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The Granger Causality Between Corruption and Economic Growth in ASEAN Countries

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ABSTRACT

This paper studies the Granger causality between corruption and economic growth in ASEAN countries over the period of 1995-2019. Ten ASEAN countries are Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Thailand, Vietnam, and Singapore. The corruption is measured by the Corruption Perception Index published annually by Transparency International. The economic growth is measured by a country's annual gross domestic product growth rate. There is a significant bidirectional Granger causality found between lower level of corruption and higher economic growth in Indonesia. It is shown that higher economic growth Granger causes lower level of corruption in Brunei Darussalam, and lower level of corruption Granger causes higher economic growth in Cambodia. No Granger causality between corruption and economic growth is found in the remaining seven ASEAN countries.

Keywords: Granger causality, Economic growth, Corruption, ASEAN

INTRODUCTION

Since the Association of Southeast Asian Nations (ASEAN) was formed by five countries in 1967, more countries joined the organization in later 1980s and 1990s. Currently it has 10 members namely Brunei Darussalam (BRN), Cambodia (KHM), Indonesia (IDN), Lao People's Democratic Republic (LAO), Malaysia (MYS), Myanmar (MMR), Philippines (PHL), Singapore (SGP), Thailand (THA), and Vietnam (VNM). ASEAN Economic Community (AEC) was established in 2015 to deepen the economic integration and eventually achieve the goal of a single integrated market. Before Covid-19 pandemic, ASEAN had an average growth rate of more than 5 percent per year for 5 years, and was the 5th largest economy in the world in 2019 [1]. ASEAN has now become more "business facilitative, financially inclusive, digitally connected, and attractive to investors" [1].

Corruption has been considered as having negative effect on economic growth. The International Association of Anti-Corruption Authorities (IAACA) has been established in 2006 to fight against corruption. Anti-corruption agencies have been established in ASEAN as well, however, the corruption hasn't been tackled effectively so far [2].

The relationship between corruption and economic growth has been studied for several ASEAN countries in previous papers, such as [3] and [4], with different sample periods and methodologies. This paper studies the Granger causality relationship between corruption and economic growth in all ten ASEAN countries.

The remaining of the paper is structured as follows, part 2 reviews the literature on economic growth and corruption, part 3 explains the data and methodology, part 4 details the empirical results of the study, and part 5 concludes the study.

LITERATURE REVIEW

One commonly used proxy for corruption is the Corruption Perception index (CPI) published by Transparency International annually since 1995. The range of CPI is from 0 to 100 where 0 represents highly corrupted and 100 represents very clean with nearly no corruption. Therefore, higher CPI score indicates lower level of corruption. CPI has been used in many research papers on corruption such as [3, 5–12]. Annual gross domestic production growth rate (GDPG) is the popular measurement for a country's economic growth [7, 10, 13–14, 16].

Many papers studied the relationship between corruption and economic growth with different data sets and methodologies. [3, 9, 12, 15–18] employed Granger causality test to study the causal relationship between corruption and economic growth. The results are mixed among those papers. For instance, the results in [12] show a bidirectional causality between higher corruption and lower economic growth; whereas [16] found no causal relationship between control of corruption and economic growth.

Only limited number of papers studied the relationship between corruption and economic growth in some ASEAN countries. Study [3] included 6 ASEAN members in the sample of Asia-Pacific countries: Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. No significant causal relationship was found using the sample period of 1997-2013. Paper [4] included Indonesia and Thailand in the sample of developing countries with the study period of 1999-2014. The result showed that corruption caused some significant decreasing effect on economic growth.

DATA AND METHODOLOGY

This paper intends to study the Granger causality between corruption and economic growth in all ASEAN countries, including Brunei Darussalam (BRN), Cambodia (KHM), Indonesia (IDN), Lao People's Democratic Republic (LAO), Malaysia (MYS), Myanmar (MMR), Philippines (PHL), Thailand (THA), Vietnam (VNM) and Singapore (SGP). Following previous research papers, the corruption is measured by the Corruption Perceptions Index (CPI) developed by Transparency International, and the economic growth is measured by annual gross domestic product growth rate (GDPG). As the CPI has been published since 1995 and Covid-19 pandemic has started since 2020, the sample period is chosen as 1995-2019 to exclude possible effects caused by the pandemic.

