Indonesia Development Forum 2017

Fighting Inequality for Better Growth

Jakarta, 9-10 August 2017
Latent Effect of Corruption to Decentralization Choice and Competitiveness Nexus

Tengku Munawar Chalil
Ph.D Candidate
Osaka School of International Public Policy (OSIPP)
Osaka University

Comparative Public Policy
Osaka School of International Public Policy (OSIPP)
Osaka University
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

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

Does Global Competitiveness Index Reflect Growth?

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.

\[
\gamma = F'(K,L)
\]

12 pillars of Competitiveness

- Basic Requirement
  - Institution
  - Infrastructure
  - Health and Primary Education
  - Macroeconomic Environment
- Efficiency
  - Market Size
  - Labor Market Efficiency
  - Goods Market Efficiency
  - Financial Market Development
- Technology
  - Innovation
  - Business Sophistication

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:

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

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

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

$$g_c = \frac{\varepsilon \varsigma}{(1-\varepsilon)q} \cdot g \quad = \frac{(1-\varepsilon)q}{\varepsilon \varsigma}$$

That can be characterized by fiscal decentralization ($\chi$) with corruption parameter;

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

Which tell us marginal effect of corruption ($\varsigma$) is negative

---

Corruption vs Competitiveness

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

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

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

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

assuming revenue only from tax:

$$\tau \cdot y = \theta = q g_l + \varsigma g_c$$

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

Barro (1990) describe optimal growth condition by

$$\tau^* = \frac{g}{y} = \frac{\tau}{\Gamma}$$

Then competitiveness is characterized as;

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

Marginal effect of $\Gamma$ is ambiguous (has positive and negative effect).

Under FOC, $\tau$ become either 0 or a function that divided by $\Gamma$. Since marginal effect of corruption ($\varsigma$) to $\Gamma$ is positive then marginal effect of corruption to competitiveness is negative.
## Related Empirical Studies

<table>
<thead>
<tr>
<th>Literature/Articles/Journals</th>
<th>Estimation Technique</th>
<th>Degree of Fiscal Decentralization</th>
<th>Level of Corruption</th>
<th>Growth (Competitiveness)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akai and Sakata [2002], 50 states of USA</td>
<td>OLS (Cross-Section)</td>
<td>Increase</td>
<td>[none]</td>
<td>Increase</td>
</tr>
<tr>
<td>Davoodi and Zou (1997), 46 Country</td>
<td>Cross Section &amp; Pooled OLS (FE)</td>
<td>Increase</td>
<td>[none]</td>
<td>Decrease (in developing country) Increase (?)/Not sig. In developed country</td>
</tr>
<tr>
<td>Lessman, Markwadt [2009], 194 countries in 1980-2009</td>
<td>Pooled OLS</td>
<td>Increase</td>
<td>[none]</td>
<td>Increase</td>
</tr>
<tr>
<td>Eckardt, S [2008], performance of 173 Indonesia local governments (relationship between political accountability and public service performance)</td>
<td>OLS</td>
<td>[none]</td>
<td>Increase</td>
<td>Decrease</td>
</tr>
<tr>
<td>Fan, S., Lin, C., and Treissman, D [2009], 80 countries linking political decentralization and Corruption (cost to firm and ease doing business)</td>
<td>MLE</td>
<td>Increase</td>
<td>Increase (bribery)</td>
<td>[none]</td>
</tr>
<tr>
<td>Arikan (2004), linking multiple measurement of decentralization and corruption</td>
<td>OLS &amp; IV-2SLS</td>
<td>Increase (?) Not Sig</td>
<td>Decrease</td>
<td>[none]</td>
</tr>
</tbody>
</table>
Treismann (2000) argues higher number of local government associated with frequent and costly bribery. Local government more corrupt.

We should consider high number of local government $\Rightarrow$ 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.

$\Rightarrow$ Corruption retards economic growth, thus competitiveness.

High decentralization $\Rightarrow$ High amount of local government $\Rightarrow$ Corruption increase $\Rightarrow$ economic growth decrease, thus competitiveness.

