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外國直接投資東協國家環境和經濟績效的影響

The Influence of Foreign Direct Investment on Environment and Economic Performance in ASEAN Countries

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外國直接投資東協國家環境和經濟績效的影響
The Influence of Foreign Direct Investment on Environment and Economic Performance in ASEAN Countries

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準博士推薦函

本校企業管理學系管理科學博士班研究生 阮氏竹英 君在本系修業 4.5 年，已經完成本系博士班規定之修業課程及論文研究之訓練。

1、在修業課程方面： 阮氏竹英 君已修滿 44 學分，其中必修科目：研究方法 、 最佳化理論 、 書報討論 、 企業倫理專題研討 等科目，成績及格(請查閱博士班歷年成績)。

2、在論文研究方面： 阮氏竹英 君在學期間已完成下列論文：

(1)博士論文：The Influence of Foreign Direct Investment on Environment and Economic Performance in ASEAN countries

(2)學術期刊：Economic Research-Ekonomska Istraživanja, Universal Journal of Accounting and Finance, Discrete Dynamics in Nature and Society.

本人認為 阮氏竹英 君已完成南華大學企業管理學系管理科學博士班之博士養成教育，符合訓練水準，並具備本校博士學位考試之申請資格，特向博士資格審查小組推薦其初稿，名稱：The Influence of Foreign Direct Investment on Environment and Economic Performance in ASEAN countries，以參加博士論文口試。

指導教授：

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ABSTRACT

Over the past decade, 5-ASEAN (including Vietnam, Indonesia, Thailand, Malaysia, and Philippines) have received the attention of capital investment from foreign investors. Recently, despite global geopolitical uncertainties and the complicated challenge of the Covid-19 epidemic, foreign direct investment (FDI) inflows have continued to pour into these ASEAN countries. Foreign Direct Investment (FDI) plays an important role for all countries in the world. Despite the favourable effects of foreign direct investment, prior literature documented inconsistent evidence on the impact of FDI inflows on the environment. Zhu et al. (2016) found a positive relationship between FDI and CO_2 emissions, (Tang and Tan, 2015; Zhang and Zhou, 2016) discovered a contradictory discovery: a negative correlation among FDI and CO2 emissions. while other scholars (Phuong and Tuyen, 2018) found no evidence on FDI and CO_2 emissions.

The study consists of 3 main issues:

Firstly, this study investigates FDI inflows are integrated to other factors, including economic development, energy demand, urbanization, and education spending of government by using multivariate environmental Kuznets curve (EKC) estimation to explore their influence on carbon emissions. The results from the Pooled Mean Group (PMG) estimator support the traditional EKC model by showing a nonlinear inverted U-shaped link exists among GDP

and carbon emissions. This study found that in the short-term, FDI may increase CO_2 emissions, particularly in developing countries, but FDI may enhance environmental quality in the host nation in the long-run.

Secondly, FDI inflows have been flowing strongly into key economic regions of Vietnam. Accordingly, the number of foreign investors as managers and owners of enterprises have also increased recently. Therefore, this study attempts to measure the influence of foreign ownership on performance of companies listed on the Vietnamese stock market using the Ordinary least squares (OLS) to have efficient estimates from the fix-effects model (FEM) for the period 2010–2019. The empirical findings show that a greater proportion of foreign institutional owners in a company may lead to a higher firm's financial performance.

Thirdly, businesses have more and more options to invest in a worldwide economy, particularly in developing nations. The ability of an organization to grow economically is mostly dependent on investment. It is very important to consider how businesses decide on investment efficiency. To understand elements which could be the result of investment strategies, this research further explores the factors that affected investment efficiency by using the co-citation analysis.

This research has useful suggestions for the literature, and for policymakers, investors as well as another relevant partners in equivalent conditions.

First and foremost, existence of a long-term association among foreign direct investment and carbon emissions, this means FDI inflows could lower carbon emissions. To reduce CO_2 emissions and achieve sustainable growth, they must set tight guidelines and norms for FDI.

Moreover, the evidence of a greater proportion of foreign institutional owners in the company may lead to higher firm's financial performance. It

might help investors keep tabs on managers' professional activities and boost investor protection by fostering better corporate governance.

Furthermore, the results of co-citation analysis provide an overview of four themes on investment performance like: quality financial statement, diverse on boards, CSR, and ownership structure. Understanding the factors that influence investment efficiency may aid policymakers in developing an investment strategy. Additionally, it aids developing nations in highlighting their advantages and boosting their level of competitiveness to attract FDI.

Last but not least, this is a valuable lesson for other developing countries on how to balance the goal of sustainable growth and environmental issues.

Keywords: carbon emissions, foreign direct investment, foreign ownership, firm's financial performance, investment efficiency

中文摘要

外國直接投資東協國家環境和經濟績效的影響

過去十年，5-ASEAN（包括越南、印度尼西亞、泰國、馬來西亞和菲律賓）受到外國投資者的關注。 近期，儘管全球地緣政治不確定性和 Covid-19 流行病的複雜挑戰，外國直接投資（FDI）持續湧入這些東協國家。 外國直接投資（FDI）對世界各國都發揮著重要作用。 儘管多數意見認為外國直接投資對地主國將產生有利的影響，但相關的文獻在 FDI 對環境影響的研究結論卻各有異同。例如 Zhu 等人(2016) 年發現 FDI 與 CO2 排放之間存在正相關，但 Tang and Tan (2015)；Zhang 和 Zhou (2016）卻發現了 FDI 與 CO2 排放之間存在負相關，而其他學者 Phuong 和 Tuyen (2018) 則發現 FDI 和 CO2 排放缺乏關聯的證據。

針對外國投資的影響，本研究研究建立 3 個主要研究主題：

首先，本研究分析 FDI 及其他因素可能與碳排放有關的因素，包括經濟增長、能源使用、城市化和政府教育支出，採用相同的多變量環境庫茲涅茨曲線 (EKC) 估計來探討它們對碳排放的影響。根據 Pooled Mean Group (PMG) 估計的結果顯示 GDP 和碳排放之間存在非線性倒 U 形的關係，支持傳統的 EKC 模型。另一方面，研究結果顯示外國直接投資可能會在短期內增加碳排放，特別是在發展中國家和正在工業化的國家，但從長遠來看，外國直接投資可能會提高地主國的環境質量。

其次，近年外國投資人積極參與越南企業投資。 因此，本研究試圖使用普通最小平方 (OLS) 和固定效應模型 (FEM)來衡量 2010-2019 年期間外國所有權對越南股票上市公司業績的影響。 實證結果顯示，公司中擁有較高比例的外國機構者，會具有更高的公司績效。

最後，在全球化經濟中，企業有越來越多的投資機會，尤其是在發展中國家。投資是決定企業經濟增長潛力的關鍵活動。如何做出有效投資則是企業非常關心的問題。為了了解影響投資決策結果的因素，本研究使用共被引用分析方法(co-citation method)進一步探討影響投資效率的因素。

這項研究不僅對文獻綜述具有正向的意涵，而且對決策者、管理者、債權人、投資者和其他處於同等條件的相關夥伴也具有啟示。

首先，FDI 與碳排放量之間存在長期顯著相關性，這意味著 FDI 流入可以降低碳排放量。為了減少二氧化碳排放並實現可持續增長，他們必須為外國直接投資制定嚴格的指導方針和規範。

此外，公司中外國機構所有者比例較高可能會導致更高的公司績效。它可以幫助投資者監督管理人員的業務活動，並通過改善公司治理來提高投資者保護水平。

此外，共引用方法分析的結果概述了關於投資效率的四種研究趨勢，例如：財務報告質量、董事會性別多元化、企業社會責任和所有權結構。了解影響投資效率的因素能有助於政策制定者擬定投資決策。它還有助於發展中國家發揮優勢，增強競爭力，吸引外國直接投資。

最後但並非最不重要的一點是，這對其他發展中國家尋求如何平衡持續增長目標和環境問題提供了一個寶貴的教材。

關鍵詞：碳排放、外國直接投資、外資持股、公司業績、投資效率

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CHAPTER ONE
INTRODUCTION

1.1. Research background and motivation

The study consists of 3 main issues, these 3 topics are connected through Foreign direct investment (FDI). FDI inflows have been flowing strongly into key economic of ASEAN region. Accordingly, the number of foreign investors have also increased. Consequently, it impacts the environment, the economic growth of the countries as well as the performance of firms. At the same time, co-citation is used to investigate potential outcomes of investment efficiency. The research could be used by policymakers in developing nations to highlight their advantages and increase their competitiveness in order to draw FDI while maintaining sustainable growth.

In this chapter, a picture of foreign direct investment in 5 ASEAN countries as well as the motivation, research background, objectives, the scope, and the procedure of this study are provided.

1.1.1. Foreign direct investment (FDI) and CO_2 emissions

In recent years, the trend of global investment flows has changed drastically due to the influence of political factors in the world and especially the Covid-19 pandemic. In that context, five developing The Association of Southeast Asian Nations (ASEAN) countries, including Vietnam, Indonesia, Malaysia, Thailand, Philippines are still bright spots on the map for attracting foreign direct investment (FDI). FDI inflows in this area are constantly increasing. This confirms that Vietnam and four others are attractive, potential, and safe markets for investors.

The boom of FDI inflows into the ASEAN market in recent years is largely due to the region's enormous economic potential. Notably, the Global Financial Crisis (GFC) of 2008-2009 was an important catalyst for the FDI boom in the

region, as many multinational companies sought investment opportunities in countries with rapid economic growth and cost advantages. Specifically, total FDI inflows into ASEAN-5 have averaged nearly US$56.1 billion per year since 2010, nearly triple what it was a decade earlier (the average in the period 2000 - 2009 was 20.3 billion USD).[1] The amount of FDI in ASEAN countries compared to global FDI is a clear demonstration of this trend. While the 1997 Asian Financial Crisis (AFC) initially caused harm to the ASEAN investment environment, after the 2008's GFC, FDI poured into this region more and more. FDI has remained steady since the Covid-19 pandemic began at the end of 2020.

FDI attraction policies in ASEAN have improved profoundly over the years when many preferential policies were issued. In particular, Indonesia and Vietnam have made the biggest changes, including improving infrastructure, loosening investment restrictions, and better fiscal management. Vietnam is a prominent case. Since the Vietnamese government promulgated the investment law in 1987, Vietnam has been officially attracting foreign direct investment (FDI) for 36 years. However, the turning point to attract FDI of Vietnam must be counted since becoming a member of the World Trade Organization (WTO) in 2007, and at this time, FDI inflows into Vietnam have increased rapidly and strongly, Vietnam become one of the countries attracting the largest FDI in ASEAN (Vietnam Investment Review-VIR, 2022). In particular, according to the report in 2021 provided by United Nations Conference on Trade and Development (UNCTAD), in 2020 Vietnam was in the top 20 nations attracting the most FDI in the world, ranked 19th, up 5 steps compared to 2019.

[1] Data resource: World Bank, 2010

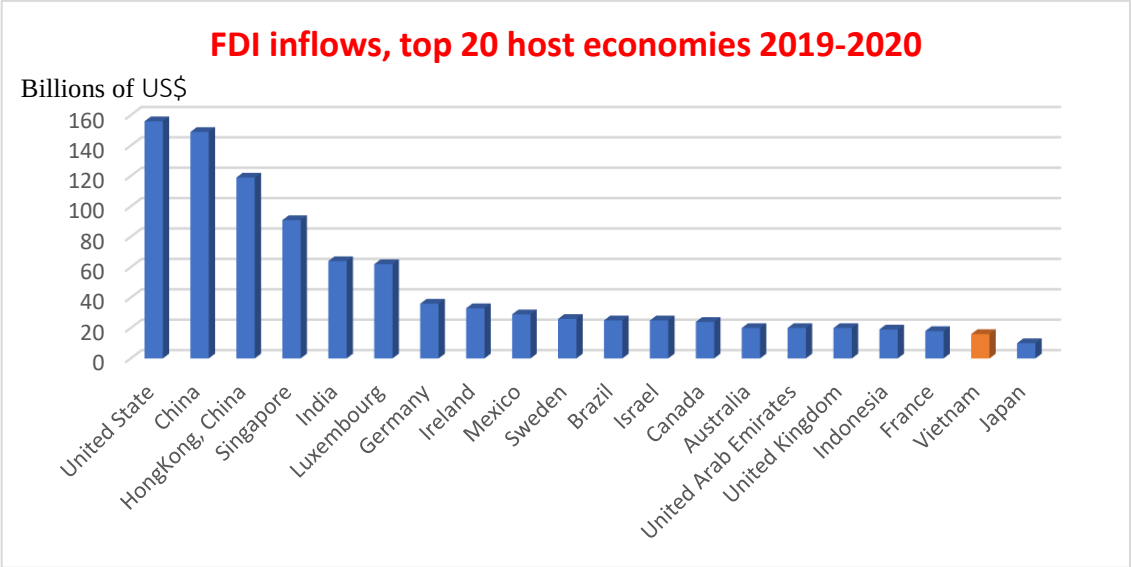

Figure 1. 1. FDI inflows, top 20 host economies 2019-2020

Source: UNCTAD, 2021

UNCTAD, 2021 also expects ASEAN will continue to be the driver of FDI growth in Asia and globally, with FDI inflows to the region increasing by 35% and increasing in most of all members. According to the Malaysian Investment and Development Authority (MIDA), based on the success of attracting investments totalling more than MYR 220 billion (more than U$52 billion) in 2021 in the manufacturing and service sectors. Meanwhile, FDI in Vietnam reached U$31.15 billion, up 9.2% over the same period in 2020 (VIR, 2021). It shows that foreign investors have placed great confidence in the investment environment in ASEAN.

In a report by the World Bank in 2020 (WB, 2020), The US-China trade war at the beginning of 2018 led to a series of companies "running away" from China More than 50 multinational corporations, including names such as Apple, Nintendo, and Dell ... are speeding up the relocation of production activities out of China to avoid US tariffs on the second-largest economy in the world. Most of the new location options are in Southeast Asia, which opens up opportunities to attract FDI for ASEAN countries. The evidence is that

investors from Asia, Europe, and the United States, continue to provide capital in ASEAN. The World Bank reports that 33 global corporations have chosen Southeast Asia as the location for their new headquarters, 23 have selected Vietnam, and others have shifted to Malaysia, Thailand, and Indonesia. In the first four months of 2022, 10.8 billion USD of foreign funding was registered in Vietnam. In which, additional investment capital was 5.29 billion USD, up 92.5% over the same period. Following the Covid-19 epidemic, adjusted capital and capital contribution, as well as share purchases, both increased significantly over the same period by 92.5 percent and 74.5 percent, respectively. This demonstrates investors' confidence in the business investment environment and economic recovery policies. It can be said that “This result has confirmed the confidence of foreign investors in the investment environment, and they have increased the capital for investment projects in ASEAN”.

ASEAN countries have been trying to attract FDI inflows to take advantage of the strong supply chain shifting. The Regional Comprehensive Economic Partnership (RCEP) has a great significance to ASEAN in attracting FDI, especially during the Covid-19 period. RCEP creates a market with 2.2 billion consumers, accounting for about 30% of the world population, a GDP of about 26.2 trillion USD, equivalent to about 30% of global GDP to become the largest free trade area in the world in terms of population size (RCEP, 2022). RCEP will also be the main destination for international investment and manufacturing, where many global multinational corporations gather in industries: electronics, semiconductors, automobiles, apparel, e-commerce, and technology, etc. Thus, RCEP will provide a positive signal for ASEAN's FDI.

Along with the motivating factors from the agreements, and signed and approved strategies, the government of ASEAN countries have also increasingly implemented policies to attract foreign investors because they have witnessed the advantage effects of foreign investment on economic

development. According to a report by World Bank in 2019, foreign investors provide new capital, innovative technological capacities, enhance the skills of the local workforce, and thus enhance the competitiveness of the host economies, promoting the process of the international economic integration of these countries. For developing countries, FDI inflows are particularly important for international economic development and integration, because this is an external force that adds capital, technology, management capacity, participating in globalization. Soaring labour productivity, increasingly strong global market integration along with effective macroeconomic policies of developing countries in recent years lead to economic growth along with generating more chances for business (WB, 2019). As a result, the focus of financial concentration is gradually shifting to ASEAN countries.

Despite the favourable effects of FDI, prior literature documented inconsistent evidence on the impact of FDI inflows on the environment. Studies show that the demand of energy is higher in emerging economies than in advanced economies. Some researchers discovered a connection between FDI and CO_2 emissions (Zhu et al., 2016; Zhang and Zhou, 2016; Tang and Tan, 2015; Phuong and Tuyen, 2018), however, their findings are still inconsistent. Zhu et al. (2016) discovered a positive correlation between FDI and CO_2 emissions, (Tang and Tan, 2015; Zhang and Zhou, 2016) reported a contrary result: a negative correlation between FDI and CO_2 emissions while other researchers (Phuong and Tuyen, 2018) found no evidence of this correlation. Additionally, governments in developing countries encourage flexible policies and permissive legal frameworks to increase per capita income through FDI inflows. The rise in energy consumption may be influenced by FDI (Ahmad and Du, 2017; Baek, 2016; Foon Tang, 2009). The amount of dioxide emissions coming from emerging nations are rising quickly, and this trend is going to continue. With about 3.5 metric tons per person as of the end of 2019,

Vietnam's CO2 emissions were third. In recent years, Malaysia has had the highest amount, around 9 metric tons (The intergrated Carbon Observation System-ICOS 2022).

It is realized that there are additional factors besides FDI that might influence the environment, including economic growth, energy consumption, urbanization level, and especially people's consciousness. Economic growth and environmental damage rise as developing nations industrialize, especially considering that advanced industry is reliant on fossil fuels (Hang and Yuan-Sheng, 2011; Kang et al., 2016; Saboori and Sulaiman, 2013). According to studies, emerging nations produce more carbon emissions from their energy use than developed nations do. These countries have also been urbanizing more and more, which raises energy consumption and CO_2 emissions (Hossain, 2011; Martnez-Zarzoso and Mariotti, 2011; Sadorsky, 2014). Since it has been demonstrated that environmental education raises people's understanding of pollution (Jaus, 1982; Zden, 2008). Based on these arguments, my thesis attempts to investigate the link between government education expenditures and environmental problems.

The studies examining the link between CO_2 emissions and GDP suffer from conflict result (Mitić et al., 2017; Narayan, 2010). Many works (Mulali et al., 2015; Hanif and Gago-de-Santos, 2017) discovered an inverted U-shaped EKC, others (Narayan, 2010) did not discover an EKC in poor nations. This research analyzes the effects of GDP per capita, energy consumption, foreign direct investment, urbanization, and education spending of government on CO_2 emissions by employing Pooled Mean Group (PMG). It is the pioneer work to estimate education expenditure in the multivariate EKC. The findings thus offer a solid basis for comprehending the fundamental connection between environmental education and CO_2 emissions.

The 5-ASEAN: Indonesia, Malaysia, Philippines, Thailand, and Vietnam are taken into account in this study for the years 1986 to 2019 because, according to the International Monetary Fund (IMF), they are among the top 20 factors driving world GDP growth. It is therefore not surprising that they are dealing with a range of environmental problems; in fact, according to a study of IQAir Air Visual and Greenpeace, 5-ASEAN are facing with high pollution. Additionally, they also have the same socioeconomic, geographic, cultural, and environmental characteristics.