The annual CPI scores are collected from the web page of Transparency International. And the annual data of GDPG are collected from the World Development Indicators, web page of the World Bank. Since some data of some countries are not available in some years, there are 206 country-year observations in total.

Thus, there are 10 variables for economic growth measured by annual GDPG of each country: GDPGBRN, GDPGIDN, GDPGKHM, GDPGLAO, GDPGMMR, GDPGMYS, GDPGPHL, GDPGSGP, GDPGTHA, and GDPGVNM; and 10 variables for corruption measured by the natural logarithm

of the CPI score of each country: LNCPIBRN, LNCPIIDN, LNCPIKHM, LNCPILAO, LNCPIMMR, LNCPIMYS, LNCPIPHL, LNCPISGP, LNCPITHA, and LNCPIVNM.

Granger causality test is used to study the causality between CPI and GDPG in each ASEAN country. If variable CPI Granger causes GDPG, then values of GDPG are better predicted from the past values of CPI than from its own values. Variables could show unidirectional causality or bidirectional causality [9].

Augmented Dickey-Fuller test is employed to test whether variables are stationary. The null hypothesis is that the variable has a unit root, which indicates nonstationary. If the null hypothesis can't be rejected, then the variable is adjusted to be stationary first before the Granger causality test.

EMPIRICAL RESULTS

Descriptive Statistics

Table 1 shows the descriptive statistics of annual GDPG of 10 ASEAN countries during 1995-2019. Some years are deleted for some countries because the CPI data is not available. Only 5 countries have the complete 25 observations for the whole period: IDN, MYS, PHL, SGP, and THA. VNM has 23 observations, MMR has 17 observations, KHM and LAO have 15 observations, and BRN has 11 observations.

It can be seen that MMR has the highest economic growth during the study period with average annual GDPG of 9.09% and standard deviation of 3.30%. KHM and LAO have average annual GDPG of about 7.40% where LAO has a lower standard deviation. VNM, SGP, PHL, MYS, IDN, THA have average annual GDPG of 6.45%, 5.16%, 5.10%, 5.09%, 4.54% and 3.50%, respectively. BRN has the lowest average annual GDPG of 0.29%.

Table 1. Descriptive statistics of annual GDPG of ASEAN countries

	Mean (%)	Standard Deviation (%)	Minimum (%)	Maximum (%)	Obs.	Years
BRN	0.29	2.40	-2.51	3.87	11	2009-2019
IDN	4.54	3.92	-13.13	8.22	25	1995-2019
KHM	7.42	2.81	0.09	13.25	15	2005-2019
LAO	7.40	0.99	4.65	8.62	15	2005-2019
MYS	5.09	3.54	-7.36	10.00	25	1995-2019
MMR	9.09	3.30	2.89	13.84	17	2003-2019
PHL	5.10	1.91	-0.58	7.33	25	1995-2019
SGP	5.16	3.79	-2.20	14.53	25	1995-2019
THA	3.50	3.49	-7.63	8.12	25	1995-2019
VNM	6.45	0.83	4.77	8.15	23	1997-2019

The level of corruption in each country during the study period is shown in Table 2. The range of CPI is 0-100, the higher the CPI score, the lower the level of corruption. SGP has the highest average CPI score of 89.69 indicating the lowest level of corruption among ASEAN countries. MMR and KHM have the lowest average score of about 20.00 indicating the highest level of

corruption in the ASEAN region. BRN, MYS, THA, PHL, VNM, IDN, and LAO have the CPI scores of 58.00, 49.64, 34.23, 29.68, 28.43, 26.84, and 25.00, respectively.

