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Does Corruption Hinder Economic Growth? A Simultaneous Analysis

Indah Susilowati [1], [2]✉ Tania Wicaksana, [3] Benny Imantria, [4] Annisa Febi, [5] Lia Anjarsari

[1,2,3,4,5] Faculty of Economics and Business, University of Diponegoro, Indonesia

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Abstract

Corruption has a causal relationship with economic growth that economists have long studied. This study aims to determine the causal relationship between corruption and economic growth, the effects of human development and good governance on corruption, and the effect of investment, labor force, and the use of technology on economic growth. The data used is panel data consisting of 43 Asian countries in 2012-2022, which were analyzed using Two-Stage Least Squares (2SLS). This study found that corruption and economic growth have a positive causal relationship, thus supporting the theory of Sand the Wheel that corruption hinders economic growth in Asian countries except Central Asia, and the determinants of corruption and economic growth have varying effects in the Asian region. This study provides information for stakeholders to develop policies that encourage economic growth by prioritizing human development, creating good governance, and increasing physical capital, human capital, and technology adoption.

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✉ Corresponding author:
Address: Faculty of Economics and Business, DiponegoroUniversity
E-mail: tania.wicaksana@gmail.com

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INTRODUCTION

Since the fourth century BCE economists, politicians, and policymakers have expressed concern about corruption as a global problem (d'Agostino et al., 2016; Saha & Ben Ali, 2017). There are two perspectives on the impact of corruption on development: the "sand the wheel" theory and the "grease the wheel" theory. The "sand the wheel" theory posits that corruption hinders growth by causing production inefficiencies, while the "grease the wheel" theory suggests that corruption can positively impact economic growth by mitigating distortions caused by suboptimal institutions and bureaucratic inefficiencies (Gründler & Potrafke, 2019). Asia plays a significant role in the global economy, contributing 38.4% of the world's GDP (World Bank, 2024). However, despite continued nominal GDP growth, Asia's economic growth rate has shown a tendency to decline, as illustrated in Figure 1.

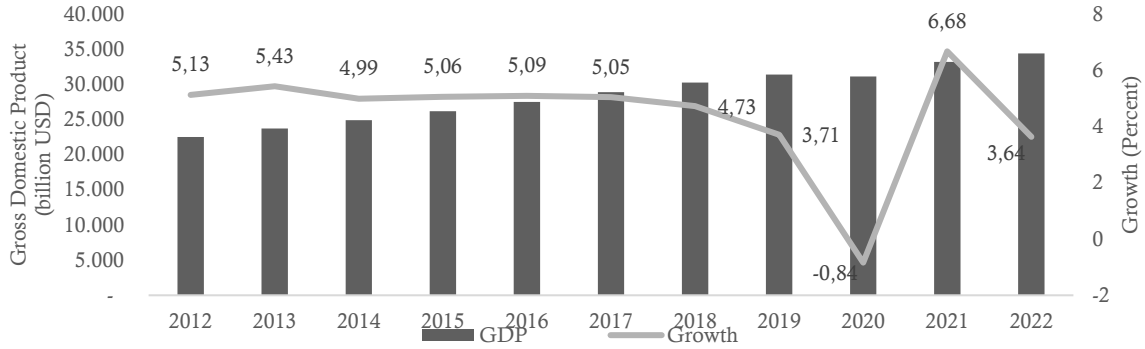

Figure 1. The Development ofGross Domestic Product of Asia
Source: World Bank, 2024

Despite the size of Asia's economy, corruption remains a complex issue in the region (Vrushi, 2020). Corruption poses a challenge to sustainable development in Asia, where many areas are among the most corrupt countries according to the Corruption Perception Index (CPI). Figure 2 compares the average CPI of Asian subregions (Western, Central, Southern, Eastern, and South-Eastern) with the overall average CPI for Asia.

As shown in Figure 2, the average CPI values in most Asian subregions have tended to stagnate. Over the past 11 years, the Central and Southern subregions have consistently had average CPI values below the Asian average. Meanwhile, the South-Eastern and Western subregions have maintained average CPI values close to the Asian average, and the Eastern subregion has had the highest average CPI value, exceeding the Asian average. The CPI is scored on a scale from 0 to 100, where 0 indicates extreme corruption, and 100 indicates a very clean system (Transparency, 2021).