1.1.2. The proxies of agency cost and firm's financial performance

The rate of foreign direct investment in Vietnam is continuously growing. FDI inflows have been flowing strongly into key economic regions of Vietnam. Accordingly, the number of foreign investors as managers and owners of enterprises has also increased recently. According to agency theory, managers frequently prioritize their own interests over those of external shareholders (Jensen, 1986, 1994). According to Chen et al. (2017) analyzed the connection between ownership structure and investment performance, a low insider ownership percentage could help prevent managerial entrenchment, large block holders would improve project supervision, as well as a significant outsider percentage could reduce agency problems and information asymmetries. Indeed, foreign investors not only bring capital, but also transfer their expertise, advanced technology, managerial methods in business processes, and consequently cutting expenses, increasing productivity, creating new products, opening new markets, to the host countries (Capron, 1999; Piscitello, 2005). Despite the favourable effects of foreign investment, prior literature documented inconsistent evidence of foreign ownership's impact on firm's financial performance. For example, (Chen et al., 2011b; Cho and Kim, 2007; Mizuno, 2010; Omran et al., 2008) found a positive influence of foreign ownership on operating profits and firm's financial performance while

(Hintoshova and Kubikova, 2016) suggested that in the short run, ownership change is correlated with higher sales growth but lower profit margins and returns on assets (ROA). However, in the long run, ownership change has a positive correlation with operational effectiveness. Other research, Gelübcke Wecke (2013) revealed no difference in profitability under foreign owner's management (Chen et al., 2016).

Likewise, as above-mentioned, experienced foreign investors help carry out the proper strategic investment for the firms (David et al., 2006). In accordance with (Kim and Lee, 2008), foreign ownership might enhance firm's financial performance because foreign investors apply a global corporate governance mechanism to emerging markets. So, this study attempts to measure the influence of foreign ownership on performance of companies listed on the Vietnamese stock market.

Vietnam is specifically well-suited for this research as the following reason. According to World Investment Report (2018), developing Asia remains receiving a stable flow of funds from foreign investment, at U$476 billion. Asia regions, specifically emerging countries, still have the first position in receiving foreign direct investment (FDI), compared to other regions in the world. Specifically, Vietnamese firms are currently receiving a large flow of funds from foreign investors (Vo, 2016). As above-mentioned, more and more foreign investors have been participating in investment projects in Vietnam along with companies also focusing on profitability under foreign owner's management, thus my goal is to analyze the following questions: How does foreign ownership affect firm's financial performance?

1.1.3. Investment efficiency

The topic of investment efficiency in businesses and their managers has been considered in academic literature since at least the 1970s. The motivation of managers to make investment decisions was originally highlighted from the

standpoint of agency theory by (Jensen and Meckling, 1976). Numerous studies on investment have recently been conducted in a variety of research topics. It implies that investment efficiency is crucial for every organization to achieve their objective of investment. As a result of globalization, a large number of articles regarding investment performance has been rising (Benlemlih and Bitar, 2018; Biddle et al., 2009; Gao and Yu, 2020; Tran, 2020; Zadeh et al., 2021).

Despite lots of research publications on this subject, we do not undersatnd exactly what types of work have been performed and the primary elements have a favorable impact on investment activities. Businesses are increasingly given chances to engage in a worldwide economy, especially in emerging markets. The ability of an organization to expand economically is mostly dependent on investment. All nations in the world benefit greatly from foreign direct investment (FDI). How can businesses make investing optimization decisions is a major challenge? The purpose of the research is to investigate the aspects that impact a company's investment performance.

In summary, the three main issues of this study are connected through foreign direct investment. Firstly, FDI inflows are integrated with other factors, including GDP, energy consumption, urbanization, and education spending of government in multivariate EKC estimation to explore their influence on carbon emissions. Secondly, this study also identified foreign ownership as a consequence of the performance of companies listed on the Vietnam stock market. Furthermore, FDI inflows and the participation of foreign ownership serve as an important variable that impacts the relationship between CO_2 emissions, the company’s efficiency, and its consequences. In order to understand elements which could be the result of investment strategies, this research further explores the factors that affected investment efficiency by using the co-citation analysis. The findings help policy makers in emerging

economies enhance their capabilities and increase their competitiveness in order to attract FDI while ensuring sustainable growth.

1.2. Research objectives

Based on the above-mentioned, the purposes of this research are proposed as follows:

1. This research analyzes the influence of FDI, economic development, energy consumption, urbanization, and government spending for education on CO_2 emissions in multivariate EKC model for 5-ASEAN during the period 1986–2019.
2. This study attempts to measure the influence of foreign ownership on the financial performance of companies listed on the Vietnam stock market from 2010 to 2019.
3. This research further explores the factors that affected investment efficiency by using the co-citation analysis.

1.3. Contribution of this study

Over the past decade, 5-ASEAN countries have received the attention of capital investment from foreign investors. Recently, despite global geopolitical uncertainties and the complicated challenge of the Covid-19 epidemic, foreign direct investment (FDI) inflows have continued to pour into these ASEAN countries. The reforms in the legal framework for FDI in these countries in the latest year are expected to improve in attracting significant FDI. It is important to note that not all ASEAN economies benefited equally from this FDI boom. Vietnam is transforming itself into a technology production centre, while Indonesia is focusing on the electric vehicle supply chain. 5-ASEAN are competitive markets to attract FDI in the ASEAN region. For example, FDI into Vietnam reached 31.15 billion USD in 2021, up 9.2% compared to 2020 (VIR, 2021). Many signals of attracting FDI inflow into Vietnam in 2022 will continue to be positive, especially into the southern key economic region. A

big question for policymakers is that “Does FDI inflows could really bring benefits and reduce carbon emissions or is it a cause of environmental problems?” The empirical analysis results have useful implications for policy makers to set up strict rules for foreign organizations to low environmental problems and ensure long-term development.

Moreover, these 5 ASEAN countries put a greater priority on economic growth than on environmental protection and sustainable development. In order to assist policymakers in implementing effective CO_2 emission control policies, it is crucial to identify the factors leading to rising carbon emissions.

In addition, this is a pioneer study, which includes the government spending on environmental education in the multivariate EKC model. A positive effect between education government expenditures and carbon emissions reveals the importance of environmental education.

Further, the evidence is that a greater proportion of foreign institutional owners in a company may lead to a higher firm’s financial performance. As a result, it might also help investors maintain control of managers' investing activity and set a higher standard for shareholder protection via improved corporate governance.

To my knowledge, it is the first article employing co-citation analysis to reveal all essential aspects of investment efficiency research. It is expected that the identification of the key publications and authors would focus on general reviews of investment research. Based on the findings, this thesis offers sources of reference for academics on this topic, particularly regarding investment decisions.

Likewise, these findings could aid policymakers in maintaining objectivity when choosing investments. Also, understanding these factors will help emerging nations in displaying their advantages and enhancing their level of competitiveness to attract FDI.

Last but not least, the past works are mainly concerned with developed countries where the context of economics and cultures are different from developing nations like 5-ASEAN. Therefore, our findings have robust implications for the existing documents for academics, policymakers, investors, and other relevant partners in equivalent conditions.

1.4. Research project and scope

The research project and scope of this study are provided in Table 1.1

Table 1. 1. Research project and scope of the study

Items	Scope of The Study
Type of the Research	The literature review is adopted to set the theoretical background for this study. - Pooled Mean Group (PMG) is proceeded to analyze the multivariate EKC model. - Ordinary least squares (OLS) to have efficient estimates from three models, including: The pooled model (POLS), Fixed-Effects model (FEM), and Random-Effects model (REM) to evaluate the relationship between foreign ownership and firm's financial performance. - Co-citation analysis is employed to find out the factors that influence on investment efficiency**.**
Part 1: The multivariate environmental Kuznets curve (EKC)	
Key issue	This part focuses on identifying the relationship between FDI inflows and CO_2 emissions in the multivariate EKC model.
Variables	**Dependent variable:** Carbon emissions (CO_2)
	Independent variables: Real Foreign direct investment (FDI)**,** Real GDP per capita (GDP)**,** Energy Use (EC), Urban population (URB), and Government expenditures for education (GOE).
Theory	The EKC theory, the pollution haven.

Data	Secondary data from World Bank; The integrated Carbon Observation System-ICOS; U.S. Energy Information Administration; reports of the ministry of education of countries.
Research Instrument	PMG estimator by using Stata 15 software.
Part 2: The proxies of agency cost and firm's financial performance	
Key issue	This part focuses on identifying the relationship between foreign ownership and firm's financial performance**.**
Variables	**Dependent variable:** firm's financial performance (ROA).
	Independent variables: Foreign ownership (FOR)
	Control variables: Board Size (TDIR), independent directors (INDDIR), CEO duality (CEODUAL), leverage (LEV), firm size (SIZE), and firm age (AGE).
Theory	Agency theory as one of the explanations.
Data	A panel data set on public firms listed on the Vietnam Stock Exchange.
Research Instrument	Using OLS to analyze estimates from three models, including: The pooled model (POLS), Fixed-Effects model (FEM), and Random-Effects model (REM) by using Stata 15 software.
Part 3: Investment efficiency	
Key issue	This part focuses on a summary of factors related to investment efficiency.
Data	The citation data was gathered from the Web of Science.
Research Instrument	Co-citation analysis: secondary data, statistical analysis instruments by using SPSS software, VOSviewer 1.6.8 software.

Source: Original study

1.5. Research procedure

This study is organized into four chapters as follows.

Chapter 1 described the research background and motivation, research objectives and scope of the study, procedure, and structure of the dissertation.

In chapter 2, relevant prior literature is reviewed and the theoretical background for my topic is set. As proposed by previous documents and related theories, the hypotheses are also developed in this chapter.

In chapter 3, the research models are developed, the research design, sample selection process, and methodology are outlined. The empirical results are presented in this chapter.

Chapter 4 presents the conclusion and the contribution of this study. The future research and the limitation of this study are presented in this chapter.

CHAPTER TWO
LITERATURE REVIEW

This chapter presented a pertinent literature review and the study's theoretical framework. Based on the theory and previous documents, the hypotheses are developed. This study employs the environmental Kuznets curve (EKC) theory and the pollution haven hypothesis (PHH) for part 1; Agency theory is used as an explanation for part 2, in which foreign ownership and other control variables are assumed the proxy of agency cost to provide empirical support for our inferences. Regarding part 3, this section's purpose is to examine the tendencies in earlier documents to find the factors that affected investment efficiency by employing co-citation method. This study did not examine the regression model or test any hypothesis, thus, the theoretical background is not mentioned for part 3.

2.1. The theoretical background

2.1.1. The environmental Kuznets curve (EKC) theory

In the 1950s and 1960s, economist Simon Kuznets initially proposed the EKC theory. The relationship between economic development and environmental quality is frequently expressed using the environmental Kuznets curve (EKC). It is predicated on the idea that there is an inverted-U relationship between per capita income and several environmental degradation indicators. The curve's shape can be characterized as follows: When the GDP per capita rises, environmental problems worsen; but, once it

hits a turning point, rising GDP per capita causes less environmental issues.

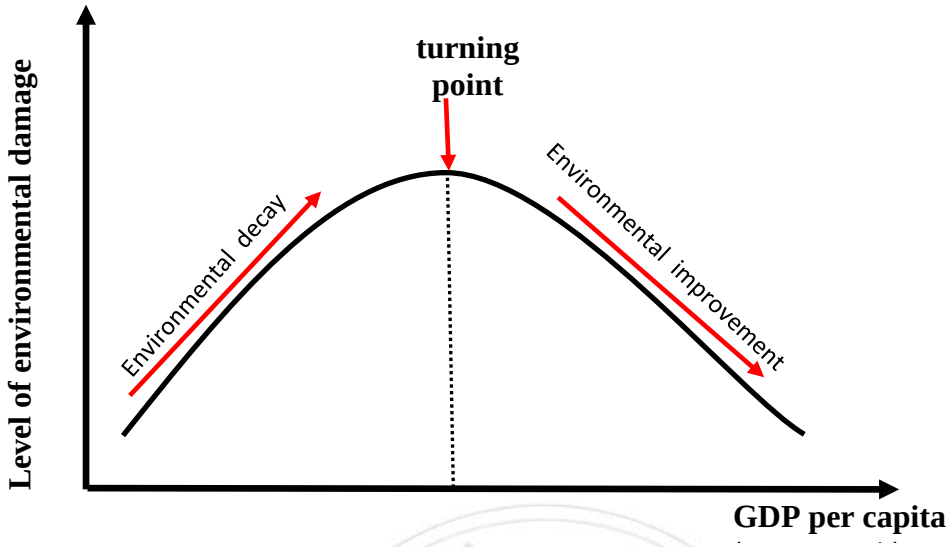

Figure 2. 1. EKC diagram

2.1.2. The pollution haven hypothesis (PHH)

Copeland and Taylor initially mentioned the idea of "pollution paradise" in the 1994 North American Free Trade Agreement. According to the pollution haven theory, when industrialized nations want to open factories or offices abroad, they typically choose the option that is the cheapest in terms of resources and labor while still giving them the access to land and materials they demand. However, its results in actions may lead to the cost of the environment. Conversely, Businesses find it more expensive to operate in nations with stricter environmental regulations due to the costs involved in adhering to these requirements. Developing countries with cheap labor resources and less stringent environmental rules. Due to this, businesses who decide to relocate abroad frequently do so in nations with lax environmental regulations or inadequate enforcement.

2.1.3. Agency theory

Agency theory was presented by Alchian and Demsetz in 1972, who emphasized that agreements were adopted to govern the work of a company

under voluntary transactions. How to structure connections effectively is explained by agency theory, in which the principal (the owners and shareholders) determines the work, and the agent (the managers who run the firms for the principals) performs.

The principal-agent problem is a subject of current economics, management, and business ethics debates. Nearly all contemporary corporate organizations have principles that are distinct from the agents. As a result, there may be circumstances where the objectives of the principals and the agents are different. The principals like to have an increase in the stock price and profits, while the agents may want growth in their pay and hierarchical positions. Agents operate the business on the owner's behalf, but they are only paid salary that accounts for the majority of their benefits. However, there may be a conflict of interest because both of these parties may desire to maximize their advantages. In this case, the owners often accept agency costs to lessen this dispute and enhance the company's operational success Jensen and Meckling (1976).

The categories of agency costs, including the cost of control, which is the sum paid to the controllers to notify shareholders when the executives engage in self-serving profit-making activities; Binding costs are expenses incurred to mitigate the harm that could result from CEOs' dishonest behavior; and the additional losses, which are fees for harms done by their representatives who abuse their authority to benefit themselves.

When considering the division of decision management and decision control from a different angle within the agency theory, an increased presence of foreign ownership (the principal) may lead to monitor managerial performance more effectively (the manager is the agent who performs work) (Chaganti et al., 1985; Fama, 1980) since outside ownership is regarded as more independent than inside ownership. According to Firth (2008), companies with

foreign share ownership incur greater agency costs. Likewise, Choi (2019), there is an inverse relationship between changes in agency costs and changes in the percentage of foreign ownership. It implies that foreign investors should monitor and penalize management to encourage them to achieve long-term value for the benefit of shareholders. By demonstrating that the decrease in agency costs brought on by the foreign ownership effect is related to greater growth rates, thus, leading to higher firm value. Therefore, foreign ownership is expected to focus on focus on shareholders' interests and firm's financial performance. The connection between the principal and the agent is shown in Figure 2.2.

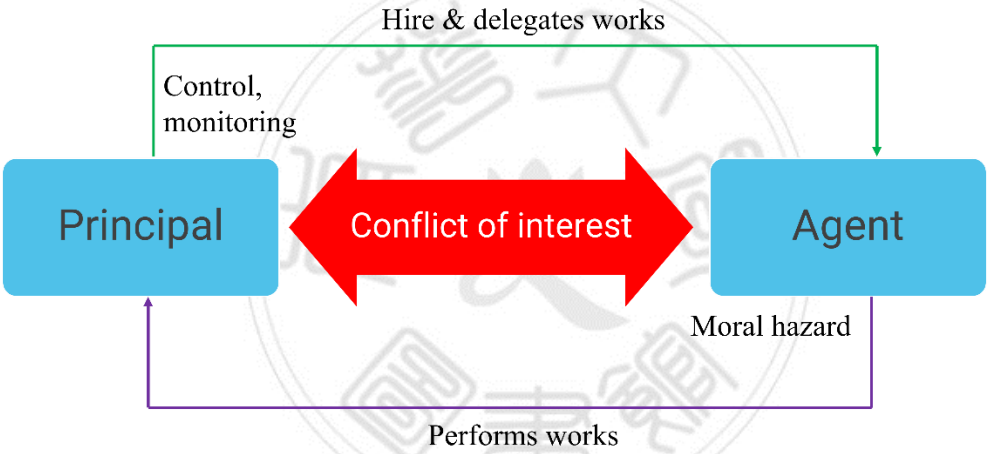

Figure 2. 2. The total conceptual framework of this study

Source: Original study

This study assumes that foreign shareholding as a proxy of agency cost and have a positive impact on ROA. At the same time, this study also uses other control variables as proxies of agency costs to provide empirical support for our inferences, such as: the number of total directors on the board (Board size); independent directors; CEO duality; Leverage; Firm size; and firm age.

2.2. Literature review and hypothesis development

2.2.1. The multivariate environmental Kuznets curve (EKC)

Many studies have investigated the connections between CO_2 emissions and social factors along with economic factors, including: GDP per capita and its

second order term (GDP, GDP^2), foreign direct investment (FDI), energy consumption (EC), urbanization (URB), and government spending on education (GOE). However, there is conflicting empirical evidence.

A line of research has looked at the connection between economic development and environmental quality using EKC framework. According to Kuznets (1955), there is an inverted-U shaped between GDP per capita and carbon emissions. EKC theory postulates that as GDP increases, so do carbon emissions, until income turns a corner and carbon emissions begin to drop. The inverted U-shape of the EKC indicates that as the economy matures, CO_2 emissions will be reduced by economic expansion itself. However, it was discovered by (Rahman, 2020; Sharif et al., 2020; Wawrzyniak and Dory, 2020) that economic development causes more degradation in the environment. (Wawrzyniak and Dory, 2020) used GMM estimates to examine the level of institutional quality among 93 developing nations from 1995 to 2014. They discovered that EKC is supported. However, their results ignored time-fixed inpact, so it is confusing and untrustworthy. Additionally, the authors claimed that countries with good institutional qualities suffer less environmental degradation, while those with weak institutional qualities have an increase in carbon emissions. They also discovered that the effect of economic growth on CO_2 emissions is only significant in cases the low institutional quality. A study of (Tamazian and Rao, 2010) offered supportive EKC findings for 24 transition economies from 1993 to 2004. For China from 1975 to 2005, a quadratic connection between income growth and CO_2 emission was discovered (Jalil and Mahmud, 2009). Other research, however, did not provide support for the EKC theory. For instance, Lean and Smyth (2010) demonstrated that the EKC theory is accepted across the whole sample, but the outcome varied in each nation. Narayan (2010) found that there was no long-term or short-term evidence to support it for 43 developing countries. Arouri et al. (2012) found a

noticeably distinct EKC turning point in Middle Eastern and North African countries from 1981 to 2005.

An N-shaped curve has been reported in numerous research (Churchill et al., 2018; Sarkodie and Strezov, 2019; Kang et al., 2016; Zhou et al., 2017). In their investigation of the OECD from 1870 to 2014, Churchill et al. (2018) discovered two thresholds in Australia, Canada, and Japan. (Sarkodie and Strezov, 2019) evaluated panel dataset of five developing countries for the period of 1982 and 2016, their findings supported both inverted U-shaped and N-shaped. Similarity, Kang et al. (2016) and Zhou et al. (2017) showed N-shaped in China. Ozturk and Acaravci (2010) investigated for Turkey from 1968 to 2005 and found no proof of a long-term link between CO_2 emissions and economic growth.

