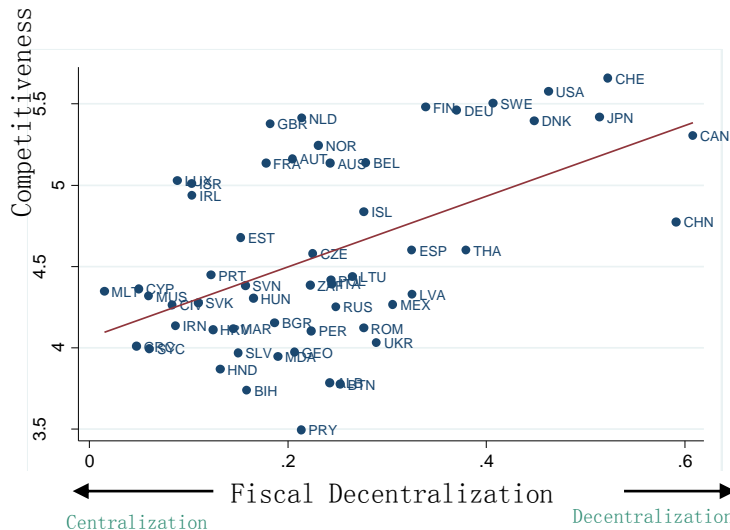
Decentralized Countries have high competitiveness level than centralized countries.
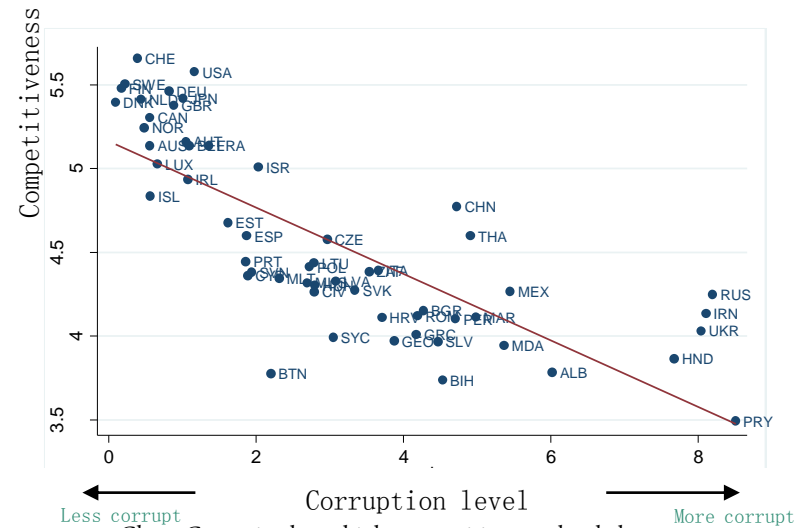
Clean Countries have high competitiveness level than corrupt countries.

Clean Countries tends to decentralize.

How we describe the linkage among them?

Research Hypothesis

Fiscal decentralization has an effect to global competitiveness, it depends on the level of corruption.
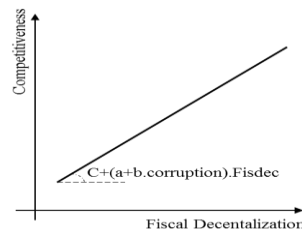
H0

Corruption and fiscal decentralization independently affect global competitiveness

$$Cmpt_i = \beta_0 + \beta_1 FD_i + \beta_2 Crpt_i + \gamma_i X_i + \varepsilon_i$$

Competitiveness

Competitive

Less Competitive

Low Fiscal Transfer

High Fiscal Transfer

Low Level of Corruption

Moderate Level of Corruption

$F(\Theta_x)$ = function of Corruption affecting the relation of Fiscal decentralization and competitiveness

High Level of Corruption

$+$

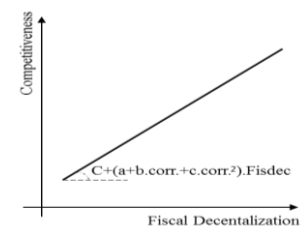$-$

Fiscal Decentralization

H1

Corruption is linearly affecting marginal effect of fiscal decentralization, then Fiscal decentralization as function of corruption affect global competitiveness