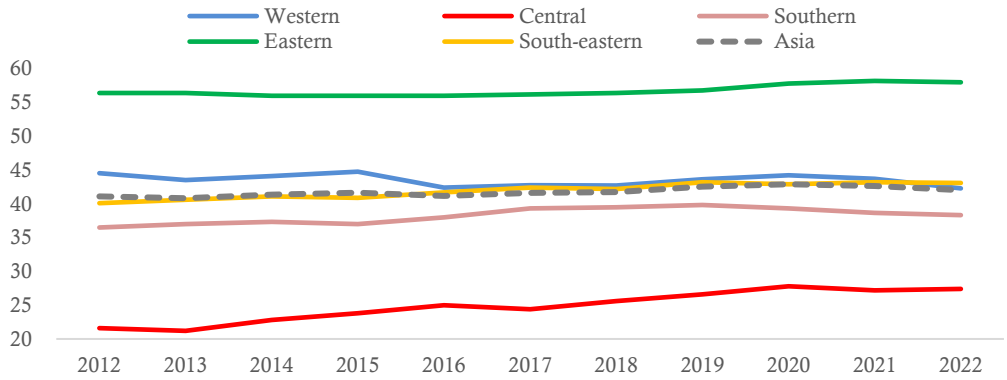

Figure 2. Corruption in the Region of Asia
Source: World Bank, 2024 (Processed)

Based on Figure 3, compared to global corruption scores, most Asian countries have CPI values below the global CPI value. This indicates that corruption occurring in Asia is at a level above the average corruption level of other countries in the world.

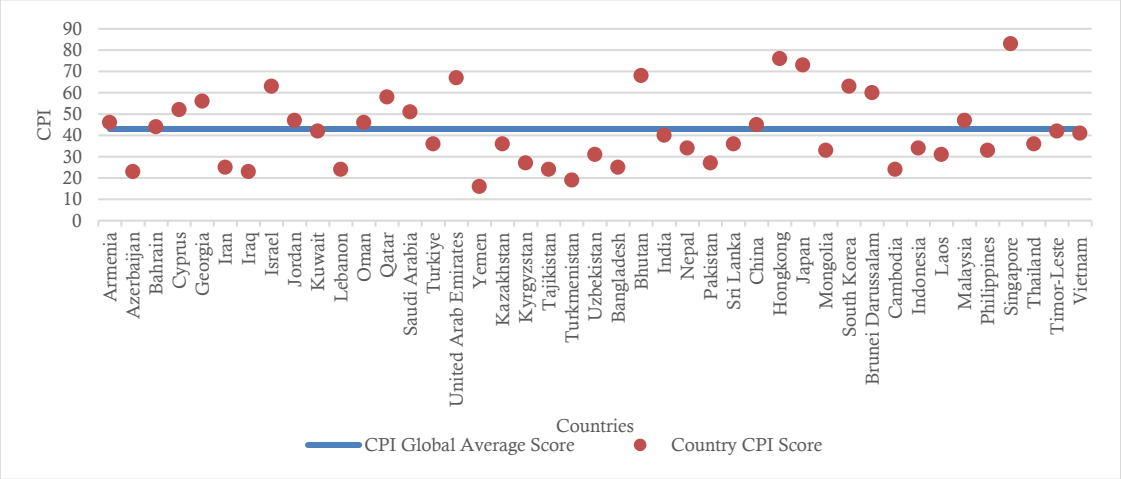

Figure 3. Comparison of Asian countries' CPI values with the world CPI in 2022
Source: Transparency, 2022 (Processed)

Corruption not only hinders sustainable development but also impacts other sectors. Studies by Karim, Karim & Nasharuddin (2019) and Shaari et al. (2022) suggest that higher levels of corruption lead to reduced investment, which in turn diminishes economic growth.

