PROACTIVITY OF PROVINCIAL LEADERSHIP AND CORRUPTION IN VIETNAM: A SPATIO-TEMPORAL DEPENDENCE ANALYSIS

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Abstract

It is widely accepted that corruption is a problem of institutional failure, and better governance positively leads to lower corruption. As a proxy of governance, proactive leadership of the local governance theoretically associates with corruption, but this impact is complex and non-linear because of the spatial dependence of corruption. This study presents a spatio-temporal model to investigate the impacts of proactivity of provincial leadership on corruption in Vietnam. Using data adapted from 63 provinces during 2006-2017, the study indicates that the provincial corruption levels are clustered in space and time. Also, there are indirect impacts of proactivity of provincial leadership on corruption in the short run and direct impacts in the long run. These impacts are inverted-U shape. This empirical result provides new evidence and sheds light on anti-corruption policy design in Vietnam.

Keywords: *Corruption, Proactivity of provincial leadership, Spatio-temporal dependence*

1. Introduction

Corruption is one of the obstacles to economic and social development. Despite anti-corruption measures and initiatives at the different levels have been applied, corruption is still a worldwide phenomenon in 2020, especially in emerging and transitional countries (Transparency International, 2020). It is one of the main social factors impeding the sustainable development of a region (Frolova et al., 2019). Thus, curbing corruption is as a solution for the economic and social development of countries around the world. There is strong and robust evidence that the higher quality of governance strongly associates with lower levels of corruption, and corruption is a problem of institutional failure. According to Rose-Ackerman (2004), poor governance contributes to low growth and to other harmful outcomes, and that weak underlying economic and institutional conditions facilitate corruption. Many studies also find poor governance is a cause of corruption prevalence. For

example, Lambsdorff (2003) finds that weak law and order and insecure property rights encourage corruption; a low level of democracy facilitates corruption (Rose-Ackerman, 2004); a lack of transparency and a lack of control by supervisory institutions also generates corruption (Šumah, 2018).

As a proxy for governance, the proactivity of local leadership strongly associates with the corruption levels. Proactive leadership of the local government means its policy should promote the development of the private sector. In Vietnam, all policies are centrally promulgated, and interpretation and implementation are conducted by the local government to support the private sector. In this sense, more proactive leadership leads to less corruption in the local government. This study investigates the impacts of proactivity of local government leadership on corruption in the localities with a focus on the spatial dependence of corruption. With data adapted from the Provincial Competitiveness Index survey and General Statistics Office of Vietnam for 63 provinces in Vietnam during 2006-2017, empirical results show that the corruption levels of provinces are positively influenced by spatio-temporal dependence of neighboring province corruption and inverted-U shaped impacts of proactivity of provincial leadership.

It is believed that corruption is a global problem, and it requires global issues. This point is supported by economists who have examined how corruption is spread across borders describe a contagion effect whereby domestic corruption takes on the characteristics of corruption in geographically proximate countries (O'Trakoun, 2017). The level of corruption differs not only between countries but also between subnational regions within a country (Borsky & Kalkschmied, 2019). Spatial dependence of corruption is explained by (i) Economic by openness and integration between economies/regions or resource allocation as Goel and Nelson (2007); Goel and Saunoris (2014), (ii) Society by the spatial sharing of institutional, cultural, or other hidden values by migration (Dong et al., 2012). However, previous studies still have some limitations. O'Connor and Fischer (2012) believe that cross-sectional analyses provide an inadequate understanding of what influences corruption over time. This limitation is explained by the effect of spatio-temporal dependence from source regions is very complex. It includes short-term direct, long-term direct, short-term indirect, and long-term indirect effects (Elhorst, 2014). But economic theory is often quite helpful to entail long-term equilibrium relationships. It has little to say about the short-run dynamics, and this equilibrium is approached (Elhorst, 2001). Existing empirical studies have relied on Spatial Durbin Model incapable of capturing short-term effects because this model cannot estimate those effects (Elhorst, 2014). This study relies instead on the spatio-temporal dependence approach and, as one of the earliest papers in the economic field, fills the above gap.

Vietnam is an active country and has made great efforts in combating corruption. The anti-corruption legal system has been increasingly completed to narrow the policies'

discretion, and administrative reforms reduce the discretion of civil servants, controlling conflicts of interest to minimize corruption based on the collusion between enterprises and civil servants, etc., but corruption is still rampant. Further, the government has multiple-goal programs, both economic development and corruption prevention, but previous studies focus less on the relationship between corruption and proactivity of provincial leadership. It raises the problem of continuing research on this relationship, which provides appropriate evidence for designing the anti-corruption program.