2.2.1.2. Energy consumption and CO_2 emissions

The second line of research has focused on the relationship between CO_2 emissions and energy use after Kraft (1978)'s key study. According to research, increased economic development is associated with increased energy consumption, and increased economic growth is associated with efficient energy use (Bakirtas and Akpolat, 2018; Rafindadi and Ozturk, 2017; Wang, 2020). Studies pertaining to the dynamic link between emissions, energy usage, and income have been encouraged as a result of the fusion of these two scholarly streams. Although some of these studies looked cross-country, the majority of them were country-specific. For instance, research from France (Ang, 2007) and Malaysia (Ang, 2008) suggested an increasing affluence is a factor in increasing energy use and environmental issues. Soytas et al. (2007) found a reverse nexus in their study of the US: energy consumption and economic development drive environmental degradation. When eight Asia-Pacific countries, including emerging ones, were analyzed between 1971 and 2005, Niu et al. (2011) found that energy consumption is the primary driver of

CO_2 emissions. They also discovered a long-term causal connection between CO_2 emissions and increases in income, and energy use. However, they discovered a unidirectional causality between energy use and CO_2 emissions in the short term. Hanif et al. (2019) analyzed a sample of fifteen developing Asian nations showed that economic development raises CO_2 emissions, fossil fuel usage increases carbon emissions, and these two factors result in environmental degradation.

2.2.1.3. Foreign direct investment (FDI) and CO_2 emissions

Another stream investigates the impact of FDI inflows on environmental performance. Foreign direct investment inflows may help developing economic to benefit from advanced technology because foreign shareholders tend to employ a global standard, even though Jensen (1996) predicted that industrial countries often relocate to areas with lax and less stringent environmental regulations. Because profit-driven organizations are aware of the gap in environmental regulation and aim to prevent cost damage to the ecosystem in their home country, FDI may either improve quality of the environment in host nation or boost economic development while damaging environmental quality (Sandbroke and Mehta, 2002; Tamazian et al., 2009; Zarsky, 1999). Research into the link of financial development and environmental quality have produced inconsistent results. For instance, Zhu et al. (2016) tested the PHH for developing ASEAN nations between 1981 and 2011, using a panel quartile regression, and they found a link between FDI and carbon emissions. (Behera and Dash, 2017) discovered a positive correlation for 17 South and Southeast Asian nations between 1980 and 2012. Atici (2012) found no causal link between FDI and CO_2 for emerging ASEAN nations from 1970 to 2006; similarly, Phuong (2018), using data from Vietnam from 1986 to 2015, found no causal link between FDI and CO_2. More recent studies have also found that

FDI has a significant impact on the environment (Solarin et al., 2017; To et al., 2019; Zakarya et al., 2015).

2.2.1.4. Urbanization and CO_2 emissions

The majority of research (Acheampong, 2018; Cai et al., 2018; Hanif et al., 2019; Muhammad and Khan, 2021; Munir et al., 2020) focused on economic issues that influence environmental deterioration. There are few scholars (Li and Lin, 2015; Pata, 2018) added urbanization in EKC framework, despite the fact that social factors like urbanization and the level of literacy, that got little notice, may also affect environmental performance. Urbanization could be defined as a shift of population from rural to urban locations through the development of modern industries in the area (Takano, 1959; De Vries, 2013). Urbanization is linked to industry, technical advancement, globalization, and migration (Bryant, 2005). Urbanization can be considered as a source of pollution because industrialisation typically takes place in urban areas. Additionally, due to industrialization, income levels are rising, which increases demand for things that use a lot of energy and causes pollution. However, an affluent society may become aware of the detrimental effects of environmental deterioration so that friendly items with the invironment are promoted through awareness campaigns and strict environmental legislation. Additionally, the idea of a compact metropolis indicates that due to high population density, urbanization may minimize environmental impact. Thus, urbanization can have a positive or negative impact on the environment. There is much debate in the research over how urbanization affects the environment. For instance, using panel data from 86 nations, (Cole and Neumayer, 2004) discovered that rising carbon emissions were followed by rising urbanization. Likewise, (Kasman and Duman, 2015) used a sample of EU members between 1992 and 2010 to show that urbanization has a statistically positive impact on CO_2 emissions. They came to the conclusion that countries with higher rates of urbanization adhere

to environmental regulations more than those with lower rates. (Liddle and Lung, 2010) revealed that because most people in urbanized regions use synthetic energy, carbon emissions there are negligible for 17 developed countries. Urbanization has been suggested to have a detrimental impact on CO_2 emissions by Fan et al. (2006). Shahbaz et al. (2016) hypothesized in a Malaysian study that new technologies have the potential to reduce energy consumption and CO_2 emissions over time in urban settings.

2.2.1.5. Environmental education and CO_2 emissions

Although objective factors that lead to environmental degradation are explored in the literature, we believe reducing environmental problems requires increasing environmental consciousness. Consequently, fostering positive environmental perceptions and behaviors is an essential component of education. The 1970s saw the beginning of environmental education research. The need of fostering environmental awareness as the cornerstone of environmental stewardship was emphasized in the Tbilisi Declaration (1977Environmental education and students' environmental cognition have been linked by (Fisman, 2005; Jaus, 1982; Mittelstaedt et al., 1999). Education is crucial for increasing students' awareness of environmental issues in developing and transitional countries, according to a number of scholars (Barraza and Walford, 2002; Liefländer et al., 2013; Pesaran, 2011; Zsóka et al., 2013). Given high environmental perceptions, people will be motivated to reduce CO_2 emissions after learning about environmental issues. Gökdere (2005) proposed that environmental education should begin at an early age. Consequently, the involvement of the government in environmental education has a significant impact on improvements in environmental consciousness. Environmental quality may be supported by a government budget for education, particularly in emerging countries. The first study of its kind to be

published in the literature, this one looks at how government spending on education affects CO_2 emissions.

Consequently, given this line of literature review, the hypotheses are proposed as follows:

Hypothesis 1: The multivariate EKC theory is supported in this model, it implies an inverted U-shaped relationship for GDP, the square of GDP, and CO_2 emissions.

Hypothesis 2: FDI may stimulate carbon emissions, particularly in developing and industrializing nations in the short-run but FDI might enhance the host country's environmental quality in the long-run.

Hypothesis 3: One of the factors that may lead to rising pollution is energy consumption in both the short and long time.

Hypothesis 4: Urbanization may have either a favourable or harmful effect on the environment. In the short-run, urbanization positively affects CO_2 emissions, while urbanization has a negative influence on CO_2 emissions in the long-term.

Hypothesis 5: In five ASEAN developing nations, more public spending on education helps to solve environmental issues and cut CO_2 emissions.

2.2.2. The proxies of agency cost and firm's financial performance

2.2.2.1. Foreign ownership and firm's financial performance

There have been many mechanisms through which owners might influence business decision-making. Prior studies have investigated that different forms of ownership create differences in corporate investment decisions. Since the advent of business globalization, foreign investors might increase their investments by buying greater shares in the firms (Oxelheim and Randøy, 2003), especially in emerging markets where the firms are receiving larger foreign capital inflows (Darmadi, 2011). (Khanna and Palepu, 2000) defined foreign ownership as the proportion of total equity held by both foreign

institutions and foreign firms. Inconsistent with the study of (Dahlquist and Robertsson, 2001), it is suggested that foreign investors seem to own more shares in large firms because large firms have greater cash positions and rapid growth opportunities. In addition, foreign investors also play an important role in monitoring the firms in emerging markets thanks to their implementation of global standards.

Previous studies found that foreign investors are probably different from domestic investors in the breadth of information asymmetry. Foreign investors are more helpful in reducing information asymmetry than domestic investors because of their higher investment expertise and experience (Kang and Stulz, 1997; Brennan et al., 1997; Kim et al., 2010) demonstrated that firms with high levels of foreign ownership have lower information asymmetry since foreign investors frequently actively monitor and discipline ingrained managers in emerging markets to prevent their informational disadvantage. By further using the cases of socially responsible firms, they concluded that a greater level of foreign investors leads to a greater level of CRS ratings (Oh et al., 2011). Several attempts have been made to prove that foreign ownership has a positive relationship with sustainability (Kronborg and Thomsen, 2009) and performance (Greenaway et al., 2014). According to Jensen (2001), businesses must take into account the interests of all stakeholders, including consumers, employees, and communities. In order to attain sustainable performance, the company's goal must be to benefit all stakeholders while also considering the economic, social, and environmental aspects. In the same line, (Hintoová and Kubková, 2016) indicated that the level of corporate governance is correlated with foreign ownership because they may have more skilled, advanced technology, financial capital, or human resources than domestic investors. Corporate governance is a crucial component of business success since it is linked to enhancing sustainable performance. Moreover, it is thought that

decision-making under foreign control gives environmental and social issues more consideration (Saltaji and Issam, 2013). Additionally, it has been conclusively shown that a greater number of foreign investors results in better financial information reporting (Guedhami et al., 2009). Extant literature (Aggarwal et al., 2011; Chen et al., 2009; Dahlquist and Robertsson, 2001; Dwivedi and Jain, 2005) indicated that among institutional investors, foreign institutional investors are better at increasing corporate governance of firms than domestic institutional investors. Foreign investors are less likely to connect with insiders than domestic investors, thus they may monitor the managers more effectively, hence resulting in reducing agency problems. Consequently, a growing amount of research (Andres, 2008; Chen et al., 2017; Cho and Kim, 2007; Filatotchev et al., 2005; Omran et al., 2008) provide supporting evidence that the level of foreign participation is positively associated with firm's financial performance. Likewise, a recent study by Kao et al. (2018) also pointed out that the higher the percentage of shares owned by foreign investors, the higher firm's financial performance.

Another source of corporate governance could be concerned is foreign ownership. Under the globalization context, cross-national investors have a positive impact on agency cost and monitoring management (Bekaert and Harvey, 2000; Stulz, 1990). In addition, foreign investors play an effective role in monitoring firms because they have enough ability to implement global standards in emerging markets (Easterbrook, 1984; Jensen, 1986). Hence, increasing foreign ownership leads to decrease agency costs. Consequently, foreign ownership might be helpful to improve firm's financial performance. Hence, the hypothesis is proposed as follows:

Hypothesis 6: Foreign ownership is positively associated with firm's financial performance.

2.2.2.2. Board characteristics and firm's financial performance

a. Board size and firm's financial performance

From the perspective of agency theory, a large size board is more able to control managers because more members will be monitoring the manager's activities (Kiel and Nicholson, 2003). In addition, Dalton et al. (1999) also argued that a larger board may also be advantageous since they expand the ability to access resources and expertise of the organization. However, a large board presents some massive issues. Larger boards are more difficult to manage, and their efficacy and efficiency are also hampered by poor coordination and communication, sluggish decision-making, and a lack of consensus (Lipton and Lorsch, 1992; Rao et al., 2012). High inequality (off-balance) or power disparity between inner and outside directors may result from a large board. Therefore, it might be challenging for outside directors to perform their monitoring duties. In the same way, Jensen (1993) also argued that due to issues regarding freeriding among directors and longer decision-making processes, larger boards are less effective in monitoring management. This approach leads to the following hypothesis:

Hypothesis 7a: A large board size may be less effective at monitoring management, leading to a negative relationship between board size and firm's financial performance.

b. Board independence and firm's financial performance

According to agency theory, a diverse board suggests a higher level of board independence and, consequently, better management of managers, which may result in improved performance (Carter et al., 2010). Agency theory confirmed the fundamental conflicts between the interests of the owner and the management. According to the agent theory, independent directors (from outside the organization) are more likely to have fewer possible conflicts of interest, which can lead to them having higher integrity and the ability to make objective decisions (Fama, 1980; Rosenstein and Wyatt, 1997). (Hermalin and

Weisbach, 1998) pointed out that adding external outsiders to the board does not always result in a board that is more independent from the CEO. In actuality, the board's independence would keep the same until the new outside directors were able to affect the negotiation process. Independent directors, however, are more likely to speak up for shareholder interests and possibly oppose the CEO (Adams et al., 2010). The personal reputations of these independent directors are valued, and they will make great efforts to safeguard them. Independent directors may be more effective monitors due to their prior expertise when they come to the board, especially if they represent the majority of the board (Fama and Jensen, 1983). In line with these points, lots of studies argued that an aspect of the agency theory concerned with independence is a board including outside directors. The independence of a board's members has an impact on their willingness and capacity to effectively control a company (Dalton and Dalton, 2011). An independent board might independently assess and advise managers, which could enhance the interests of the shareholders (Brickley and Zimmerman, 2010). Additionally, more independent directors need to have the skills, incentives, and knowledge to engage in monitoring managers (Harris et al., 1990). Hence, the hypothesis is proposed as follows:

Hypothesis 7b: A higher proportion of independent directors on the board might lead to a higher firm's financial performance.

c. CEO duality and firm's financial performance

The role of the board in punishing the company management when there is CEO duality is a subject of considerable argument in the literature on corporate governance. Due to the CEO's great power, the internal control system frequently fails (Jensen, 1993). It is challenging for the board to replace ineffective managers because of the CEO duality (Goyal and Park, 2002). Outside directors might not be able to give the board impartial advice and

counsel in such a board. This approach leads to CEO duality is the reason for raising the firm's agency costs.

Separating the responsibilities of the CEO and chairman of the board is necessary to solve the problems that occur when one person is in charge of making, putting into action and assessing business decisions. In other words, there is a lower likelihood that the CEO will act selfishly and harm the company's performance.

According to these viewpoints, the hypothesis is developed as follows:

Hypothesis 7c: There is a negative association between CEO duality and firm's financial performance.

2.2.2.3. Leverage and firm's financial performance

According to the agency costs hypothesis, excessive leverage lowers outside equity's agency costs and boosts company value by pressuring or incentivizing managers to act more in the best interests of shareholders. According to Jensen and Meckling (1976), the effect of leverage on agency costs cannot be monotonous. At lower degrees of leverage, increasing debt decreases agency conflicts by providing managers with favourable incentives, but at greater levels, losses increase because of projects involving negative net current values, which raises the risk of bankruptcy and financial difficulties. Therefore, any rise in leverage may cause an increase in total agency costs, resulting in a detrimental effect on profitability and firm's financial performance as bankruptcy and financial crisis become more probable. Based on the study of (Jensen and Meckling, 1976), many documents on such agency theory explanations of capital structure have developed. For example, (Harris et al., 1991; Myers, 2001) concluded that the prospect of liquidation, which results in personal losses to managers in terms of wages, reputation, and perks, may have an impact on managers and reduce agency costs. In a similar vein, several academics asserted that greater leverage can reduce disagreements between

shareholders and managers about the type of investment to make and the level of risk to take (Williams, 1987).

There is supporting evidence for this adverse correlation between debt levels and firm's financial performance or profitability from a variety of research (Kester, 1986; Gleason et al., 2000, Booth et al., 2001). While some studies claimed that leverage has both favourable and unfavourable effects on a firm's performance. For instance, (Simerly and Li, 2000) showed that debt reduces competitiveness because covenants put on the corporation restrict its flexibility to make decisions. However, when debt levels are high, corporate governance may shift from internal to external controls, which might be advantageous for a company's profitability. Following the above discussion, the hypothesis is stated as follows:

Hypothesis 8: The relationship between debt level and firm's financial performance is negative, leading to a negative link of leverage and firm's financial performance.

2.2.2.4. Firm characteristics: Firm size and firm age

Many scholars (Bentzen et al., 2012; Solakoglu, 2016) figured out that firm size is important for performance because of market power, implying larger firms have a higher performance. This is consistent with previous studies, which argued that the size of the corporation has an impact on its performance because of the differences in the operating conditions, accessibility to markets, business diversification, and information asymmetry (Ramaswamy, 2001; Frank and Goyal, 2003; Ebaid, 2009). However, it is also feasible to interpret size for flexibility and assume a correlation between firm's financial performance and size, especially in business areas that require swift responses to market demands.

In the same vein, Smith et al. (2006) indicated that a firm's age may have an impact on its performance. it is reasonable to anticipate an inverse U-shaped

relationship between performance and age since older organizations may be in a stage of decreasing profits in their product lifecycle while younger firms are just starting in their production cycle. Another argument is that younger businesses are more open to variety than older businesses. Likewise, Dawar (2014) concluded that firm age shows a significantly negative relationship with firm's financial performance, implying that newer companies are able to score higher than older companies in adjusting to the shifting technologies and products and competitiveness capacity in the marketplace. On the other sign, Majumdar (1997) mentioned that older firms with experience in business management, thus avoid the harmful effect of newness, suggesting a positive association between age and firm's financial performance. Given this line of literature review, the hypotheses are proposed as follows:

Hypothesis 9a: Levels of firm size are positively correlated with firm's financial performance.

Hypothesis 9b: Firm age has a significantly positive association with firm's financial performance.

2.2.3. Investment efficiency

All the returns from the investment, including socioeconomic benefits, profits for investors, and all relevant stakeholders, can be referred to as investment efficiency. Investors use their capital in investment operations to create and enhance their property by creating and enforcing to achieve company objectives. Reaching the objective of company indicates that investment efficiency has been realized.

This study highlighted the main research streams on this topic in a review of previous publications. Four of the most significant study trends, including accounting information quality, diversed gender on board, ownership structure, corporate social responsibility (CSR) were revealed using co-citation analysis.

2.2.3.1. Financial reporting quality and investment efficiency

There have been many researchers who examined the relationship between investment strategies-making and the quality of financial statement. For example, (Biddle et al., 2009; Chang et al., 2009; McNichols and Stubben, 2008) in order to maximize their worth, organizations make investments until the marginal benefit is greater than the marginal expense. They also demonstrated that the level of over- or under-investment is inversely correlated with the quality of financial reporting, hence higher quality financial statements reducing information asymmetry between managers and outside investors. Additionally, a lot of studies (Chen et al., 2011; Elaoud and Jarboui, 2017; Roychowdhury et al., 2019) also demonstrated that financial statement quality might be increase investment efficiency by helping managers to make better investment decisions through better identification of projects and more reliable accounting numbers.

2.2.3.2. Board gender diversity and investment efficiency

The second type of research is related to human resources, especially senior staff. The board of directors' capacity, experience and professional qualifications who perform business strategies (Richardson et al., 2013). Over the past three decades, there has been a global trend for board gender diversity as a way to improve corporate governance (Terjesen et al., 2015). As a result, it is not surprising to have many publications connecting female representation on the board with firm-level investment decisions. For instance, in their evaluation of the contribution of female directors in controlling risks, (Chen et al., 2016; Levi et al., 2014) found that gender diversity on the board tend to reduce huge disadvantages in R&D spending. (Griffin et al., 2021; Ye et al., 2019) have recently discovered that female participation on boards lowers the propensity toward overinvestment and risk exposure that is driven by CEOs' overconfident attitudes. It is entirely congruent with the discovery made by (Barber and Odean, 2001) that female directors have a greater impact on

investment performance because they are less exhibit overconfidence than male directors. Especially, female directors tend to avoid uncertain investment opportunities. In comparison to organizations with male CEOs, those run by women have less leverage and less volatile income (Faccio, Marchica, and Mura, 2016). In the same vein, (Abad, Lucas-Pérez, Minguez-Vera, and Yagüe, 2017) further found information asymmetry and gender diversity on boards are negatively correlated. These findings showed a negative correlation between the level of investment efficiency and board gender diversity.

2.2.3.3. Corporate Social Responsibility (CSR) and investment efficiency

Many studies considered the influence of CSR on investment performance have also been conducted. CSR was explained by Dhaliwal et al. (2012) like a company's voluntarily decision to join in businesses that go far beyond conformity and address many social issues which may include achieving carbon neutrality, producing recyclable goods, operating workplace safety, and creating a greening environment. Likewise, Erhemjamts et al. (2013) claimed that CSR has a significant influence in determining enterprises' investment decision-making and project efficiency. They revealed strong proof indicating firms that exhibit a greater degree of CSR often suffer from fewer level of asymmetry and lower equity costs. Hence, greater CSR engagement reduces the risk of overinvesting or underinvesting and optimizes returns on investments. Recently, (Liu and Tian, 2021) also discovered that corporations must have a corporate social responsibility obligation. This policy improves control of Chinese businesses, particularly those with agency issues, thus lessening overinvestment in China.

