Sustaining Integrity: The Role of Education and Macroeconomic Variables for Corruption Eradication

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Abstract

This study aims to analyze the effect of education level and several macroeconomic variables on the corruption index in Asia-Pacific Economic Cooperation (APEC) member countries. This study uses the two-stage least square (2SLS) estimation method. This study found that the lifelong learning index, higher education participation, and foreign direct investment have a negative and significant effect on corruption in all APEC member countries and developing country members. Secondary education and government efficiency index have a negative and significant effect on corruption in all countries (all member states, developed and developing countries). GDP per capita and economic openness have a positive and significant effect on corruption levels in APEC member states and developing countries. The fight against corruption must be immediately implemented as a political influence. Delaying this will reduce the effectiveness of future policies. Institutional reforms bring more positive benefits in countries that are really fighting corruption.

Keywords: APEC, Corruption, Education, GDP, Macroeconomic
**JEL Classification:** B22, D73, E60

INTRODUCTION

Corruption is a widespread abuse of power in society and is considered by many to be a significant obstacle to economic and social development. Svensson (2005) states that corruption, defined as the misuse of public office for personal advantage, can be elucidated as a situation in which an individual leverage their public position or authority for personal gain. This encompasses explicit instances of corruption (where officials accept bribes) and subtler manifestations of bureaucratic corruption, like nepotism. Corruption erodes equitable competition and public confidence and can result in the misallocation of resources, ultimately diminishing society's overall well-being. Economic research on corruption often focuses on two aspects: causes and effects (Liu, 2016).

Prior studies concerning the source of corruption commonly investigate the influence of the political system, economic development, receptiveness to foreign investment, legal heritage, educational attainment, societal norms, and religious beliefs (Acemoglu & Verdier, 2000; Alt & Lassen, 2008; Šumah, 2018). Although

education is a crucial factor contributing to the extent of corruption within a nation. Education is often understood as a human effort to develop a personality by the values of society applied in his environment. The quality of education will undoubtedly affect the development and progress of a country, so a totality of efforts is needed to realize the future of quality education.

According to a study conducted by Mo (2001), From 1970 to 1985, an analysis was conducted on 46 countries spanning ASEAN, East Asia, Latin America, the OECD, and Sub-Saharan Africa. The findings revealed that corruption has a direct negative impact on investment, human capital, and political stability, thereby impeding economic growth indirectly. Pellegrini & Gerlagh (2004) used cross-border data from 48 nations spanning the years 1980 to 1985, and discovered that corruption impedes economic progress by influencing investment and trade policy. The Anti-Corruption and Transparency Expert Working Group (ACTWG), first known as the "Anti-Corruption Task Force," was founded by APEC Senior Officials in 2004. The ACTWG is distinctive in its formation as a means to combat all manifestations of corruption. The 12 nations participating in APEC acknowledge that corruption poses a significant risk to APEC's objectives of achieving sustainable economic development, promoting good governance, ensuring market integrity, and fostering expanded trade and investment in the Asia-Pacific region. APEC members acknowledge the potential of collaborative efforts in combating corruption and advancing transparency. Hence, scholars have a keen interest in investigating corruption inside the economies of APEC member countries.