Following this instruction, Section 2 mentions methodology, including the development of the spatial weight matrices, spatial correlation test, estimated models, and variables used. Section 3 presents the estimated results and discussion, and Section 4 concludes the paper.

2. Method

Data and estimated model

The estimates of the spatio-temporal dependence of corruption and investigate how proactivity of provincial leadership spatially affect corruption have three steps: (i) test the best fit model with research data; (ii) investigate the impacts of proactivity of provincial leadership on spatio-temporal dependence of corruption.

Spatial weight matrix

Estimation of a spatio-temporal model requires a spatial weight matrix. It is a square matrix with a dimension of $N \times N$, where N is a number of geographical areas/regions. Previous studies have provided several ways to build a spatial weight matrix. In this study, inverted distance weight matrix is used. Inverted distance weight matrix, W , then has spatial weights of the form: $w_{ij} = \begin{cases} \frac{1}{d_{ij}} & if\ 0 \le d_{ij} < d_{max} \\ 0 & if\ d_{ij} \ge d_{max} \end{cases}$, where d_{max} is the distance band.
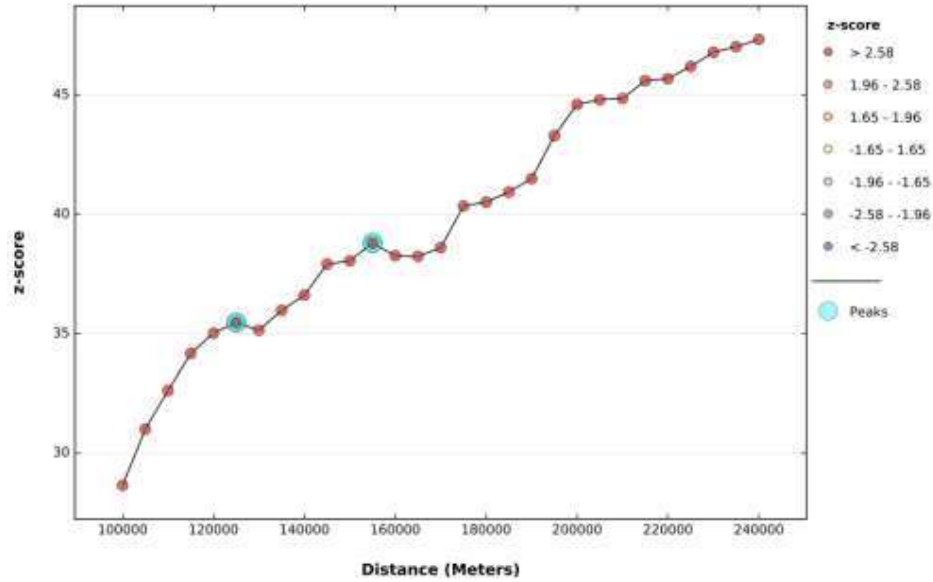
Figure 1: Incremental Spatial Autocorrelation by distance

In which the distance between provinces is calculated by Great circle distance. The great circle distance is calculated using the Haversine formula as follows: $d_{ij} = r *$ $arccos\left[\cos\left(Lon_{r(i)} - Lon_{r(j)}\right) * \cos Lat_{r(i)} * \cos Lat_{r(j)} + \sin Lat_{r(i)} * \sin Lat_{r(j)}\right]$, where d_{ij} is usually computed as the distance between their centroids or another important unit; $Lon_{d(i)}$ and $Lon_{d(j)}$ be the longitude and $Lat_{d(i)}$ and $Lat_{d(j)}$ the latitude coordinates of region i and j measured by degrees, respectively; $Lon_{r(i)}$ and $Lon_{r(j)}$ be the longitude and $Lat_{r(i)}$ and $Lat_{r(j)}$ the latitude coordinates of region i and j measured by radians, respectively; and r is the Earth's radius. The distanced band (d_{max}) is measured by Incremental Spatial Autocorrelation (Spatial Statistics) from ArcGIS Pro. The result shows that 125 kilometers is the best distance band with this data sample (Figure 1).