Decentralization-Corruption-Growth nexus become complicated, is there any prerequisite condition when decentralization increase competitiveness $\Rightarrow$ corruption matters?

Fiscal Federalism:


More decentralize $\Rightarrow$ More efficient public service $\Rightarrow$ economic growth increase, thus competitiveness

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
Global Competitiveness, Fiscal Decentralization and Corruption

Decentralized Countries have high competitiveness level than centralized countries.

Clean Countries have high competitiveness level than corrupt countries.

How we describe the linkage among them?

Clean Countries tends to decentralize.
**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

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

**H1**
Corruption is linearly affecting marginal effect of fiscal decentralization, then Fiscal decentralization as function of corruption affect global competitiveness

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

**H2**
Corruption is affecting marginal effect of fiscal decentralization in non-linear form, then Fiscal decentralization as function of corruption affect global competitiveness

\[ Cmpt_i = \beta_0 + (\alpha + \beta_2 Crpt_i + \beta_3 Crpt_i^2)xFD_i + \gamma_i X_i + \varepsilon_i \]
## Data Description

<table>
<thead>
<tr>
<th>Main Variables</th>
<th>Data Employed</th>
<th>Description</th>
<th>Source</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Decentralization</td>
<td>Revenue Indicators (RI)</td>
<td>Share of <em>subnational</em> (all tiers of government below central government) to <em>general government</em> (all tiers government include central government) <em>revenue</em>.</td>
<td>IMF Government Finance Statistics (GFS)</td>
<td>Panel</td>
</tr>
<tr>
<td></td>
<td>Expenditure Indicator (PI)</td>
<td>Share of <em>subnational</em> (all tiers of government below central government) to <em>general government</em> (all tiers government include central government) <em>expenditure</em>.</td>
<td>IMF Government Finance Statistics (GFS)</td>
<td>Panel</td>
</tr>
<tr>
<td></td>
<td>Production-Revenue Indicator</td>
<td>Mean of expenditure decentralization and revenue decentralization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corruption Perception Index</td>
<td>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</td>
<td>Transparency International</td>
<td>Panel</td>
</tr>
</tbody>
</table>

### 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, Democrats dummy, Federal dummy, and British Colonial dummy
Methodology & Regression Result (1)

Cross Section Analysis

- Problem: endogeneity of corruption \( \Leftrightarrow \) OLS vs IV-2SLS
- Durbin-Wu Test: Exogeneity of corruption: OLS not biased
- Suggested relation:
  \[
  Cmp_i = (0.773 \overline{Crpt}_i - 0.108\overline{Crpt}_i^2)xFD_i + \gamma_i\bar{X}_i + \varepsilon_i
  \]
  \[
  N = 54 \quad R\text{-Squared} = 0.933
  \]
  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 \((-b/2a \text{ or } 3.58/10) \Rightarrow \) 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.

Cross Section Analysis Methodology & Regression Result (1)

\[
\begin{array}{c|c|c|c|c|c}
\text{Clean Country} & \text{Middle Country} & \text{Corrupt Country} \\
N = 54 & R\text{-Squared} = 0.933 & \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c|c|c|c|c}
\text{Level of Corruption} & 0 & 3.58 & 5 & 7.15 & 10 \\
\text{Optimal Level of Decentralization} & 0.6 \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c|c|c|c|c}
\text{Clean Country} & \text{Middle Country} & \text{Corrupt Country} \\
\text{Fiscal Decentralization (PRI)} & 0 & 0.2 & 0.4 & 0.6 & 0.8 & 1.0 \\
\text{Optimal Level of Decentralization} & 0.6 \\
\end{array}
\]
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

\[
Cmp_{it} = (0.907 - 0.235 Crpt_{it}) x FD_{it} + \gamma_i X_{it} + \varepsilon_{it}
\]

\[
(0.402) \quad (0.402)
\]

N = 402   Country = 42

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

\[
\frac{\partial Cmp_i}{\partial FD_i} = \begin{cases} 
  \text{positive, if corruption < } -\frac{b}{a} \\
  \text{negative, if corruption > } -\frac{b}{a}
\end{cases}
\]

- The estimate critical value of corruption, \(-\frac{b}{a} = 3.85\) 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.
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).

