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TÁC ĐỘNG CỦA TÀI CHÍNH XANH VÀ THUẾ BẢO VỆ MÔI TRƯỜNG ĐẾN SỰ PHÁT TRIỂN BỀN VỮNG CỦA VIỆT NAM: BẰNG CHỨNG TỪ CÁC NƯỚC ĐÔNG NAM Á

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Tóm tắt

Phát triển bền vững đã trở thành một trong những ưu tiên hàng đầu của tất cả các quốc gia trên thế giới, trong đó có Việt Nam và các nước Đông Nam Á, nhằm giải quyết thách thức kép giữa thúc đẩy tăng trưởng kinh tế và bảo vệ môi trường. Bài nghiên cứu này sẽ thực hiện phân tích so sánh giữa năm nước ASEAN, đi sâu đánh giá tác động của tài chính xanh và thuế môi trường đối với tiến trình hướng tới phát triển bền vững. Sử dụng dữ liệu bảng từ năm 2015 đến 2024 (được thu thập từ các tổ chức tài chính khu vực và cơ sở dữ liệu toàn cầu), phương pháp Hồi quy Bình phương nhỏ nhất (OLS) được áp dụng để đo lường vai trò của các sáng kiến tài chính xanh và nguồn thu từ thuế môi trường trong việc thúc đẩy Mục tiêu Phát triển Bền vững (SDGs). Kết quả chỉ ra rằng việc kết hợp hài hòa giữa chiến lược tài chính xanh và cơ cấu thuế môi

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trường hợp lý có thể định hướng các quốc gia xây dựng nền kinh tế sinh thái, bền vững. Những phát hiện này cung cấp cơ sở tham khảo quan trọng cho các nhà hoạch định chính sách Việt Nam trong việc cân bằng giữa việc thúc đẩy kinh tế năng động và nghĩa vụ bảo vệ hệ sinh thái.

Từ khoá: tài chính xanh, thuế bảo vệ môi trường, phát triển bền vững, ASEAN, nền kinh tế xanh

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IMPACT OF GREEN FINANCE AND ENVIRONMENTAL PROTECTION TAX ON SUSTAINABLE DEVELOPMENT OF VIETNAM: EVIDENCE FROM ASEAN COUNTRIES

Abstract

Sustainable development has emerged as a key priority for ASEAN nations, largely in response to the challenge of combining economic growth with environmental stewardship. In this comparative analysis of five ASEAN countries, the study explores how green finance and environmental taxes influence progress toward sustainability. Drawing on panel data spanning 2015 to 2024—from both regional financial bodies and global databases—an Ordinary Least Squares (OLS) regression is employed to evaluate the roles of green finance initiatives and environmental tax revenues in advancing the Sustainable Development Goals (SDGs). Results indicate that a carefully composition of green financing strategies and thoughtfully structured environmental taxes can promote these countries toward a more eco-friendly, sustainable economic framework. These findings provide actionable insights for policymakers striving to balance robust economic performance with ecological responsibilities.

Keywords: green finance, environmental tax, sustainable development, ASEAN, green economy

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1. Introduction

Growing concerns over climate change and ecological degradation have compelled governments around the world to seek strategies that synchronize economic progress with environmental stewardship. In Southeast Asia, nations like Vietnam, Singapore, Malaysia, the Philippines, and Indonesia have witnessed rapid industrialization and urban expansion—factors that have intensified environmental challenges, including elevated greenhouse gas emissions and accelerated resource depletion. Consequently, ensuring that economic development goes hand in hand with environmental protection has emerged as a key priority for these countries (Tran et al., 2024).

Green finance and environmental taxation have both surfaced as critical levers for fostering sustainable development in this region. Green finance channels funding into initiatives that offer environmental gains, such as renewable energy projects, energy efficiency programs, and pollution abatement efforts (Lazaro et al., 2023; Shi and Yang, 2025). Mechanisms like green bonds, green loans, and sustainability-focused investment funds serve to mobilize capital for eco-friendly ventures. Research suggests that green finance notably contributes to lowering carbon emissions and cultivating sustainability in ASEAN nations (Hieu, 2022). In Malaysia, the government's Green Technology Master Plan (GTMP) 2017–2030 seeks to position the country as a leader in green technology by fostering investments in both sustainable infrastructure and energy-related projects, aiming to boost the share of renewable energy in the national power mix while enhancing energy efficiency across multiple industries. Singapore's Green Plan 2030, similarly, sets out ambitious objectives to expand solar energy output fourfold by 2025 and cut landfill waste by 30% by 2030, thereby creating a favorable environment for green-focused investments.

Environmental taxation, meanwhile, involves imposing levies on activities or products with harmful environmental impacts, effectively integrating the external costs of ecological damage into market prices. By introducing financial barriers to polluting behaviors, these taxes encourage businesses and consumers to switch to cleaner technologies and practices. Singapore pioneered a carbon tax in 2019 at a rate of S$5 per ton of greenhouse gas emissions and plans to gradually raise this rate in the future (Yap and Chen Aizhu, 2024). This tax is intended to incentivize industries to curtail their carbon footprint and adopt energy-saving measures. Indonesia, for its part, has introduced a carbon tax strategy targeting sectors with substantial emissions, promoting a shift toward renewable energy and other sustainable methods (Dept, 2022).