Estimated model

The Spatio-temporal model can be described as follows:

$$Y_{i,t} = \varphi Y_{i,t-1} + \delta W Y_{i,t-1} + \rho W Y_{i,t} + \theta W X_{i,t} + X_{i,t}\beta + u_{i,t}$$

$$u_{i,t} = \lambda W u_{i,t} + \varepsilon_{i,t}$$

(1)

Where Y is the dependent variable as corruption, X is a vector of explanatory variables, and proactivity of provincial leadership is an interested variable, W is the spatial weight matrix, u is the error terms. $\varepsilon = (\varepsilon_1, \ldots \varepsilon_N)$ is a vector of disturbance terms, and ε_i are independently and identically distributed error terms for all i with zero mean and variance σ^2. φ is a serial autoregressive parameter showing the dependent variable lagged in time. δ is the space and time autoregressive parameter measuring the dependent variable lagged in both space and time. ρ is called the spatial autoregressive coefficient measuring

the dependent variable lagged in space. λ is the spatial autocorrelation coefficient; θ measures the exogenous interaction effects among the independent variables; β measures the impact of the independent explanatory variables.

Control variables and data

Because corruption is an attribute influenced by many factors, equation (1) is augmented by including other regional characteristics. As mentioned above, according to previous studies, the spatial dependence of corruption is often caused by three mechanisms: (i) Economic factors proxied by openness and integration between economies/regions; (ii) Society by the spatial sharing of institutional, cultural, or other hidden values, proxied by in-migration rate, freight traffic; and (iii) the governance of regions/countries that is usually proxied by transparency and proactivity of local leadership.

The dataset is adapted from two sources of Vietnam Provincial Competitiveness Index (PCI) and the General Statistics Office of Vietnam (GSO) during 2006 – 2017. The definitions, measures, and descriptions of variables are presented in Table 1.

Table 1. Describe the variables (2006-2017)

Variables	Description	Mean	Std. Dev	Source
Corruption	Corruption is measured by asking if "enterprises in your line of business have to pay for informal charges."	60.59	10.86	Provincial Competitiveness Index
In-migration rate	The number of people from different territorial units in-migrates to a territorial unit in the reference period on average per 1,000 people of the in-migration territorial unit.	5.86	8.24	General Statistics Office of Vietnam
Openness	Openness is the ratio of export and import to provincial gross regional domestic products.	1.09	1.66	General Statistics Office of Vietnam
Log of Freight traffic	Log of freight traffic, which is calculated by multiplying the volume of freight carried with the actual transported distance.	8.95	1.12	General Statistics Office of Vietnam
Transparency	Transparency is a measure of whether firms have access to the proper planning and legal documents necessary to run their businesses, whether those documents are	5.91	0.83	Provincial Competitiveness Index (PCI)

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	equitably available, whether new policies and laws are communicated to firms and predictably implemented, and the business utility of the provincial webpage.			
Proactivity of provincial leadership	A measure of the creativity and cleverness of provinces in implementing central policy, designing their own initiatives for private sector development, and working within sometimes unclear national regulatory frameworks to assist and interpret in favor of local private firms.	5.05	1.29	Provincial Competitiveness Index

3. Results

Proactivity of provincial leadership and corruption in Vietnam

Corruption in Vietnam persists, although much anti-corruption effort has been conducted. The introduction of new Anti-Corruption Law with a strong will to combat corruption; many actions have been introduced and implemented. For example, the Vietnamese government applied a comprehensive administrative reform and reduced public officials' discretion of policy and discretionary decisions. It also controls for conflict of interests in doing public work and requires and discloses public officials' assets declaration. In addition, many corruption cases have been brought to the course and strictly sentenced. Hence, it creates corruption "deterrent effects" that help reducing corruption. It eventually reduces the perception and experience of corruption among firms and citizens in Vietnam for the last three years. These anti-corruption results have been recognized by Transparency International in the Corruption Perceptions Index ranking when Vietnam increase the index from 31 in 2015 to 36 in 2020, ranking 104 out of 179 surveyed countries.

The proactivity of provincial leadership is a measure of the creativity and cleverness of provinces in understanding and implementing central policy to support private sector development. According to the PCI ranking published by the Vietnam Chamber of Commerce and Industry, the proactivity of provincial leadership was around 4.6 to 5.5 during 2005-2014, and it continuously increased to 6.4 in 2020. The correlation between corruption levels and the proactivity of provincial leadership is presented in Figure 1.