Table 2. Descriptive statistics of CPI of ASEAN countries

CPI	Mean	Standard Deviation	Minimum	Maximum	Obs.
BRN	58.00	3.38	52	63	11
IDN	26.84	7.30	17	40	25
KHM	20.67	1.11	18	23	15
LAO	25.00	4.36	19	33	15
MYS	49.64	2.74	43	53	25
MMR	19.71	5.96	13	30	17
PHL	29.68	4.85	23	38	25
SGP	89.69	3.71	84	94	25
THA	34.23	2.65	28	38	25
VNM	28.43	3.63	24	37	23

The trends of CPI and GDPG of all ASEAN countries are shown in Figure 1. However, the trends are not very clear for some countries. The CPI scores of IDN and VNM have the clear upward trend which indicates lower level of corruption expected. The corruption trends in other countries seem to be levelled off or getting worse. It is shown that economic growth rates are either levelling off or getting lower in the future for all countries.

Unit Root Test and Granger Causality Test

Augmented Dickey-Fuller test is employed to test the unit root of each variable. It can be seen in Table 3 that 6 variables in Panel A – GDPGIDN, GDPGMYS, GDPGPHL, GDPGSGP, GDPGTHA, and LNCPITHA – are stationary at the level; 11 variables in Panel B – GDPGKHM, GDPGMMR, GDPGVNM, LNCPIBRN, LNCPIIDN, LNCPIKHM, LNCPIMMR, LNCPIMYS, LNCPIPHL, LNCPISGP, and LNCPIVNM – are stationary at the first difference; and 3 variables in Panel C – GDPGBRN, GDPGLAO, and LNCPILAO – are stationary at the second difference.

The Granger causality test results are displayed in Table 4. There is a bidirectional causality between LNCPIIDN and GDPGIDN, LNCPIIDN Granger causes GDPGIDN at the 5 percent significance level and GDPGIDN Granger causes LNCPIIDN at the 1 percent significance level. Lower level of corruption (higher CPI score) and higher economic growth are having bidirectional Granger causality in IDN. This result is consistent with [12].

