AN INVESTIGATION INTO THE ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) FACTORS TOWARD STOCK MARKET PERFORMANCE OF SELECTED COUNTRIES IN ASIA PACIFIC, AMERICAS, AND EUROPE

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SEPTEMBER 2024

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A final year project submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF FINANCE (HONS)

UNIVERSITI TUNKU ABDUL RAHMAN

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SEPTEMBER 2024

DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work, and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

(4) The word count of this research report is 13,074 words.

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Date: 5 SEPTEMBER 2024

ACKNOWLEDGEMENT

Our Final Year Project (FYP) is accomplished productively and successfully. Hence, we would like to use this opportunity to acknowledge three different parties for the effort, assistance, advice, and guidance that have given to us starting from the commencement until the end.

First and foremost, we would like to express our deepest gratitude to our esteemed supervisor, Mr. Ng Cheong Fatt, for being our supervisor. He, undeniably, has shown us his unwavering support, insightful advice, and continuous guidance throughout our journey of completing this challenging FYP. We are beyond grateful for his valuable feedback and time that he has invested in mentoring us. Indeed, we learnt a lot from him as learning is a lifelong process.

Additionally, we wish to extend our heartfelt thanks to Dr. Tan Ai Lian, our examiner, for her feedback from FYP1 to FYP2. Her comments have definitely helped in the success of this FYP as she exposed us a wider view that we never think of. Similar to Pn. Noorfaiz binti Purhanudin, the FYP coordinator, she has provided us her guidance during the FYP briefing. We admire her passion in helping us readily when we have any enquiry or confusion by replying to us swiftly through email.

Most importantly, we are profoundly grateful for every one of us that has put in our priceless effort, time, collaboration, and hard work into this FYP. Working collectively as a team has not only refined our knowledge but also formed the precious teamwork. Perseverance and determination that are instill in us have helped in levitating the overall quality of this project. Each member has contributed her own unique perspectives and ideas, which served an unforgettable learning experience. The endless nights that we poured into this FYP have shaped this project a rewarding and enlightening one.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller Test
AIC	Akaike Information Criterion
AUM	Assets Under Management
COC	Control of Corruption
CPI	Corruption Perception Index
DOLS	Dynamic Ordinary Least Squares
EDU	Education
ESG	Environmental, Social, and Governance
FDI	Foreign Direct Investment
FMOLS	Fully-Modified Ordinary Least Squares
GCC	Gulf Cooperation Council
GHG	Greenhouse Gases
GPA	Grade Point Average
IPS	Im-Pesaran-Shin Test
LLC	Levin-Lin-Chu Test
OLS	Ordinary Least Squares
SMC	Stock Market Capitalisation
SMI	Stock Market Involvement
SMP	Stock Market Performance
UNE	Unemployment
WHO	World Health Organization

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PREFACE

The global stock market has reacted harshly and resulted in various crises over decades. Numerous studies were conducted to identify the factors contributing to the stock market performance for different time periods and countries. Inevitably, people are paying more attention on ESG nowadays and intending to discover its roles toward the performance of stock market. Since ESG has become a trending topic in the financial industry, several research were carried out to explore and anaylse its impact on the stock market performance. It is noticed that most of the studies examined their relationships during the crisis period, and there is a little evidence available for the less developed countries. Thus, we are eager to narrow the gap available in the academic world by widening the scope of literature with a panel data. Henceforth, research with the topic of "An Investigation into the Environmental, Social and Governance Factors toward Stock Market Performance of 26 countries in Asia Pacific, Americas and Europe" was undertaken. This research is believed to provide insights and be a reference to various parties including government, firms, researchers and institutional as well as individual investors for investment decision and policy making.

ABSTRACT

In recent decades, ESG has become increasingly important in making investment decision. This research aims to investigate on how Environmental, Social, and Governance factors individually influence the SMP of selected countries in Asia Pacific, Americas, and Europe by implementing several panel statistical approaches such as unit root test (Levin-Lin-Chu, Im-Pesaran-Shin, and Augmented Dicky-Fuller tests), cointegration test (Pedroni and Kao tests), long run estimates (Fully-Modified Ordinary Least Squares and Dynamic Ordinary Least Squares tests), and Dumitrescu-Hurlin Granger causality test. A balanced panel data is employed with yearly time series data from 2002 to 2020 across 26 selected countries. Our findings discover that Environmental and Governance have significant positive relationship with the SMP while Social has significant negative relationship with the SMP. Therefore, our results are believed to contribute a valuable insight to various parties such as investors, shareholders, firms, policymakers, and researchers.

CHAPTER 1: INTRODUCTION

1.0 Introduction

To start off this research, this first chapter will be focusing on introducing the detailed research idea of the investigating topic. Next, we will move on to the issues relating to the research area, together with the purposes and questions of the research. Lastly, we will also include the significance of research that can be absorb by relevant parties.