Competitiveness

C+(a+b.corruption).Fisdec

Fiscal Decentralization

$$Cmpt_i = \beta_0 + (\alpha + \beta_2 Crpt_i)xFD_i + \gamma_i X_i + \varepsilon_i$$

H2

Corruption is affecting marginal effect of fiscal decentralization in non-linear form, then Fiscal decentralization as function of corruption affect global competitiveness

Competitiveness

C+(a+b.corr.+c.corr²).Fisdec

Fiscal Decentralization

$$Cmpt_i = \beta_0 + (\alpha + \beta_2 Crpt_i + \beta_3 Crpt_i^2)xFD_i + \gamma_i X_i + \varepsilon_i$$

9

Data Description

Main Variables	Data Employed	Description	Source	Type
Fiscal Decentralization	Revenue Indicators (RI)	Share of *subnational* (all tiers of government below central government) to *general government* (all tiers government include central government) *revenue*.	IMF Government Finance Statistics (GFS)	Panel
	Expenditure Indicator (PI)	Share of *subnational* (all tiers of government below central government) to *general government* (all tiers government include central government) *expenditure*.	IMF Government Finance Statistics (GFS)	Panel
	Production-Revenue Indicator	Mean of expenditure decentralization and revenue decentralization		
Competitiveness	Country Competitiveness Index (CCI)	[1] Not Competitive ~ [7] Most Competitive. Standardized Index that published by World Economic Forum and developed by Xavier Sala-i-Martin and Elsa V. Artadi, created from 110 variables that represent 12 pillars of development.	World Economic Forum	Panel
Corruption	Corruption Perception Index	A method developed by Transparency International to measure perception of corruption in public sector. Standardized scale from 10 (clean) to 0 (corrupt) but without losing the order, readjusted to [0] clean ~ [10] corrupt	Transparency International	Panel

Control Variable

Decentralization control (vertical gap, number of government tiers, number of local governments, and share of government workers) , macroeconomics (GDP Per Capita PPP, Openness, general government expenditure), and others (Level of Education, Population and Surface area)

Instrument

Press Freedom, Democratics dummy, Federal dummy, and British Colonial dummy
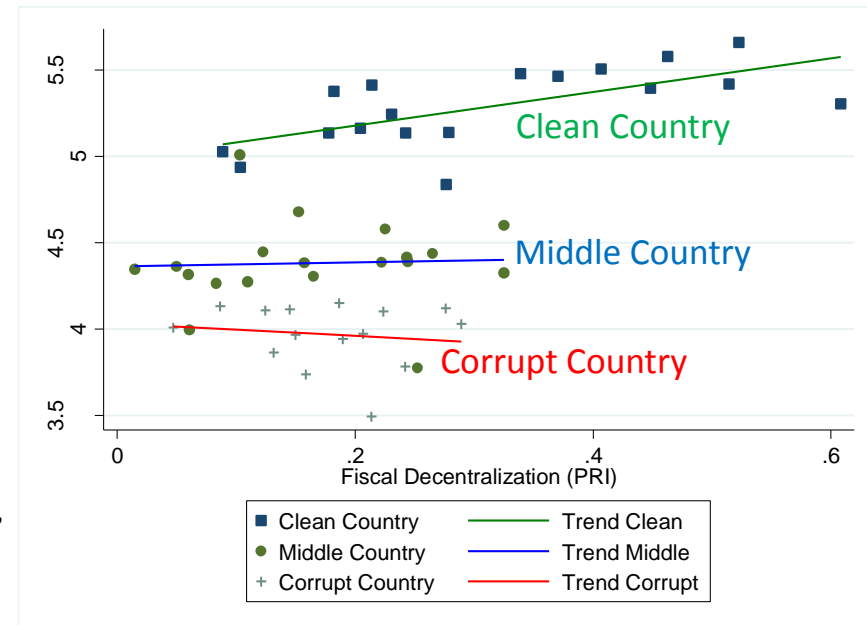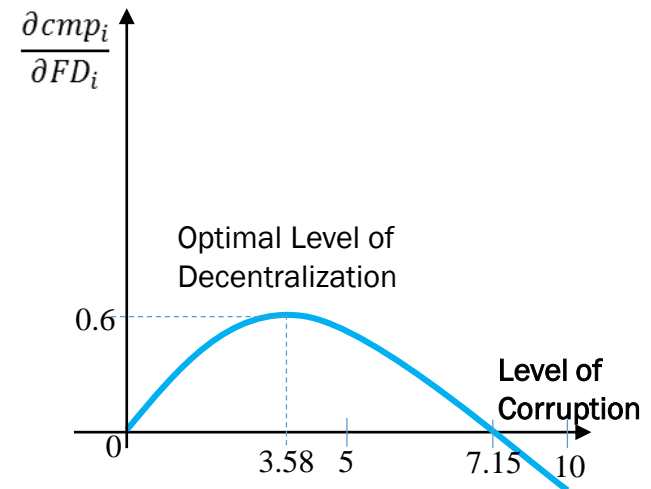
Methodology & Regression Result (1)