As shown in Figure 1, the Corruption Perception Index (CPI) illustrates variations in the degree of corruption among the twelve APEC economies.
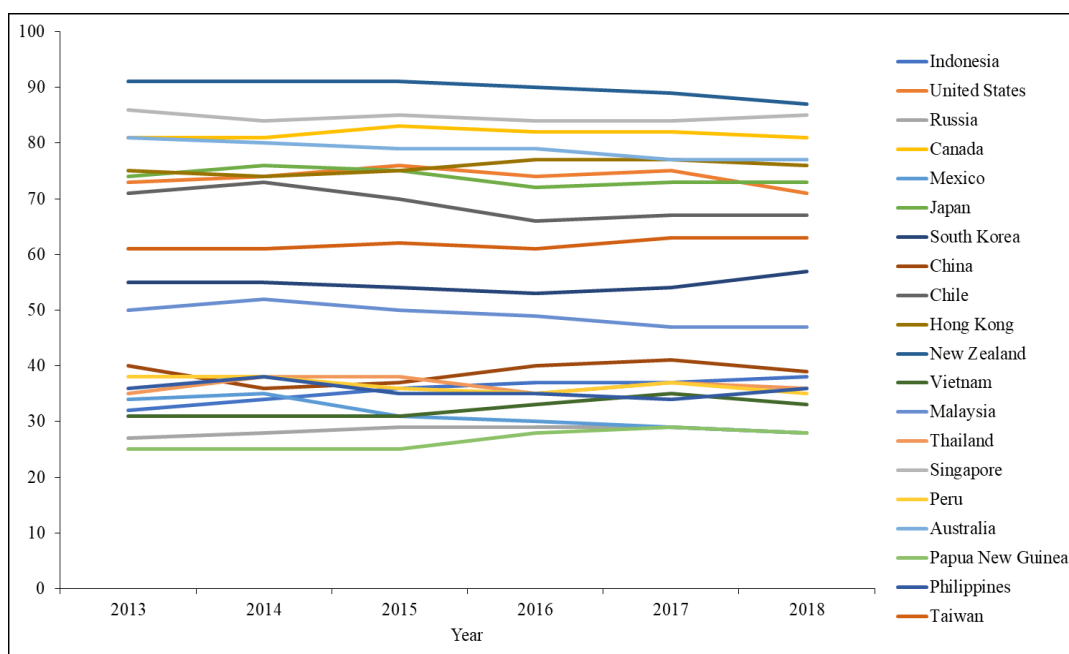
Figure 1. Corruption Perception Index in APEC Economies 2013-2018
Source: World Bank (2023)

From Figure 1, it can be observed that, when assessing CPI values with a threshold of 60, there are two primary groups: nations with comparatively minimal corruption levels (United States, Canada, Japan, Chile, Hong Kong, New Zealand, Singapore, Australia, and Taiwan), and nations with moderate to high corruption levels (Papua New Guinea, Russia, Mexico, Vietnam, Indonesia, Thailand, Philippines, Peru, China, Malaysia, and South Korea).

By concentrating on education and other macroeconomic variables, this study seeks to assess the factors that influence the degree of corruption in APEC economies. Additional macroeconomic variables that exert an influence on the level of production encompass the degree of economic openness, foreign direct investment, and the government efficiency index. The examination of these macroeconomic variables is warranted due to their demonstrated substantial influence on levels of corruption in prior research.

This research aims to broaden the existing discoveries and reaffirm the outcomes established by Maria et al. (2021) concerning the impact of education and various macroeconomic factors on the corruption level. Research by Maria et al. (2021) was conducted on G20 member countries, this study was conducted on a different organization, namely APEC member countries. Regarding the influence of macroeconomic factors on corruption levels, this research amalgamates multiple macroeconomic factors previously investigated and assesses their impact on corruption levels in APEC economies. Owing to the restricted data accessibility, the study focused on a mere dozen countries, which include Indonesia, the United States, Canada, Japan, South Korea, Chile, New Zealand, Hong Kong, Malaysia, Thailand, Russia, and Mexico.

This document comprises five sections. The initial section elucidates the study's background, highlighting its significance and positioning about prior research. The subsequent segment provides a comprehensive analysis of pertinent scholarly works and presents empirical findings regarding the impact of education and additional macroeconomic variables on corruption. The data and model utilized, which include Two-Stage Least Squares (2SLS) and Principal Component Analysis (PCA), are elaborated upon in the third section. Additionally, the findings of the model analysis utilizing APEC economic data spanning the years 2013 to 2018 are detailed in Section 4. Finally, section 5 presents conclusions from the results of this study.

LITERATURE REVIEW

Corruption is distinguished by the utilization of public office, authority, and privileges for the purpose of promoting personal agendas or catering to the requirements of a minority group (Aracil et al., 2022). Moreover, corruption exacerbates social inequality, and unemployment impairs economic development and exacerbates poverty (Jarmuzek & Lybek, 2020). Prevention is better than cure, meaning that a good state of corruption awareness and education is needed from an early age for an individual. An education system for students that teaches morality, integrity, understanding of nation and state, improvement of a firm, and a credible legal system is also important to reduce acts of corruption in the future. As an alternative strategy to eradicate corruption, this study on the corruption index is therefore conducted with policymakers, academics, and society at large in mind.

Education on Corruption

In a world that is becoming more interconnected, education, innovation, and knowledge are crucial to economic expansion (Mohamed et al., 2022). Furthermore, education and knowledge are prerequisites for any innovation (S. Malik, 2023). Asongu & Nwachukwu (2015) posit that the capacity of education to impart moral values—thereby thwarting corrupt behavior—bolsters its contribution to the struggle against corruption. A review of the relevant literature indicates that education influences corruption in various ways.