2.2.3.4. Ownership structure and investment efficiency

There are a lot of research articles that provided evidence about the influence of ownership structure on investment behaviours. For instance, Chen et al.

(2011) found that non-SOEs have greater levels of investment sensitivity than SOEs when comparing the differences in profitability among state enterprises and non-SOEs. Additionally, SOEs are inclined to invest incompetently in comparison to non-SOEs. Their results are in line with the agency theory, which asserts that information asymmetries and conflicts between managers, owners, and outside investors limit businesses from making efficient investment decisions. In accordance with this idea, Chen et al. (2017) also discovered that state enterprises perform investments less effectively than foreign businesses.

2.2.4. The total conceptual framework

Three main issues of this study are connected through foreign direct investment (FDI). FDI inflows have been flowing strongly into key economies of ASEAN region. Consequently, it impacts the environment, the economic growth of the countries, thus, FDI inflows are integrated with other factors, including GDP per capita, energy consumption, urbanization, and spending on education in multivariate EKC estimation to explore their influence on carbon emissions. Accordingly, the number of foreign investors has also increased along with an increase in FDI inflows recently, hence this study also assumes that foreign ownership and other control variables as proxies of agency cost, which have impact on the performance of companies listed on the Vietnam stock market. Furthermore, FDI inflows and the participation of foreign ownership serve as an important variable that impacts the relationship between CO_2 emissions, the company's efficiency, and its consequences. In order to understand elements which may arise as a result of investment strategies, this research further explores the factors that affected investment efficiency by using the co-citation analysis.

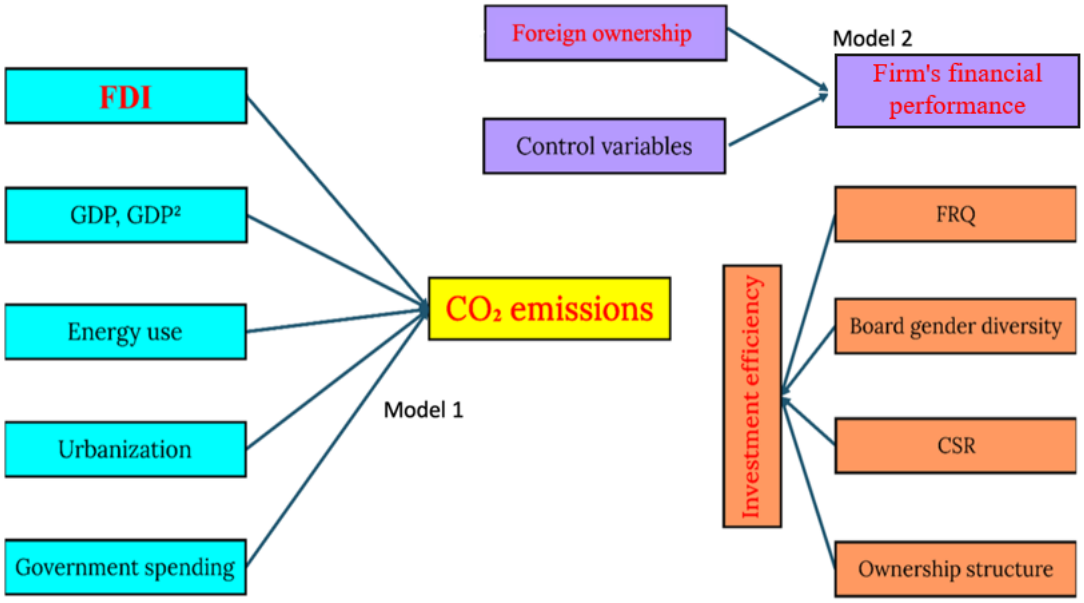

Figure 2. 3. The total conceptual framework of this study

Source: Original study

From the total conceptual framework, this study includes three models, which are:

In the first model, this study developed traditional EKC model to investigate the impact of foreign direct investment (FDI) and other factors, such as: GDP per capita (GDP), the square of GDP per capita (GDP^2), energy use (EC), urbanization (URB), and government education spending (GOE) on CO_2 emissions in 5-ASEAN nations.

The second model is used to analyze the relationship between proxies of agency cost and firm's financial performance.

The remainder of the conceptual framework of this study, co-citation is utilized to identify aspects connected to investment performance from articles in 21 leading journals recognized by Web of Science from 1999 to 2021. The purpose of this research is to investigate the tendency of earlier works in this field. As a result, this study did not analyze the regression model as well as not test any hypothesis. However, a great number of papers along with the co-

citation technique can assist us in investigating the elements which have a positive influence on investment efficiency.

CHAPTER THREE

SPECIFIC MODEL, DATA, METHODOLOGY, RESULTS AND DISCUSSIONS

3.1. Part 1- The multivariate environmental Kuznets curve (EKC)

3.1.1. Specified model

The quadratic EKC model is presented:

$CO_{2it} = \beta_0 + \beta_1 lnGDP_{it} + \beta_2 lnGDP_{it}^2 + \beta_3 lnEC_{it} + \beta_4 lnFDI_{it} + \beta_5 lnURB_{it} + \beta_6 lnGOE_{it} + \varepsilon_{it}$ (Eq. 1.1)

Where I and t represent the nation and time period, respectively.

As above-mentioned, the link of economic development and environmental quality has a nonlinear inverse U-shape. (GrossmanGM, 1991; Kuznets, 1955). GDP and GDP^2 are indicators of EKC model.

The turning point of the GDP per capita is given by:

$GDP_{it} = e^{\frac{-\beta_{1t}}{2\beta_{2t}}}$ (Eq. 1.2)

Where:

GDP_{it} represents GDP per capita of country i in year t

β_{1t}, β_{2t} denote the estimated coefficients.

3.1.2. Data

We utilize secondary data from 5-ASEAN, from 1986 to 2019. All of the variables are yearly data. Table 3.1 provides a summary of the variables:

Table 3. 1. Description of Variables for model 1

Variable	**Units of Measure**	Definition	**Sources**
Carbon emissions **CO_2**	Metric Tons per capita	Carbon dioxide emissions are produced by burning fossil fuels and manufacturing cement. They emit carbon dioxide while using solid,	The integrated Carbon Observation System-ICOS

		liquid, and gas fuels. Carbon dioxide emissions data include gases from the combustion of fossil fuels and the making of cement, but exclude emissions from land usage, such as deforestation.	
Real GDP per capita **GDP**	Real GDP per capita (US$)	Gross domestic product divided by population equals nominal GDP per capita. Real GDP is calculated by dividing nominal GDP by the GDP deflator (base year varies by country).	WDI- World Bank
Real Foreign direct investment **FDI**	Real FDI, net inflows (BoP, US$)	Direct investment, often known as foreign direct investment, involves equity, income reinvestment, and other types of capital. Adjusted FDI from the GDP deflator is used to calculate real FDI.	WDI- World Bank
Energy Consumption **EC**	Kg per capita	Total oil equivalent usage per capita in kg.	WDI- World Bank U.S. Energy Information Administration
Urban population **URB**	Percent	Urbanization refers to the people shift from rural to urban areas. Urbanization is measured as the percentage of the total population living in cities.	WDI -World Bank
Government expenditure for education **GOE**	Percent	The percentage of government education spending in total GDP.	WDI- World Bank & documents of the ministry

			of education of countries.

Notes: data frequency is annual data (yearly data).

Source: Original study

Table 3. 2. Descriptive statistics for variables of model 1

Variable	Unit	Mean	Std. Dev.	Min	Max
CO_2	Metric tons	2.36	2.01	0.26	7.92
GDP	US$	2,802.77	2,635.32	94.56	11,432.83
EC	Kg	1,043.28	763.66	260.79	3,111.90
FDI	US$ (million)	5,290	5,470	0.04	25,100
URB	Percent	43.07	13.96	19.62	76.61
GOE	Percent	3.33	1.59	0.26	7.66

Notes: data frequency is annual data (yearly data).

Source: author's own calculation using Stata 15.

The mean value of carbon emissions (CO_2) is 2.36, this means that the average quantity of carbon emissions generated is 2.36 metric tons per year. According to the 6th ASEAN Energy Outlook report, energy demand of ASEAN countries will increase significantly by 2040, the consequence of this is an increase in CO_2 emissions. Malaysia (7.7 metric tons in 2019) overtakes Thailand (3.7 metric tons in 2019) to become the second largest of carbon emissions among Southeast Asian countries. Vietnam, Indonesia, and Philippines are also countries with high CO_2 emissions (3.5 metric tons, 2.3 metric tons, and 1.3 metric tons in 2019, respectively) in the ASEAN region. The average value of GDP is 2,802.77, showing that GDP per capita is 2,802.77 US$. According to the ASEAN Integration Report 2019 released on November 27, ASEAN has become the 5th largest economy in the world with a gross domestic product (GDP) of about 3 trillion USD in 2018, an increase significantly compared to its position as the 7th economy of the world 5 years

ago. The mean value of energy consumption (EC) is 1,043.28, revealing oil consumption per capita is 1,043.28 kg per year. Population growth, income and rapid urbanization are the factors that have increased energy demand in the ASEAN region during past time and are expected to increase even more in the future. With the above economic growth conditions, ASEAN's energy demand will increase significantly, by 2040 is expected to increase about 1.5 times compared to now. The mean value of FDI is 5,290, indicating average total FDI inflows is 5,290 million US$. The proportion of urbanization in the total population is approximately 43.07%. Developed countries (such as Europe, the United States or Australia) are often much more urbanized (over 87%) than developing countries. However, urban areas in developed countries have largely stabilized, so the rate of urbanization is much lower than in the case of developing countries. The reported mean value of GOE is 3.33, implies that these ASEAN countries spend around 3.33% of GDP on education, significantly lower from developed countries like the US and UK where spend 5.6% and 6.3% respectively. Significantly, Vietnam's education spending is equivalent to 4.9% of GDP, lower than Malaysia (5%), and higher than others in ASEAN. However, the level of spending on education has not reached 20% of the total budget expenditure that the Education Law has set out the goal in 2019.

All data is yearly data, and these numbers are the average for 5 ASEAN countries.

3.1.3. Methodology

Our testing method includes four steps to assess the causal relationships between CO_2 emissions and the independent variables in the long-run and short-run. The panel unit root initially verifies the sequence of events. In order to ascertain whether the series are integrated and whether these variables are nonstationary in their level form, panel cointegration tests are performed. The

PMG estimator is used to calculate the long-run and short-run elasticities when there is cointegration between the variables. Finally, the Granger causality test will estimate the error correction model to analyze the interactions in the short- and long-run dynamics. The methodology is structured:

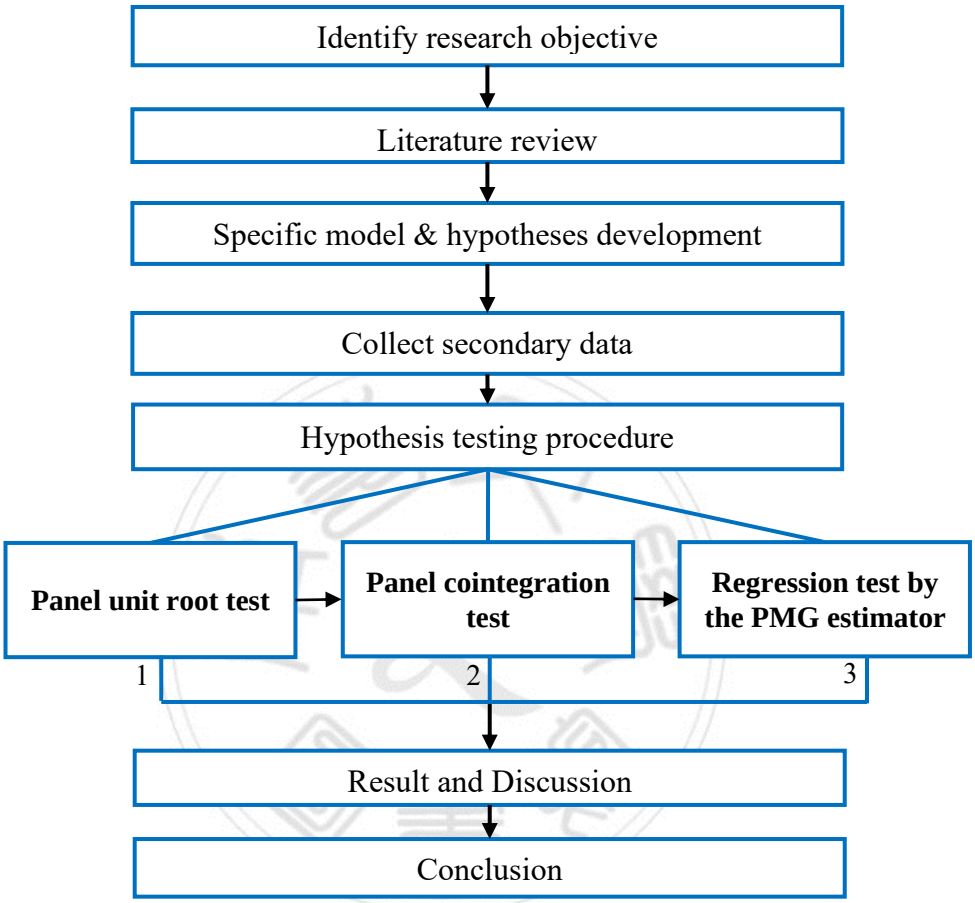

Figure 3. 1. Summary of the process of testing for model 1

Source: Original study

3.1.3.1 Panel unit root test

A critical step of estimation and regression is the panel unit root test. To assess if trending data should be initially differenced or regressed on deterministic functions of time to make the data stable, unit root tests can be utilized. Such testing in time series was invented by Dickey and Fuller in their publications from 1979 and 1976, respectively. Based on the conventional Dickey-Fuller (DF) or Augmented Dickey-Fuller unit root tests, researchers have developed panel unit root tests (ADF). The series is stationary for an

integrated series of order zero I(0), but it is nonstationary in the level and loses its stationarity for the first difference for an integrated series of order one I(1).

In this study, the Im, Pesaran, and Shin (IPS, 2003) is used to determine the order of the series' integration. The equation proposed by Pesaran (2003) is defined as follows:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \gamma_i f_t + \varepsilon_{it}$$

Where:

$\Delta y_{it} = y_{it} - y_{i,t-1}$

y_{it} is the observation on the i^{th} cross-section unit at time t

$\alpha_i = (1 - \varphi_i)\ \mu_i;\ \beta_i = -(1 - \varphi_i)$

γ_i are independently distributed for all i; f_t is the unobserved common effect; ε_{it} is the individual-specific (idiosyncratic) error. From the above equation, the hypothesis are:

$H_0: \beta_i = 0, \forall i$; the intergrated series is nonstationarity

$H_1: \beta_i < 0$ there is at least one integrated series that is stationary

3.1.3.2 Panel cointegration test

In this section, if there is non-stationarity in the cross-sectional units, the cointegration test will examine the long-term relationships between the variables. The original notion of cointegration was introduced by Granger (1981) and Engle and Granger (1987). Later, this exam was created by (Kao, 1999; Pedroni, 1999, 2004; and Westerlund, 2005). The cointegration tests based on Engle and Granger's framework, examine the stationarity for the estimated residuals.

All the cointegration tests are based on the following panel-data model for the I(1) dependent variable y_{it}, where i = 1,…,5 denotes the country and t = 1, . . . , T_i denotes time:

$$y_{it} = \gamma_i + \beta_i x'_{it} + \varepsilon_{it}$$

Where:

For each panel i, each of the covariates in $x'_{it}$is an I(1) series. All the tests require that the covariates are not cointegrated among themselves; γ_i denotes panel-specific means; β_i denotes the cointegrating vector; ε_{it} is the error term.

The hypothesis are:

$H_0: \rho_i = 1, \forall i$ or (there is no cointegration)

$H_1: \rho_i < 1, \forall i$

3.1.3.3 Regression tests by the Pooled Mean Group estimator (PMG)

In this study, the short-run parameter estimates between variables in non-stationary panels were estimated using the pooled mean group estimator (PMG), which was recently established by Pesaran and Smith (1995). (Pesaran et al., 1999). This approach combines averaging and coefficient pooling. The mean group (MG) estimator, which employs cross-section averaging, and the dynamic fixed effects (DFE) estimate, which depends on pooling cross-sections, were also utilized in this study as additional models for comparison.

Since all variables are I(1) and cointegrated, their main characteristic is that they react to any change from the long-run equilibrium. This implies that the divergence from equilibrium affects the short-run consequences of the variables in an error correction model.

Based on the PMG approach, thus Eq. (1.1) can be written as:

$$\Delta CO_{2it} = \varphi[CO_{2it} - \{\beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{it}^{\ 2} + \beta_3 EC_{it} + \beta_4 FDI_{it} + \beta_5 URB_{it} + \beta_6 GOE_{it}\}] + \alpha_1 \Delta GDP_{it} + \alpha_2 \Delta GDP_{it}^{\ 2} + \alpha_3 \Delta EC_{it} + \alpha_4 \Delta FDI_{it} + \alpha_5 \Delta URB_{it} + \alpha_6 \Delta GOE_{it} + \varepsilon_{it} \quad \text{(Eq.1.3)}$$

Where:

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the long-run coefficient

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ are the short-run coefficient

The parameter is the rate at which the CO2 adjustment term moves from a short-term shock to its long-term equilibrium (Pesaran, 1999; Martnez-Zarzoso et al., 2004).

If the EKC hypothesis is supported, we expect a positive sign for β_1 and a negative expected sign for β_2; in the short run, we also predict a positive sign for α_1 and a negative sign for α_2. The parameter β_3 and α_3 are expected to be positive because energy consumption is considered as the main factor causing environmental pollution. Foreign direct investment may increase carbon emissions in the early stage of FDI attraction, particularly in developing and industrializing countries, along with a corresponding rise in energy demand. However, in the long-run, FDI may improve environmental quality. Thus, we hypothesize the signs of β_4 to be negative and the signs of α_4 to be positive. Additionally, we predict the social factors' effects on environmental quality will be statistically significant. Especially, in the context of developing nations, a large portion of the population is moving from rural to urban regions. For example, the population of Vietnam's big cities grows yearly. Urban population growth may cause more pollution hence α_5 is expected to be positive, but the sign of β_5 might be negative. Whereas, we expect that both α_6, and β_6 are negative due to the importance of education policies and government budget support.

3.1.4. Results and Discussion

3.1.4.1. Unit root test

The findings of the unit root test utilizing the Im, Pesaran, and Shin (IPS) test for each variable in our model are displayed in Table 3.3. Since each variable has a unit root, the integrated series are nonstationary in their level form. With the exception of URB, which is stationary in the first difference form at the 5% significance level, they are stationary in the five countries for

the first difference form, I(1), at the 1% significance level. To ensure that no variables in the second difference form are stationary, the unit root test defines the order of series integration (I2). Because all samples are integrated in the same order, the cointegration test is then used to determine whether there is a relationship between economic growth (GDP), energy consumption (EC), foreign direct investment (FDI), urbanization (URB), government education expenditures (GOE), and CO2 emissions (1).

Table 3. 3. Unit root test

Variable	At level		At first difference		Conclusion
	Statistic	p-value	Statistic	p-value	
CO_2	-0.2162	0.4144	-5.6509***	<0.01	I(1)
GDP	1.9584	0.9749	-6.0110***	<0.01	I(1)
GDP^2	2.7514	0.997	-5.9444***	<0.01	I(1)
EC	0.1295	0.5515	-5.9385***	<0.01	I(1)
FDI	-1.0285	0.1519	-6.6789***	<0.01	I(1)
URB	-1.0104	0.1562	-2.1744**	<0.05	I(1)
GOE	-1.0899	0.1379	-6.0290***	<0.01	I(1)

Notes: ***, **, * represent p < 0.01, p< 0.05, p<0.1, respectively.