Cross Section Analysis

- Problem: endogeneity of corruption ← OLS vs IV-2SLS

- Durbin-Wu Test: Exogeneity of corruption: OLS not biased

- Suggested relation:

$$\overline{Cmp_i} = (0.773\,\overline{Crpt_i} - 0.108\overline{Crpt_i}^2)x\overline{FD_i} + \gamma_i\overline{X}_i + \varepsilon_i$$
$$\quad\quad\quad (0.266) \quad\quad\quad (0.0346)$$

N = 54   R-Squared = 0.933

- In the long run, fiscal decentralization positively (negatively) correlated with global competitiveness regarding level of corruption

- The result suggest increasing level of corruption change marginal effect of fiscal decentralization to competitiveness, particularly when inverse U-curve passes its root zero point (7.15)

- Existence optimal level of corruption (-b/2a or 3,58/10) ➔ Optimal Level of Decentralization

- Note: if no corruption case, government would fully decentralize but our finding suggest it is not optimal, therefore central government should take a part.

Methodology & Regression Result (2)

Panel Data

- Problem:

    - Endogeneity of Corruption
    - Correlation of Decentralization to time invariant variable
- Panel analysis: FE vs HT estimator

- Certain level of corruption will change the marginal effect of fiscal decentralization to global competitiveness in simply linear way

$$Cmp_{it} = (0.907 - 0.235Crpt_{it})xFD_{it} + \gamma_i X_{it} + \varepsilon_{it}$$

$$\qquad\qquad (0.402) \qquad (0.402)$$

N = 402   Country = 42

- Marginal effect of fiscal decentralization to competitiveness change by following condition

$$\frac{\partial cmp_i}{\partial FD_i} = \begin{cases} positive, & if\ corruption < -b/a \\ negative, & if\ corruption > -b/a \end{cases}$$

- The estimate critical value of corruption, $-b/a = 3.85$ of 10 scale
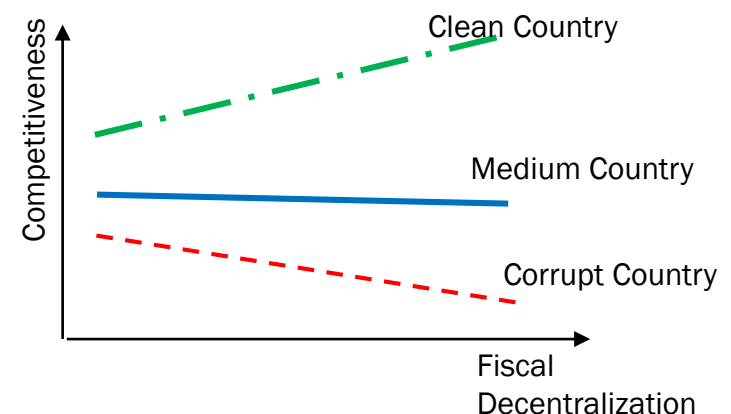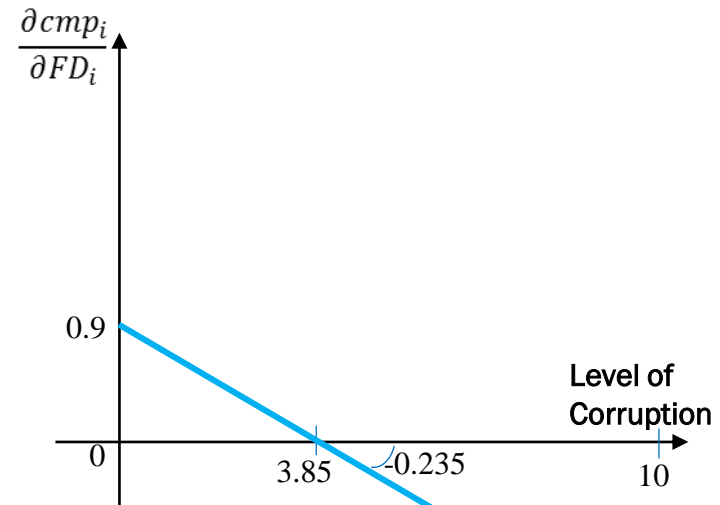
The result shows that increasing level of corruption would change the effect of fiscal decentralization to competitiveness from positive into negative, which suggest clean country should decentralize and corrupt country should centralize to attain high competitiveness