Corruption imposes costs that decrease efficiency and obstruct economic progress. Consequently, the 'sand the wheels' theory of corruption, which views corruption as a barrier to growth, is more prevalent in developed countries with effective and efficient institutions and bureaucracies (Fhima, Nouira and Sekkat, 2023). Several other studies, including those by Mustapha (2014), Spyromitros and Panagiotidis (2022) and Al-Tal, Al-Tarawneh and Mahasneh (2023) support the hypothesis that corruption act as a 'sand the wheel,' that can hinder a country's economic growth.

Conversely, some studies have found that corruption can actually enhance economic growth by circumventing inefficient regulations where known as 'grease the wheels' concept. This effect is generally observed in developing countries with ineffective and inefficient institutions and bureaucracies (Maria *et al.*, 2021; Lucarelli, Muço and Valentini, 2024)

Corruption is sometimes perceived as a means of bypassing bureaucratic and regulatory obstacles that slow down economic growth, and certain forms of corruption are even considered to help improve a country's institutional and political systems. Huang (2016) found that in several countries within the Asia-Pacific region, the relationship between corruption and economic growth is positive, suggesting that corruption may not necessarily be detrimental to economic growth in this region.

Other studies such as Spyromitros and Panagiotidis (2022) and Trabelsi (2024) support the 'grease the wheels' hypothesis, identifying moderate levels of corruption as an efficiency factor that can positively affect economic growth.

The main objective of this study is to determine the impact of corruption on economic growth, assuming a causal relationship in the Asian region (Western, Central, Southern, Eastern, and South-Eastern) during the period 2012-2022. The study also incorporates other variables, including human capital variables and World Governance Index (WGI) indicators, which consist of control of corruption, government effectiveness, voice and accountability, regulatory quality, rule of law, and political stability. Additionally, this study includes production function variables such as investment, labor, and technology.

RESEARCH METHODS

This study uses a quantitative approach with secondary data using panel data with 473 observations spanning 43 countries in Asia during the period from 2011 to 2020. Data from Asian countries were selected due to Asia's strategic contribution to the global economy. The period from 2011 to 2022 was chosen to ensure the accuracy and completeness of the data Based on Table 1, data obtained from several sources can be detailed as follow.

Table 1. Variables and Data Source

Variable	Description	Unit	Data Source
Corruption Perceptions Index (Corrupt)	The composite index for scoring corruption in public sector. Countries with higher levels of corruption will have lower CPI values.	Index	Transparency International
Gross Domestic Product Percapita (GDPC)	Gross domestic product divided by population held constant in 2015 U.S. Dollars.	USD	World Bank
Human Development Index (Human)	The composite index for scoring health, knowledge, and a decent standard of living.	Index	UNDP
Control of Corruption (Control)	Perceptions which government is used for private gain, including corruption and elite capture.	Index	World Bank
Government Effectiveness (Govern)	Perceptions of public services quality and independence from political pressures.	Index	World Bank
Voice and Accountability (Voice)	Perceptions of citizen's ability to participate in election, including freedom to speech, association, and media.	Index	World Bank
Regulatory Quality (Regulator)	Perception of the institution's ability to create and implement policy rules that support development of non-public sector.	Index	World Bank
Rule of Law (Law)	Perception of the ability to apply legal rules in governance including contracts and property rights.	Index	World Bank
Political Stability (Politic)	Perception of political instability within the government.	Index	World Bank
Foreign Direct Investment (Invest)	Value of net inflows of inward direct investment made by foreign investors divided by gross domestic product.	Percent	World Bank
Labor Force (Labor)	Population aged 15 and above who engage in economic activities by working during a specified period.	Percent	World Bank
Internet Use (Tech)	Households that have used the internet in the last 3 months divided by population.	Percent	World Bank
$\beta_{1\text{-}8}$, $\gamma_{1\text{-}4}$	Regression coefficient		
μ_{1it} , μ^{*}_{2it}	Error term		

Source: Data Processed, 2024

The dependent variable in equation one (1) is the Corruption Perceptions Index (CPI), while the independent variables being GDP per capita, Human Development Index, Control of Corruption, Government Effectiveness, Voice and Accountability, Regulatory Quality, Rule of Law, and Political Stability. In the second equation (2), the dependent variable is GDP per capita, with the independent variables being CPI, Investment, Labor Force Participation Rate, and Technology.