Together, these five countries offer a varied picture in terms of their economic trajectories and environmental policies. Besides Singapore's Green Plan 2030 and Malaysia's Green Technology Master Plan, the Philippines has enacted the Renewable Energy Act to attract private investments in renewables (World Bank, 2022). Indonesia, in addition, has begun participating in the global carbon credits market to advance its green energy transition (Scott, 2024). Vietnam is also making strides in promoting green finance and environmental taxation, although specific policy details were not provided in the cited sources.

This research aims to evaluate how green finance and environmental taxation have influenced sustainable development in Vietnam, Singapore, Malaysia, the Philippines, and Indonesia over the 2015–2024 timeframe. Employing panel data analysis, the study will

investigate the interplay between green finance initiatives, environmental tax mechanisms, and the pursuit of Sustainable Development Goals (SDGs) in these nations. The insights gained are anticipated to guide policymakers, financial institutions, and businesses in effectively merging economic and environmental objectives, thereby facilitating the region's transition to a green economy.

2. Literature Review

Scholarly research indicates that environmental taxes and green finance are essential for reaching sustainable development. Understanding the relationship between financial policies and sustainability initiatives is crucial as ASEAN countries strive to balance economic growth with environmental preservation. This overview of the literature summarizes important research on green finance, environmental taxes, and their combined effects on sustainable development, with a focus on Vietnam, Singapore, Malaysia, the Philippines, and Indonesia.

Green financing generally refers to financial mechanisms that support projects with a positive environmental impact—ranging from energy efficiency programs and pollution control initiatives to renewable energy ventures. Within ASEAN, it has increasingly been acknowledged as a key driver of sustainable development (Sadiq et al., 2023). Specifically, instruments like green bonds and green loans play a critical role in encouraging eco-friendly business endeavors and moving the region closer to its Sustainable Development Goals (SDGs). Research by Chien et al. (2021) also emphasizes that green finance not only furthers sustainability but can help mitigate risks associated with climate change. In Vietnam, for example, Trang et al. (2024) identify a positive association between environmental taxes and sustainable development progress, indicating that fiscal measures can effectively motivate businesses to adopt more environmentally responsible practices.

In terms of policy leadership, Singapore's Green Finance Action Plan aims to establish a robust market for sustainable investments, supported by grants and incentives from the Monetary Authority of Singapore for both green bonds and loans tied to sustainability (OECD, 2023). Malaysia's Green Technology Master Plan (GTMP) 2017–2030 uses a mix of regulatory frameworks and financial incentives to encourage the uptake of green finance, highlighted by a growing market for green sukuk (Islamic bonds aimed at funding sustainable projects) (OECD, 2023). In the Philippines, a push toward green bonds and public-private initiatives has advanced renewable energy projects, yet limited investor awareness and the absence of clear guidelines remain key obstacles (World Bank, 2023). Indonesia, meanwhile, has made headway by issuing sovereign green sukuk dedicated to energy efficiency, renewable energy, and sustainable agriculture, alongside formulating a Green Taxonomy to steer investment toward sustainable

ventures (IMF, 2023). Despite these efforts, however, inconsistent definitions and regulations—along with shallow market liquidity—still hamper broader implementation of green finance across the region (Ngo et al., 2021).

Environmental taxation complements these strategies by internalizing the environmental costs of pollution and resource degradation. Evidence suggests that such taxes can significantly reduce emissions and spur the adoption of cleaner technologies (Gajjar, 2020). Singapore introduced a carbon tax in 2019 at S$5 per ton of emissions, aiming to escalate it incrementally over time, chiefly targeting heavy emitters to incentivize lower carbon footprints (NEA, 2023). Indonesia followed suit with a carbon tax policy in 2022, initially targeting coal-fired power plants and planning to extend it to other sectors as part of a broader transition to renewable energy (IMF, 2023). Vietnam's environmental taxes focus on fossil fuels and plastic waste, and although they have curbed plastic consumption and emissions to some degree, enforcement remains uneven (Trang et al., 2024). Malaysia applies environmental taxes primarily on petroleum products and carbon-intensive industries; while they generate revenue, critics argue that current tax rates are insufficient to trigger major behavioral change (OECD, 2023). The Philippines has likewise implemented taxes on plastic bags and fossil fuels, though gaps in enforcement and limited public awareness continue to limit their effectiveness (World Bank, 2021b).

The combination of environmental taxes and green financing offers a comprehensive strategy for advancing sustainability. In order to address the supply and demand for environmentally friendly activities, comprehensive methods that combine financial incentives and regulatory procedures can be developed (Touat & Tebani, 2022). A number of obstacles still exist even though there is proof that green finance, environmental taxes, and sustainable development are positively correlated. The main problems include inconsistent policies, SMEs' restricted financial options, and enforcement systems' shortcomings. Additionally, the majority of studies concentrate on the consequences of individual policies, thus only a minor has been learned about the long-term effects of combining environmental taxation with green finance.

Future research should explore the synergies between these policies in the selected ASEAN countries, examining their collective impact on sustainable development indicators, private sector engagement, and social equity (Sadiq et al., 2023).

3. Thereotical Framework

3.1. Thereotical Framework on Green Finance

Green finance is a rapidly evolving field that aims to integrate environmental considerations into financial decision-making processes, thereby driving investments toward sustainable development. Green finance lacks a universally accepted definition but generally refers to financial services and activities that promote environmentally positive outcomes (Osman and Ensar Agirman, 2018). Various organizations have provided definitions that highlight its scope.