Sharma & Paramati (2021) investigated the hypothesis "Does financial development reduce the level of corruption?" in 140 sample countries worldwide. The findings, derived from an extensive sample of 140 countries worldwide, demonstrate that education plays a critical role in halting the rise of corruption. Corruption affects the allocation of public resources towards public health and education. Consistent with the findings of A. H. Malik et al. (2022), education can facilitate the development of an understanding of the detrimental consequences of corruption and the correction of unethical and self-centered conduct. Furthermore, a study by Jungo et al. (2023) revealed that interventions involving financial inclusion, education, and the interplay between the two can mitigate corruption.

Jetter & Parmeter (2018) analyzed an exhaustive inventory of 36 potential determinants of corruption in 123 countries using Bayesian Model Averaging (BMA). The findings indicate that the level of primary education plays a significant role in addressing corruption, particularly in developed nations. high school enrolment increases corruption. In line with Kaffenberger (2012), which states that primary education is insignificant to corruption participation, but undergraduate/university education is more likely to commit corruption because it has the highest influence, namely (13.7%) a greater percentage to participate in corruption than people who do not have formal education.

However, different results in the research of Maria et al. (2021) used the Two-Stage Least Square (2SLS) estimation method in examining corruption in G20 member countries. In contrast, Maria et al. (2021) examined corruption in G20 member states using TSLS estimation method and reached divergent conclusions. Several indicators were employed to assess corruption in G20 member countries within the education sector, including enrollment in primary, secondary, and tertiary education, as well as Educatex. According to the study, corruption in G20 nations is adversely affected by education. However, No statistically significant correlation has been observed between enrollment in primary school, the lifelong learning index, and corruption levels in the twenty-first century, particularly in the more prosperous and youthful member states.

Macroeconomic Variables on Corruption

Investment and economic expansion are likely to be impeded by elevated levels of corruption (Spyromitros & Panagiotidis, 2022). The correlation between corruption and gross domestic product (GDP) has been demonstrated in numerous studies. The impact of macroeconomics on the Corruption Index in G20 member states was examined by Maria et al. (2021). They discovered that corruption levels in G20 developing countries increased in proportion to GDP, whereas corruption levels in G20 developed countries decreased in proportion to higher per capita income. Conversely, the situation is reversed in developing nations. However, in

contrast to the research of Gründler & Potrafke (2019), their study using panel data found that economic expansion is negatively correlated with corruption. Long-term real GDP per capita decline of approximately 17% occurs whenever the inverse CPI rises by one standard deviation. The impact is especially conspicuous in authoritarian regimes and nations characterized by inadequate governance efficiency and lax legislation.

Due to the already high level of corruption control, The significance of the dynamics of good governance, encompassing government effectiveness and adherence to the rule of law, is heightened in the fight against corruption. Using panel data from 46 African countries, Asongu (2013) investigates the factors that determine corruption control across the conditional distribution of corruption eradication. According to the findings, the rule of law, political stability, and effective government are all components of good governance that contribute to the struggle against corruption. This assertion is substantiated by a study conducted by Maria et al. (2021), which examines the efficacy of governmental anti-corruption efforts in G20 member states. This research demonstrates that the degree of corruption is considerably influenced by the performance of the government. Government efficacy is positively correlated with minimal levels of corruption in both developed and developing nations.

Conversely, foreign direct investment has the potential to mitigate corruption. If corruption is not controlled, high international capital mobility will increase the possibility of foreign investors leaving the market. Wei (2000) discovered indications that European and American investors oppose corruption in host countries. According to Elliott (2017), local officials and behavior are influenced by foreign standards of integrity due to the critical role that foreign investment plays in the local economy. Corruption, according to Rose-Ackerman (1975), might be less widespread if it had enduringly detrimental effects on the organizations and individuals implicated. This pertains to initiatives involving foreign direct investment. Furthermore, certain investor countries deem commissions paid to foreign officials to be lawful and tax deductible, as stated by Tanzi & Davoodi (1997).