Source: author's own calculation using Stata 15.

3.1.4.2. Panel cointegration test

In order to analyze regression model by classical methods like ordinary least squares, an assumption is made: The variances and means of the series are constants that are independent of time (i.e. the processes are stationary). Non-stationary time series (or unit root variables) don't meet this assumption, so the results from any hypothesis test will be biased or misleading (regression results show high R^2, signed coefficients as expected and statistically significant based on t-test, but not economically significant). Cointegration test is the method that allows us to estimate the long-run parameters or equilibrium in systems with unit root variables. The cointegration test is essential for avoiding misleading causality or the absence of causes and effects and for figuring out

the order in which variables are integrated. At a significance level of 1%, the nonstationary integrated series of the unit root test strengthens the case for cointegration relationships between the variables. For the cointegration test, this study employed three methods (Kao, 1999; Pedroni, 1999, 2004; and Westerlund, 2005), each with the null hypothesis H0: no cointegration.

All Kao tests, shown in Table 3.4, had a 1% rejection rate for the null hypothesis. The null hypothesis was accepted by the modified Phillips-Perron test but was rejected by the two Pedroni tests at 10% and 5%, respectively. Westerlund test presented no cointegration. It is really difficult to determine which of the three methods is the most reliable. However, there are 2 reasons to help me conclude that the Kao test is more reliable than other tests. First, most of the results rejected the null hypothesis, and presented cointegration. In particular, all the tests of Dickey and Fuller rejected the null hypothesis; Second, Dickey and Fuller (Dickey and Fuller, 1979; Fuller, 1976) pioneered such testing in time series. Researchers produced panel unit root tests and cointegration tests based on the traditional Dickey-Fuller (DF) or Augmented Dickey-Fuller (ADF) unit root test.

Based on the findings of the Kao and Pedroni test, it can be stated both long- and short-term correlations between the variables are supported by the possibility of one or more cointegration relationships between them. The PMG model is then used to look at the variables' long- and short-term effects in the following phase.

Table 3. 4. Cointegration tests

	CO_2	**p-Value**
Panel A: Kao test for cointegration		
Modified Dickey-Fuller	-4.5221***	<0.01
Dickey-Fuller	-2.4703***	0.0067

Augmented Dickey-Fuller	-3.1282 ***	0.0009
Unadjusted modified Dickey-Fuller	-4.2794 ***	<0.01
Unadjusted Dickey-Fuller	-2.4149 ***	0.0079
Panel B: Pedroni test for cointegration		
Modified Phillips-Perron	1.2142	0.1123
Phillips-Perron	-1.5996*	0.0548
Augmented Dickey-Fuller	-1.8127**	0.0349
Panel C: Westerlund test for cointegration		
Variance ratio	-1.2519	0.1053

Notes: ***, **, * the rejection of the null hypothesis of no cointegration is statistically significant at 1%, 5%, and 10%.

Source: author's own calculation using Stata 15

3.1.4.3. Regressions

Ordinary least squares (OLS) estimators may bias the parameters in a cointegrated panel series. The pooled mean group (PMG) estimate is used in this work to assess the short-run and long-run equilibrium nexus between the variables. The mean group (MG) and the dynamic fixed effects are two additional comparison methodologies included in this study (DFE). Table 3.5 displays the results for all three estimators.

Table 3. 5. Regression results of PMG, MG, and DFE estimator

Dependent variable CO_2	**Pooled mean group (1)**	**Mean group (2)**	**Dynamic fixed effects (3)**
Long-run coefficients			
GDP	0.709** (0.043)	1.275*** (0.001)	0.380* (0.061)
GDP^2	-0.047** (0.047)	-0.085*** (0.000)	-0.018* (0.058)
EC	1.519*** (0.000)	0.927*** (0.007)	1.521*** (0.000)
FDI	-0.039** (0.026)	-0.004* (0.058)	-0.001* (0.07)

URB	- 0.263* (0.073)	-0.172 (0.122)	-1.024*** (0.003)
GOE	- 0.030** (0.048)	-0.052** (0.047)	-0.155* (0.073)
φ	0.180	0.552	0.202
Short-run coefficients			
ΔGDP	0.636** (0.029)	1.220** (0.042)	0.409*** (0.002)
ΔGDP^2	-0.041** (0.041)	-0.079* (0.063)	-0.022** (0.025)
ΔEC	0.736*** (0.000)	0.792*** (0.000)	0.720*** (0.000)
ΔFDI	0.008*** (0.000)	0.010*** (0.000)	0.008** (0.031)
ΔURB	0.535** (0.027)	0.697*** (0.001)	0.668 (0.253)
ΔGOE	-0.004* (0.080)	-0.012* (0.077)	-0.006* (0.062)
Turning points—TNP ($US): $30,292.87			

Notes: ***, **, * represent p < 0.01, p< 0.05, p<0.1, respectively. The value in () denotes for p-value.

Source: author's own calculation using Stata 15

The PMG estimate allows the short-term coefficients to vary across countries, whereas the MG estimator restricts the coefficients between nations because it utilizes the average regression coefficients of each. Estimates of the rate of adjustment from each model (compare 0.18 from PMG and 0.55 from MG, and 0.20 from DFE). The amount of time needed to transition from one set of macroeconomic variables to a specific set of those variables is referred to as the speed of adjustment. PMG estimator combines coefficient pooling and averaging, leading to a much lower estimated speed of adjustment. The adjustment speed of The PMG estimator is smaller than the MG estimates, and the DFE estimates, implying the time needed for CO_2 toward its long-run equilibrium following a short-run shock from the PMG estimator is nearer than other estimators.

The Hausman test was conducted to test the difference in these models. The Hausman statistic between PMG and MG shows p-value is 0.468> 0.05, thus, the PMG estimator is selected; Besides, the Hausman statistic between PMG and DFE indicates P-value is 0.201> 0.05, thus, the PMG estimator is choosed to be explained in this study. Besides, the short-run coefficients must be equal in order for the DFE estimator to work. (Baltagi et al., 2000) showed that the endogeneity between the lagged dependent variable and the error term causes DFE results to exhibit simultaneous equation bias. Therefore, it can be said that the PMG estimator is reliable for calculating both the short- and long-term characteristics of how each independent variable affects CO_2.

The calculations from the PMG show that the real GDP (GDP), its square (GDP^2), real FDI (FDI), energy consumption (EC), urbanization (URB), and government education expenditures (GOE) all have a significant impact on carbon emissions (CO_2).

The findings reveal that the long run effects are mostly different from the short run effects. In which, GDP per capita, FDI, and urbanization may stimulate CO_2 emissions in the early stage of industrialization and economic development. However, in the later stages of economic growth, and especially when the greater population realizes the importance of the environmental system, particularly, as their income exceeds the turning point, consequently, the impact changes from positive to negative. As a result, it may be helpful for policy makers in developing countries when setting mitigation goals and adopting appropriate strategies towards the goal of sustainable growth.

The findings in Table 3.5 demonstrate that the GDP and GDP^2 coefficients are statistically significant at the 5% level. Thus, economic growth and CO_2 emissions are related over the long term. GDP and GDP^2 are showing positive and negative signals, respectively. This suggests an inverted U-shaped relationship between per capita income and CO_2 emissions, which in turn

supports the EKC. There is a turning point that denotes a change from an environmental condition of environmental degradation to one of environmental improvement since the link between environmental quality and economic growth is inverted U-shaped. Using Equation (1.2), we can determine the GDP per capita turning point as $30,292.87. It noted that the turning point is the expected value under the current information set. After this point, economic development has a negative impact on carbon emissions instead of a positive one. Reaching the turning point of EKC as soon as possible should be the target of countries. As proposed by the EKC theory, finding the income threshold at which things start to change and the corresponding level of carbon emissions requires a lot of work (Yaduma et al., 2015). Galeotti et al. (2006) emphasized that the "turning point" may allow the governments to know exactly developing countries realize how far they reach the turning point, which will be helpful when setting mitigation goals and adopting appropriate strategies. Thus, following is an explanation for the inverted U-shaped relationship between economic expansion and environmental deterioration.

At the first stage, as countries industrialized, industrial production quickly increased, destroying natural resources and driving environmental damage. The process of industrialization and economic development has caused harm to the environment. Like most other developing countries, these 5 ASEAN countries have depended on the advantages of natural resources as the foundation to promote economic growth in the early stages of development. Besides, economic development also leads to increasing demand for energy consumption. When natural resources are exhausted, especially the greater use of fossil fuels for industrial production, has led to an increase in carbon emissions, along with environmental consequences. Moreover, due to the limitation of technology as well as human consciousness, leading to great

damage such as the decrease in oxygen and water availability, while toxic gases such as CO_2 increase rapidly.

At a later stage, we expect that people become aware of the damaging effects on the environment after their income exceeded the threshold, leading to technical development and a decline in the use of fossil fuels, both of which reduce CO2 emissions. Our inverse U-shaped EKC is consistent with (Chandran and Tang, 2013; Tang and Tan, 2015).

According to Table 3.5, the long-term FDI coefficient is -0.039 at 5%, which is inconsistent with (Tang and Tan, 2015; Zhang and Zhou, 2016) who disproved the veracity of the pollution haven concept. However, these findings are consistent with (To et al., 2019), which included information from 25 emerging markets for the years 1980 to 2016 (including our five sample countries). Indeed, it is impossible to dispute the benefits of FDI for developing countries. Modern technology are transferred to host countries through FDI inflows, which encourages domestic R&D and patenting. Therefore, increasing the productivity and efficiency of input resources could result in a large reduction in energy consumption and carbon emissions. But in the near run, the coefficient of FDI is 0.008 at 1%, which means that a 1% increase in FDI inflows will, on average, result in a 0.008% increase in per capita carbon emissions. This result supports hypothesis 2 that FDI may stimulate carbon emissions, particularly in developing and industrializing countries in the short run but FDI could improve the host country's environmental quality in the long run. In fact, many developing nations tend to weaken environmental protection rules in the early stages in order to compete with other nations in the process of attracting foreign direct investment. As a result, there is more risk to the environment. Basically, over the past time, FDI enterprises have shown their compliance with environmental regulations quite well. However, there are many FDI enterprises operating wastewater treatment plants that do not comply

with regulations, causing significant impacts on the environment. On the other hand, environmental management and supervision agencies lack both equipment and human resources, so the supervision and inspection work of these countries is still quite limited, and sanctions are not highly deterrent. For example, the case of Formosa company, an FDI enterprise in Vietnam making serious marine pollution, causing mass fish deaths in April 2016 in 4 provinces of Vietnam is a typical example.

Additionally, our results show that energy use affects carbon emissions across models. The coefficient of energy use has a positive sign, meaning that for every percentage point increase in energy consumption, there will be a corresponding rise in carbon emissions of 1.51% over the long term and 0.731% over the short term. As a result, hypothesis 3 is supported, as is our anticipation that increased energy use will result in a long-term decline in environmental quality (Ang, 2008; Ozturk and Acaravci, 2010).

The long-run coefficient of URB is -0.263 at a 10% significance level while the short-run coefficient of URB is 0.535 at a 5% significance level. In the first stage, urbanization is one of the causes of increasing CO_2 emissions in big cities. In particular, industrial production activities are considered as the primary causes of air pollution, especially production facilities in the chemical, textile and food processing industries. Moreover, rapid population growth in urban areas causes an overload of technical infrastructure, which is one of the main causes of pollution in urban areas. However, in the long run, as carbon emissions fall as urbanization rises. The notion of the compact city, which contends that economies of scale produced by higher-density urbanization could lessen environmental harm, is one reason that could be used. Additionally, wealthy city dwellers favor using eco-friendly products as they are aware of the consequences of environmental degradation. This is consistent with (Shahbaz, Loganathan, Muzaffar, Ahmed, and Jabran, 2016), who

revealed how long-term urbanization in Malaysia reduces energy use and CO_2 emissions through the use of modern technologies.

It is not surprising that the sign of GOE is negative and that the short-run coefficient of GOE is -0.004 at the 10% significance level. The long-run coefficient of GOE is negative with a coefficient of -0.030 at the 5% significance level. This supports hypothesis 5, which states that government investment on education will lower carbon emissions in 5 ASEAN emerging nations, and is consistent with our initial forecast for the impact of government on carbon emissions. Environmental education also guards against environmental issues. As a result, it's critical to foster in kids a feeling of environmental responsibility so that they will be positively motivated to act in a pro-environmental manner as adults. The governments of these nations allocate a sizable budget as well as particular policies for this program each year since they understand how important environmental education is. The Ministries of Education and Training of the nations in our sample concentrated on integrating environmental education into the primary curriculum after environmental education was initially taught through extracurricular activities. Environmental education is required at all levels, including preschool, elementary school, high school, colleges, and institutions. The organization of environmental education tactics (lectures, school essays, environmental seminars, and outdoor activities for kids) must also take into account the cultural and traditional values of the society. On environmental protection, a large number of documents, articles, textbooks, and reference books have been produced and published. In addition, a lot of campaigns to raise awareness and encourage the residents as well as the social organizations to participate in environmental protection through materials, pictures media (newspapers, radio, television) or contests about environmental laws are conducted every year. To further advance awareness, environmental understanding, and environmental

law, several national and international conferences and seminars on the environment have been organized. Additionally, a system of environmental data has been set up to oversee environmental preservation efforts. Indeed, the goal of environmental education is to better educate the public about the complexity of both natural and artificial environmental systems. People behave in a more "friendly" manner toward the environment as a result. Spending by the government on environmental education may help to solve environmental issues and lower CO_2 emissions.

3.2. Part 2- The proxies of agency cost and firm's financial performance

3.2.1. Specified model

To examine the connection between foreign ownership and a firm's financial performance, the second model is used.

$$ROA_{it} = \beta_0 + \beta_1 FOR_{it} + \beta_2 TDIR_{it} + \beta_3 INDDIR_{it} + \beta_4 CEODUAL_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} + \beta_7 AGE_{it} + \varepsilon_{it} \quad \text{(Eq. 2.1)}$$

Where: ROA represents the firm's financial performance; FOR denotes foreign investors; β_0 is the intercept of firm's financial performance; β_1 is the coefficient of FOR variable, all the rest variables are control variables related to firm's financial performance, including: Board Size (TDIR) presents the number of total directors on the board; INDDIR displays the percentage of independent directors on the total directors; CEODUAL is a dummy variable equal to one if the CEO and Chairman positions are held by the same person; Firm Size (SIZE) is the natural log of total assets; Firm age (AGE) is the natural log of the number of years a firm is listed on the stock exchange; and Leverage (LEV) is calculated as the total liabilities divided by the total assets of the firm; ε_{it} represents the standard error.

3.2.2. Data

This study makes use of a panel data set on publicly traded companies registered on the Vietnam Stock Exchange, which includes 270 companies listed from 2010 to 2019. Three criteria were employed to filter them:

First, the total assets of each observation must be at least VND 1 billion, to eliminate the small firm effect.

Second, none of the variables in our empirical models has a missing value.

Third, the sample must not comprise financial institutions and banks because they have special characteristics. After this filtering, the final sample of 2,700 firm-year data was taken into account in this investigation.

We extend the sample duration in this study to 2019. These extra 10 years of data offer a potent out-of-sample evaluation of the validity and precision of the foreign ownership metric as a predictor of business financial performance. Additionally, extending the time frame enables us to record the firms' financial performance.

3.2.2.1 Measures of firm’s financial performance

We can use a variety of metrics to assess a company's financial performance, including market-based metrics like earnings per share (EPS), Tobin's Q ratio, and market-to-book ratio, as well as accounting-based metrics derived from a company's financial statements, such as return on assets (ROA) and return on equity (ROE). Return on assets (ROA) was used in this study to follow the methodology of other empirical studies (Manuel et al., 2015; Brahma et al., 2021; Adams and Ferreira, 2009) in assessing a firm's financial performance. The ratio of a company's annual net income to its total assets over the course of a fiscal year is what is referred to as the ROA, an accounting-based metric. ROA is frequently used by managers, owners, investors, and stakeholders to evaluate how well a business uses its resources to make a profit. (Barber and Lyon, 1996) outlined the benefits of using ROA as a measure of a company's

financial success. Because ROA takes into account the size of the company, it makes it simple to assess how well one company is doing in comparison to another.

Although ROA is an accounting-based measurement so it may be out of date. However, it is appropriate for Vietnamese accounting because most businesses are still unfamiliar with fair value measurement. That is why this study did not use market-based measures like Tobin's Q ratio and market-to-book ratio, and EPS. In line with this reason, an indicator called ROE evaluates how effectively a company uses its equity. However, ROE still has limitations. In terms of stability, this ratio lacks stability because the profits of enterprises on the stock exchange fluctuate wildly. In addition, the index will increase when the number of treasury shares increases resulting in a decrease in equity. Besides, income after taxes will not change causing ROE to increase mechanically.

3.2.2.2 Measurement of the proxies of agency cost

The main explanatory variable FOR is the percentage of common stocks held by foreign investors.

For the control variables, based on the empirical research of (García-Meca et al., 2015), the control variables are classified into two categories. The first type of control variables related to board characteristics, including: board Size (TDIR) presents the number of total directors on the board; INDDIR displays the percentage of independent directors on total directors; CEODUAL is a dummy variable equal to one if the CEO and Chairman positions are held by the same person, and zero otherwise. The other category of variables related to the firm such as firm size (SIZE) is the natural log of total assets; firm age (AGE) is the natural log of the number of years a firm is listed on the stock exchange, and leverage (LEV) is calculated as the total liabilities divided by the total assets of a firm. All the variables measured are shown in Table 3.6.

Table 3. 6. Variables definition for model 2

Variable	Definition
ROA	ROA is calculated as the ratio of a company's annual net income to total assets over a fiscal year.
FOR	FOR denotes the proportion of common shares held by foreign investors.
TDIR	board Size (TDIR) displays the total number of directors on the board.
INDDIR	INDDIR shows the proportion of independent directors to total directors.
CEODUAL	If the CEO and Chairman positions are held by the same person, CEODUAL is a dummy variable equal to one.
SIZE	Size is the natural log of total assets, measured in million VND.
AGE	Firm age (AGE) is the natural log of the number of years a company has been listed on the stock exchange.
LEV	Leverage (LEV) is calculated as the total liabilities divided by the total assets of a firm.

Notes: All of the variables are yearly data.

Source: Original study

Table 3.7 shows the descriptive statistics for the explanatory variables of model 2.

Table 3. 7. Descriptive statistics variables for model 2

Variable	Mean	Std. Dev.	Min	Max
ROA	0.09	0.07	(-0.49)	0.81
FOR	0.11	0.14	0.00	0.69
TDIR	5.60	1.22	2.00	11.00
INDDIR	0.10	0.17	0.00	0.86

CEODUAL	0.29	0.46	0.00	1.00
LEV	0.49	0.21	0.02	0.95
SIZE	8.81	0.68	7.24	11.61
AGE	0.79	0.26	0.00	1.15

Notes: ROA is the ratio of a company's annual net income to total assets over a fiscal year. FOR denotes the proportion of common stocks held by foreign investors. Board Size (TDIR) shows the total number of directors on the board; INDDIR shows the percentage of independent directors on the total number of directors. If the CEO and Chairman positions are held by the same person, CEODUAL is a dummy variable equal to one. The natural log of total assets is firm size (SIZE). Firm age (AGE) is the natural log of the number of years a company has been listed on the stock exchange, and leverage (LEV) is computed by dividing the company's total liabilities by its total assets.