1.1 Research Background

The idea of Environmental, Social, and Governance (ESG) was first inaugurated by the United Nations Global Compact in 2004. ESG refers to a set of non-financial criteria that is used to evaluate the performance of organisations on sustainability practices about the three pillars - E, S, and G (Hu et al., 2023). Mainly, E refers to assessment of firm's environmental impact and possible risks due to environmental challenges namely climate change and emissions whereas S is defined as how a firm serves various groups of individuals – customers, suppliers, employees, and community (Mathis & Stedman, 2023). G stands for the internal controls of firms and governments on its policies and managements to strictly follow industry standards and laws in the aspects of corporate governance and anti-corruption (Liu et al., 2023; Sahut & Pasquini-Descomps, 2015).

Over the span of years, the rising concerns of global issues such as climate change and social injustice have prompted international policymakers and regulators to promote ESG practices. Particularly, the Paris Agreement 2015 with a total of 193 signatories aims to combat climate change, stabilise global warming, and offer financing for a sustainable low carbon future (United Nation, 2023). In 2020, President Xi Jinping of China assured to attain carbon neutrality by 2060 (McGrath, 2020). These initiatives attempt to address sustainability issues proactively and

catalyse the shift to renewable energy. To achieve carbon neutrality by 2050, the World Economic Forum (2019) proposes that more robust climate actions need to be executed to cut the emissions which in turn contributes to greater employment prospects and innovative technologies. Thus, various tax regimes and incentives are gradually introduced by governments worldwide to inspire green behaviour and implement certain tariffs to deter detrimental conducts and generate income (Huggett & Hatch, 2024; MacAuley et al., n.d.). Based on EY Green Tax Tracker, an estimated 1,850 ESG tax incentives are actively promoting sustainable firm operations globally (Koch & Angus, 2023).

Inevitably, ESG has become increasingly important in investment decision making thanks to the rising interest in impact finance and socially responsible investments among regulators and investors. It is due to the stakeholders imply that a firm with excellent ESG practices competes effectively in the market (Schuler & Cording, 2006). Researchers prove that ESG advancement can improve a firm's status, customer loyalty, employee engagement, and investor attractiveness, which potentially enhances stock market performance (SMP) (Kushwaha & Sharma, 2016). Besides, SRI enhances long-term investor returns or implement as a safe-haven strategy to reduce uncertainty during volatile markets (Rubbaniy et al., 2021) and benefit society by promoting firms to follow corporate governance principles. Based on GlobeScan (2021), 82% of global retail investors are attracted to invest in socially responsible firms and 72% would steer clear of any sector that fuels climate change. 60% of institutional investors have experienced better financial returns from their ESG investments in relation to non-ESG alternatives (PricewaterhouseCoopers [PwC], 2022). Therefore, a rising number of green bonds and social impact assets issued are being used as indicators that investors are looking for firms that place a high priority on sustainability (La Torre et al., 2020). Recently, sustainable firms have grown significantly in the European financial markets (Gavrilakis & Floros, 2023). According to the Morningstar Research "Global Sustainable Fund Flows: Q2 2023 in Review", Europe continues to be the most advanced and varied ESG market with 84% of global sustainable fund assets, followed by the US at 11% and Asia ex-Japan at 2% (Kenway, 2023). PwC highlighted that institutional investments with an ESG focus are expected to surge 84% from $18.4 trillion in 2021 to $33.9 trillion by 2026, constituting 21.5% of the

world's total Assets Under Management (AUM) in not more than 5 years (PwC, 2022). Deloitte, on the contrary, predicted that the ESG-related AUM will grow to $53 trillion by 2025 (Deloitte, 2024). It implies that financial institutions worldwide are catalysing the shift to a more sustainability conscious economy.

The current state of the research is focused on the structure and determinants of ESG indices, and the effect of ESG indices on firms' financial standing (Deng & Cheng, 2019). The findings of Friede et al. (2015) showed that over 2,000 papers have been issued by researchers analysing the effect of ESG factors on corporate financial performance since 1970. Yoon et al. (2018) also stated that the non-financial elements of the ESG score may cause a lack of uniformity in measuring standards. This is upheld by Ni and Sun (2023) where more practical measures are used to quantify E performance, but S and G performance are based on less widely used proxies. Our research topic remains controversial for several reasons (Lokuwaduge & Heenetigala, 2017). First, although ESG disclosures are required in developed countries, ESG performance standards are still not widely acknowledged or understood by relevant parties such as firms and authorities in developing countries. Second, various studies revealed conflicting results for the relationship with three divergent conclusions – positive, negative, and no relationship in the European viewpoint (Miralles-Quirós et al., 2018). Next, La Torre et al. (2020) argued that "ESG ratings" and "ESG scoring" are commonly comparable and interchangeable but there is a clear distinction between them. The former gauges a firm's vulnerability to ESG risks where the higher the ratings, the lower the exposure to ESG risks and an improved capacity to mitigate them. Rather than taking a forward-looking stance, ESG scoring, do not offer risk management. They evaluate the ESG attitude of a firm by assessing its integrity in dealing with ESG factors and their current management techniques.