Methodology & Regression Result (3)

Robustness Test for Panel Data Regression

We try to check robustness of regression if one interested variable is changed

In previous estimation, corruption is measured by Corruption Perception Index by Transparency international. For robustness check we used Kaufman Index (Control for Corruption), initially varies from -2,5 (corrupt) to +2,5 (clean).

We adjusted the measurement to 0 (clean) to 10 (corrupt).

Kaufman vs CPI Plot
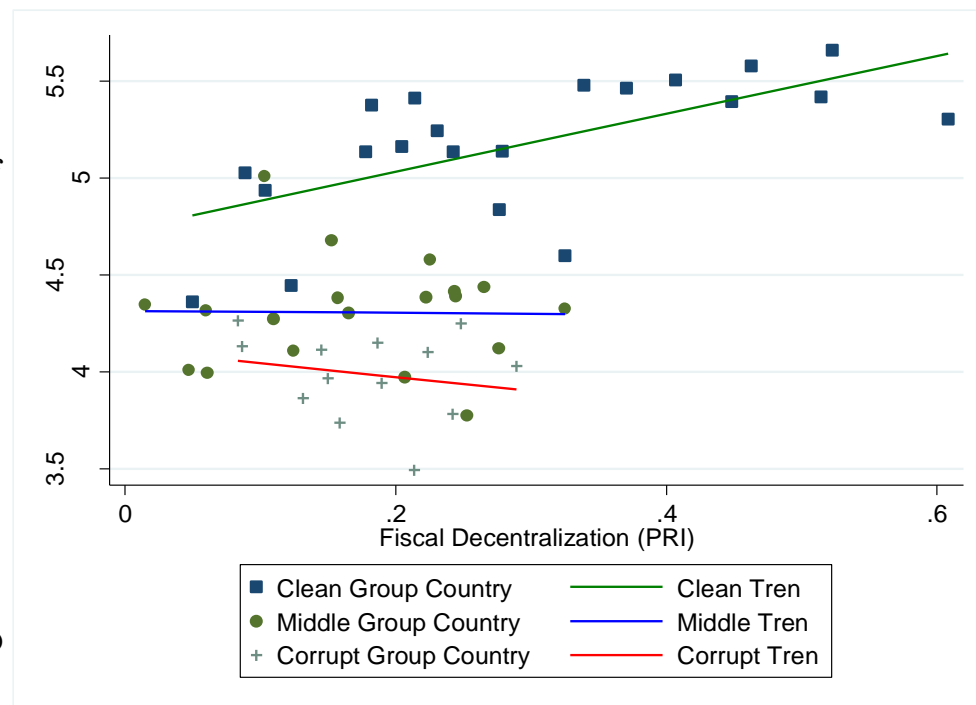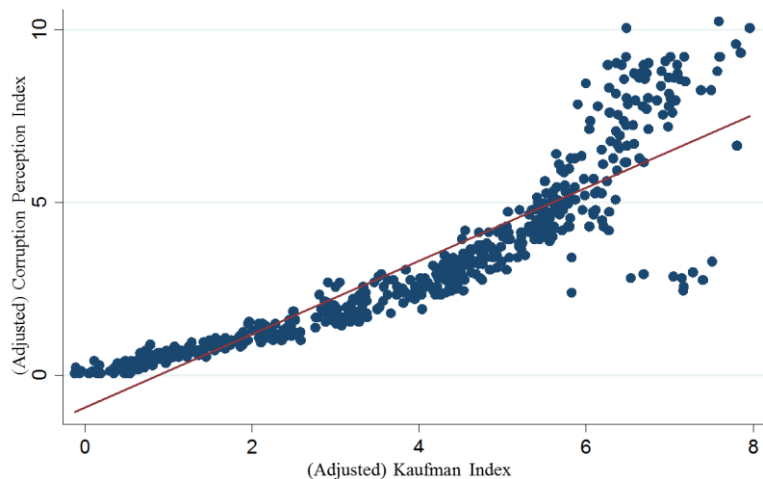
The sign of interaction terms does not change from previous estimation