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.
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?
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

<table>
<thead>
<tr>
<th>DepVar: Global Competitiveness</th>
<th>(1) OLS</th>
<th>(2) OLS</th>
<th>(3) OLS</th>
<th>(4) IV-2SLS</th>
<th>(5) IV-2SLS</th>
<th>(6) IV-2SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Decentralization</td>
<td>1.133***</td>
<td>1.328***</td>
<td>0.0577</td>
<td>1.227***</td>
<td>1.256***</td>
<td>0.272</td>
</tr>
<tr>
<td></td>
<td>(0.232)</td>
<td>(0.435)</td>
<td>(0.403)</td>
<td>(0.262)</td>
<td>(0.364)</td>
<td>(0.485)</td>
</tr>
<tr>
<td>Corruption</td>
<td>-0.106***</td>
<td>-0.0881*</td>
<td>-0.589***</td>
<td>-0.0729**</td>
<td>-0.0693*</td>
<td>-0.493***</td>
</tr>
<tr>
<td></td>
<td>(0.0305)</td>
<td>(0.0500)</td>
<td>(0.0911)</td>
<td>(0.0305)</td>
<td>(0.0367)</td>
<td>(0.149)</td>
</tr>
<tr>
<td>Corruption x Fiscal</td>
<td></td>
<td>-0.0880</td>
<td>0.773***</td>
<td></td>
<td>-0.0110</td>
<td>0.561</td>
</tr>
<tr>
<td>Decentralization</td>
<td></td>
<td>(0.172)</td>
<td>(0.266)</td>
<td></td>
<td>(0.118)</td>
<td>(0.376)</td>
</tr>
<tr>
<td>Corruption² x Fiscal</td>
<td></td>
<td></td>
<td>-0.108***</td>
<td></td>
<td></td>
<td>-0.0674</td>
</tr>
<tr>
<td>Decentralization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.0572)</td>
</tr>
<tr>
<td>Corruption²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.0429***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.0164)</td>
</tr>
</tbody>
</table>

Instrument of Corruption

<table>
<thead>
<tr>
<th>British Colonial, Federal, Democrats, Press Freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
</tr>
<tr>
<td>Hansen J statistic</td>
</tr>
<tr>
<td>p-value of J</td>
</tr>
<tr>
<td>Kleibergen-Paap LM</td>
</tr>
<tr>
<td>p-value of LM</td>
</tr>
<tr>
<td>first stage F</td>
</tr>
<tr>
<td>Number of Country</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DepVar: Global Competitiveness</th>
<th>(1) OLS-Fixed Effect</th>
<th>(2) OLS-Fixed Effect</th>
<th>(3) OLS-Fixed Effect</th>
<th>(4) Hausmann-Taylor</th>
<th>(5) Hausmann-Taylor</th>
<th>(6) Hausmann-Taylor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Decentralization</td>
<td>-0.0754 (0.302)</td>
<td>0.577 (0.464)</td>
<td>0.979* (0.523)</td>
<td>0.0928 (0.260)</td>
<td>0.907** (0.402)</td>
<td>1.043** (0.462)</td>
</tr>
<tr>
<td>Corruption</td>
<td>-0.117*** (0.0179)</td>
<td>-0.0714** (0.0304)</td>
<td>0.0353 (0.0756)</td>
<td>-0.130*** (0.0168)</td>
<td>-0.0698** (0.0295)</td>
<td>-0.0126 (0.0721)</td>
</tr>
<tr>
<td>Corruption x Fiscal Decentralization</td>
<td>-0.176* (0.0956)</td>
<td>-0.511** (0.212)</td>
<td>-0.235*** (0.0907)</td>
<td>(0.203)</td>
<td>(0.0907)</td>
<td>(0.203)</td>
</tr>
<tr>
<td>Corruption² x Fiscal Decentralization</td>
<td>0.0512 (0.0395)</td>
<td>0.0355 (0.0285)</td>
<td>(0.0285)</td>
<td>(0.0355)</td>
<td>(0.0355)</td>
<td>(0.0355)</td>
</tr>
<tr>
<td>Corruption Decentralization</td>
<td>(0.0395)</td>
<td>0.0142 (0.00880)</td>
<td>-0.00852</td>
<td>(0.00844)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instrumented Variable
- Constant Within Panel
- Regressors
  - Observations: 402
  - Hansen-J Stat.: 13.38
  - P-Value of J: 0.06
  - R-squared: 0.176
  - Number of Country: 42