- European Banking Federation: Green finance encompasses environmental aspects such as pollution, greenhouse gas emissions, biodiversity, water/air quality, and climate change-related aspects like energy efficiency and renewable energies.
- Organization for Economic Co-operation and Development (OECD): Green finance supports economic growth while reducing pollution and greenhouse gas emissions, minimizing waste, and improving natural resource efficiency.
- People's Bank of China (PBOC): Green finance uses policies and institutions to attract private capital investments into green industries like environmental protection, energy conservation, and clean energy.
- Indonesian Financial Services Authority (OJK): Sustainable finance achieves sustainable development through a harmonious relationship between economic, social, and environmental interests.
- Government of Germany: Green finance incorporates the financial sector in the transformation towards low-carbon and resource-efficient economies.

Green finance fundamentally aims to steer monetary resources toward projects that benefit the environment, placing particular emphasis on interventions that either mitigate or adapt to climate change while sustainably leveraging natural resources. By aligning economic activities with environmental priorities, green finance aspires to generate long-term value for investors and for society at large.

Beyond its focus on sustainable investments, green finance represents a wide-ranging framework that shapes a significant portion of an economy's overall financial system. According to Dr. Nannette Lindenberg, the scope of green finance encompasses three main areas: (1) financing for public and private green investments, (2) funding for government policies related to environmental objectives, and (3) the establishment of a green financial

system. As Lindenberg (2014) highlights, green finance transcends the goal of sustainable development alone, extending its reach to address an array of environmental targets.

3.2. Thereotical Framework on Environtmetal Tax

Environmental taxes are levies specifically aimed at regulating behaviors that damage the environment or deplete natural resources. According to Zakaria Aissa Assia (2011), these taxes target both pollution and the overuse of natural resources, ultimately promoting green growth and sustainable development. In a related classification, the European Commission (2016) identifies four primary categories of environmental taxes: energy, transport, pollution, and resource-based levies.

In Vietnam, the Environmental Protection Tax Law of 2010 stipulates that environmental tax is an indirect tax imposed on products and goods that, when used, may have negative environmental impacts. Typical examples include gasoline, coal, plastic bags, and polluting chemicals.

3.3. Role of Green Finance and Environmetal Tax on Sustainable Development

Both green financing and environmental protection tax contribute to Vietnam's progress toward achieving the United Nations Sustainable Development Goals (SDGs), particularly Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action). Nguyen and Phong (2022) highlight that green bonds and sustainable banking initiatives in Vietnam have boosted investments in renewable energy, waste management, and climate resilience projects. Moreover, the gradual increase in environmental tax rates has encouraged more efficient resource use and lower greenhouse gas emissions (World Bank, 2021).

4. Methodology

4.1. Research Methodology

The study conducts a panel dataset of Vietnam covering 10 years from 2015 to 2024. Our research uses ordinary least square (OLS) regression to measure the relationship between the independent variable and dependent variables. Subsequently, we will run diagnostic tests to find out any potential model defects by using variance inflation factor (VIF) for multicollinearity, heteroskedasticity by the Breusch-Pagan test, autocorrelation by Arellano-Bond test and Ramsey RESET test for omitted variables. If any abovementioned problems were identified, we will apply robust standard errors HAC to remedy the issues of heteroskedasticity and autocorrelation.

To dive into the impact of green finance and environmental tax on sustainable development of Vietnam, a quantile regression model will be applied. 5 typical South East Asia countries will be studied, including: Vietnam, Singapore, Indonesia, Malaysia and Philippine, as their development in environmental tax and green sector in specific and great economy size in general. The overall result will be in comparison with those previous findings as well as quantile regression model standards to evaluate consistency, efficiency, then drive further insights.

4.2. Definition of Variables

4.2.1. Dependent Variable

The Sustainable Development Goals (SDGs), also known as the Global Goals, were created by the United Nations with the intention of addressing global concerns such as eradicating poverty, protecting the environment, and ensuring universal peace and prosperity by 2030 (Sachs, Lafortune and Fuller, 2024). The seventeen Sustainable Development Goals (SDGs) are clearly interconnected. Given that many regions are interdependent, the authors emphasize how crucial it is to balance social and environmental concerns while developing economy. An element that warrants consideration is the statistic expressed as a percentage of SDG fulfillment.

4.2.2. Independent Variable

Green credit (GC) is knows as domestic commercial bank's total outstanding loan that permits individuals and organizations to take part in environmentally friendly activities (Zhang et al., 2021). **Green credit percentage (GCP)** refers to the annual ratio of total green credit to domestic credits. GCP, as an environmental governance tool, enables credit resources to flow to green development items by improving credit resource allocation, thus guiding heavy polluters to regulate their manufacturing and management behaviors, promoting green transformation of enterprise development, and improving GPE (Lv, Fan and Lee, 2023). Thus, green credit is one of the ways that specialized finance can use essential financial tools to assist Vietnam's social and microenvironments.