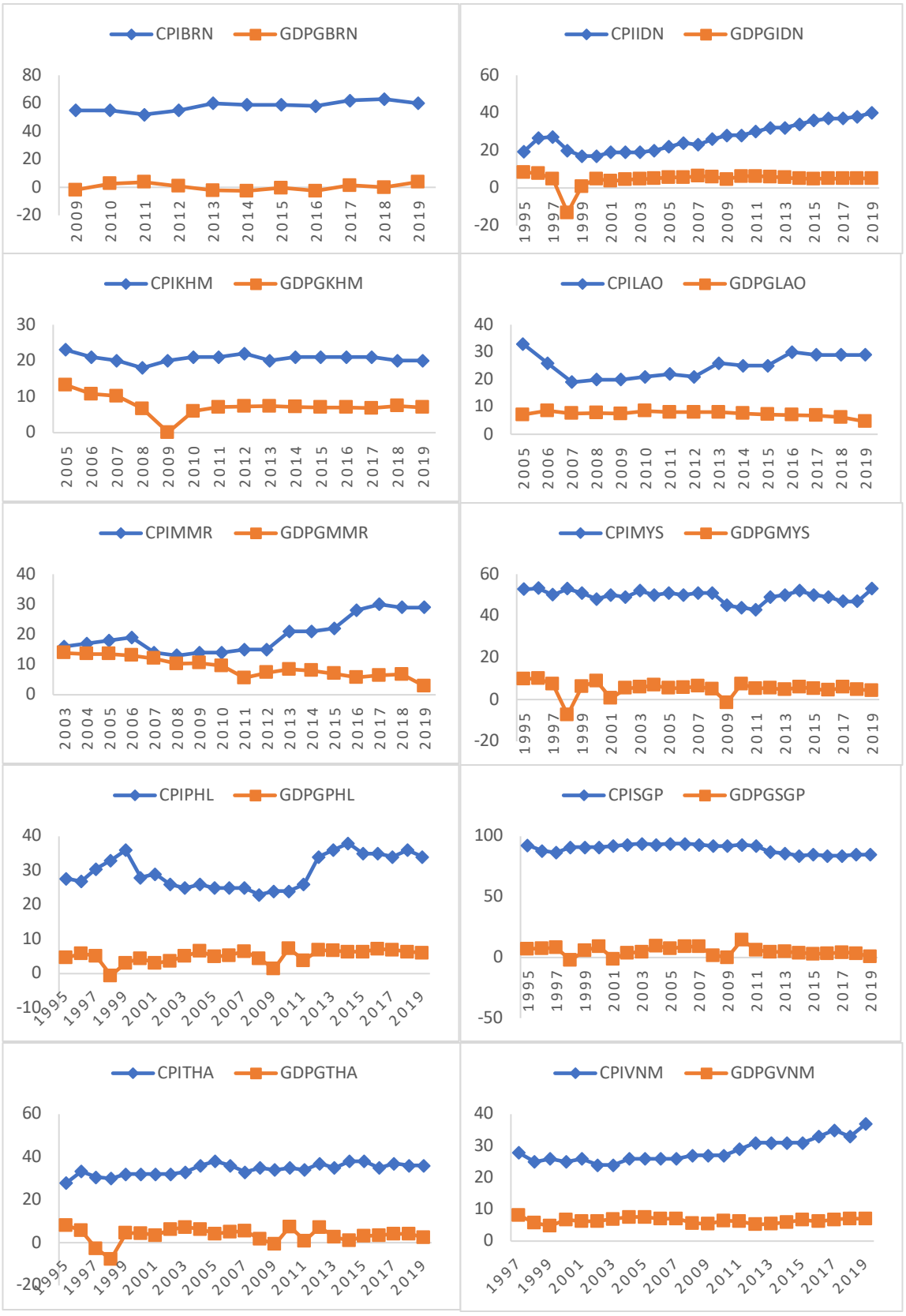


Figure 1. Trends of CPI and GDPG of ten ASEAN countries

Table 3. Augmented Dickey-Fuller test statistic

Panel A	Constant t-Statistic	Prob.	Constant and trend t-Statistic	Prob.	Level Order of integration
GDPGIDN	-3.743	0.010**	-4.290	0.013**	I(0)
GDPGMYS	-5.798	0.000***	-6.358	0.000***	I(0)
GDPGPHL	-3.632	0.013**	-4.248	0.014**	I(0)
GDPGSGP	-4.763	0.001***	-4.188	0.016**	I(0)
GDPGTHA	-4.140	0.004***	-4.095	0.019**	I(0)
LNCPITHA	-3.245	0.030**	-4.505	0.008***	I(0)

Panel B	Constant t-Statistic	Prob.	Constant and trend t-Statistic	Prob.	First difference Order of integration
GDPGKHM	-3.671	0.020**	-3.679	0.063*	I(1)
GDPGMMR	-4.409	0.005***	-4.165	0.028**	I(1)
GDPGVNM	-6.599	0.000***	-6.313	0.000***	I(1)
LNCPIBRN	-4.376	0.013**	-3.975	0.067*	I(1)
LNCPIIDN	-5.274	0.000***	-6.021	0.000***	I(1)
LNCPIKHM	-4.041	0.010**	-3.813	0.051*	I(1)
LNCPIMMR	-3.452	0.026**	-3.582	0.067*	I(1)
LNCPIMYS	-4.699	0.001***	-4.704	0.005***	I(1)
LNCPIPHL	-4.464	0.002***	-4.349	0.012**	I(1)
LNCPISGP	-4.733	0.001***	-4.914	0.004***	I(1)
LNCPIVNM	-6.352	0.000***	-4.551	0.010**	I(1)