The analytical tool used is Two-Stage Least Square (2SLS) analysis, by Henri Theil and Robert Basmann, because there are allegations of endogeneity in the GDP per capita variable, where there may be a causal relationship with the corruption variable. 2SLS extention of ordinary least squares (OLS) method which implements two successive applications of OLS. Accordingly, the model in this equation is over identified with the following equation:

$$Corrupt_{it} = \beta_0 + \beta_1 \widehat{GDPC}_{it} + \beta_2 Human_{it} + \beta_3 Control_{it} + \beta_4 Govern_{it} + \beta_5 Voice_{it} + \beta_6 Regulator_{it} + \beta_7 Law_{it} + \beta_8 Politic + \mu_{1it} \quad ..... (1)$$

$$GDPC_{it} = \gamma_0 + \gamma_1 \widehat{Corrupt}_{it} + \gamma_2 Invest_{it} + \gamma_3 Labor_{it} + \gamma_4 Tech_{it} + \mu^{*}_{2it} \quad ..... (2)$$

RESULTS AND DISCUSSION

As shown in Table 2, the descriptive statistics provide information on corruption, human development, good governance, gross domestic income per capita, and factors of production over the observation period. Central Asia has the lowest average CPI with a small standard deviation, indicating that corrupt practices are consistently prevalent across countries in the region. Central Asia and Southern Asia also have lower average scores in good governance compared to other Asian regions, as reflected in indicators such as control of corruption, government effectiveness, voice and accountability, regulatory quality, rule of law, and political stability.

Although human development, encompassing health, knowledge, and standard of living, is relatively uniform across Asia, East Asia demonstrates a higher quality of human development. Central Asia exhibits the weakest economic performance, with GDP per capita values significantly below the average for other Asian regions.

Table 2. Descriptive Statistics Result

Variable	Min	Max	Mean	Std. Dev.
Western Asia				
Corrupt	14	71	43.51872	15.65534
GDPC	1017.873	72870.37	18132.09	16970.16
Human	.402	.861	.7184759	.0743744
Control	-1.712633	1.273586	-.1036423	.8229289
Govern	-2.36193	1.500586	.0622044	.8575554
Voice	-1.882015	1.056248	-.7653837	.7703697
Regulator	-2.040683	1.300974	.0948265	.8231828
Law	-1.849667	1.131567	-.0665652	.8091679
Politic	-2.996031	1.223599	-.6396515	1.012597
Invest	-103.1567	280.1455	7.573449	33.75902
Labor	31.724	88.633	59.57711	14.90245
Tech	7.1	100	71.47883	23.39364
Central Asia				
Corrupt	17	38	24.85455	5.348652
GDPC	855.6801	11402.76	4493.299	3772.442
Human	.586	.813	.7206	.0525144
Control	-1.439067	-.1853012	-1.09826	.3083754
Govern	-1.185951	.1434305	-.685682	.3671851
Voice	-2.259164	-.3544603	-1.44077	.5792862
Regulator	-2.132286	.154889	-.9864102	.7292594
Law	-1.492237	-.4665397	-1.063928	.3070024
Politic	-1.24086	.4280879	-.3896807	.3372932
Invest	-4.854847	17.13123	3.720986	3.395651
Labor	40.588	70.726	56.26375	10.59566