Taxes are economic tools that, either directly or indirectly, affect how economic actors behave in ways that benefit the environment. Only specific goods and products that are thought to be harmful to the environment are subject to the **Environmental Protection Tax (EPT)** (Domguia et al., 2024). The money raised by this tax is then used to support environmental protection-related projects and programs. Establishing financial incentives for companies and consumers to adopt more ecologically friendly behaviors is the main goal of an environmental

protection tax. As environmental protection tax revenue or/and **percentage of environmental protection tax to total tax revenue (EPTP)** rises, this economic tool encourages businesses to use environmentally damaging materials, encourages customers to shun environmentally harmful items, allows market prices to include environmental costs, and promotes adherence to environmental rules.

4.2.3. Control Variable

GDP stands for gross domestic product, which is the total value of a country's output. Beside GDP, annual GDP growth is also a representation of an economy's overall size and financial health (Van den Bergh and Jeroen CJM, 2007). One important factor in evaluating sustainable economic growth is GDP structure. The percentage of GDP allocated to industries and services must exceed that of agriculture in order to achieve sustainable growth. However, the objective of sustainable development or economic growth linked to environmental considerations may be negatively impacted by the rise of the gross domestic product.

Transparency International publishes an annual ranking called the **Corruption Perceptions Index (CPI)** that measures how corrupt the public sector is thought to be in various nations across the world**.** (Transparancy International, 2018). The index scores nations on a scale from 0 to 100, where 0 represents highly corrupt and 100 indicates very clean. The CPI is based on expert assessments and surveys conducted by institutions such as the World Bank, World Economic Forum, and various risk consultancies. It evaluates factors like bribery, diversion of public funds, abuse of power, and the effectiveness of anti-corruption policies. The CPI is widely used by policymakers, businesses, and researchers to assess governance quality and corruption risks in different countries. However, the CPI measures perceptions of corruption rather than actual corruption levels, making it a useful but indirect indicator of transparency and integrity in the public sector. One major barrier to accomplishing the Sustainable Development Goals (SDGs) is corruption. It reduces democratic institutions, hinders steady economic growth, and exacerbates income disparity. Additionally, corruption fosters the idea that bribery is the only solution to problems and undermines public trust in government officials.

4.3. Research Model

The figure below displays the model diagram to evaluate the effect of green financing and environmental taxes on sustainable development goals in five ASEAN nations from 2015 to 2024, based on the literature study, theoretical framework, and previous research.

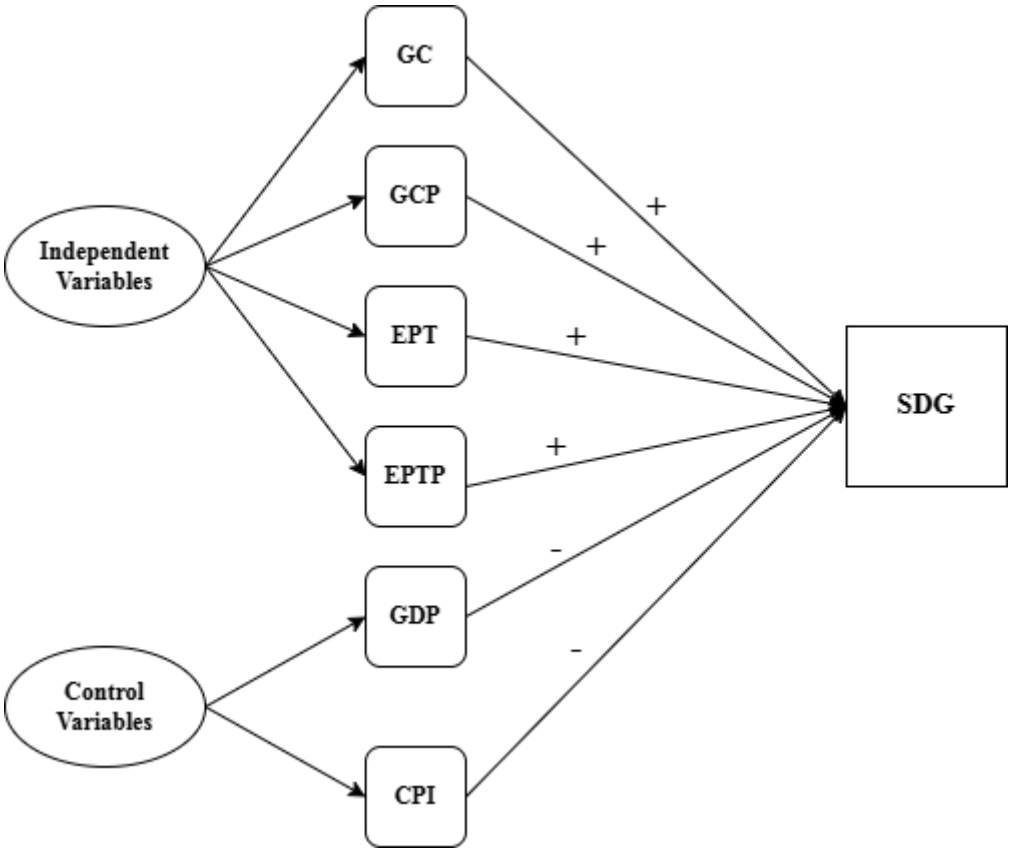

Figure 1. Research Model Diagram

Source: Authors' compilation

To conduct this diagram, our research will adopt the following model

- Population regression function:

$$\ln SDG = \beta_0 + \beta_1 GCP + \beta_2 GC + \beta_3 EPTP + \beta_4 EPT + \beta_5 GDP + \beta_6 CPI + e_{it}$$