1.2 Problem Statement

According to Statista (2024), the global stock market's total market capitalisation escalated from $65.04 trillion in 2013 to $111 trillion in 2023, revealing the equity

market's growth. A smooth-functioning and staunch stock market is indeed vital to underpin the economic growth due to its key role in mobilising the transfer of capital from unproductive to productive uses, which subsequently contributes to economic efficiency (Durusu-Ciftci, 2017). Oanh et al. (2023) also claimed that it fosters the capability of the financial system to withstand economic shocks and the macroeconomic volatility. However, past crises such as the Wall Street Crash in 1929, Black Monday in 1987, and 2007-2008 Financial Crisis caused stock market in each nation with their respective economic and stock market frameworks responds brutally (Bhowmik et al., 2022). Thus, from the past until now, determinants swaying stock market in many nations have drawn a lot of attention, particularly those in Central Asia, the Middle East, and Latin America, that have undertaken a rising share of global economic growth (Aljazaerli et al., 2016). With the potential to provide substantial downside protection in turbulent times, ESG engagements preserve investors' loyalty in holding shares and thus, protect stock prices against unfavourable situation. To illustrate, Japanese stock market improved in its stability and liquidity because of robust ESG performance during the pandemic. Given the popularity of ESG presently, an urge to investigate whether it will exert influence on overall SMP is increasing.

Climate change has been a global environmental concern ever since the mid-20th century. It is predominantly caused by human activities that contribute to an increase in greenhouse gases (GHG) emission, comprising carbon dioxide, nitrous oxide and methane. The increased GHG emissions has ultimately led to global warming, climate change and other unprecedented natural phenomenon (Bhatti et al. 2024). Based on the Intergovernmental Panel on Climate Change of the UN, a record-breaking highest level of average annual GHG emissions on a global basis was observed between 2010 and 2019 with an average growth of 1.3% yearly (Long & Feng, 2024). Further, GHG emission in 2022 recorded the highest at 53.8 Gt CO_{2eq} (Crippa et al., 2023). Climate change affects the ecosystems negatively due to more extreme weather and drop in crop production that harm economic activities. The stock market will be volatile in the events of natural disasters such as floods, earthquakes, and wildfires as these will lead to uncertainties in the business environment. Thus, the firms have made radical changes to meet investors' increasing demand for green products by spending more to control the emission.

Subsequently, business performance may be impacted by the climate-change policy and compliance costs which ultimately, spur the financial market volatility (Noh and Park, 2022).

Chancel et al. (2022) said the current global inequality level is comparable to the early 20th century's drastic levels. Rising inequality has been notably marked at the top end of the income distribution, evident in the income share of the top 1% of the rich growing in many nations over the past 40 years (Qureshi, 2023). To illustrate, the wealthiest 1% reaped 27% of world's wealth and the poorest 50% of the world reaped only 12% in 1980 but they own 45% and below 1% of the world's wealth respectively by 2023, showing a greater polarization in income distribution (Alvaredo et al., 2018; Credit Suisse, 2023). Generally, earnings dispersions may engender impoverishment, hardship, and social exclusion (Nolan & Valenzuela, 2019). Based on Aghion et al. (1999), increased inequality restricts the ability of middle-and-low class to invest in education and skill development and worse still, it may hinder their descendants' access to education and opportunities for future progress. Indirectly, a less competent and productive workforce will be created, slowing down overall economic growth, and ultimately impacting firms. Larence (2022) also stated that inequality poses a significant risk to the firms as it potentially dampens consumer confidence and spending patterns, disrupting production and supply chain. The weakened demand for goods and services greatly reduces the firms' profitability and affects SMP (Jahan et al., 2014).

Corruption level, political stability, and accountability are the elements of governance quality (Hooper, 2009). The UN Convention against Corruption was adopted by UN General Assembly in 2003 to curb global corruption (UNCAC Coalition, n.d.). Transparency International (2024) laid out the corruption level is scored from 0 (highly corrupt) to 100 (very clean). Countries that account beyond four-fifths of the world population scored below international mean of 43. The mean CPI score of non-democratic countries is 32, flawed democracies (48) and full democracies (73), showing non-democratic countries perform poorly in combating corruption. Corruption tends to impair the accountability of the public servants, leading to injustice systems (Transparency International, 2024). Hooper (2009) claimed that low corruption level causes better quality of governance which can

maximise shareholders' wealth with lower transaction and agency costs. Thus, high transaction costs arose from weak governance hinder firm's ability to invest in profitable projects and the demand for the firm's shares as fund managers will not invest in highly corrupted country with low justice system (Aggarwal et al., 2005). Thus, corruption and poor governance will affect the financial market performance.