Panel C	Constant t-Statistic	Prob.	Constant and trend t-Statistic	Prob.	Second difference Order of integration
GDPGBRN	-4.437	0.012**	-4.726	0.031**	I(2)
GDPGLAO	-2.957	0.073*	-3.627	0.082*	I(2)
LNCPILAO	-4.445	0.007***	-5.510	0.006***	I(2)

Note: *, **, and * indicate significance at the level of 1%, 5%, and 10%, respectively.**

There are two unidirectional causality found: GDPGBRN Granger causes LNCPIBRN at the 10 percent significance level, and LNCPIKHM Granger causes GDPGKHM at the 5 percent level. That is, higher economic growth will Granger cause lower level of corruption in BRN. However, lower level of corruption will Granger cause higher economic growth in KHM. This result is consistent with the common negative effect of corruption on economic growth [4-7]. However, since the sample sizes for BRN and KHM are small, the results should be interpreted with caution.

There is no Granger causality between corruption and economic growth in the remaining 7 ASEAN countries. This result is consistent with [3, 16]. However, the result for THA is not consistent with [4] and the possible reason is that sample periods are different in two studies.

Table 4. Granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNCPIBRN) does not Granger Cause D(GDPGBRN,2)	7	5.749	0.148
D(GDPGBRN,2) does not Granger Cause D(LNCPIBRN)		13.493	0.069*
D(LNCPIIDN) does not Granger Cause GDPGIDN	22	4.658	0.024**
GDPGIDN does not Granger Cause D(LNCPIIDN)		9.811	0.002***
D(LNCPIKHM) does not Granger Cause D(GDPGKHM)	12	9.226	0.011**
D(GDPGKHM) does not Granger Cause D(LNCPIKHM)		1.660	0.257
D(LNCPILAO,2) does not Granger Cause D(GDPGLAO,2)	11	2.202	0.192
D(GDPGLAO,2) does not Granger Cause D(LNCPILAO,2)		2.089	0.205
D(LNCPIMMR) does not Granger Cause D(GDPGMMR)	14	2.628	0.126
D(GDPGMMR) does not Granger Cause D(LNCPIMMR)		1.424	0.290
D(LNCPIMYS) does not Granger Cause GDPGMYS	22	0.681	0.519
GDPGMYS does not Granger Cause D(LNCPIMYS)		1.381	0.278
D(LNCPIPHL) does not Granger Cause GDPGPHL	22	0.083	0.921
GDPGPHL does not Granger Cause D(LNCPIPHL)		2.135	0.149
D(LNCPISGP) does not Granger Cause GDPGSGP	22	1.309	0.296
GDPGSGP does not Granger Cause D(LNCPISGP)		1.473	0.257
LNCPITHA does not Granger Cause GDPGTHA	23	0.345	0.713
GDPGTHA does not Granger Cause LNCPITHA		0.274	0.764
D(LNCPIVNM) does not Granger Cause D(GDPGVNM)	20	0.911	0.423
D(GDPGVNM) does not Granger Cause D(LNCPIVNM)		1.109	0.356

Note: *, **, and * indicate significance at the level of 1%, 5%, and 10%, respectively.**

CONCLUSION

This paper studies the Granger causality between corruption and economic growth in 10 ASEAN countries over the period of 1995-2019. The economic growth is measured by annual percentage growth rate of a country's GDP and the corruption is measured by CPI published

annually by Transparency International. Due to missing data, only 5 countries have complete 25 observations for the whole sample period. MMR, KHM, LAO, and BRN have less than 20 observations, therefore the results of these 4 countries should be interpreted with caution.

A significant bidirectional Granger causality between lower level of corruption (higher CPI score) and higher economic growth is found in IDN. Further, the results show that higher economic growth will Granger cause lower level of corruption in BRN, and lower level of corruption will Granger cause higher economic growth in KHM. Hence, the authorities and anti-corruption agencies in IDN, BRN, and KHM could refine policies to lower the level of corruption and improve the economic growth.

This study shows no Granger causality between corruption and economic growth in the remaining 7 ASEAN countries.

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