- Sample regression function:

$$\widehat{lnSDG} = \widehat{\beta_0} + \widehat{\beta_1} GCP + \widehat{\beta_2} GC + \widehat{\beta_3} EPTP + \widehat{\beta_4} EPT + \widehat{\beta_5} GDP + \widehat{\beta_6} CPI + \widehat{e_{it}}$$

In which

Table 1. Variables' Name Explanation

Variable Name	Variable Explanation
SDG	Sustainable Development Goals Index
GCP	Percentage of Total Green Credit to Domestic Credit
GC	Total Green Credit
EPTP	Percentage of Total Environmental Protection Tax to Total Tax Revenue
EPT	Total Environmental Protection Tax
GDP	Gross Domestic Product Growth
CPI	Corruption Perception Index
β0, β1, β2, β3, β4, β5, β6	Regression Coefficient
$\widehat{\boldsymbol{\beta_0}}$	Estimated free coefficient. When independent variables of GCP, GC, EPTP, EPT, GDP, CPI equal 0, the average value of dependent variable lnSDG will be $\widehat{\beta_0}$
$\widehat{\boldsymbol{\beta_1}}, \widehat{\boldsymbol{\beta_2}}, \widehat{\boldsymbol{\beta_3}}, \widehat{\boldsymbol{\beta_4}}, \widehat{\boldsymbol{\beta_5}}, \widehat{\boldsymbol{\beta_6}}$	Estimated slope coefficient. When independent variables of GCP, GC, EPTP, EPT, GDP, CPI change by 1 percentage (other factors remain unchanged), the average value of the dependent variable GINI will change respectively by $\widehat{\boldsymbol{\beta_1}}, \widehat{\boldsymbol{\beta_2}}, \widehat{\boldsymbol{\beta_3}}, \widehat{\boldsymbol{\beta_4}}, \widehat{\boldsymbol{\beta_5}}, \widehat{\boldsymbol{\beta_6}}$ percentage
$\widehat{\boldsymbol{e_{it}}}$	Disturbance term

Source: Authors' compilation

4.4. Data and Data Source

The authors utilized secondary data collected from reliable sources such as World Bank, 5 ASEAN Countries' State Bank and 5 ASEAN Countries' General Office of Statistics. Our data set consists of 50 observations, as the data of every variable is published yearly and varied widely depend on nations' characteristics so we only choose 5 typical ASEAN countries with

greatest economy size with high commitment to green finance and environmental tax. Although the sample size is small, the minimum number of observations required for a time-series analysis is sometimes stated to be 40." (Poole et al., 2002, p. 56), we believe the outcome would be statistically significant and offer insightful information about how environmental protection taxes and green funding affect the sustainable development of the five countries under study.

Table 2. List of Variables, Expected Sign and Sources

Variable	Code	Unit	Expected sign	Source
Dependent Variable	SDG	%		World Bank
Independent Variables	GCP	%	+	State Bank
	GC	Trillion VND	+	State Bank
	EPTP	%	+	GSO
	EPT	Trillion VND	+	GSO
Control Variables	GDP	%	-	World Bank
	CPI		-	Transparency International

5. Empirical Result

5.1. Descriptive Statistics of Data

Before analyzing the collected data, we will bring in general description about the model and the parameters by using the command sum in STATA. This command reveals the Observations (Obs), Mean, Standard Deviation (Std. Dev.) as well as Minimum (Min) and Maximum (Max) values of the variables.

Table 3. Summary Statistics of The Regression Model's Variables

Variable	Obs	Mean	Std. dev.	Min	Max
lnSDG	50	4.220402	.0563766	4.027136	4.301359
GC	50	.5134829	.8204223	.0274496	5.4188
GCP	50	4.0246	3.055573	.5	11
EPT	50	27.99911	21.40372	4.465	72.08
EPTP	50	3.6372	1.636059	1.53	7
GDP	50	4.433	3.456336	-9.5	9.7
CPI	50	48.22	19.09086	31	85

Source: Authors' compilation

In which

- lnSDG: The mean value of natural logarithm of SDG index in 5 countries in period from 2015 to 2024 is 4.220402, the standard deviation is 0.0563766, min value is 4.027136 and max value is 4.301359
- GC: The mean value of total green credit in 5 countries in period from 2015 to 2024 is 0.5134829, the standard deviation is 0.8204223, min value is 0.0274496 and max value is 5.4188 (Trillion VND)
- GCP: The mean value of percentage of total green credit to domestic credit in 5 countries in period from 2015 to 2024 is 4.0246, the standard deviation is 3.055573, min value is 0.5 and max value is 11 (%)
- EPT: The mean value of total environmental protection tax in 5 countries in period from 2015 to 2024 is 27.99911, the standard deviation is 21.40372, min value is 4.465 and max value is 72.08 (Trillion VND)
- EPTP: The mean value of percentage of total environmental protection tax to total tax revenue in 5 countries in period from 2015 to 2024 is 3.6372, the standard deviation is 1.636059, min value is 1.53 and max value is 7 (%)
- GDP: The mean value of GDP growth in 5 countries in period from 2015 to 2024 is 4.433, the standard deviation is 3.456336, min value is -9.5 and max value is 9.7 (%)

- CPI: The mean value of Corruption Perception Index in 5 countries in period from 2015 to 2024 is 48.22, the standard deviation is 19.09086, min value is 31 and max value is 85