Economic openness (measured by the ratio of imports and exports to GDP) has stimulated fair economic competition, which lowers economic rents and increases corruption control through economic openness (Ades & Tella, 1997). Economic openness exhibits a negative correlation with corruption levels, according to "Analysis of Factors Affecting Corruption in the Asia Pacific Region" by Hariyani et al. (2016). In developed G20 countries, economic openness significantly reduces corruption, whereas in developed G20 countries, this finding is not supported by a study by Maria et al. (2021) that examined the relationship between economic openness and the Corruption Index in G20 member countries.

METHOD
Data

This study uses data from 2013 to 2018 from 12 APEC (Asia-Pacific Economic Cooperation) member countries, which include Indonesia, the United States, Canada, Japan, South Korea, Chile, New Zealand, Hong Kong, Malaysia, Thailand, Russia, and Mexico. We use the Corruption Perception Index (CPI)

variable as a proxy for the level of corruption obtained from Transparency International.

Table 1. List of Variables

Variables	Description	Source
$Corr_{it}$	Corruption Perception Index (0-100)	Transparency International
β_0, γ_0	Intercept	
$GDPC_{it}$	Gross Domestic Product per Capita (US$)	WDI Database
$\widehat{GDPC}_{it}$	Estimated Gross Domestic Product per Capita	processed
GEI_{it}	Government Effectiveness Index (-2,58 to 2,59)	WDI Database
FDI_{it}	Foreign Direct Investment in % of GDP (%)	
$Open_{it}$	Trade Openness ((Export + Import)/PDB)	WDI Database (processed)
Edu_{it}	Elementary School Enrolment Secondary School Enrolment Tertiary School Enrolment	WDI Database
	Educatex (lifelong learning index, obtained using Principal Component Analysis (PCA))	WDI Database (processed)
$\gamma_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_{5-8}$	Regression coefficient	
μ_{it}, μ_{it}^*	Error term	

Meanwhile, variables such as GDP per capita, government effectiveness, foreign direct investment, trade openness, primary school, secondary school, tertiary school, and Educatex are independent variables obtained from the World Bank (see Table 1).

Two-Stage Least Square (2SLS) Regression

This study uses the Two-Stage Least Square (2SLS) regression method because the endogenous variables (GDP per Capita and Corruption) are expected to have a causal relationship. In addition to overcoming endogeneity problems, 2SLS can also handle nonlinear and interaction effects, heteroscedasticity, and specification errors (Ozili et al., 2023). The 2SLS regression model in this study is adapted from the research of Maria et al. (2021), where the equation is written as follows:

$$Corr_{it} = \beta_0 + \beta_1 GDPC_{it} + \beta_2 GEI_{it} + \beta_3 FDI_{it} + \beta_4 Open_{it} + \beta_{5-8} Edu_{it} + \mu_{1it} \quad (1)$$
$$GDPC_{it} = \gamma_0 + \gamma_1 Corr_{it} + \mu_{2it} \quad (2)$$

Based on this equation, in the next stage, the variables $GDPC_{it}$ and $Corr_{it}$ are replaced with the estimated value of each variable. Thus, the final equation is obtained as follows:

$$Corr_{it} = \beta_0 + \beta_1 \widehat{GDPC}_{it} + \beta_2 GEI_{it} + \beta_3 FDI_{it} + \beta_4 Open_{it} + \beta_{5-8} Edu_{it} + \mu_{1it}^* \quad (3)$$
$$GDPC_{it} = \gamma_0 + \gamma_1 \widehat{Corr}_{it} + \mu_{2it}^* \quad (4)$$

Principal Component Analysis (PCA)

Educatex is a variable created by Asongu & Nwachukwu (2015). This variable is calculated using Principal Component Analysis (PCA), an education index from primary, secondary, and tertiary levels (Maria et al., 2021). PCA is a technique that uses mathematical principles to transform several variables that may be correlated into several smaller variables called principal components (Salem & Hussein, 2019).

Table 2. Calculation Result of Education Index (Educatex) with PCA

Component Loadings	First PC	Second PC	Third PC
PSE	-0.5910	0.4780	0.6498
SSE	0.5262	0.8390	-0.1386
TSE	0.6114	-0.2600	0.7474
Proportion (%)	61.22	22.84	15.95
Cumulative Proportion (%)	61.22	84.05	100.00
Eigen Value	1.83647	0.685165	0.478364

Notes: PSE = Primary School Enrolment, SSE = Secondary School Enrolment, TSE = Tertiary School Enrolment

Table 2 presents the results of PCA analysis, which shows that the first PC contributes more than 61% and produces an eigenvalue of 1.8365. This result is the index value of the Educatex variable calculated using PCA (Asongu & Nwachukwu, 2015).