Among them, the variable foreign ownership, board size, independent directors, CEO duality, leverage, firm size, and firm age are regarded as proxy variables of agency cost, which is used to analyze the impact of agency problems on the firm's financial performance (ROA).

The mean value of return-on-assets (ROA) is 0.09, with a standard deviation of 0.07, this means that the total income after taxes from continuing firm operations is 9% on average. The average value of foreign investors is 0.11, with a standard deviation of 0.14, showing that foreign investors account for 11% on average of Vietnam companies. The mean value of total directors (TDIR) is 5.6, revealing there are more than 5 members on the board. The proportion of independent directors on the board is approximately 10%. The reported mean value of CEODUAL is 0.29, with a standard deviation of 0.46, it implies that around 29 percent of the positions of CEO and chairman are separated positions in Vietnam companies. The mean value of leverage (LEV) is 0.49, with a standard deviation of 0.21. The average firm size (SIZE) is 8.81, indicating average total assets of approximately VND 2.910 million. The average value of 0.79 years of establishment (AGE) indicates that the sample firms have been in business for 9.12 years.

3.2.3. Methodology

This study used ordinary least squares (OLS) for obtain efficient estimates from three models, including: the pooled model (POLS), the fixed-effects model (FEM), and the random-effects model (REM) to assess the connection between foreign ownership and a firm's financial performance. After that, Hausman test is proceeded to get the difference in these models. When contrasted to a different, less effective estimator that is previously known to be consistent, this test assesses an estimator's consistency. It enables us to assess how well a statistical model fits the data and choose the best model. Moreover, to obtain stable, unbiased, and effective estimation coefficients for the regression, the Pearson correlation matrix, multicollinearity, heteroscedasticity, and autocorrelation are carefully tested. The methodology is organized as follows:

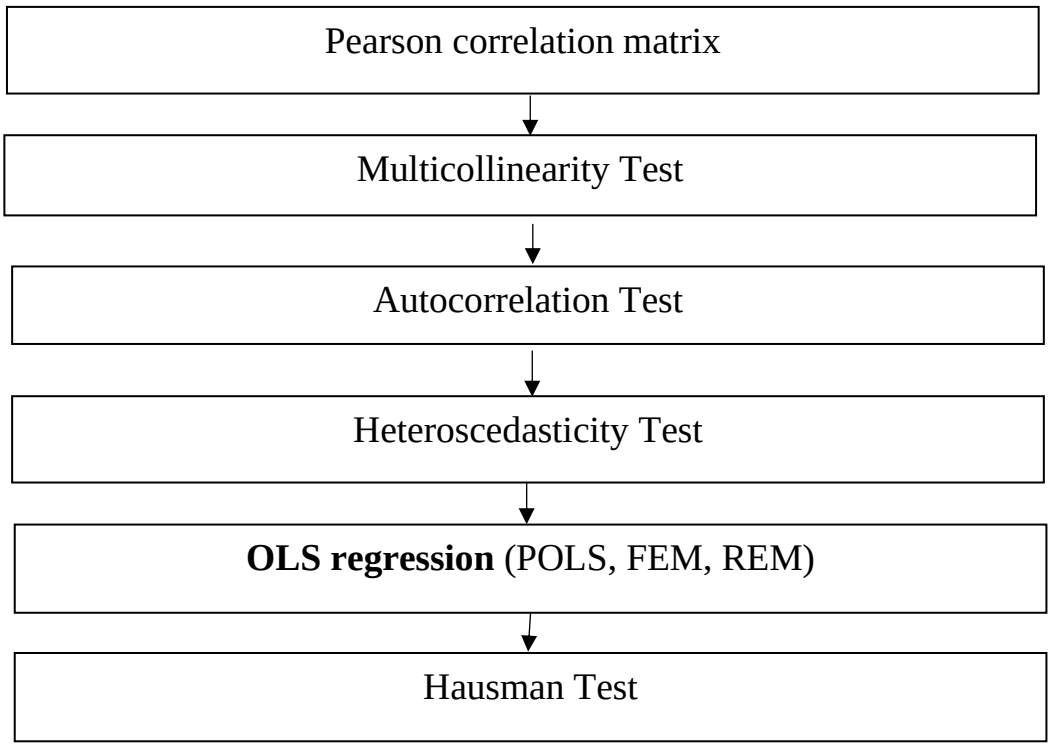

Figure 3. 2. Summary of the steps of testing for model 2

Source: Original study

Panel data estimate techniques come in a variety. The fixed effects model, random effects model, and pooling model are those that are used the most commonly.

3.2.3.1. Ordinary Least Squares regression (OLS)

Ordinal least squares regression (OLS) is a widely used technique for analyzing the coefficients of linear regression equations that indicate the relationship between one or more independent variables and a dependent variable (simple or multiple linear regression). The OLS regression model is expressed as follows:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$$

Where:

y represents the dependent variable; the model's intercept is β_0; $x_1, x_2, \ldots x_k$ denote independent variables; and ε is the standard error.

3.2.3.2. The pooled model

The pooled model disregards panels and time, considering each observation as independent of the others. No panel information is utilized. A pooled model can be described as:

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}$$

Where:

y_{it} represents the dependent variable observed for individual at time t; the model's intercept is β_0; $x_1, x_2, \ldots x_k$ denote independent variables; k: is (the number of independent variables) regressor vector; and ε is the standard error.

When homoscedasticity and the absence of autocorrelation exist and the participants behave identically, a pooled model can be employed. If there is unobserved heterogeneity, it means that there is some unobserved factor that impacts the dependent variable and is connected with some observed regressor, in which case the Pooled model is inconsistent. OLS can only then be utilized to get reliable estimates from the model.

3.2.3.3. The Fixed effects model

A statistical regression model with fixed effects allows the intercept to vary freely between individuals or groups. Panel data is typically used to adjust for any individual-specific traits that do not change over time. One of the advantages of using the fixed effects model that can handle heteroscedasticity.

The fixed effects model for k factors can be presented as follows:

$y_{it} = \alpha_i + \beta_1 x_{1,\,it} + \beta_2 x_{2,\,it} + \cdots + \beta_k\, x_{k,\,it} + \varepsilon_{it}$

α_i denotes an individual's specific intercept. But for all individuals, the slopes (the β parameters) are the same.

3.2.3.4. The Random effects Model

The random effects model is a popular method commonly used technique to analyze the impact of the individual unobserved heterogeneity is uncorrelated with the independent variables. The individual-specific component is regarded as a random variable in the random effects model.

The random effects model can be expressed as follows:

$y_{it} = \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k\, x_{k,it} + \alpha + (\mu_i + \varepsilon_{it})$

Where:

α is the common bias (the mean of all unit-specific effects)

μ_i is the variance introduced by the unit-specific effect for unit i

3.2.3.5. The Hausman Test

The Hausman test, established in 1978 by James Durbin, De-Min Wu, and Jerry A. Hausman, is used to examine an estimate's consistency in comparison to another, less effective estimator that is already known to be consistent. It aids in determining whether or not a statistical model fits the data.

The Hausman test equation is presented as follows:

$H = (\beta_1 - \beta_0)' \,(Var\,\beta_1 - Var\,\beta_0)^{-1}\,(\beta_1 - \beta_0)$

The Hausman test can be utilized to distinguish between a fixed effects model and a random effects model.

3.2.4. Results

3.2.4.1. Correlation matrix

Table 3.8 displays the Pearson correlation coefficients for each variable in the model. The results show that the input and output variables have substantial relationships, in which FOR, INDDIR, CEODUAL, SIZE, and AGE have positive correlation coefficients with ROA, except for TDIR and LEV have a negative correlation coefficient with ROA.

Table 3. 8. Pearson correlation matrix

		ROA	FOR	TDIR	INDDIR	CEODUAL	LEV	SIZE	AGE
ROA	**Correlation**	1.00							
	p-value								
FOR	**Correlation**	0.13***	1.00						
	p-value	0.0000							
TDIR	**Correlation**	-0.02**	0.34***	1.00					
	p-value	0.0314	0.0000						
INDDIR	**Correlation**	0.05**	0.005	-0.03	1.00				
	p-value	0.0189	0.8019	0.1871					
CEODUAL	**Correlation**	0.03	0.02	-0.02	0.12***	1.00			
	p-value	0.1288	0.2898	0.3694	0.0000				
LEV	**Correlation**	-0.39***	-0.19***	-0.02	-0.12***	-0.06***	1.00		
	p-value	0.0000	0.0000	0.3559	0.0000	0.0010			
SIZE	**Correlation**	0.06***	0.31***	0.35***	-0.06***	-0.11***	0.33***	1.00	
	p-value	0.0014	0.0000	0.0000	0.0011	0.0000	0.0000		
AGE	**Correlation**	0.16***	0.18***	0.03	0.06***	-0.07***	-0.04*	0.18***	1.00
	p-value	0.0000	0.0000	0.1446	0.0011	0.0001	0.0507	0.0000	

Notes: *, **, *** indicates correlation is significant at the 10%, 5%, and 1% level, respectively.

Source: author's own calculation using Stata 15

Besides, the variance inflation factor (VIF) in the ordinary least square (OLS) regression analysis is used to determine the level of multicollinearity. VIF is calculated by dividing the variance of estimating a parameter in a model by the variance of a model with only one term. VIF values usually start at 1 and have no upper limit. There is no multicollinearity if VIF is less than 10, and multicollinearity if VIF is greater than 10. Multicollinearity is a phenomenon that frequently occurs when two or more independent variables in a regression model have a strong correlation with one another. In other words, it is possible to predict one independent variable from another independent variable. Multicollinearity violates the linear regression model's presumption that the independent variables do not relate to one another in a linear way.

The findings of the test for the variance inflation factor (VIF) are from 1.03 to 1.51 for all variables as shown in table 3.9. Based on the recommended level of (Gujarati and Porter, 2009), given that the mean VIF is 1.22, this study may not be multicollinear.

Table 3. 9. The result of multicollinearity by a variance inflation factor (VIF)

Variable	VIF	1/VIF
SIZE	1.51	0.66
FOR	1.34	0.75
LEV	1.28	0.78
TDIR	1.24	0.81
AGE	1.07	0.93
CEODUAL	1.03	0.97
INDDIR	1.03	0.97
Mean VIF: 1.22		

Source: author's own calculation using Stata 15

3.2.4.2. Autocorrelation

The degree of correlation between the same variables over two subsequent time intervals is referred to as autocorrelation. It determines how closely a variable's original value at time (t) relates to its lagged value at time (t-1). It usually occurs in panel data and in time-series data. Autocorrelation causes the standard error values of the OLS model to be underestimated, i.e., the estimated t values are inflated to be higher than normal. It also causes the model suffering from spurious regression.

Although there are many autocorrelation tests, to determine autocorrelation in panel data, this study employed the Wooldridge test.

H0: no first-order autocorrelation

The result of the Wooldridge test indicates p-value = 0.089 > 0.05, suggesting that the null hypothesis is non-rejected, which implies there is autocorrelation in our model.

3.2.4.3. Heteroscedasticity

The variance of the error terms in a regression model for an independent variable is known as heteroskedastic. If the model occurs with variable variance error, the OLS value is still unbiased and consistent, but not the most effective estimator. Because of this, it is not possible to minimize the error variance. The model's F-test and regression coefficient tests become invalid. As a result, concluding these findings is inappropriate.

The Breusch and Pagan Lagrangian multiplier test is applied to examine Heteroskedasticity.

H0: constant variance

The result demonstrates that the chi-square statistic's probability value is 0.15, suggesting that the null hypothesis of constant variance can be accepted since there is no evidence of heteroscedasticity in the residuals.

3.2.4.4. Regression findings

Table 3.10 provides the regression findings by ordinary least squares (OLS) to obtain estimates from three models, including: The pooled model (POLS), the Fixed-Effects model (FEM), and the Random-Effects model (REM).

The Hausman statistic between FEM and REM shows p-value is 0.0002 < 0.05, thus, this study chooses regression results of FEM. Besides, the Hausman statistic between FEM and POLS shows p-value is 0.019 < 0.05; thus, FEM is selected. As these results, this study explains the regression results from Fixed-effect model (FEM). It can be explained as follows:

The fundamental drawback of the RE model is that, if some of the explanatory factors are linked with the particular effect or the error term, it may produce biased and inconsistent estimates. In order to determine whether this bias exists, the Hausman test is run. The estimated Hausman test statistic suggests that the FE model is more effective than the RE model because it rejects the null hypothesis that there is no association between the individual effects and the regressors.

The pooled model disregards panels and time, considering each observation as independent of the others. It is predicated on the idea that all observations' independent variable slopes will be the same. In reality, this assumption is minimal. Therefore, despite the simplicity, the pooled regression model may misrepresent the relationship between dependent variable and independent variables.

Table 3. 10. Regression results of POLS, FEM, and REM

Variable	POLS	**FEM**	REM
FOR	0.039** (0.025)	0.038*** (0.004)	0.035** (0.016)
TDIR	-0.003** (0.048)	-0.001** (0.042)	-0.001* (0.056)
INDDIR	0.006** (0.032)	0.008** (0.037)	0.007** (0.043)

CEODUAL	0.012 (0.390)	0.011 (0.372)	0.009 (0.406)
LEV	-0.15*** (0.000)	-0.17*** (0.000)	-0.16*** (0.000)
SIZE	0.053*** (0.006)	0.052*** (0.003)	0.050*** (0.008)
AGE	0.065** (0.012)	0.068*** (0.009)	0.059*** (0.007)

Notes: ***, **, * represent p < 0.01, p< 0.05, p<0.1, respectively. The value in () denotes for p-value.

Source: author's own calculation using Stata 15

ROA represents the firm's financial performance; FOR denotes foreign investors; Board Size (TDIR) presents the number of total directors on the board; INDDIR displays the percentage of independent directors on total directors; CEODUAL is a dummy variable equal to one if the CEO and Chairman positions are held by the same person; Firm Size (SIZE) is the natural log of total assets; Firm age (AGE) is the natural log of the number of years a firm is listed on the stock exchange, and Leverage (LEV) is calculated as the total liabilities divided by total assets of the firm. As expected, there is a positive association between foreign ownership and firm's financial performance, as shown by the data in Table 3.11, where the coefficient on FOR is 0.038 and statistically significant at the 1% level. This is consistent with a lot of prior documents, for example (Carney et al., 2019; Kao et al., 2018; Lindemanis et al., 2022; Margaritis and Psillaki, 2010) found that companies have a high proportion of foreign investors generally have greater shareholder value than their other institutions. Many scholars proved that the presence of foreign investors is correlated with better performance. It can be explained by the following reasons: Firstly, compare to domestic investors, they have less information, therefore they often analyze carefully before investing (Dahlquist and Robertsson, 2001). Foreign investors tend to consider the financial and economic conditions in the host countries. These factors mainly arise from the

policies as well as the specific economic conditions of each country such as growth in gross domestic product, money supply, interest rates, inflation, and preferential policies... (Koepke, 2018). Moreover, due to less connection with insiders than domestic investors so they often pay more attention to monitor the company's business (Rashid, 2020). Second, foreign investors are more different from domestic investors in a firm's decision (Oh et al., 2011b). This is because foreign investors are better at enhancing corporate governance of the firms (Aggarwal et al., 2011). Experienced foreign investors help carry out the proper strategic investment for the firms and they are often cautious about high-risk projects (David et al., 2006). In line with this reason, many other empirical studies (Alodat et al., 2021; Cho and Kim, 2007; Omran et al., 2008) also suggested that firms having a large foreign ownership concentration are expected to manage their assets more effectively.

Regarding the control variables, the regression results show that there is a statistical significance (at 1%, 5%, and 10%) for all variables, except for CEODUAL. Where, the total directors on the board variable is significantly negative at 5 percent level (β = -0.001, p-value = 0.042<0.05). According to the research of (Riordan and Williamson, 1985), the board's primary responsibility is to reduce the agency cost of both the principal and agent, with the goal of maximizing shareholders value as well as protecting the interests of investors when participating in investment projects. (Dwivedi and Jain, 2005) figured out that the decision-making process and effective management of the board may be affected by the size of the board. There are many different viewpoints on the size of the board. Some scholars (Mangena et al., 2012; Pearce and Zahra, 1992; Ramdani and Witteloostuijn, 2010) demonstrated that large boards may enhance firm's financial performance as they have more knowledge and experience, might helps companies in effective management and administration, reducing agency problems between owners and managers.

On the contrary, other academics (Andres et al., 2005; Green and Homroy, 2018; Haniffa and Hudaib, 2006) argued that smaller boards are more cohesive and more efficient. Their empirical results indicated a negative relationship between the board size and firm value. A recent study Cheng et al. (2020) discovered that the change in monthly stock returns and annualized accounting return on assets (ROA) is negatively correlated with board size. In line with this reason, our findings support a negative correlation of ROA with board size. This study also discovered that the correlation coefficient between INDDIR and ROA is positive at the 5 percent significance level ($\beta = 0.008$; p-value = 0.037<0.05), suggesting that the proportion of independent directors may enhance firm's financial performance.

We found that both firm size (SIZE) and AGE are a significantly positive impact on firm's financial performance, which is steady with the past studies (Sami et al., 2011; Tam and Tan, 2007) older and bigger firms are likely to have greater experience in the market and managerial knowledge, they also have a better reputation than new and small firms. Whereas, LEV is negatively related to ROA at 1 percent level ($\beta = -0.17$, p-value = 0.000 < 0.01), supporting slack resource theory, there is a negative correlation between debt ratio and a firm's profitability because organizations with high leverage always prioritize short-term objectives over the corporation's long-term performance (Waddock and Graves, 1997).

3.3. Part 3: Investment efficiency

The remainder of the conceptual framework of this study, from 37 publications in 21 of the top economic journals published by Web of Science from 1999 to 2021, co-citation is used to pinpoint the elements influencing investment efficiency. This study's goal is to investigate the tendencies of past research in this sector. As a result, neither the regression model nor any hypothesis was tested. However, the large number of publications and the co-

citation method can aid in our comprehension of the factors that improve investment efficiency.

3.3.1. Data Collection

In order to find keywords, create clusters, and graphically map the outcomes in the science mapping literature, this study uses the VOSviewer 1.6.8 software (Waltman, van Eck, and Noyons, 2010), the most common and useful software (Lee, Felps, and Baruch, 2014). Following the VOS analysis, the author extracts a thesaurus used by VOSviewer to gather authors whose names have various spellings and are comparable for keywords before clustering. The author also removes the data lacking author or reference information before clustering (Anderson, 2019).

The citation data from the Web of Science was used to compile the study's data. The primary keyword in the accounting and finance fields, "Investment efficiency," was the only topic on which this study concentrated. Based on (Acedo et al., 2006; Culnan, 1986), to gather reliable data and significantly influence on the outcome. Figure 3.3 shows the number of annual publications on the "investment efficiency" topic. The number of publications appeared around 1537 papers from 1999 to 2021. Significantly, there have been more than 100 publications since 2015. This result indicated that researchers have been paying more attention to this topic recently.