Robust effect of corruption negatively affect the relation of fiscal decentralization with competitiveness

However, initial instrument not work well for corruption (Kaufman Index)

Research Conclusion

Fiscal decentralization impacts competitiveness through corruption
In country with low level of corruption, increasing level of
decentralization would elevate competitiveness.

Oates theorem suggest under homogeneous cost of providing public service, decentralized the public service contributes to economic growth better than centralized regime under the condition that subnational governments not engaging any rent seeking activity (low corruption) ➔ deliver effective and efficient public services.

If subnational governments seek high return to rent seeking behavior, local elites would likely to overstatement of the cost of provision of local public goods which lead to decrease efficiency of public service expenditure.

Under this claim then giving more fiscal authority to corrupt local elites eventually would retards economic growth, thus reduces competitiveness.

Policy Implication

The policy implication from this study would significantly contributes to answer fundamental question of government choice;
which is better for achieving prosperous and welfare condition, decentralization or centralization policy?.

Our finding suggest that the government should assess in what rank of corruption they are.

If it's *high risk* of corruption, they are better to *centralize*. In other hand, if in *low risk* of corruption, they are better off to *decentralize* the service.

Thank You

Question? Comments?

Estimation Method: OLS and IV−Regression 2SLS

DepVar: Global Competitiveness	(1) Model (1)	(2) Model (2)	(3) Model (3)	(4) Model (1)	(5) Model (2)	(6) Model (3)
		OLS			IV-2SLS	
Fiscal Decentralization	1.133***	1.328***	0.0577	1.227***	1.256***	0.272
	(0.232)	(0.435)	(0.403)	(0.262)	(0.364)	(0.485)
Corruption	-0.106***	-0.0881*	-0.589***	-0.0729**	-0.0693*	-0.493***
	(0.0305)	(0.0500)	(0.0911)	(0.0305)	(0.0367)	(0.149)
Corruption x Fiscal Decentralization		-0.0880	0.773***		-0.0110	0.561
		(0.172)	(0.266)		(0.118)	(0.376)
Corruption^2 x Fiscal Decentralization			-0.108***			-0.0674
			(0.0346)			(0.0572)
Corruption^2			0.0533***			0.0429***
			(0.00986)			(0.0164)
Instrument of Corruption				British Colonial, Federal, Democratics, Press Freedom		
R-squared	0.887	0.888	0.933	0.883	0.883	0.928
Hansen J statistic				2.190	2.367	1.363
p-value of J				0.534	0.500	0.851
Kleibergen-Paap LM				33.14	32.93	18.69
p'value of LM				1.12e-06	1.23e-06	0.00220
first stage F				15.50	11.88	2.316
Number of Country	54	54	54	54	54	54

Durbin−Wu Hausman F Test (p−value = 0.21), suggesting exogeneity of corruption (contrast with origin assumption, corruption is endogenous), therefore OLS better