Figure 1: Correlation bet ween corruption levels and proactivity of provincial leadership
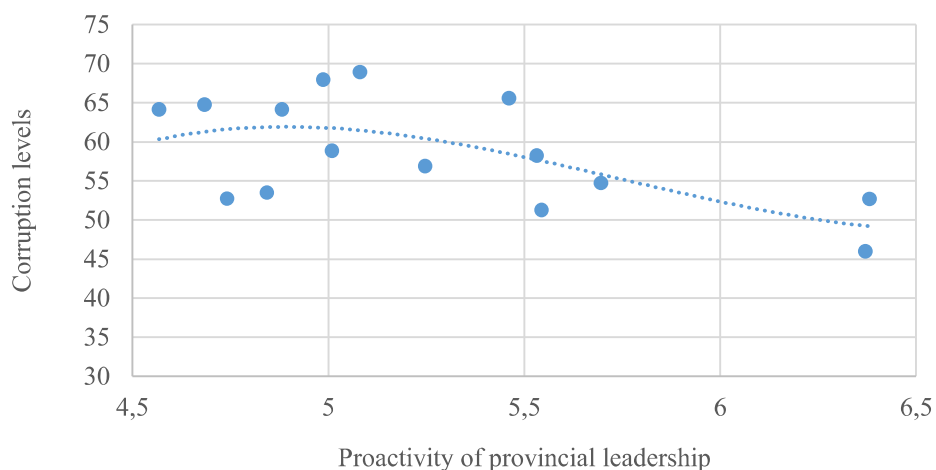
Descriptively, the proactivity of provincial leadership has a quadratic correlation with provincial corruption levels. It means that, at the lower levels of proactivity of provincial leadership, an increase in proactivity of leadership positively associates with a higher corruption level. However, when proactivity of provincial leadership is sufficiently high, an increase in proactivity of leadership positively is negatively associated with the lower corruption levels. It is good evidence for specifying estimated models and guidance for anti-corruption policy design.

Testing for the fitted model

Follow the guidance from Belotti et al. (2017), to determine which spatial econometric model is the best fit for the sample, we first estimate the Spatial Durbin Model (SDM) (LeSage & Pace, 2009) and then test for the exclusion of variables by using LR tests for nested models while using the modified AIC criterion as in Burnham et al. (2004) for the Spatial AutoCorrelation Model (SAC). The test results are presented in Table 2.

Table 2. Spatio-temporal dependence – Test for model selection

	χ^2	P-value	AIC
SAR vs Dynamic SAR	458.40	0.000	.
SDM vs Dynamic SDM	442.21	0.000	.
SEM vs Dynamic SDM	483.18	0.000	.
Dynamic SAR vs Dynamic SDM	22.16	0.001	.
SAC	.	.	5007.1
Dynamic SDM	.	.	4595.8

The test results indicate that the Dynamic SDM model is the best fitted model to investigate the impacts of proactivity of local leadership on corruption in Vietnam.

Estimated results

The testing results show that the Dynamic SDM model is an appropriate model to explore impacts of proactivity of provincial leadership on corruption in Vietnam. Estimates from the dynamic SDM regression model described in equation (1) are presented in Table 3.

Table 3. The estimation results of the Dynamic SDM model

Variables	Main (1)	Wx (2)	SR_Direct (3)	SR_Indirect (4)	LR_Direct (5)	LR_Indirect (6)
Lagged corruption (φ)	0.132***					
	(0.037)					
Spatially lagged corruption (δ)	0.115*					
	(0.063)					
Ln(Freight traffic)	-1.409	-2.203	-1.463	-5.173*	-6.636**	-1.994
	(1.776)	(2.267)	(1.633)	(3.051)	(2.764)	(1.883)
In-migration rate	0.141*	-0.185	0.131*	-0.204	-0.073	0.146
	(0.074)	(0.147)	(0.073)	(0.258)	(0.276)	(0.090)
Openness	0.007	0.135	0.017	0.193	0.210	0.030
	(0.259)	(0.459)	(0.252)	(0.782)	(0.848)	(0.307)
Transparency	-0.018	3.615***	0.309	6.642***	6.950***	0.692
	(0.456)	(1.099)	(0.470)	(2.017)	(2.197)	(0.593)
Proactivity of PL	1.102	4.885	1.498	9.283*	10.782*	2.234
	(1.290)	(3.034)	(1.420)	(5.374)	(6.101)	(1.819)
Proactivity of PL 2	-0.279**	-0.529*	-0.329**	-1.145**	-1.474**	-0.448***
	(0.124)	(0.292)	(0.132)	(0.516)	(0.585)	(0.170)
Spatio-temporal						

Rho (ρ)	0.473***
	(0.046)
Lambda (λ)	44.699***
	(2.223)

Note: Proactivity of PL 2 represent quadratic term of Proactivity of PL.

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

The statistically significant Rho (ρ) parameter and the construction of the distance weight matrix mean that the corruption in Vietnam has spatial dependence across provinces, and the effects are smaller when the distance between provinces is higher. The statistically significant parameter of Lagged corruption (φ) means the corruption has the temporal effect over the years in each province, and the effect is smaller when the lag of time is higher. Especially, the parameter of spatially lagged corruption (δ) is statistically significant. It means local corruption is not only influenced by spatial effect and temporal effect but also by spatio-temporal effect by neighboring provinces.