Following the descriptive analysis of the variables, a correlation matrix is constructed to assess the relationships between the independent and control variables in the regression model. The correlation coefficient ranges from -1 (indicating a perfect negative correlation) to +1 (indicating a perfect positive correlation), with a value of 0 representing no linear relationship. From the table below, there is no autocorrelation between any variable as their coefficients are less than 80%

Table 4. Variables Correlation Matrix

	GC	**GCP**	**EPT**	**EPTP**	**GDP**	**CPI**
GC	1.0000					
GCP	0.3990	1.0000				
EPT	0.1903	0.4033	1.0000			
EPTP	-0.0208	0.5715	0.7178	1.0000		
GDP	0.0792	-0.0863	0.1264	-0.0362	1.0000	
CPI	0.1767	0.0573	-0.3770	-0.4465	-0.2291	1.0000

Source: Authors' compilation

5.2. Estimated Result

Based on the regression model built above, the authors conducted a regression analysis, whose results are shown in table below.

Table 5. Estimated Regression Results

Source	SS	df	MS	Number of obs	=	50
				F(4, 310)	=	4.04
Model	.056165058	6	.009360843	Prob > F	=	0.0027
Residual	.09957274	43	.002315645	R-squared	=	0.5306
Total	.155737798	49	.003178322	Adj R-squared	=	0.4814
				Root MSE	=	.04812

lnSDG	Coef.	Std. Err.	t	P > |t|	[95% Conf.	Interval]
GC	.0077952	.0103523	0.75	0.056*	-.0130822	.0286725
GCP	.0079354	.0034776	2.28	0.002***	.0009221	.0149486
EPT	.0009642	.000501	1.92	0.016**	-.0000462	.0019746
EPTP	-.0191159	.008428	-2.27	0.002***	-.0361127	-.0021192
GDP	-.001771	.00212	-0.84	0.084*	-.0060465	.0025044
CPI	.0005336	.0004618	1.16	0.054*	-.0003976	.0014649
_cons	4.209111	.0390728	107.72	0.000	4.130314	4.287909

Source: Authors' compilation

*Note: Signs *, **, *** means the variables are statistically significant at 10%, 5%, 1%.*

5.3. Testing the appropriateness of the regression model

5.3.1. Detection of Multicollinearity

Using the Variance Inflation Factor (VIF) method to detect whether the model has multicollinearity or not. If existing at least one value of VIF greater than 10, the model contracts this defect.

Table 6. Result for Detection of Multicollinearity

Variable	VIF	1/VIF
GC	4.02	0.248557
GCP	2.43	0.410950
EPT	2.39	0.418535
EPTP	1.64	0.608086
GDP	1.53	0.655131
CPI	1.14	0.880155
Mean VIF	2.19	

Source: Authors' compilation

From above table, it is obvious that every VIF value (respectively 4.02, 2.43, 2.39, 1.64, 1.53, 1.14) of four independent variables (GC, GCP, EPT, EPTP) and two control variables (GDP, CPI) is less than 10. Therefore, the model does not have multicollinearity.

5.3.2. Detection of Omitted Variables

We used the Ramsey RESET test to find out whether the model has omitted variables or not. The result we got is shown as the following

Table 7. Result for Detection of Omitted Variables

Ramsey RESET test using powers of the fitted values of GINI
Ho: model has no omitted variables
F(3, 307) = **1.71**
Prob > F = **0.1802**

From the table above, we can see that [Pro > F] value is greater than 5% (0.1802 > 0.05)

5.3.3. Detection of Heteroskedasticity

Using Breusch–Pagan test, we can detect whether model incurs heteroskedasticity or not. The result we got is shown as the following

Table 8. Result for Detection of Heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of lnSDG

chi2(1) = 1.61

Prob > chi2 = **0.2039**

Source: Authors' compilation

From the above table, it is obvious that the model has [Prob > chi2] = 0.2039 and this P-value is greater than 5% (0.2039 > 0.05). Therefore, we conclude that the model is not heteroscedasticity at α = 5%.

5.3.4. Detection of Autocorrelation

We used the Arellano Bond test to detect whether the model has autocorrelation or not. The result we got is shown as the following

Arellano-Bond test for AR(1)	z	=	3.42	Pr > z	=	0.0006
Arellano-Bond test for AR(2)	z	=	0.53	Pr > z	=	0.5965
Arellano-Bond test for AR(3)	z	=	0.01	Pr > z	=	0.9939
Arellano-Bond test for AR(4)	z	=	-0.07	Pr > z	=	0.9450
Arellano-Bond test for AR(5)	z	=	-0.78	Pr > z	=	0.4373
Arellano-Bond test for AR(6)	z	=	-0.68	Pr > z	=	0.4934
Arellano-Bond test for AR(7)	z	=	-1.21	Pr > z	=	0.2248
Arellano-Bond test for AR(8)	z	=	-1.31	Pr > z	=	0.1889
Arellano-Bond test for AR(9)	z	=	-0.88	Pr > z	=	0.3774
Arellano-Bond test for AR(10)	z	=	.	Pr > z	=	.

Normally, because the difference series automatically has first-order correlation AR(1), the AR(1) test is omitted. From the above table, we can see that every [Pr > z] value except for

AR1 (respectively 0.5965, 0.9939, 0.9450, 0.4373, 0.4934, 0.2248, 0.1889, 0.3374) of the model is greater than 5%. Therefore, we conclude that the model has no autocorrelation.