RESULTS AND DISCUSSION
Descriptive Statistics

Table 3 presents the results of descriptive statistics showing that the average level of corruption and inflation in developed countries is lower than in developing countries. In general, developed countries score better and higher than developing countries in various aspects such as GDP per capita, trade openness, government effectiveness, and education.

An interesting result is shown at the education level, where the average primary school enrolment in developing countries is higher when compared to developed countries. Meanwhile, the average high school enrollment has unequal differences between developed and developing countries. Meanwhile, in terms of investment through the value of FDI, developed countries have a very high average value compared to developing countries. Harms & Ursprung (2002) found that foreign investors invest in countries with strong democratic structures.

Table 3. Descriptive Statistics

Variable	12 Countries Member APEC				
	Mean	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Corr	58.27778	61.50000	91.00000	27.00000	20.94138
GDPC	2.67E+12	1.06E+12	2.05E+13	1.78E+11	5.00E+12
GEI	0.972500	1.050000	1.930000	-0.450000	0.766354
FDI	5.322146	2.231518	58.51837	-0.041206	10.93272
Open	0.954651	0.644368	4.426233	0.266336	0.973549
Educatex	-2.78E-08	0.14454	1.441085	-1.735902	1.000005
PSE	102.083	101.164	110.2268	96.91344	3.610838
SSE	100.9213	101.6663	120.6512	81.87223	9.80861
TSE	66.12407	69.10713	95.86415	30.30004	20.63736
Variable	**Developed Countries APEC**				
	Mean	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Corr	68.26190	74.50000	91.00000	27.00000	19.32275
GDPC	4.13E+12	1.60E+12	2.05E+13	1.78E+11	6.16E+12
GEI	1.352143	1.665000	1.930000	-0.450000	0.708986
FDI	6.814940	1.311340	58.51837	-0.041206	14.09690
Open	1.016715	0.549568	4.426233	0.266336	1.238322
Educatex	0.577167	0.586237	1.441085	-0.194174	0.528668
PSE	101.0003	99.89458	110.2268	97.58688	3.480722
SSE	104.4410	102.2120	115.3846	96.18649	6.111959
TSE	78.03521	78.22220	95.86415	62.11674	10.91028
Variable	**Developing Countries APEC**				
	Mean	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Corr	44.30000	37.50000	73.00000	28.00000	14.11810
GDPC	6.34E+11	4.17E+11	1.32E+12	2.42E+11	3.81E+11
GEI	0.441000	0.290000	1.160000	-0.300000	0.475644
FDI	3.232235	2.838650	9.840910	0.487372	1.982535
Open	0.867761	0.743812	1.426884	0.363383	0.372979
Educatex	-0.808034	-1.051686	1.200359	-1.735902	0.946190
PSE	103.5988	104.7981	109.4415	96.91344	3.273783
SSE	95.99360	98.46865	120.6512	81.87223	11.81824
TSE	49.44848	44.42029	90.89631	30.30004	19.52675

Two-Stage Least Square (2SLS) Analysis

There are four research models used in this study, which are differentiated based on the education variable. The four models are Educatex, primary school enrollment, secondary school enrollment, and senior secondary school enrollment (Table 4). Furthermore, the analysis is grouped into three parts. First, the study involves APEC member economies, which total 12 countries. Second, the research is specific to APEC economies that have achieved high levels of progress, including the United States, Canada, Japan, South Korea, New Zealand, Hong Kong, and Russia. Third, the analysis is also conducted on APEC members that are in the process of development, namely Indonesia, Chile, Malaysia, Thailand, and Mexico.

The first hypothesis tested is about the negative impact of education on corruption in APEC. Educatex has a significant impact on corruption in APEC economies and developing countries by selecting various indicators to measure lifelong learning. Primary school enrollment rates do not have a significant effect on the level of corruption in APEC economies, and this is in line with the research of Maria et al. (2021) in a study conducted on G20 countries. On the other hand,

research conducted by Glaeser & Saks (2006) and Jetter & Parmeter (2018) provides different results, where they find that primary school enrollment is an important factor in combating corruption.