Variable	Min	Max	Mean	Std. Dev.
South Asia				
Corrupt	25	68	38.25758	13.48995
GDPC	781.1039	4495.71	2085.856	1099.985
Human	.503	.818	.694697	.0765106
Control	-1.075527	1.618237	-.3076181	.7821231
Govern	-1.13535	.7017297	-.3327317	.5212488
Voice	-.8776661	.4409994	-.2683526	.4038953
Regulator	-1.093009	-.0504464	-.5823004	.2977646
Law	-.9361674	.6720346	-.2726186	.4738311
Politic	-2.677004	1.106088	-.7205532	1.012632
Invest	-.6388063	2.409136	.8578741	.584891
Labor	39.64	69.909	53.11042	7.736288
Tech	5	88	29.04017	20.20645
East Asia				
Corrupt	33	77	56.74545	16.62798
GDPC	3374.438	45280.49	24239.88	15315.3
Human	.715	.959	.8532364	.0894616
Control	-.5608071	1.73259	.5969594	.8887671
Govern	-.6261314	1.878422	.90644	.8202762
Voice	-1.660774	1.109647	.1438624	.9429274
Regulator	-.4184176	2.221292	.7650019	.8919715
Law	-.5453845	1.856512	.7203306	.8562244
Politic	-.5525597	1.153229	.4598885	.5463029
Invest	-37.17265	58.51837	9.570057	16.05067
Labor	58.21	70.41	62.51678	3.314336
Tech	16.4	97.57133	73.25407	24.23607
Southeast Asia				
Corrupt	20	87	41.94545	17.77114
GDPC	992.1346	67359.79	12015.71	17868.24
Human	.551	.949	.7258182	.10829
Control	-1.356795	2.139808	-.1517589	.9318873
Govern	-1.245917	2.284573	.242616	.9339889
Voice	-1.815576	.4875514	-.5790423	.6741839
Regulator	-1.023703	2.252235	.1145639	.882776
Law	-1.21267	1.837814	-.1155353	.8538736
Politic	-1.37869	1.599123	.09447	.7592779
Invest	-32.95523	32.69116	5.495672	8.527613
Labor	54.75	77.2	67.00307	5.152929
Tech	4.94	99	53.21554	26.83898

Source: Data Processed, 2024

However, the use of production factors to improve economic performance is lacking in Southern Asian countries such as small foreign direct investment, small labor force, and low internet usage.

The results of the 2SLS analysis in this study can be detailed in Table 3. Result of Two-Stage Least Square Estimation. Based on the P>|t| value, there is a variety of partial relationship between GDP per capita, HDI, and good governance on CPI in Asia according to the first equation (1), and there is a variety of partial relationship between CPI, foreign direct investment, labor force, and internet usage on GDP per capita in Asia according to the second equation (2).

Table 3. Two-Stage Least Square Analysis Results

Dependent Variable = Corrupt					
Variable	**Western**	**Central**	**Southern**	**Eastern**	**South-eastern**
GDPC	0.0000286	-0.00111**	-0.00237	0.000137	0.0000378
	(0.3524)	(0.0184)	(0.1456)	(0.8253)	(0.7350)
Human	0.309	-25.40**	8.927	18.68	37.96***
	(0.9218)	(0.0320)	(0.2856)	(0.7311)	(0.0001)
Control	16.87***	14.45***	11.64***	16.45***	11.27***
	(0.0000)	(0.0015)	(0.0000)	(0.0000)	(0.0000)
Govern	0.0165	0.286	2.595	0.616	1.880
	(0.9848)	(0.9226)	(0.1222)	(0.6731)	(0.3428)
Voice	-0.319	-0.471	-4.344	0.116	2.240**
	(0.4029)	(0.8045)	(0.1978)	(0.9339)	(0.0191)
Regulator	0.316	3.302	-0.267	0.377	1.035
	(0.7083)	(0.2308)	(0.8986)	(0.9127)	(0.6829)
Law	0.863	-0.436	13.52**	-3.509	-2.917
	(0.4129)	(0.9428)	(0.0455)	(0.2271)	(0.1586)
Politic	0.432	4.955**	-0.272	1.385	4.045***
	(0.2701)	(0.0579)	(0.7808)	(0.1936)	(0.0000)
Constant	44.58***	68.24***	43.60***	28.69	15.65**
	(0.0000)	(0.0000)	(0.0000)	(0.4215)	(0.0213)
N	187	55	66	55	110
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.966	0.719	0.978	0.993	0.983
Dependent Variable = GDPC					
Variable	**Western**	**Central**	**Southern**	**Eastern**	**South-eastern**
Corrupt	337.7***	-290.8*	22.18	750.5***	872.1***
	(0.0000)	(0.0724)	(0.1165)	(0.0000)	(0.0000)
Invest	-22.69	295.1*	324.5	69.86**	542.2***
	(0.3153)	(0.0583)	(0.1388)	(0.0129)	(0.0000)
Labor	588.4***	43.12	21.37	170.1	-1.940
	(0.0000)	(0.5378)	(0.2973)	(0.2261)	(0.9807)
Tech	37.10	112.6***	11.35	131.6***	-28.23
	(0.4034)	(0.0070)	(0.1590)	(0.0000)	(0.1739)
Constant	-34099.9*	3242.0	-505.5	-39290.2*	-25912.8*
	(0.0000)	(0.4083)	(0.5608)	(0.0001)	(0.0000)
N	187	55	66	55	110
Prob > F	0.0000	0.0001	0.0000	0.0000	0.0000
R-squared	0.662	0.278	0.287	0.966	0.951