From all the above results, the regression results for the impact of Green Finance and Environmental Protection Tax on sustainable development of Vietnam are as follow:

$$\widehat{lnSDG} = 4.2091 + 0.0078GC + 0.0079GCP + 0.0009EPT - 0.0191EPTP - 0.0018GDP + 0.0005CPI + \widehat{e_{it}}$$

With the above sample regression function, we have meaning of these regression coefficients as below

- $\widehat{\beta_0}$ = 4.2091 means that when the value of independent variables and control variables equals 0, lnSDG equals 4.2091
- $\widehat{\beta_1}$ = 0.0078 means that when the other variables stay the same, if the GC increases 1%, the would be 0.0078% increase in SDG
- $\widehat{\beta_2}$ = 0.0079 means that when the other variables stay the same, if the GCP increases 1%, the would be 0.0079% increase in SDG
- $\widehat{\beta_3}$ = 0.0009 means that when the other variables stay the same, if the EPT increases 1%, the would be 0.0009% increase in SDG
- $\widehat{\beta_4}$ = -0.0191 means that when the other variables stay the same, if the EPTP increases 1%, the would be 0.0191% decrease in SDG
- $\widehat{\beta_5}$ = -0.0018 means that when the other variables stay the same, if the GDP increases 1%, the would be 0.0018% decrease in SDG
- $\widehat{\beta_6}$ = 0.0005 means that when the other variables stay the same, if the CPI increases 1%, the would be 0.0005% increase in SDG

6. Discussions

According to the data above, the model has passed every defect test; in particular, it has residuals that are normally distributed and does not exclude any important variables. Additionally, the variables do not exhibit autocorrelation, heteroskedasticity, or multicollinearity. The R-squared = 0.5306 shows that the sample regression function is relatively appropriate. This means that the independent variables can explain 53.06 % in the change of the value of the dependent variable, the rest 46.94% are explained by are others.

In the sample data, the estimated findings indicate a positive relationship between the green-oriented economy as well as the stimulation of green finance to the sustainable growth of Vietnam. In specific, based on the statistical analysis, the green credit and environmental

protection tax play a significant role in motivate sustainable development goals index. A P-value of 5% ensures this result, indicating that the OLS model and the given data are appropriate to support this link. As a result, policymakers may find this research to be useful in determining when to publish green finance plans and how to modify them for common situations. Controlling highly polluted industries and promoting their green transformation and green innovation in company operations are also crucial. The State Bank also have a important role in funding strategy in collaboration with the government's power to enhance the effectiveness of green credit policies and fund allocation to achieve sustainable growth.

However, the result shows a contrasting result, where total environmental protection tax (EPT) positively correlates with SDG progress, but its percentage of total tax revenue (EPTP) shows a negative relationship—suggests that while higher environmental tax revenues contribute to sustainability, a growing reliance on these taxes within the fiscal structure may signal deeper structural issues. A higher absolute EPT indicates increased government efforts to tax polluting activities, with the potential for these funds to be reinvested into green initiatives, infrastructure, or environmental programs, thereby driving positive SDG outcomes. However, when EPTP rises, it may reflect that polluting industries still account for a significant portion of overall tax revenue, suggesting slow progress in transitioning toward a greener economy. This could indicate that economic dependence on environmentally harmful sectors remains high, meaning that despite collecting more in environmental taxes, the broader tax base is not diversifying toward more sustainable industries. Additionally, a rising EPTP could signal inefficiencies in tax revenue allocation—if these funds are not effectively reinvested, they may impose additional financial burdens without generating proportional environmental or social benefits. This aligns with findings from Othman, Nordin and Sadiq (2020) which highlights that tax structures must be supported by proper reinvestment strategies to achieve long-term development goals. Moreover, if businesses pass higher environmental taxes onto consumers without complementary policies such as subsidies or green investment incentives, this could exacerbate short-term economic pressures and social inequalities, negatively impacting SDG progress. Therefore, while environmental taxes are a crucial tool for sustainability, their effectiveness depends on how revenues are utilized, the pace of industrial transition, and the overall balance of economic and environmental policy measures.

Sustainable economic development requires a stable annual growth rate of gross domestic product (GDP). It means that the green transformation of an economy can not happen without economic development. This is the precondition for green transformation could be conducted effectively, as a result, significantly contribute to the economy. However, our

findings find out that gross domestic product (GDP) has a negative impact on sustainable development goals index, in other words, GDP growth rate and green transformation negatively affect each other. This relationship could be explained as rising output may increase incomes, but it usually results from resource-intensive activities that damage the environment and tax public infrastructure, therefore undermining more general sustainable development aims. Mallick and Rahman (2020) observe that the expansion of production, especially in manufacturing and mining, can bolster immediate economic metrics but simultaneously generate higher emissions and pollution. Bukhari, Hashim and Amran (2021) similarly note that without proper environmental governance, GDP gains can come at the expense of public health and ecological integrity, impairing progress on SDG dimensions related to clean energy, sustainable cities, and responsible consumption. Consequently, although a growing GDP can translate into increased fiscal capacity, it may also exacerbate social and environmental costs in economies where regulatory frameworks and green investment mechanisms have not kept pace with industrial growth.