Considering the research gap of our study, numerous previous research has concentrated on either the overall ESG performance score (Aureli et al., 2020; Landau et al., 2020) or one dimension of ESG only (Barnett & Salomon, 2012; Ong et al., 2014; Ponnu, 2008). Besides, Tarmuji et al. (2016) said that extant studies on ESG performance mostly focus on developed countries while there is little evidence from emerging countries. Therefore, there is an absence of clear measurement, challenging the development of comprehensive ESG metrics due to the lack of demand to evaluate ESG in developing countries (Dobers & Halme, 2009; Han et al., 2016; Miralles-Quirós et al., 2018). Thus, we will study the relationship between ESG factors and SMP of the 26 countries in Asia Pacific, Americas, and Europe rather than solely focusing on a country, or region, to broaden the scope of literature with wider spectrum of countries.

1.3 Research Objectives

1.3.1 General Objectives

General objectives of this research are to identify how ESG factors contribute to SMP of selected countries in Asia Pacific, Americas, and Europe.

1.3.2 Specific Objectives

To fulfil the general objectives, three detailed objectives need to be structured.

1) To examine whether a significant association exists between environmental and stock market performance of selected countries in Asia Pacific, Americas, and Europe.
2) To examine whether a significant association exists between social and stock market performance of selected countries in Asia Pacific, Americas, and Europe.
3) To examine whether a significant association exists between governance and stock market performance of selected countries in Asia Pacific, Americas, and Europe.

1.4 Research Questions

To better understand the objectives of our research, three research questions are developed.

1) Is there a significant association between environmental and stock market performance of selected countries in Asia Pacific, Americas, and Europe?
2) Is there a significant association between social and stock market performance of selected countries in Asia Pacific, Americas, and Europe?
3) Is there a significant association between governance and stock market performance of selected countries in Asia Pacific, Americas, and Europe?

1.5 Significance of Study

Our research in this area has the potential to provide a valuable insight to various parties. Firstly, governments worldwide mainly play an important role in ensuring a high quality ESG system to remain relevant in this globally competitive market. Our findings will denote the capacity to be a reference for them in assessing the effectiveness of implementing their strategies and regulatory policies while conforming with the ESG values that are in line with the new global trends. As the policymakers, they could be better off with the formation of policies and frameworks that encourage high ESG practices in companies through the evidence presented in this study. Eventually, this can lead the economy to be more robust and

attract more investors. A stability in financial and steady growth in economic will shape a resilient stock market; thus, developing an effective regulatory framework through a good governance is crucial.

Next, this research could give investors a better perspective and understanding of how ESG revolves and influences the SMP. With solid comprehension, they can make an elevation on the quality of their investment decisions, which eventually provides them an enhanced prospect of maximising returns. Inexperienced investors, especially, will gain a thorough concept of ESG issues in sustainable investing area that is growing nowadays. Generally, ESG practices can be reflected in companies' stock prices as both move in parallel. Hence, investors tend to invest their money on companies not only based on financial but also non-financial elements because they can provide investors with a more sustainable and better return in the long run.

Finally, corporations must grasp a comprehensive insight of ESG roles in revitalising the SMP so they can persistently serve as firms that uphold ESG values and introduce more investments that adhere to the ESG ideals, which can secure and earn the trust, confidence, and support from investors. Elements such as financial, E, and S will insert an essential stimulus on firms' financial performance that aligns with the exposure and emphasis that will be discussed in this study. Mostly, organisations that portray solid ESG practices have access to more capital in a way that is easier than those portray weak practices. The rationale is investors perceive these organisations as those possessing lower risk while possibly earning high returns.

1.6 Conclusion

In a nutshell, the above discussion comprising the most significant introduction to our investigating topic. Therefore, it is crucial to understand thoroughly from the beginning to the end for the easier understanding of upcoming chapters.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

We will review the literature on both dependent variable – SMP and independent variables – E, S, G will be discussed thoroughly. It also explains theoretical frameworks such as stakeholder theory and signalling theory to support our research.

2.1 Review of Literature

2.1.1 Stock Market Performance

Stock market refers to a regulated financial marketplace where securities like stocks, bonds, and derivatives are traded. A country's economic development is linked to a deep-seated and thriving stock exchange due to its key function in channelling the flow of capital from investors to businesses. It offers the listed companies with long-term capital to finance investments and grow operations which ultimately foster economic activity (Naik, 2013). There are several proxies for a country's SMP, but three types have been widely deployed in the past studies. The first type is stock market index which is composed of the collective performance of the constituent stocks, normally those large firms listed on the stock exchange (Chan & Rayappan, 2023; Mohammad et al., 2017). Stock market capitalisation, the aggregate market value of the domestic listed firms' outstanding shares, is another measure (Lenee & Oki, 2017; Sugiarto et al., 2023). Last, Tripathi and Seth (2014) employed stock market turnover which is the total amount of domestic shares traded relative to SMP.