There are exciting results in developing countries, where both secondary and tertiary school enrollment leads to decreased corruption levels. On the other hand, in developed countries, only secondary school enrollment has a significant effect on the level of corruption. The impact of lowering corruption levels can be observed in people who have completed high school and university education. The higher the level of education they have, the lower their chances of being involved in corrupt acts. In contrast, those not pursuing formal education have a greater chance of being involved in corrupt practices. This finding contradicts previous research, which concludes that the higher a person's level of education, the higher the level of corruption (Glaeser & Saks, 2006; Kaffenberger, 2012; Maria et al., 2021). Beets (2005) presented similar findings that higher levels of education are associated with lower levels of corruption across a range of educational indicators.

In the examination of the second hypothesis, it can be seen that an increase in GDP has a significant effect on the level of corruption in developing countries in the APEC region. However, this is not the case with developed countries in the APEC region. In the results of this study, it is known that GDP per capita data significantly influence the level of corruption in APEC countries as well as developing countries. This research aligns with previous research by Gründler & Potrafke (2019), which utilized panel data from 2012-2018 from 175 countries. Higher corruption, characterized by a one-standard-deviation increase in the consumer price index (CPI), led to a 17% decrease in real GDP per capita. In Corrado & Rossetti (2018) study, similar results were found, stating a negative relationship between income per capita (GDP) and corruption levels across all Italian regions. Higher spending (per capita) on general public services represents a considerable portion of total public spending (as they also include interest payments on debt). This finding is slightly different from the research of Maria et al. (2021), similar results where GDP per capita in developing countries influences increasing corruption, but there are differences in outcomes in developed countries that are not significant and do not have an impact on the results of this study.

In testing the third hypothesis regarding the negative effect of government effectiveness on the level of corruption in APEC, the 2SLS regression results show a significant impact of government effectiveness on the level of corruption. When the level of government effectiveness is higher, both in developed and developing countries, corruption will decrease. In 130 countries, Montes & Paschoal (2016) found that the higher the government index, the lower the level of corruption. In this context, it is believed that improving government effectiveness in general can have a positive impact on reducing the level of corruption and increasing the level of transparency (Kim et al., 2009; Máchová et al., 2018; Mauro, 1995).

The results of statistical testing of the fourth hypothesis on the effect of the level of foreign direct investment on the level of corruption in APEC show a significant negative impact of inflation on the level of corruption in APEC and developing APEC members. Based on this result, it can be seen that the fluctuation of FDI in developing countries tends to be higher than in developed countries, which tend to be more stable. Foreign investors tend to invest in developing

countries that have a good handling of corruption, as FDI has a significant effect on reducing corruption.

This result is in line with the findings of Larraín & Tavares (2004), where FDI is shown to have a strong and negative relationship with corruption based on the magnitude of the FDI coefficient shows that an increase in foreign investment inflows of 1 percent will reduce corruption by 0.27 on a scale of 1 to 10 when extra controls are used. Mengistu & Adhikary (2011) explain that investors will not invest in countries whose institutions encourage corruption and nepotism because these factors increase the cost of doing business. This finding is not in line with research conducted by Kolstad & Wiig (2013) the results show that an increase in corruption in a country is associated with an increase in extractive industry FDI.

Based on the statistical results obtained, the fifth hypothesis states that there is a significant relationship between economic openness and corruption levels in developing APEC economies. However, this relationship is not significant in developed APEC economies. This finding indicates that the poor quality of economic openness has a significant impact on increasing corruption, according to the results of previous studies (Gurgur & Shah, 2014; Marjit et al., 2014). According to Ades & Tella (1997) and Torrez (2002), the increase in corruption aligns with the lack of support for trade. This may be due to poor economic structure, too much government dominance, poor monitoring institutions in quantity and quality, low social development, and low civil servant salaries.

Table 4. Results of the Two-Stage Least Square (2SLS)