Last but not least, corruption can significantly impact governance, economic efficiency, and the effectiveness of policies aimed at sustainable development. Given the crucial role of transparency and accountability in achieving sustainable development goals (SDGs), our study shows that there is a negative relationship between corruption perception index and sustainable development goals index. It means that higher CPI is, the more sustainably a nation develops, fostering accountability and trust in public institutions. When corruption is minimized, governments are more likely to allocate resources effectively, channeling funds into projects and programs that advance sustainable development rather than losing them to bribery or mismanagement. Mauro (1995) finds that corruption distorts economic incentives and investment decisions, ultimately hampering societal well-being. By contrast, lower corruption reduces policy uncertainty and improves the likelihood that taxes or aid earmarked for SDG-aligned initiatives—such as infrastructure, health, or education—will be spent as intended. This transparency and efficiency enable policies to yield tangible benefits for communities, thereby explaining why higher CPI often correlates with stronger SDG performance.

One clear limitation of this study lies in the fact that the current model does not capture enough the differences in how green finance and environmental taxes affect each of the five countries examined, even including 2 control variables GDP and CPI. While the paper analyzes data from Vietnam, Singapore, Malaysia, the Philippines, and Indonesia, the model combines all observations into a single framework, leading to general conclusions rather than country-specific insights. Each of these nations has different economic structures, policy priorities, and

levels of commitment to sustainability, which means the same factor — such as an increase in green credit or environmental tax — could have varying levels of impact. However, by not including variables that interact with each country's identity or characteristics, the model overlooks these variations. This makes it difficult for policymakers in each country to draw meaningful conclusions for their own situations. Therefore, future research should consider building a more detailed model, either by adding interaction terms between countries and key variables or by using sub-group analysis, so that the unique influence of green finance and environmental taxation in each country can be clearly identified and better applied in practice.

7. Conclusions and Recommendations

As already analyzed above, our study focuses on how green finance (GC, GCP) and environmental protection tax (EPT, EPTP), with data extracted from 5 ASEAN countries over a 10-year period from 2015 to 2024. We have found that there is a positive correlation of the operation of green finance and environmental protection tax (except for EPTP due to expected high reliance on polluting sectors as high percentage of environmental tax to total tax revenue) on sustainable development goals index, which suggest that state bank should implement loans priorities in collaboration with government in allocating fund in sector that promote environmental sustainability. As a result, the flow of foreign direct investment in green sector is also enhanced. The study also examines the impact of annual gross domestic product growth (GDP), which has a negative effect on sustainable development goals index as a result of damaging environment in exchange for benefits, especially in manufacturing and mining industries. Finally, corruption perception index (CPI) has a negative impact on sustainable development goals index as higher corruption (lower CPI) leads to tax misallocation and inefficient green policies.

In terms of policy implications, we suggest that it is necessary to implement synchronous solutions from the Government, banks and credit institutions to effectively support good projects related to environmental standards and ensure green economic development. Specifically, it is necessary to quickly complete legal regulations related to green credit, whereby the Government needs to establish clear criteria and lists when evaluating green projects for each specific economic sector, from which credit institutions have a basis to appraise and identify appropriate projects (Thanh , 2024). Accordingly, it is expected that by 2025, Vietnam will start piloting and officially operating the carbon credit exchange by 2028. In addition, it is necessary to apply environmental impact measurement tools such as environmental monitoring, GIS, modeling, environmental audit, etc. to support and promote green credit more effectively. Credit institutions need to focus on improving the professional

skills of officials in charge of risk management and environmental impact assessment, in order to ensure that the appraisal of green projects takes place strictly and effectively. At the same time, the establishment of a separate specialized agency or specialized department in commercial banks will help monitor the implementation of green credit, ensuring full compliance with environmental standards.

The SBV and relevant ministries and sectors need to come up with supportive policies such as tax reductions or subsidies for businesses and individuals participating in green projects. At the same time, it is necessary to have preferential credit packages with attractive interest rates from commercial banks to attract participation in environmental protection projects. However, incentives should only be focused on industries with difficulties and pioneering industries of the economy, not spreading out to reduce the effectiveness of preferential policies (Đức Việt, 2024). Moreover, the environmental protection tax policy has not covered all goods that have a negative impact on the environment in the taxable category and the environmental protection tax collection rate, and has not ensured the principle of high collection depending on the level of negative impact on the environment. For instance, the environmental protection tax bracket and the specific environmental protection tax rate being applied to plastic bags are low, so environmental protection tax has not had much impact on the restriction on the production and use of plastic bags (Đức Việt, 2024). Therefore, for environmental protection tax, we recommend Ministry of Finance expand environmental protection taxable objects, aiming at polluting subjects, the most accurate pollution acts, covering pollution sources such as cigarettes, chemical fertilizers, detergents, growth stimulants, etc.

Green finance specifics like green investment, green investment percentage, and green bonds have not yet been included in this study. Furthermore, our analysis only looks at how environmental protection taxes and green financing affect the achievement of sustainable development goals in the five most developing nations in South East Asia, which are progressively transitioning to an environmentally conscious economy. As a result, this study ignores the cultural, geographic, and social distinctions between other developed and emerging countries in favor of concentrating solely on the economic elements of developing countries. On the basis of this finding, future studies could broaden their analysis to include the entire Asia-Pacific region, the OECD, or international markets.

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