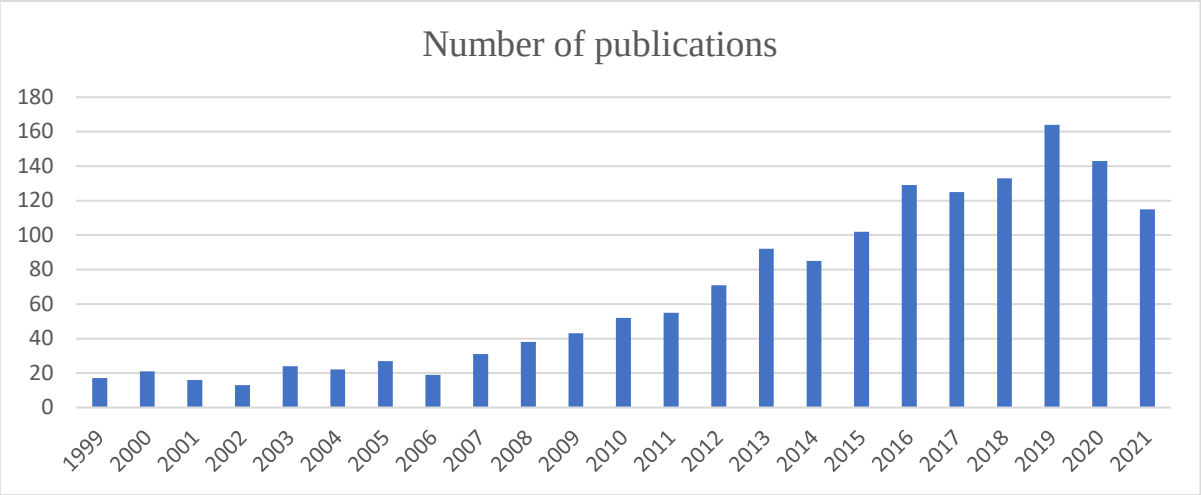

Figure 3. 3. The number of publications from 1999 to 2021

Source: Web of Science

Additionally, Table 3.11 demonstrates the frequency of journals where investment efficiency studies were published. Journal of Banking and Finance, Journal of Corporate Finance, Journal of Business Ethics, and Journal of Accounting and Economics are the journals that have many publications the most, being 239, 196, 172, and 119, respectively.

Table 3. 11. Summary of the Journal

No.	JOURNALS	Frequency
1	Journal of Banking and Finance	239
2	Journal of Corporate Finance	196
3	Journal of Business Ethics	172
4	Journal of Accounting and Economics	119
5	Applied Financial Economics	89
6	Journal of Business Finance and Accounting	89
7	Journal of Empirical Finance	71
8	Accounting Research Journal	60
9	Accounting and Business Research	58
10	Journal of Financial and Quantitative Analysis	56
11	Pacific Accounting Review	51

12	Research in International Business and Finance	47
13	Pacific Accounting Review	40
14	The Accounting Review	36
15	Business Research Quarterly	35
16	The Journal of Finance	34
17	Accounting and Finance	32
18	International Review of Financial Analysis	30
19	Journal of multinational financial management	29
20	Academy of management Journal	28
21	Journal of Accounting and Public Policy	26

Source: Web of Science

Selected articles should include more than 30 citations to other studies, according to 1,537 publications. In this analysis, a total of 37 papers with at least 30 citations were identified. The document resource relates to the "investment efficiency" topic is shown in appendix.

3.3.2. Co-citation method

Co-citation analysis was used in this study. It is a type of bibliometric network analysis that can be used to describe how academic research topics are organized (White, 1990) and (McCain, 1990). Co-citation analysis has long been recognized as an essential tool for bibliometric investigations (White and Griffith, 1981). Co-citation analysis shows how frequently two papers are cited in the same article, indicating the relationship between them (Bellardo, 1980; Small, 1973). When two papers are referenced in the same document, this is known as co-citation. Co-citation analysis finds networks of linkages and may help classify the research areas as well as determine the most active research areas by mapping a study field's intellectual structure (Zupic and Čater, 2015). Figure 3.4 presents the steps proceeded co-citation analysis in this research.

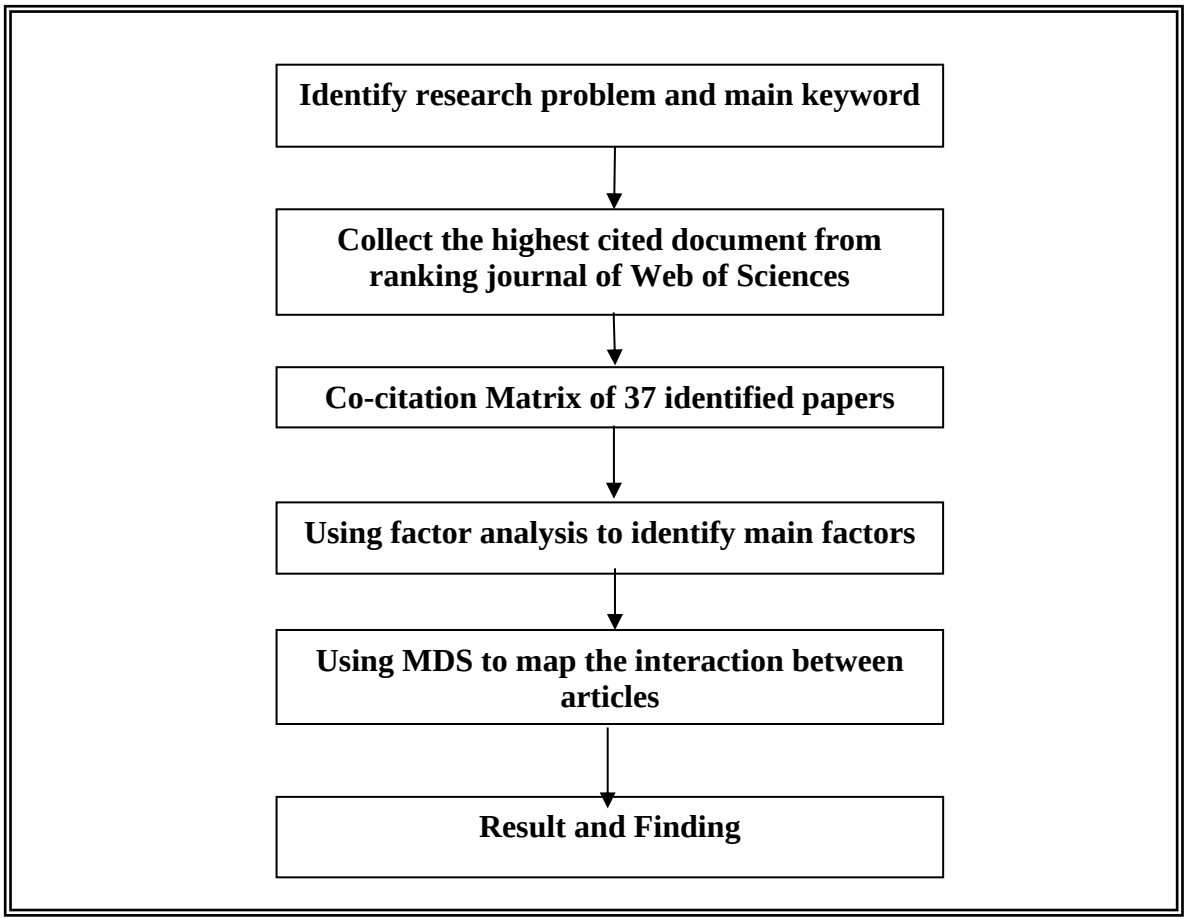

Figure 3. 4. Summary of the steps of co-citation analysis

Source: Original study

A co-citation matrix is created after the sample is chosen, then implementing a multi-dimensional scale analysis.

3.3.2.1 Building the Document Co-citation matrix.

Following the frequency of citations that can be taken into account in the study, we must choose the most influential works. Only documents with 30 or more citations are taken into account in this analysis. A symmetrical matrix of 37 of those publications is created, with each cell denoting the amount of citations for a particular piece of writing. Due to the fact that a study could not be cited more than once in a single document, the value in the matrix's major diagonal is zero. Next, this study followed (White and Griffith, 1981) to total the three greatest co-citations for each document and divide them by two. As a result, diagonal lines are produced that estimate the next highest score in the

distribution and indicate the relative worth of a certain work within a given field of study. The raw co-citation frequency data in the matrix was then normalized in this study using the Jaccard index (Small and Greenlee, 1980), which calculates the ratio of document similarity.

3.3.2.2 Multidimensional Scaling (MDS)

An outline of a map illustrating the similarities or differences between author groups is created using the data reduction technique known as multidimensional scaling (MDS) in authors' co-citations (Wilkinson, 2002). Multidimensional scaling was specifically utilized to generate the relationship between the authors by specifying the dimensions that show the differences or similarities between the variables. However, the MDS results make it difficult to define distinct borders for each academic group, necessitating the necessity for component analysis.

McCain (1990) asserted that the literature in a specific research area was established and cited ideas from previous works in the similar field. In other words, they referenced works in the same field that might share frameworks or conclusions. A self-organized network of scholars who frequently study the same topic, go to the same conferences, read and quote each other's works, and publish in the same journals was also suggested by Morris and Van der Veer Martens (2008). As a result, the studies are classified as belonging to the same factor after factor analysis is applied using related theories or research fields (Nerur et al., 2008). In co-citation analysis, factor analysis is employed to minimize the quantity of value provided from the topic of the article is reduced by using factor analysis. To comply with the co-citation analysis requirement, only absolute values of factor loadings higher than 0.5 ($|f| > 0.5$) are included in the same factor (Köseoglu et al., 2015).

3.3.3 Result of co-citation analysis

To discover research trends linked to investment efficiency, a 37 × 37 unit co-citation matrix was constructed in this study using the number of co-citations observed. This study identified four research themes, including financial reporting quality (FRQ), board gender diversity, CSR, and ownership structure, based on the results of the co-citation matrix, which is utilized as the input for factor analysis and multidimensional scaling.

3.3.3.1 Result of factor analysis

Kaiser-Meyer-Olkin (KMO) = 0.807 > 0.5, which confirms the suitability of the factor analysis for the data, was the outcome of the factor analysis, and p-value = 0.011 < 0.05, implies that the variables do relate to one another enough to run a meaningful EFA. Therefore, exploratory factor analysis (EFA) is appropriate. Four factors were cited with eigenvalues greater than 1 with a cumulative total variance of 74.468%. Therefore, it can be said that the data satisfies the conditions. Following items, suggesting that the measurement of every component is accurate and appropriate for our investigation.

Table 3. 12. The result of the factor analysis

No.	Authors	Component			
		Factor 1	Factor 2	Factor 3	Factor 4
1	Biddle et al., 2009	0.871			
2	McNichols, et al., 2008	0.859			
3	F. Chen et al., 2011	0.836			
4	Cutillas Gomariz, 2014	0.805			
5	Roychowdhury et al., 2019	0.792			
6	Elaoud and Jarboui, 2017	0.774			
7	Al-Dmour et al., 2018	0.668			
8	Krishnan and Parsons, 2008		0.820		
9	Terjesen et al., 2015		0.813		

10	Levi et al., 2014		0.809		
11	Cumming et al., 2015		0.801		
12	Arun, et al., 2015		0.786		
13	Richardson et al., 2013		0.765		
14	Gavious et al., 2012		0.704		
15	R Lanis et al., 2017		0.692		
16	S. Chen et al., 2016		0.677		
17	Richardson et al., 2016		0.658		
18	Ye et al., 2019		0.642		
19	Griffin et al., 2021		0.615		
20	Dhaliwal et al., 2012			0.846	
21	H. Liang et al., 2017			0.827	
22	Benlemlih and Bitar, 2018			0.819	
23	Erhemjamts et al., 2013			0.795	
24	Chan and Milne, 1999			0.780	
25	Adam and Shavit, 2008			0.764	
26	Cook et al., 2019			0.697	
27	Samet, M., 2017			0.669	
28	Brown-Liburd et al., 2018			0.654	
29	Liu and Tian, 2021			0.631	
30	S. Chen et al., 2011				0.829
31	R. Chen, El, et al., 2017				0.764
32	Andres, 2011				0.737
33	Abad, et al., 2017				0.721
34	Eisdorfer et al., 2013				0.706
35	He and Kyaw, 2018				0.659

36	Shen et al., 2015				0.648
37	N. Chen et al., 2017				0.620

Notes: Total variance explained: 74.468 %.

Source: author's own calculation using SPSS 20

As a result, there are four factors classified in this study, implying that the papers are belonging to the similar factor, which using related ideas or related topics of study

Seven papers are included in Factor 1, showing that the author's group is concerned with the accuracy of financial reporting (FRQ). All of the items had factor loading values greater than 0.7, with the exception of one item having the lowest factor loading of 0.668 and the highest factor loading of 0.871, indicating that these items have a significant impact on investment efficiency. According to agency theory, asymmetric information between owners and managers is what causes both overinvestment and underinvestment. Using information problems about moral hazard and adverse selection, (Dmour et al., 2018; Liang, 2006; Zhai and Wang, 2016) created a framework for the impact of asymmetric knowledge on investment performance. In terms of moral hazard, the unequal rewards received by owners and managers may lead managers to make investment decisions that may not be in the best interests of shareholders in an effort to maximize their own interests. In addition, many researches (Dmour et al., 2018; Biddle et al., 2009; Cutillas Gomariz and Sánchez Ballesta, 2014; Lai and Liu, 2017) discovered that businesses with high-quality financial reporting show a high return on investment due to lower cash flow sensitivity. According to their research, businesses with higher-quality financial statements are less vulnerable to the effects of macroeconomic shocks than those with lower-quality financial statements. Therefore, to remove information asymmetries and maximize investment efficiency, businesses must improve the accuracy of financial reporting.

Factor loading values of at least 0.615 are present in twelve publications in Factor 2, with the maximum factor loading value of 0.820 demonstrating a connection between board gender diversity and investment performance. According to Arun et al. (2015), female directors should well seek out voluntary information in corporate settings to reduce information imbalance between managers and female directors. Previous studies demonstrated that board gender diversity may improve the reliability of financial reporting (Gavious et al., 2012; Krishnan and Parsons, 2008; Srinidhi et al., 2011). They suggested that there was fewer earnings manipulation as more women were on boards. Further research into the relationship between gender-diverse boards and information asymmetry is done by Abad et al. (2017). These results show a strong correlation between gender diversity on the board and investment performance. Women are also less likely to participate in unethical behavior for personal gain, such as accounting misreporting, because they are more likely to be ethical in management (Chen et al., 2016; Samet and Jarboui, 2017; Xie, 2015). Tax evasion (Cumming et al., 2015; González and Garca-Meca, 2014) (Lanis et al., 2017; Richardson et al., 2016). These results confirmed that having women on boards will improve a company's ability to make investments.

Ten studies in factor 3 have factor loadings higher than 0.6, with the highest factor loading (0.846) demonstrating a connection between CSR and investment effectiveness. According to (Martin and Moser, 2016), strong linkages between businesses and communities inspire investors. Investor participation rates are higher in environmentally sound investment portfolios than in environmentally unsound ones (Chan and Milne, 1999). The CSR strategy may support organizations in increasing their competitive advantages, reputation, credibility and market segment. Likewise, Asset growth, return on investment, and return on assets are all positively correlated with CSR. On the

one hand, CSR may help companies in lowering production costs by utilizing efficient and safe production techniques (Adam and Shavit, 2008; Liburd et al., 2018). In addition, many scholars (Dhaliwal et al., 2011; Liang and Renneboog, 2017) proposed that strong CSR corporations are disclosed to be associated with reduced agency conflicts and fewer information asymmetry. As a result, it is not surprising to see growing evidence (Benlemlih and Bitar, 2018, Cook et al., 2019, Erhemjamts et al., 2013) demonstrating that an organization's commitment to its stakeholders regarding the level of CSR disclosure has a significant impact on their decision to make an investment. Companies with stronger CSR make investments more effectively, as a result, lowers both overinvestment and underinvestment.

Eight papers in factor 4 have factor loadings above 0.6 and are focused on many works that investigate the role of ownership structure affecting investment performance. Prior documents revealed that different owner types have distinct preferences regarding different investment behaviours. For instance, Chen et al. (2017) provided evidence that investment efficiency declines with increasing ownership concentration, especially for SOEs. They find unambiguous evidence linking agency issues, state ownership, and foreign ownership to the level of information asymmetry. Generally, managers put their own interests ahead of those of external shareholders (Eisdorfer et al., 2013; Shen et al., 2015). Following agency theory on he relation of ownership structure and investment efficiency, it is considered that a small internal ownership ratio could aid in preventing managerial entrenchment, large blockholders could boost direct oversight, and significant foreign ownership could reduce agency issues and information asymmetry (Chen et al., 2017b).

Based on all criteria, it can be concluded that the four factors in this series of previous publications are reliable and internally consistent because all components accumulate a total explained variance of more than 74%.

3.3.3.2. Result of Multidimensional Scaling (MDS)

The metric scaling option of MDS was applied to get two-dimensional scales. It is possible to create a symmetric matrix of co-citations by a cluster that displays the frequency of each document in the cluster co-cited by every other document. The co-citation frequencies can then perform another transformation that turns them into "distances." An algorithm for scaling determines the relative position of the articles in a cluster based on the distances between them in two dimensions. It indicates that the two groups included are those with the most space.

Regarding the effectiveness of investments made by academic foundation networks, there are four research trends. The research issue shared by all of the papers in the same group. Consequently, there are linkages between them and a great deal in common (Nerur et al., 2008).

Figure 3.7 displays the Multidimensional Scaling results (MDS). A two-dimensional scale map of the investment efficiency structure was used to describe it. Group 1, which includes the majority of documents from factor 1 and factor 3, concentrates on the effects of CSR and financial reporting quality, whereas group 2, which includes all of the documents from factor 2, concentrates on board gender diversity and ownership structure. It is plotted as a diagram. Points on the maps are identified by the last name of the first author and the year of publication.

The stress value is an approximate measure of the goodness-of-fit of the input distances to the two-dimensional final configuration. The input distances must closely match the configuration distances. Technically, it suggests that to link input to scaled distances, a straight regression line across the origin is adopted. Therefore, a high-stress value is an evidence that fits the data. It is also necessary in determining the relative positions of documents in configurations that can be consistently interpreted, or the relationship of the ideas of the

authors. Greater than the acceptable value of 0.2, the stress value is 0.348, implying a great fit for the data (McCain, 1990).

A scaling algorithm that assesses the distances between articles in a cluster can help us determine the frequency of each document is co-cited by every other document. From there, it can be shown the relationship between the ideas of authors, and the trends in the same research field.

The author retrieval procedure uses author cluster information and a cluster map to retrieve information about publications produced by an author. The query input from the user will be the author's name, either whole or partial. The map of the author cluster to which the input author belongs will subsequently be displayed by the system. For example, if the user's query is "Cutillas", Fig. 3.5 illustrates the map of the cluster that contains the author "Cutillas". Each point denotes a different author. The distance between them basically corresponds to their resemblance.