	Dependent Variable: Corruption Perception Index											
Variable	**Model 1**			**Model 2**			**Model 3**			**Model 4**		
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
C	38.717*	34.495*	46.244*	63.526**	-18.903	48.428**	19.602*	-69.899*	39.703*	32.455*	33.509*	39.851*
	(1.360)	(2.475)	(0.997)	(24.994)	(52.928)	(17.822)	(6.985)	(14.249)	(2.608)	(2.431)	(7.588)	(1.956)
GDPC	-2.060*	-9.830	-5.010*	-1.730**	-1.140	-6.320*	-1.300	2.730*	-6.140*	-2.060*	-9.830	-5.010*
	(7.120)	(8.150)	(6.070)	(7.340)	(7.690)	(7.130)	(7.230)	(6.870)	(4.370)	(7.120)	(8.150)	(6.070)
GEI	25.793*	27.264*	11.460*	26.481*	27.328*	10.632*	25.890*	22.667*	11.407*	25.793*	27.264*	11.460*
	(0.973)	(1.314)	(1.339)	(1.015)	(1.212)	(2.087)	(0.958)	(0.984)	(1.458)	(0.973)	(1.314)	(1.339)
FDI	0.450*	0.080	0.512*	0.540*	-0.009	0.581*	0.493*	0.024	0.570*	0.450*	0.080	0.512*
	(0.134)	(0.181)	(0.171)	(0.147)	(0.189)	(0.201)	(0.133)	(0.110)	(0.181)	(0.134)	(0.181)	(0.171)
Open	-7.715*	-3.274	-11.628*	-8.269*	-3.718	-13.039*	-8.087*	-0.508	-13.307*	-7.715*	-3.274	-11.628*
	(1.549)	(2.132)	(0.942)	(1.601)	(2.098)	(1.269)	(1.534)	(1.349)	(0.925)	(1.549)	(2.132)	(0.942)
Educatex	1.954*	0.308	1.995*									
	(0.729)	(1.857)	(0.654)									
PSE				-0.250	0.541	-0.031						
				(0.244)	(0.533)	(0.167)						
SSE							0.188*	1.020*	0.058**			
							(0.070)	(0.138)	(0.026)			
TSE										0.945*	0.015	0.097*
										(0.0353)	(0.090)	(0.032)
R2	0.942	0.934	0.991	0.936	0.936	0.988	0.942	0.974	0.990	0.942	0.934	0.991
Adj R2	0.937	0.925	0.989	0.931	0.927	0.986	0.937	0.970	0.988	0.937	0.925	0.989
F-stat	212.783*	101.992*	551.733*	193.853*	105.025*	396.843*	212.621*	266.673*	480.093*	212.783*	101.993*	551.734*

***significant by 10%; ** significant by 5%; * significant by 1%. ( ) standard error. A: 12 countries member APEC. B: Developed countries APEC. C: Developing countries APEC.

These results suggest that the more open the economies of these countries, the higher the level of corruption. Export and import operations in developing countries show signs of being prone to corruption. According to the hypothesis put forward by Lalountas et al. (2011), economic openness has a significant impact on the country's efforts to fight corruption. Although it is associated with the hypothesis of (Maria et al., 2021), this hypothesis does not support these results.

CONCLUSION

Reducing corruption is the hope of all countries, both developed and developing. By improving education, governments can focus on improving people's welfare and reducing corruption. Secondary and higher education levels can be a top priority in improving education, especially in developing countries, to improve the quality of human resources, which in turn can improve their welfare. Increased welfare levels will reduce the likelihood of corruption. In addition, it is also important to implement normative education, such as anti-corruption education, at all levels of education, especially at the early stage of knowledge development, namely the basic education level.

Based on the results of hypothesis testing, it is found that education, government efficiency, and the level of foreign direct investment have a negative impact on corruption in APEC. This is by the hypothesis of each variable developed. The GDP hypothesis significantly increases corruption in developing APEC economies but not significantly in developed APEC economies. The hypothesis is that economic openness is important in reducing corruption in developed APEC economies but not in developing APEC economies. The results obtained are inconsistent with this hypothesis. High per capita income in developing countries may lead to higher levels of corruption. This may be due to the inequality that exists in developing countries. In developing countries, fewer people own wealth, and power is concentrated in one group or a few political parties.

Consistent improvements in government efficiency can reduce the number of corruption cases in APEC economies. This factor is the most important focus as it has a direct impact on reducing corruption and is more effective than other factors. Possible initiatives include improving the efficiency of current government efforts. Foreign direct investment (FDI) has been very successful in developing economies, and these results suggest that FDI can play a role in reducing corruption. Economic openness has a significant impact on increasing corruption. Corruption may grow in this sector, as it is primarily governed by government policy, especially import and export activities, particularly the quota system, and is an area of great potential. This study has limitations, including the failure to show the direct and indirect effects of variables that are thought to affect corruption specifically. Future research could examine more comprehensively what dimensions influence corruption and clarify the impact of long-term relationships.

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