2.1.2 Environment

Environmental is associated with the topics or concerns such as climate change, environmental degradation, deforestation, and energy consumption (Ditlev-Simonsen, 2021). Referring to World Health Organization [WHO] (n.d.), air pollution, which is chiefly triggered by GHG emissions to the atmosphere, harms the biosphere and contributes to the climate change. GHG includes carbon dioxide, methane, nitrous oxide, and fluorinated gas (United States Environmental Protection Agency, n.d.). In fact, it has reached a hazardous level that threatens the health of nearly 2,400 million people worldwide (WHO, n.d.).

Mixed results were obtained based on the available studies regarding the effect of environmental on SMP. Numerous studies have proved that a significant relationship exists between environmental and SMP. Bolton and Kacperczyk (2021a) stated that a positive relationship had resulted in US context since the investors require more compensation for the carbon risk that is undertaken by them. Thus, it was observed that firms that emit more GHG could offer greater return. Subsequently, Bolton and Kacperczyk (2021b) affirmed their previous study by examining 77 countries to prove the presence of carbon premium in which greater stock return was gained for firms that have high level of GHG emission. Li and Wu (2017) discovered that GHG emission and SMP is positively correlated in China, reflecting the loss of market value after firms declared their environmentally sustainable conducts. Miao (2023) further claimed that firms with high production would increase GHG emission and resulted in more profit generation. Thus, it leads to better SMP.

However, some researchers claimed that an inverse correlation exists between E and SMP. Based on the study by Choi and Luo (2021) that focused on firms from numerous countries, polluters that exceeded the emission limit in the countries that adopt Emission Trading System are usually punished by investors through their market value. In addition, Klassen and McLaughlin (1996) claimed that stock market responded favourably to US companies that achieved environmental performance awards. This means that reduction in GHG emissions will enhance

SMP. A same conclusion had been drawn with the investigation in Sweden and Spain context respectively (Hassel et al., 2005; Moneva & Cuellar, 2009).

On the contrary, Al-Hiyari and Kolsi (2021) mentioned that insignificant relationship was obtained in their research focusing on Middle East and North African countries since their local shareholders do not stress on the environmental issues. This is because polluting firms are rarely litigated with regard to their bad behaviours. Hence, investors view the environmental initiatives as unnecessary and costly. Consequently, environmental element is not reflected by the market value due to investors' unawareness of its impacts on the economy. Similar result was procured by Verbeeten et al. (2016) for German firms.

Different results were acquired since the researchers applied distinct countries as sample, statistical method, sample size, and sample period. To elaborate, a significant relationship between environmental and SMP was obtained by Bolton and Kacperczyk (2021a) who adopted 3000 samples in US from 2005 to 2018 through Pooled Ordinary Least Squares (OLS) Regression. In contrast, Al-Hiyari and Kolsi (2021) used 439 companies in the Middle East and North African countries as their sample to conduct the research for 2013-2019 period, and ultimately obtained an insignificant relationship between environmental and SMP via OLS Regressions.

To sum up, the distinct relationship between environmental and SMP were influenced by the sample size, sample period, types of countries and statistical method adopted by various researchers.

2.1.3 Social

According to Carroll (1979), social is a three-dimensional concept including corporate's social responsibility (economic, moral, legal, discretionary), social responsiveness (accommodation, defense, proaction, reaction), and social issues (consumerism, discrimination, product safety, occupational health and safety,

shareholders). The performance of the firms is defined by their capacity to achieve the objectives and results by executing social responsibility. Besides, it acts as an integral strategy that highlights a firm's obligations to various stakeholders such as customers, employees, and the society to gain their trust and loyalty, thereby enhancing its competitive standing (Turban & Greening, 1997).

Previous studies investigating the social factor on SMP have shown conflicting results. It was found that social initiatives have a significant influence on SMP in developed countries. The developed countries include 16 European countries (Engelhardt et al., 2021), China (Ni & Sun, 2023), Korea (Lee et al., 2022), Japan (Liu et al., 2023). Based on the study of Alareeni and Hamdan (2020) in the US, social initiatives pose a negative effect on firms' operations and financial success as they come at a higher cost (Nollet et al., 2016). However, they found that social initiatives favourably impact the SMP as firms often use them to create value for stakeholders and firms, entice more investors to invest in the stock market, and further increasing stock market prices. Hence, these firms can attain better financial and SMP by informing investors about the depth of firms' risk management approaches and social capital activities to improve social conditions. These outcomes are affirmed by other studies in China and the US, stating that social initiatives can substantially mitigate market risk, enhance long-term stakeholder and firm value, boost financial performance, and thus allow a better SMP of higher returns and lower stock volatility (Albuquerque et al., 2020; Broadstock et al., 2021).