Note: * p<0.01; ** p<0.05; *** p<0.1
Source: Data Processed, 2024

GDP per capita has a positive effect on CPI in West, South, East, and Southeast Asia, thus an increase in GDP per capita will increase CPI (reduce corruption). This result is in line with the "grease of wheel" corruption perspective which views corruption as a lubricant for the wheels of the economy. The existence of corruption will accelerate the running of the wheels of the economy. Arsandi (2022) argued that corruption as 'grease the wheel' occurs primarily in countries with excessive industrial bureaucratic regulations, a phenomenon often observed in Asian countries and referred to as the Asian Paradox. Song, Chang, and Gong (2021), using panel data from 142 countries, found that corruption affects economic and financial growth primarily in developing countries but does not have a significant impact in developed nations.

This finding is consistent with a study conducted by Yunan and Andini (2018) which demonstrated that transparency in budget management and anti-corruption programs

promotes economic growth. Conversely, GDP per capita has a significant negative effect on CPI in Central Asia, such that an increase in GDP per capita by 1 USD results in a 0.001-point reduction in CPI (increase in corruption). This result is consistent with the studies by (Maria *et al.* (2021), Li and Kumbhakar (2022), Susilowati *et al.* (2024), which found that rising GDP per capita can increase corruption in developing countries and those experiencing very rapid growth.

HDI has a positive effect on CPI in West, South, and East Asia and a significantly positive effect in Southeast Asia, indicating that an increase in HDI will raise the CPI (reduce corruption). Specifically, a 1-point increase in HDI in Southeast Asia will lead to a 37.96-point increase in CPI. This finding is supported by Sarabia *et al.* (2020), Samanta and Sanyal (2023) and Seiam and Salman (2024), who found that meeting basic human needs for education, health, and living standards creates an environment conducive to reducing corruption. Conversely, HDI has a significant negative effect on CPI in Central Asia, such that a 1-point increase in HDI will result in a 25.40-point reduction in CPI (increase in corruption).

Control of corruption has a significant positive effect on CPI across Asia. An increase in control of corruption by 1 standard deviation results in CPI increases of 16.87, 14.45, 11.64, 16.45, and 11.27 points in West, Central, South, East, and Southeast Asia, respectively. These results are consistent with studies by Choi (2018), Appiah-Kubi *et al.* (2023), and Durguti, Alidemaj and Krivins (2024). Choi (2018) found that corruption can be reduced through control of corruption and prevention run by government institutions that are independent in implementing the rule of law.

Government effectiveness also has a positive effect on CPI across Asia, suggesting that increased government effectiveness leads to a reduction in corruption. This finding is consistent with studies by Maria *et al.* (2021), Linhartová and Halásková (2022), Appiah-Kubi *et al.* (2023), and Durguti, Alidemaj and Krivins (2024). Linhartová & Halásková (2022) found that the discipline of civil servants in public services according to procedures and codes of conduct will reduce corruption in a country.