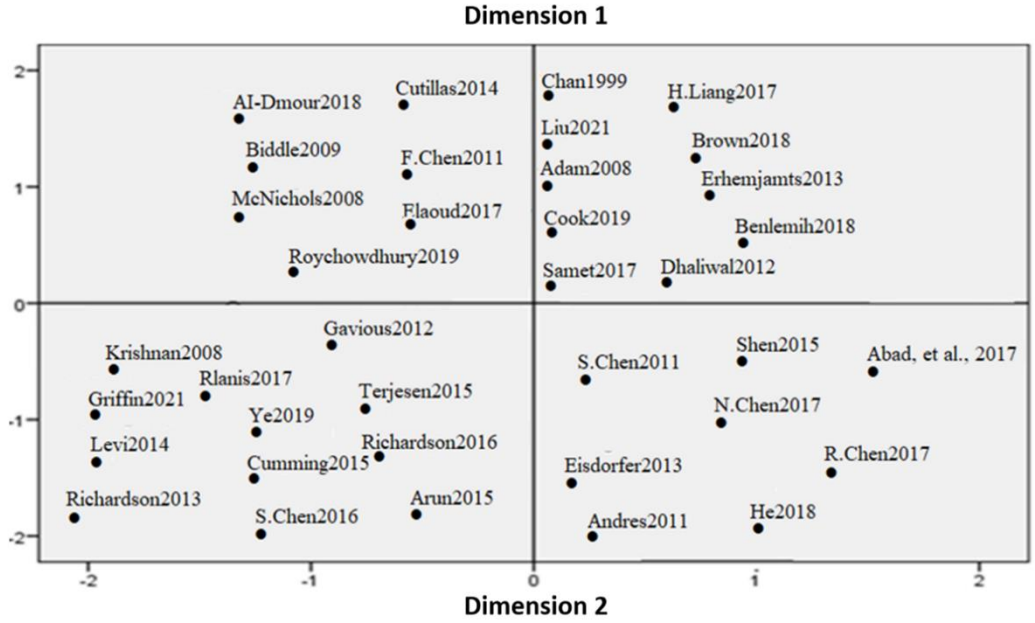

Figure 3. 5. Multidimensional Scaling (MDS)

Source: author's own calculation using SPSS 20

Besides from author information retrieval, author cluster maps can also be used to track a certain author's research focus. As an example, consider the

following. As author samples, the 37 most highly referenced writers in the subject of investment efficiency from 1999 to 2021 are taken from the Web of Science Database. For illustration reasons, the boundaries of each author cluster are described for each research field based on the common research topics of each author inside a cluster. As a result, two large groups of authors from different research areas emerged from above to below on the horizontal axis, such as: most of the records in Group 1 are from Factor 1 (Financial reporting quality) and Factor 3 (CSR), while all of the papers in Group 2 are from Factor 2 (Board gender diversity) and Factor 4 (role of ownership structure). The factor loading values for factors 1 and 3 are the highest. As a result, most articles in the investment efficiency research area are concerned with the influence of Financial Reporting Quality and CSR, while board gender diversity and ownership structure are the rest.

CHAPTER FOUR

CONCLUSIONS

4.1. Summary of hypotheses testing results

Table 3.13 provides the summary of the hypotheses testing results of this study.

Table 3. 13. Summary of hypotheses testing results

Hypothesis number	Hypotheses	Conclusion
Hypothesis 1	The multivariate EKC theory is supported in this model, it implies an inverted U-shaped relationship for GDP, the square of GDP, and CO_2 emissions.	Supported
Hypothesis 2	FDI may stimulate carbon emissions, particularly in developing and industrializing nations in the short-run but FDI might enhance the host country's environmental quality in the long-run.	Supported
Hypothesis 3	One of the factors that may lead to rising pollution is energy consumption in both the short and long time.	Supported
Hypothesis 4	Hypothesis 4 Urbanization may have either a favourable or harmful effect on the environment. In the short-run, urbanization positively affects CO_2 emissions, while urbanization has a long-run significant negative effect on CO_2 emissions.	Supported

Hypothesis 5	In five ASEAN developing nations, increasing government spending on education has a favorable impact on resolving environmental issues and lowering CO_2 emissions.	Supported
Hypothesis 6	The financial performance of a corporation is favorably correlated with foreign ownership.	Supported
Hypothesis 7a	A large board size may be less effective at monitoring management, resulting in a negative correlation between board size and financial performance of the company.	Supported
Hypothesis 7b	A higher percentage of independent directors on the board may improve the financial performance of the company.	Supported
Hypothesis 7c	CEO duality has a negative correlation with a company's financial performance.	Not Supported
Hypothesis 8	Negative correlation exists between a firm's debt level and financial performance, leading to a negative link of leverage and firm’s financial performance.	Supported
Hypothesis 9a	Levels of firm size are positively correlated with firm’s financial performance.	Supported

Hypothesis 9b	Firm age has a significantly positive association with firm's financial performance.	Supported

Source: Original study

4.2. The multivariate environmental Kuznets curve (EKC)

4.2.1. Conclusions and contributions

Our findings are summarized:

The EKC curve is supported by the PMG estimator's findings, which show a nonlinear inverted U-shaped relationship between real GDP and carbon emissions. According to this, economic growth and carbon emissions rise together until a critical point, then they start to fall.

The primary cause of the growing environmental degradation in these five countries is energy consumption. Indeed, energy use supports economic expansion in 5-ASEAN but leads to environmental problems. This implies that trying to cut down energy use could lower CO_2 emissions and enhance environmental quality.

There is a long-run negative relation among CO_2 emissions and FDI, this means FDI inflows may lower carbon emissions. However, in the first stage of attracting FDI, many FDI enterprises violated regulations on environmental protection, causing environmental pollution in host countries so policymakers need to be aware of the environmental issues in these countries. They must strict rules and standards for FDI businesses to reduce CO_2 emissions while maintaining sustainable growth.

According to research, urbanization has a strong short-term positive impact on carbon emissions but a significant long-term negative impact.

Based on the robust empirical findings, The long-term and short-term effects of government education spending on improving environmental quality are substantial. In fact, government spending on education reform, particularly the

inclusion of environmental instruction in schools, alters how aware school children are of environmental issues. They are typically more accountable for preventing harm to the environment and regulating pollutants. Our findings are consistent with those of Lopez and Palacios (2010), who discovered a connection between government spending and environmental quality. They found that the capacity to slow down environmental degradation depends on the volume and make-up of government spending on social and public policy.

Four pairs of variables, including GDP, energy consumption, urbanization, and carbon emissions are shown to have bidirectional causal links by empirical data from the Dumitrescu-Hurlin approach. Therefore, any strategy involving one would have an impact on the others.

Our conclusions enable us to propose suggestions for legislators regarding contemporary environmental issues. In reality, monitoring energy efficiency, selecting sustainable growth through the use of cutting-edge technology, high-performance To reduce CO2 emissions, cutting-edge technology, high-performance machinery, and clean and renewable energy sources are required, clean and, renewable energy sources are necessary to reduce CO_2 emissions. Foreign investment inflows have significant benefits for the economy, but it is also facing challenges related to the environment. To lower the risk of environmental pollution from foreign-invested enterprises, governments need to change their thinking on environmental issues. Economic development must be associated with environmental protection, resolutely not trading off the environment for the sake of the economy. Governments need to encourage attracting FDI in high technology, environmental protection, labor development, sustainable investment, creating high-added value, and attracting similar technology projects future of the industrial revolution 4.0. On the other hand, these countries need to limit the attraction of FDI in industries that use a lot of energy, which may cause environmental pollution.

Moreover, environmental concerns and climate change affect all countries, as well as being a widespread regional and worldwide issue. Therefore, to solve environmental challenges, it is crucial to increase collaboration among ASEAN member states. The solutions must be open, efficient, and appropriate to the economic and social context of every country. Promote these countries to take part in joint initiatives to strengthen the ASEAN Climate Change Initiative (ACCI), increase technology transfer, share experience about R&D projects, and enhance the capacity to fit to and reduce the possible effects of environmental degradation. Additionally, we assume that environmental education is crucial for resolving environmental problems and promoting sustainable growth. Policy makers need to promote citizen knowledge of the need to use more environmentally friendly products and inform people about the harmful effects of a high-carbon industry for both children and adults. Furthermore, environmental education and the establishment of ethical behavior as well as habits, are essential for environmental protection, as these nations could benefit from Singapore's prosperous experience as an ASEAN member. Additionally, governments must establish and implement stricter policies against actions that harm the environment.

Finally, we would like to mention a report by Vietnamese experts. They reveal that Vietnam suffers annual economic losses from air pollution from between 10.8 to 13.2 billion USD, approximately 5% of the nation's GDP. Indeed, environmental pollution and CO_2 emissions not only greatly affect our health but also negatively impacts the goal of sustainable development. Besides contributing useful values to the literature, this paper also has practical benefits to help policymakers recognize which factors affect the environment. From our findings, we suggest that the government needs to increase the budget for environmental education, along with promulgating mechanisms and rules on the environment. Last but not least, this is a valuable lesson for other

developing countries on how to balance the goal of sustainable growth and environmental issues.

4.2.2. Limitations and future research directions

Although our study contributes useful implications to the literature, its limits must be considered. The MG, PMG, and dynamic fixed effect (DFE) estimators are used in this work as three different methodologies for comparison. The short- and long-term effects of variables on CO2 emissions are explained using the pooled mean group (PMG) estimator's findings. The short-run PMG estimator allows parameters to vary freely between cross-sections. However, since the long-run coefficient is a nonlinear function of the short-run coefficients in this example with a quadratic EKC model, the long-run coefficients may have nonlinear constraints. This shows that the long-run estimation may be skewed when the short-run bias is removed. According to the findings of the IPS test of Pesaran and Shin, all of the variables in our model are stationary in the first difference form. Since this study used estimation, it may be inferred that there is a long-term link over the entire sample. Conclusion: It is still feasible to use the PMG estimator when estimating equations for a limited number of groups (five nations). However, we also encourage future studies to expand the sample size to achieve more reliable estimation results.

To our knowledge, this research will be the first to examine how government education spending affects CO_2 emissions using the EKC model. The results of this study could pave the way for a variety of new initiatives for investigation into aspects of government spending on education. Researchers might explore whether residents' attitudes toward environmental issues are influenced by their literacy levels in future work. In line with our research, academics may take into account the amount of governmental funding for education about the environment in rural and urban locations that influences behavior and

environmental consciousness. We also recommend increasing the number of nations that have the same socioeconomic, geographic, cultural, and environmental characteristics.

4.3. The proxies of agency cost and firm's financial performance

4.3.1. Conclusions and contributions

We examine how foreign shareholders affect company's performance among Vietnamese listed companies using the OLS regression method for the fix-effects model for the period 2010–2019.

We discover that foreign ownership significantly improves firm's financial performance. Additionally, our findings also indicate that independent directors, size, age of the firms have a significantly significant influence on firm's profitability while board size and leverage have a negative sign on firm's financial performance in the model where an existence of foreign investors.

Our study has significant effects for academics, policymakers, managers, creditors, and shareholders. It adds to the existing documents through emphasizes the important value of foreign investors in improving firm's financial performance. This research concludes that a greater proportion of foreign institutional owners could be concerned with a higher firm's financial performance. We suppose that in an emerging market like Vietnam, which enjoys capital inflows from outside their countries. Governments of developing nations must increase economic cooperation with other nations by establishing favorable conditions and flexible preferential policies to entice foreign investors to take part in projects in addition to attracting foreign direct inflows for fostering economic progress. To strengthen tight control and evaluation of foreign investment projects, particularly mergers and acquisitions, they should employ a number of measures. The government must also find ways to help domestic businesses become more competitive so they can keep up with the advancement of the global economic development. Furthermore, previous

documents (R. Chen, El Ghoul, et al., 2017; S. Chen et al., 2011) reported that business performance efficiency is lower as ownership concentration is higher, particularly for SOEs. In Vietnam, most state-owned enterprises are inefficient, thus the proportion of state ownership should be reduced as well as monopoly mechanisms should be abolished to create advantage opportunities for other economic sectors to participate in investment projects. We contend that the government plays a critical role in fostering local business growth and luring foreign capital into investment initiatives. By enhancing commercial practices and tax laws, the government can give businesses more advantages.

4.3.2. Limitations and future research directions

Although our research contributes to the literature, its limitations must be taken into account. First, this study employs only 2,700 firm-year observations from 2010 to 2019 hence it is not able to reflect the changes in the firm's operating performance before and during the pandemic. We suggest future research attempts to get results on this issue.

Second, Only ROA is utilized in this study to estimate a company's financial performance because most businesses are still fairly unfamiliar with fair value measurement in Vietnamese accounting, this study did not use market-based measures like Tobin's Q ratio and market-to-book ratio. However, ROA is an accounting-based measurement so it may be out of date.

4.4. Investment efficiency

4.4.1. Conclusions and contributions

The findings of the study give a general summary of the elements affect efficiency of investment. Four research trends can be identified: ownership structure, CSR, gender diversity on boards, and financial reporting quality.

Firstly, based on collected papers, a growing number of studies released concentrate on the connection between the reliability of financial reporting and

investment effectiveness. FRQ helps promotes investment performance by significantly eliminating information asymmetries. The quality of financial reporting hugely impacts managers, policymakers, and particularly investors in making investment decisions. As a result, organisations need to give a lot of important information, Information both financial and not financial. Additionally, shareholders and investors should know the short- and long-term plans. Indirectly, this makes it easier to attract investment and improves predictability for firms. Investment capital, especially FDI inflows will be easily attracted by transparent and comparable financial statements. It is crucial for emerging nations as they attempt to integrate into the global economy. In fact, this research has greatly benefits to policymakers in developing countries in improving the accountability and transparency of financial statements. As a result, it might also help shareholders in controlling the managers' investing activity as well as improve the standard of investor protection.

Second, a new line of inquiry in board gender research. The findings indicated that decision-making is greatly influenced by gender and that the composition of the board gender directors is crucial for corporate governance. Obviously, diverse gender on the board needs to be more balanced. the existence of female participants on the board is reported to have many advantages in enhancing the ability of management, creating diverse viewpoints and capabilities, and introducing various leadership styles. According to papers, having women on boards adds value and gives businesses a competitive edge. This is linked to good performance and investment efficiency. These results enable us to make suggestions for increasing the amount of female board directorsFor organizations to achieve gender parity, qualified women must be added to their boards since women are capable of generating symbolic value inside and outside of the business, linking it to other industries.

Third, the association among CSR and investment performance was shown in many prior documents. “Ensure that responsibility for the environment, individuals, and community is at the heart of sustainable development”, according to Mr. Florian Beranek, technical advisor for Project Unido (United Nations Industrial Development Organization). CSR is becoming extremely crucial in enhancing businesses' affordability, generating worth for organisations, building the belief, loyalty of clients, shareholders, and society. Through engaging CSR, companies benefit community and have greater chances to advertise and strengthen their value. It is realized that businesses which implement CSR will have a lot of opportunities to easy access to external funding since investors are frequently ready to invest in companies with extensive CSR practices. CSR really offers many benefits to organisations, including: boosting brand recognition, increasing client commitment since clients are more likely to choose goods and services from firms implementing CSR will have various opportunities to acquire investment money readily, from companies with stronger social reputations, operating expenses can be reduced by improving operational processes, and so on. For the mentioned reasons above, our suggestion is that policymakers take CSR into account as a long-term policy. In light of this, policy makers need to make many of an effort to establish favourable In light of this, the government should exert more effort to establish favorable circumstances that would raise understanding of CSR, so boosting its adoption and creating new opportunities for all enterprises. that would increase awareness of CSR, hence encouraging the adoption of CSR and opening up more chances for all organization.

Next, another idea focuses on various types of ownership impact investment performance. Most earlier research have revealed that foreign institutional investors are more concerned with investment efficiency than domestic institutional investors. We assumed that foreign investors would make up the

majority of capital inflows to emerging markets. To achieve this, governments of developing nations must increase economic cooperation with other nations by establishing optimal environment and adaptable preference rules to support international stakeholders to engage in activities and attract FDI inflows for boosting economic development. But they need to employ a variety of strategies to enhance tight management and evaluation of projects, particularly acquisition and integration. In addition, the policy makers must figure out how to assist domestic businesses become more competitive so they can keep up with the expansion of the global economy.

In general, the studies have important advantages for policymakers, creditors, as well as investors since they aid in their understanding of the elements that might have an effect on their investment choices. We believe that the government plays an important role in encouraging domestic business growth and attracting FDI to take part in investment projects by enhancing commercial practices and tax laws to give businesses more advantages. From the findings, we recommend that businesses should improve the infrastructure quality to increase their prospects of luring investors. At the same time, policymakers also need to create a balance between the interests of managers and shareholders.

4.4.2. Limitations and future research directions

Other potential future work areas, such as improving the availability of external financing or the role of financial constraints on investment efficiency are recommended besides these four ideas from the co-citation analysis. Obviously, the ability to access outside funding sources like bank loans as well as capital from financial institutions, could be considered a key component in making a profitable venture. This kind of funding might support businesses in ensuring their long- and short-term solvency. However, in fact, many organizations find it extremely difficult to obtain financing for a variety of

reasons, including agency issues, institutional factors, tax laws, along with internal management limits,... However, there still currently less academics concerned in investigating the financial aspects that affect investment efficiency. As a result, we suggest that it might be a very exciting research directions trend because funding is equally crucial to getting a successful investment.

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APPENDIX

Summary of keywords of the document resources

No.	AUTHORS	KEYWORDS
1	Biddle et al., 2009	Financial reporting quality, capital investment, information asymmetry
2	Dhaliwal et al., 2012	Corporate social responsibility, analyst forecasts, nonfinancial disclosure
3	Abad, et al., 2017	Corporate board, female directors, gender diversity, information asymmetry, market microstructure
4	McNichols and Stubben, 2008	Earnings management, investment
5	Chen F. et al., 2011	Investment efficiency, under- and overinvestment, financial reporting quality, private firms, emerging markets, financing sources, tax incentives
6	Chen S. et al., 2011	Government intervention, political connections, investment efficiency
7	Krishnan and Parsons, 2008	Earnings quality, gender diversity, ethics, conservatism
8	Liang and Renneboog, 2017	Corporate social responsibility, legal origins, stakeholder orientation
9	Terjesen et al., 2015	Corporate governance, gender equality, board gender codes, board gender quotas, welfare state, left-leaning political coalitions, path dependency, publicly traded firms, state-owned enterprise
10	Levi et al., 2014	Director gender, bid initiation, bid premium, mergers and acquisitions, overconfidence, risk aversion
11	Cumming et al., 2015	Corporate governance, ethical sensitivity, fraud, gender diversity, risk aversion
12	Cutillas Gomariz, 2014	Investment efficiency, overinvestment, underinvestment, financial reporting quality, debt maturity
13	Arun, Almahrog, and Aribi, 2015	Earnings management, gender diversity of boards, financial reporting
14	Richardson et al., 2013	Board of director, corporate tax aggressiveness

15	Benlemlih and Bitar, 2018	Corporate social responsibility, corporate governance, investment efficiency, stakeholders theory
16	Chen R. et al., 2017	Privatization, investment efficiency, corporate governance
17	Erhemjamts et al., 2013	Corporate social responsibility, firm's financial performance, investment policy, organizational strategy
18	Roychowdhury et al., 2019	Financial reporting, corporate investment
19	Gavious et al., 2012	Earnings management, earnings quality, Gender, women's motivation, boards of directors, corporate governance
20	Chan and Milne, 1999	Firms' environmental performance, investment funds
21	Andres, 2011	Family firms, ownership structure, investment policy, corporate governance
22	Adam and Shavit, 2008	Corporate social responsibility, social responsible investment, ethical investment, corporate social performance, performance, theory of SRI
23	Eisdorfer et al., 2013	Capital structure, executive compensation, agency costs, investment
24	Lanis et al., 2017	Board of director diversity, corporate governance, tax aggressiveness
25	Chen S. et al., 2016	Female director, diversity, R&D, risk management
26	Richardson et al., 2016	Corporate governance, board of directors, gender, corporate tax aggressiveness
27	Cook et al., 2019	Corporate social responsibility, investment efficiency, innovation
28	Ye et al., 2019	Corporate governance, agency problem, board gender diversity, dividend payout, female board directors
29	Griffin et al., 2021	Board gender diversity, corporate innovation
30	Elaoud and Jarboui, 2017	Auditor specialization, accounting information quality, investment efficiency
31	He and Kyaw, 2018	Overinvestment, ownership structure, corporate governance
32	Al-Dmour et al., 2018	Quality of financial reporting, non-financial business performance, shareholdings companies
33	Shen et al., 2015	Earnings management, investment efficiency, outlier

		robust regression
34	Chen N. et al., 2017	Corporate governance, incentive-based compensation, institutional investor, investment efficiency, ownership structure
35	Brown-Liburd et al., 2018	Corporate social responsibility, fairness perceptions, investment decisions
36	Liu and Tian, 2021	Mandatory corporate social responsibility disclosure, investment efficiency
37	Samet, 2017	Corporate social responsibility, investment efficiency, agency costs, information asymmetry.

Source: Web of Science