Since there are less widely uniform indicators for social performance, studies have employed various indicators such as labour standards (employment, education), product responsibility, community, and human rights. Historically, there are mixed studies on social factors of unemployment (UNE) rate and education on SMP. Research has shown that UNE and SMP have a negative correlation (Bernanke & Kuttner, 2005; Jareño & Negrut, 2016). High UNE rates indicate an economic downturn, resulting in lower consumer spending. It adversely impacts firms' financial performance and stock prices as investors are pessimistic about the stock market. In a thriving economy with low UNE, stock returns rise. These results are parallel with Boyd et al. (2005) who argued that high UNE rates may have different impacts on the stock market due to business cycles. Surging UNE will boost stock

returns during economic expansions but reduce stock returns during recessions. In contrast, Gonzalo and Taamouti (2017) stated that there is a positive linkage between UNE and SMP as the Federal Reserve lowers interest rates when there is a high UNE rate, which drives up the stock market prices. Though a high UNE rate may imply a decline in future consumption, it has often come with government intervention in monetary policies to support the SMP such as lower interest rates or higher unemployment incentives (Chi, 2021). This neutralises the impacts of reduced consumption and pessimistic market sentiment, and thus stock market index increases. Another advocating view is that experienced investors tend to adopt a portfolio management approach by switching their funds to larger and safer stocks to gain returns during recessions marked by high UNE and vice versa (Sloan, 2012).

Prior research indicates that education (EDU) and SMP are positively correlated (Koekemoer, 2019; Thomas & Spataro, 2018; Zhang et al., 2023). Investors with higher EDU levels are equipped with better knowledge and skills which makes them capable of effectively assessing investment risks and returns and more risk-tolerant, thereby translating to higher stock market involvement (SMI) and stock returns. As such, higher EDU level investors are willing to take higher risks to earn higher investment returns. On the contrary, Dong et al. (2023) revealed a negative correlation between Grade Point Average (GPA) and stock ownership. First, findings show that SMI is severely hampered by an inability to digest information (Grinblatt et al., 2011). Second, investors tend to face difficulty to juggle between EDU and response to firm updates, trading behaviour (Pantzalis & Ucar, 2018), and institutional oversight (Kempf et al., 2017). Hence, it suggests that students with higher GPAs may prioritise and value coursework over investing, leading to a decline in SMI. Besides, Vaarmets et al. (2019) stated that persons who work in EDU, retail, health, and social work fields have increased risk aversion as they often possess qualities of caring and sympathy that are against the stock market nature, which deters them from trading stocks. They further added that educated individuals who are not proficient in financial market operations may face obstacles like uneven learning ability and distress in collecting suitable data to make investment choices can negatively impact the SMI. Therefore, lower SMI will lead to lower liquidity in the stock market which consequently negatively impact the SMP.

However, there is an insignificant influence between social initiatives and SMP in developing countries such as India (Mittal et al., 2008), Malaysia (Atan et al., 2018; Tarmuji et al., 2016), Thailand (Tangjitprom, 2011), Indonesia (Haryono & Iskandar, 2015), and Bangladesh (Abedin et al. 2020). Tangjitprom (2011) declared that the insignificance may be due to data timing as UNE rates are not released until the relevant agency reports. Thus, the lag of the UNE rate is employed rather than the actual one. Abedin et al. (2020) also stated that EDU has no impact on SMP since it does not raise the involvement of educated individuals in the stock market; moreover, there is no knowledgeable and informed investors exist in its stock market. These findings are in line with another study by McWilliams and Siegel (2001) where they found no evidence that social initiatives enhance SMP.

Since there are inconsistent results found in the relationship between social and SMP, statistical methods, sample sizes, and sample periods chosen are examined. To illustrate, Engelhardt et al. (2021) and Haryono and Iskandar (2015) studied the social factor on SMP. However, the former showed a significant relationship by using OLS Regression while the latter found an insignificant relationship by utilising Structural Equation Model. Albuquerque et al. (2020) and Engelhardt et al. (2021) conducted their study on 1,452 firms from 16 European countries for 2019-2020 period and 134,689 American firms for 2017-2020 period respectively. As such, they found a significant result with a larger sample size during COVID-19. Conversely, Mittal et al. (2008) and Atan et al. (2018) conducted their study on 50 Indian firms for 2001-2005 period and 54 Malaysian firms for 2010-2013 period individually. Therefore, they obtained an insignificant result with a smaller sample size during normal periods.

In short, conflicting results of social factor on SMP were revealed in the existing literature due to the different types of countries, statistical methods, sample sizes, and sample periods chosen.