Voice and accountability have a positive effect in East Asia and a significant positive effect in Southeast Asia, meaning that an increase in voice and accountability is associated with a rise in CPI (reduction in corruption). Specifically, a 1 standard deviation increase in voice and accountability in Southeast Asia results in a 2.24-point increase in CPI. This finding aligns with the study by Appiah-Kubi et al. (2023), which found that voice and accountability contribute to a robust institutional framework that can reduce corruption. Public participation in shaping development policies decreases the potential for corruption by promoting welfare-oriented policies (Todaro and Smith, 2020). Conversely, an increase in voice and accountability has a negative effect on CPI in Western, Central, and Southern Asia, where an increase in voice and accountability leads to a decrease in CPI (increase in corruption). This result is consistent with the study by Linhartová and Halásková (2022).

Regulatory quality has a positive effect on CPI in West, Central, East, and Southeast Asia , indicating that improved regulatory quality leads to an increase in CPI (reduction in corruption). This finding is consistent with studies by Appiah-Kubi et al. (2023), Bahaudin G. Mujtaba et al. (2018), Durguti et al. (2024), Koeswayo et al. (2024), Linhartová & Halásková (2022), Maria et al. (2021), Montes & Paschoal (2016), Oktavilia et al. (2020), Uddin & Rahman (2023). Durguti et al. (2024) found that swift and effective government strategies that encourage private sector involvement in the economy reduce corruption and promote economic growth. Similarly, Oktavilia et al. (2020) observed that enhancing the fiscal capacity of local governments increases the provision of public goods, which in turn boosts private sector participation in the economy, thereby reducing corruption and fostering economic growth. Conversely, in South Asia, regulatory quality negatively impacts CPI, meaning that an increase

in regulatory quality leads to a decrease in CPI (increase in corruption).

The rule of law has a positive effect on CPI in West Asia and a significantly positive effect in South Asia, meaning that an increase in the rule of law is associated with a rise in CPI (reduction in corruption). Specifically, a 1 standard deviation increase in the rule of law in South Asia results in a 13.52-point increase in CPI. This finding is consistent with studies conducted by Durguti et al. (2024), Koeswayo et al. (2024), Linhartová & Halásková (2022), Mohd-Rashid et al. (2023), Taqi et al. (2021), Thach & Ngoc (2021). Mohd-Rashid et al. (2023) found that the strict application of the rule of law protects property rights and reduces government corruption, thereby enhancing the country's image as corruption-free, which is beneficial for promoting economic growth through market efficiency. In contrast, the rule of law negatively affects CPI in Central, Eastern, and Southeastern Asia, meaning that an increase in the rule of law in these regions is associated with a decrease in CPI (increase in corruption).

Political stability has a positive effect on the CPI in Western and Eastern Asia and a significant positive in Central and Southeast Asia, so that an increase in political stability will increase the CPI (reduce corruption). An increase in political stability in central and southeast Asia by 1 standard deviation will increase the CPI by 4.95 and 4.04 index points, respectively. This finding is consistent with a study conducted by Linhartová and Halásková (2022), Appiah-Kubi *et al.* (2023), and Koeswayo, Handoyo and Abdul Hasyir (2024). Koeswayo et al. (2024) found that government institutions operate more effectively in a stable environment, which facilitates law enforcement and the implementation of anti-corruption policies. Conversely, political stability negatively affects CPI in South Asia, such that an increase in political stability will lower the CPI (increase corruption).

Based on the Prob>F value in the first equation, all independent variables used in this study jointly have a significant effect on the dependent variable in all Asian regions. CPI is influenced by GDP per capita, HDI, control of corruption, government effectiveness, voice and accountability, regulatory quality, rule of law, and political stability by 96.6%, 71.9%, 97.8%, 99.3%, and 98.3% in West, Central, South, East, and Southeast Asia, respectively, and the rest is explained by other variables outside the equation model.

CPI has a positive effect on GDP per capita in south Asia and is significantly positive in west, east, and southeast Asia, so an increase in CPI (decrease in corruption) will increase GDP per capita. An increase in CPI in Eest, East, and Southeast Asia by 1 index point will increase GDP per capita by 337.3, 750.5, and 872.1 USD, respectively. The decrease in corruption that drives the increase in GDP per capita shows that the "Sand the Wheel" theory applies in west, south, east, and southeast Asia.