Corruption
- Federal, Democratics, British Colonial, Tiers, Surface Area, Vertical Gaps
- P-value of Hausman test for 3rd model = 0.30, suggest HT estimator as least as efficient with pooled OLS
### Robustness Check

<table>
<thead>
<tr>
<th>DepVar: Global Competitiveness</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Model (3)</th>
<th>Model (4)</th>
<th>Model (5)</th>
<th>Model (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>Fixed</td>
<td>OLS</td>
<td>Hausmann-</td>
<td>Hausmann-</td>
<td>Hausmann-</td>
</tr>
<tr>
<td></td>
<td>Effect</td>
<td>Effect</td>
<td>Fixed</td>
<td>Taylor</td>
<td>Taylor</td>
<td>Taylor</td>
</tr>
<tr>
<td>Fiscal Decentralization</td>
<td>0.919***</td>
<td>0.862*</td>
<td>-0.324</td>
<td>0.849***</td>
<td>0.486</td>
<td>-0.299</td>
</tr>
<tr>
<td></td>
<td>(0.266)</td>
<td>(0.509)</td>
<td>(0.768)</td>
<td>(0.289)</td>
<td>(0.487)</td>
<td>(0.915)</td>
</tr>
<tr>
<td>Corruption</td>
<td>-0.174***</td>
<td>-0.179***</td>
<td>-0.514**</td>
<td>-0.199***</td>
<td>-0.236***</td>
<td>-0.441*</td>
</tr>
<tr>
<td></td>
<td>(0.0432)</td>
<td>(0.0646)</td>
<td>(0.207)</td>
<td>(0.0636)</td>
<td>(0.0772)</td>
<td>(0.230)</td>
</tr>
<tr>
<td>Corruption x Fiscal</td>
<td>0.0176</td>
<td>0.918</td>
<td>0.105</td>
<td>0.010</td>
<td>0.078</td>
<td>0.787</td>
</tr>
<tr>
<td>Decentralization</td>
<td>(0.149)</td>
<td>(0.580)</td>
<td>(0.106)</td>
<td>(0.064)</td>
<td>(0.628)</td>
<td></td>
</tr>
<tr>
<td>Corruption^2 x Fiscal</td>
<td>-0.121</td>
<td></td>
<td></td>
<td></td>
<td>-0.0951</td>
<td></td>
</tr>
<tr>
<td>Decentralization</td>
<td>(0.0849)</td>
<td></td>
<td></td>
<td></td>
<td>(0.0862)</td>
<td></td>
</tr>
<tr>
<td>Instrument of Corruption</td>
<td>R-squared</td>
<td>0.901</td>
<td>0.901</td>
<td>0.910</td>
<td>0.900</td>
<td>0.897</td>
</tr>
<tr>
<td>Hansen J statistic</td>
<td>1.848</td>
<td>1.086</td>
<td>1.363</td>
<td>1.363</td>
<td>1.363</td>
<td></td>
</tr>
<tr>
<td>p-value of J</td>
<td>0.065</td>
<td>0.780</td>
<td>0.714</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kleibergen-Paap LM</td>
<td>14.15</td>
<td>13.64</td>
<td>13.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value of LM</td>
<td>0.00683</td>
<td>0.00853</td>
<td>0.00859</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>first stage F</td>
<td>3.461</td>
<td>2.565</td>
<td>1.730</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Country</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

### Cross Section Analysis

- **Instrument of Corruption**
- **Constant Within Panel Regressors**
- **Observations**: 402
- **Hansen-J Stat.**: 14.76, 11.12, 15.03
- **P-Value of J**: 0.04, 0.03, 0.13
- **Number of Country**: 42


Reference (2)