2.1.4 Governance

Governance is a methodology that describes the framework of overseeing the financial markets. Development, especially in the country aspect mandates an up-to-scratch governance structure. To evaluate the soundness and effectiveness of governance, various means such as control of corruption, political stability, government effectiveness and more could possibly be employed. In the past, nearly all the literatures emphasise on governance in the firm-level to explain SMP, but the opposite for country-level. Given the cruciality of governance in the country dimension, more studies have started to incorporate it. Country-level governance acts heavily in ensuring the functionality of all firms in the country, which can affect the stock market activities. Hence, country-level governance has a direct impact on the governance in the firm-level, which is agreed by Klapper and Love (2004). Indeed, firms located in countries with weak governance can have some degree of refinement in their firm-level governance, but such attempt will not last long due to the dominant effect of country-level governance.

Over the years, diversified relationships between governance and SMP have been produced as different authors examined from diverse viewpoints. To begin, governments and courts play a major role in the enforcement of a country's legal regimes, which directly shape the level of governance. Due to the disparities in laws of every country, differences in governance level are observed. Hence, governance is promised in a country with strict laws. Chiou et al. (2010) and La Porta et al. (1997) said investors display high willingness to invest in a corporation if the nation portrays a strong governance characterised by unprejudiced legal framework and high investor protections such as investors rights, ban of insider trading and more freedom on short selling. Thus, a positive nexus showing the truth that investors with greater protection from hazardous activities can be better off due to the strong governance that reduced their risk exposure. The study is in line with Albuquerque and Wang (2008) and Harvey (1995) that revealed investors in developing nations face greater risk due to inadequate legal protection given their imperfect governance. Moreover, Giannetti and Koskinen (2010) argued that higher investors protection led to greater demand of robust governance stocks and more earnings. Conversely,

when protection for investors is maximised, rich investors are impossible to exploit the market and control those inferior governance stocks. Hence, the demand and price for those stocks will reduce. In the end, it will stop the relevant investors from gaining personal benefits. Gompers et al. (2003) who advanced the study by taking in agency costs concluded an inverse significant association. Companies with poor governance will have lower stock returns as they are normally tied with higher agency costs, which are the cost of ensuring managers maximising shareholder's wealth. Thus, there is a conflict between managers and shareholders where managers are likely to act for themselves and harm shareholders returns. Meanwhile, this has proven that investment funding acquisition from third parties will diminish in the event of lacking strong governance since Dumludag (2009) and Low et al. (2015) claimed that the flow of foreign direct investment (FDI) is correlated with country's governance. In fines, investors incline to offer financing to borrowers given the protection against adverse incidents with the solid law enforcement (La Porta et al., 1997; Lombardo & Pagano, 2006).

Fundamentally, a country with low corruption means have control of corruption (COC) while a country with high corruption means no or low COC. To begin with, Mauro (1995) disclosed a significant positive connection between COC and SMP. He mentioned a low COC will hold back investment and growth in a country's SMP as it dampens investors' confidence to invest in a country, leading to a decrease in FDI (Lambsdorff, 2003; Voyer & Beamish, 2004; Wei, 1997). Little COC also suggests shallow transparency, which is a threat for risk-averse investors and leading to deteriorating the SMP. Also, Hussain et al. (2017) has shown that a percent increase in a country's legal management over corruption, SMP will increase by 4.3% in the long run. This suggest that a robust institutional setting can magnify the country' SMP and induce investors to pour money in its stock market as they will have little to no fear of losing their investment. Lee et al. (2019), similarly, performed their analysis on 10 distinct Asian countries found a rise in the corruption perception index (CPI) will improve SMP because a rise in CPI implies minor corruption level and this is consistent with Ayaydin and Baltaci (2013). On top of that, Wang and You (2012) claimed that financial markets in developed economies are flourished, so the absence of COC will deteriorate the firms' growth. Mashal (2011) likewise, contended that economic growth in a country will devastate,

following a diminish in COC. Thus, rivalry in the country SMP will reduce and later affecting the domestic and international firms in it.

Apart from a positive link, Low et al. (2011) asserted that governance dimension represented by COC possessed a significant negative association with stock market return from a risk factor view. Countries with poor corruption management have greater corruption and risk level; henceforth, investors would demand outrageous risk premium and equity returns as their confidence are pulled down ultimately. Pinheiro (2010) found that existence of COC can negatively impact SMP in developed nations. Generally, developed nations with sophisticated financial systems and robust governance have less chances of exploiting the market to gain abnormally even with some risky and illegal acts. Hence, the overall risk reduced will relieve investors from being worst off. Next, Aidt (2009) mentioned that lower COC will accelerate the business deals like FDI some cumbersome procedures can be avoided and thus, offer an opportunity for private firms to conduct businesses by conquering those ineffectual regulations that can lead to a higher SMP. Lastly, Aljazaerli et al. (2016) who focused on Gulf Cooperation Council (GCC) countries relatedly expressed a negative correlation between COC and SMP due to those countries presently have an extreme corruption level and wealth.