The estimated results also indicate that the proactivity of provincial leadership has an inverted-U- shaped effect on corruption levels. These effects are indirect in the short run but direct in the long run. In the short run, the corruption level of a province is positively affected by the proactivity of provincial leadership of the neighboring provinces if the levels of proactivity of provincial leadership are low; but this effect is negative if the levels of proactive of provincial leadership are sufficiently high. However, in the long run, indirect effects of proactivity of provincial leadership no longer exist, and the direct effects are present. It implies that the proactivity of provincial leadership will determine the provincial corruption levels. The estimated results also indicate that when the levels of proactivity of provincial leadership improve, the corruption of both province and neighboring provinces tend to decrease. It is a good signal that the actual average levels of proactivity of provincial leadership in Vietnam (5.53) are currently higher than the short-run threshold level of 4.05 and the long-run threshold level of 3.66. It means higher proactivity is negatively associated with lower corruption levels.

The result implies that in the short run, control of corruption in Vietnam should focus on coordination in anti-corruption measures among provinces, the control of how provinces interpret and implement to support the private sector for personal gains of the provincial officials. However, the anti-corruption should shift to promote proactivity of provincial leadership, and in turn, more proactive leadership would decrease the corruption levels in the long run. These empirical results should provide more evidence for the anti-corruption policy design in Vietnam in the years ahead.

4. Discussion and Conclusion

Corruption impedes economic growth and development, and anti-corruption is a priority in many countries. Although, many anti-corruption initiatives have been applied, corruption is still rampant since the spatial dependence of corruption has not been sufficiently investigated and solved, especially when self-interested rent-seeking behavior among local government officials occurred via their proactivity. By using a Spatio-temporal dependence model, this study shows that corruption levels differ among provinces within a country, and they are clustered in space and time. With data adapted from the Provincial Competitiveness Index survey and General Statistics Office of Vietnam for 63 provinces in Vietnam during 2006-2017, empirical results show that the corruption levels of provinces are positively influenced by Spatio-temporal dependence of neighboring province corruption and inverted-U shaped impacts of proactivity of provincial leadership. These impacts are indirect in the short run and direct in the long run.

This study may have a limitation that the spatio-temporal model is not really complete because it only estimates the fixed effect models. In addition, the perceived corruption is used in this study, and it may contain some drawbacks. Respondents from different sub-national regions may perceive corruption differently due to social norms and local tolerance of corruption. Further, perception survey may be affected by socially desirable answers.

Although the study has some limitations, its empirical results still provide merit values. From a theoretical perspective, corruption is clustered in space and time, meaning that corruption levels of a region are affected by region-specific corruption and neighbors' corruption levels over time, and those effects are simultaneous. Once estimating the impact of corruption, it should use the Spatio-temporal dependence models to avoid underestimating the effects, measure the spatial externality effects from neighboring regions, and get unbiased estimates. Furthermore, the role of proactivity of local leadership determines corruption of the locality and corruption levels of neighboring provinces. Thus, investigating the impacts of proactivity of local leadership on corruption should consider the spatio-temporal effects.

From a managerial perspective, the empirical results may have several political applications. Our results emphasize the spatio-temporal of sub-regions research on corruption, which is important to understand how proactivity of provincial leadership affects corruption and can thus provide important policy lessons for central and local governments.

-       First, the anti-corruption policy should take Spatio-temporal dependency of corruption levels into account. It means that anti-corruption actions should be coordinated outside the administrative border of provinces, at least at the regional levels.

- Second, in the short run, provinces should focus on the indirect effects of proactivity of provincial leadership on corruption by controlling policy interpretation and implementation of provincial governments to avoid personal rent-seeking behaviors of provincial officials. The Vietnamese government should vigorously and strictly implement policies that help control for personal rent-seeking activities of the officials. They include the control of conflict of interests, asset declaration, strict moral requirements of the government officials at all levels, and a strong inspectorate system.

- Third, in the long run, anti-corruption measures should focus on promoting the proactivity of provincial leadership to promote the direct effects of the proactivity of leadership on corruption. Some issues should be considered to improve the proactivity of local government leadership: (i) having a strong and transparent legal framework supporting the private sector. This framework helps to guide what local government officials can do to support the private sector. (ii) consistently and predictably implementing the private-supporting policies. It would help firms have long-run investment and development strategies. (iii) increasing the roles and responsibility of the local government leader in their tasks, especially in supporting the development of the private sector.

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