Estimation Method: Pooled OLS and Hausman–Taylor Estimator

DepVar: Global Competitiveness	(1) Model (1) OLS-Fixed Effect	(2) Model (2) OLS-Fixed Effect	(3) Model (3) OLS-Fixed Effect	(4) Model (1) Hausmann-Taylor	(5) Model (2) Hausmann-Taylor	(6) Model (3) Hausmann-Taylor
Fiscal Decentralization	-0.0754	0.577	0.979*	0.0928	0.907**	1.043**
	(0.302)	(0.464)	(0.523)	(0.260)	(0.402)	(0.462)
Corruption	-0.117***	-0.0714**	0.0353	-0.130***	-0.0698**	-0.0126
	(0.0179)	(0.0304)	(0.0756)	(0.0168)	(0.0295)	(0.0721)
Corruption x Fiscal Decentralization		-0.176*	-0.511**		-0.235***	-0.432**
		(0.0956)	(0.212)		(0.0907)	(0.203)
$Corruption^2$ x Fiscal Decentralization			0.0512			0.0355
			(0.0395)			(0.0285)
$Corruption^2$			-0.0142			-0.00852
			(0.00880)			(0.00844)
Instrumented Variable					Corruption	
Constant Within Panel Regressors				Federal, Democratics, British Colonial, Tiers, Surface Area, Vertical Gaps		
Observations	402	402	402	402	402	402
Hansen-J Stat.				13.38	9.61	12.038
P-Value of J				0.06	0.05	0.10
R-squared	0.176	0.184	0.191			
Number of Country	42	42	42	42	42	42

P-value of Hausman test for 3rd model = 0,30, suggest HT estimator as least as efficient with pooled OLS

Robustness Check

Cross Section Analysis

DepVar: Global Competitiveness	(1) Model (1)	(2) Model (2)	(3) Model (3)	(4) Model (1)	(5) Model (2)	(6) Model (3)
		OLS			IV-2SLS	
Fiscal Decentralization	0.919***	0.862*	-0.324	0.849***	0.486	-0.299
	(0.266)	(0.509)	(0.768)	(0.289)	(0.487)	(0.915)
Corruption	-0.174***	-0.179***	-0.514**	-0.199***	-0.236***	-0.441*
	(0.0432)	(0.0646)	(0.207)	(0.0636)	(0.0772)	(0.230)
Corruption x Fiscal Decentralization		0.0176	0.918		0.105	0.787
		(0.149)	(0.580)		(0.106)	(0.628)
Corruption^2 x Fiscal Decentralization			-0.121			-0.0951
			(0.0849)			(0.0862)
Instrument of Corruption				British Colonial, Federal, Democratics, Press Freedom		
R-squared	0.901	0.901	0.910	0.900	0.897	0.906
Hansen J statistic				1.848	1.086	1.363
p-value of J				0.605	0.780	0.714
Kleibergen-Paap LM				14.15	13.64	13.63
p'value of LM				0.00683	0.00853	0.00859
first stage F				3.461	2.565	1.730
Number of Country	53	53	53	53	53	53

Panel Analysis

DepVar: Global Competitiveness	(1) Model (1) OLS-Fixed Effect	(2) Model (2) OLS-Fixed Effect	(3) Model (3) OLS-Fixed Effect	(4) Model (1) Hausmann-Taylor	(5) Model (2) Hausmann-Taylor	(6) Model (3) Hausmann-Taylor
Fiscal Decentralization	-0.0866	0.389	0.942	0.0832	0.724*	0.827*
	(0.300)	(0.454)	(0.786)	(0.259)	(0.396)	(0.452)
Corruption	-0.125***	-0.0903***	0.0252	-0.137***	-0.0863***	-0.0524
	(0.0181)	(0.0310)	(0.116)	(0.0172)	(0.0301)	(0.0792)
Corruption x Fiscal Decentralization		-0.138	-0.622**		-0.200**	-0.454**
		(0.0988)	(0.311)		(0.0942)	(0.218)
Corruption^2 x Fiscal Decentralization			0.0781			0.0542
			(0.0492)			(0.0332)
Instrumented Variable				Corruption		
Constant Within Panel Regressors				Federal, Democratics, British Colonial, Tiers, Surface Area, Vertical Gaps		
Observations	402	402	402	402	402	402
Hansen-J Stat.				14.76	11.12	15.03
P-Value of J				0.04	0.03	0.13
Number of Country	42	42	42	42	42	42

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