CPI has a significant negative effect on GDP per capita in central Asia, so an increase in CPI (decrease in corruption) will reduce GDP per capita. An increase in CPI in Central Asia by 1 index point will reduce GDP per capita by 290.8 USD. The increase in corruption that drives the increase in GDP per capita shows that the theory of "Grease the Wheel" applies in central Asia.

Foreign Direct Investment (FDI) has a positive effect on GDP per capita in south Asia and a significant positive in Central, East, and Southeast Asia, so an increase in foreign direct investment will increase GDP per capita. An increase in foreign direct investment in Central, East, and Southeast Asia by 1% will increase GDP per capita by 295.1, 69.86, and 542.2 USD, respectively. This finding is consistent with a study conducted by Simarmata and Iskandar (2022). In contrast, FDI has a negative effect on GDP per capita in West Asia, so an increase in foreign direct investment will reduce GDP per capita. These results are in line with study conducted by Nizar and Arif (2023).

Labor force has a positive effect on GDP per capita in Central, Southern, and Eastern Asia, and a significant positive effect in Western Asia, so an increase in labor force will increase GDP per capita. A 1% increase in labor force in West Asia will increase GDP per capita by 588.4

USD. These results in line with Classical Economic Growth Theory which has been developed since the 17th century, where there were two important figures in the classical era, namely Adam Smith and David Ricardo. In the theory of economic growth according to Adam Smith, there are two main aspects in the process of economic growth, namely: total output growth and population growth. Total output growth consists of 3 important elements in the production process including natural resources, human resources and capital stock supplies.

These results are also consistent with study conducted by Yuniarti, Wianti and Nurgaheni (2020), Firdani, Fathorrazi and Yuliati (2023), Hartono, Tampubolon and Irvan, (2023, Purba and Damanik (2024). Conversely, labor force has a negative effect on GDP per capita in Southeast Asia, so an increase in labor force will reduce GDP per capita. These results are in line with study conducted by (Nizar and Arif, 2023).

Internet use has a positive effect on GDP per capita in western and southern Asia, and a significant positive effect in central and eastern Asia, so an increase in internet use will increase GDP per capita. A 1% increase in internet use in central and eastern Asia will increase GDP per capita by 112.6 and 131.6 USD, respectively. This finding was in line with Neoclassical economic growth theory which was developed by Robert Sollow and Trevor Swan. Neoclassical theory argues that economic growth is based on the addition and development of factors that affect aggregate supply. This growth theory emphasizes that the development of production factors and technological progress are determining factors in economic growth (Sukirno, 2013). The production function is constant return to scale so that output will increase in the same proportion if capital and labor are doubled and new inputs are used as important as existing inputs.

This finding is consistent with a study conducted by Oktavia (2020), Setiawati and Alqoodir (2021), Haikal and Anward (2023). Conversely, internet use has a negative effect on GDP per capita in Southeast Asia, so an increase in internet use will reduce GDP per capita.

Based on the Prob>F value in the second equation, all independent variables used in this study jointly have a significant effect on the dependent variable in all Asian regions. GDP per capita is influenced by CPI, foreign direct investment, labor force, and internet use by 66.2%, 27.8%, 28.7%, 96.6%, and 95.1% in West, Central, South, East, and Southeast Asia, respectively and the rest is explained by other variables outside the equation model.

CONCLUSION

This study found that GDP per capita and HDI have a positive effect on the CPI in all Asian regions except Central Asia, while good governance have a varying influence on the CPI in Asia. Based on the results of the second equation model, CPI has a positive effect on GDP per capita in all Asian regions except Central Asia, while foreign direct investment, labor force, and internet use have varying effects on GDP per capita in Asia. CPI and GDP per capita have a causal relationship in Asia except Central Asia, thus supporting the "Sand the Wheel" theory. Corruption must be reduced when running the governments in Asian countries in order to create economic growth. This study is expected to provide benefits for stakeholders to formulate policies that promote economic growth through strategies that prioritize human development, realize good governance, and increase physical capital, human capital, and technology adoption.

The limitations of this study lie in the analytical results obtained based on the selection of variables, data samples, and analysis methods used. Further study can be conducted to determine the effect of corruption on GDP per capita in the short and long term in a narrower country or region.

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