Apart from that, numerous authors examined an insignificant relationship between governance and SMP. Modugu and Dempere (2020) asserted that COC is the only governance indicator that is irrelevant to SMP in GCC countries. Similarly, Ismail and Suhardjo (2001) argued no significant link between political stability and SMP in Indonesia. Further, Low et al. (2011) who used voice and accountability as governance proxy found insignificant nexus with stock returns in developed countries. Low et al. (2015) concluded an insignificant link between governance and uncertainty in the stock market for emerging and developed countries.

The different results were contributed by several factors such as statistical methods and sample sizes. To illustrate, Wang and You (2012) studied in China context and found a significant relationship whereas Low et al. (2011) studied 48 countries and discovered an insignificant relationship. In GCC countries, Aljazaerli et al. (2016) found a significant correlation by using Pooled OLS Regressions while Modugu

and Dempere (2020) found no significant correlation by using Panel Least Squares Regression.

In brief, from the abovementioned review of past literatures, the dissimilar relationship of governance on SMP can be contributed to the difference in countries, statistical methods, and sample sizes.

2.2 Theoretical Framework

2.2.1 Stakeholder Theory

Stakeholder Theory was introduced by Freeman (1984). The theory proposes a firm's managers should consider the interests and create value for all stakeholders namely employees, suppliers, customers, government, and the community, but not solely focus on shareholders when making decisions. It implies a good rapport between management and stakeholders is vital to sustaining long-term growth and survival. In other words, enhanced stakeholder engagements allow firms to create ethical and sustainable operations through ESG initiatives that benefit all the stakeholders, win over their support, and ultimately improve the firm and SMP.

Based on Yin et al. (2023), financial institutions consider a firm's ESG performance in their credit evaluations and offer enticing interest rates that can lower financing costs. Individuals especially socially conscious customers tend to invest in firms with a strong corporate image and social reputation. Investors, on the other hand, have trust in firms with constant earnings growth and robust management, which lowers the possibility of losses and promotes greater stock ownership. Information disclosure of the firm's sustainability report may also uphold stakeholder trust and confidence. This reduced information asymmetry and inadequacy of financial resources, improving stock liquidity since the effective ESG approaches may draw in investors and boost their propensity to buy and invest (Roy et al., 2022). Also, a passionate workplace culture can entice top-notch talents and enhance employee motivation, which eventually increases the firm's performance. Moreover, ESG

may contribute to firm's critical assets in return for government incentives such as steady political relations (Chen et al., 2011), product differentiation tactics (Albuquerque et al., 2019), and financial gains (Jian & Wong, 2010).

He et al. (2022) also mentioned that ESG involvement enhances firm's stakeholder governance, thereby boosting operation effectiveness and discouraging delinquencies in the firm. As a result, firms who implement ESG initiatives for the benefit of all the stakeholders may achieve long-term development growth and higher profitability in financial performance, which substantially affects the stock returns in SMP backed by various findings (Alshehhi et al., 2018; Kotsantonis et al., 2016; Malik, 2015; Torugsa et al., 2012).

2.2.2 Signalling Theory

Signalling Theory was proposed by Spence (1973) with the notion that information asymmetry exists between two parties where one party (the signaller) must choose the information (signal) to be delivered to the other side (the receiver), followed by the signal received must be decoded by the receiver (Connelly et al., 2011; Drover et al., 2018) and interactions occur between them (feedback) (Bae et al., 2018). Particularly, signals are behaviours or traits of persons within a market that offer information or alter the perceptions of other market participants intentionally or unintentionally (Spence, 1974).

Since managers generally have more information than other stakeholders, any extra information that goes beyond the mandatory financial reporting is likely to be deemed by stakeholders as signals to the capital markets. Therefore, individuals can use the additional information to evaluate the firm's essential beliefs and future path, thereby making informed investing and purchasing decisions (Akerlof, 1970). Jones and Murrell (2001) asserted that this theory is remarkably precious in the case of ESG information and SMP. Spence (1973) stated that firms with higher ESG performance often disclose more ESG information and vice versa. The disclosure aims to signal stakeholders their strengths, which are hard for rivals to imitate and

thus, stand out from the market (Verrecchia, 2001). Likewise, Eliwa et al. (2019) mentioned that managers might be motivated to disclose ESG initiatives to lower information asymmetry and ambiguity on variables influencing firm value and thus, mitigate adverse selection expenses. Inevitably, ESG disclosure assists investors in making wise investing choices (Dhaliwal et al., 2011) while firms can lower the cost of capital and improve reputation and firm value, which further affect the share price in the SMP (Ramchander et al., 2012; Verrecchia, 1983).

In addition, prior studies mentioned that firms with effective ESG initiatives tend to surpass their rivals in the financial and SMP (Chatterji et al., 2009; Fairchild, 2008). They revealed that firms may gain by enticing ESG-aware investors, solving activist concerns, lowering regulatory risk, and reducing energy and waste consumption. As such, firms with good ESG initiatives may signal as having reduced residual risks, which boosts their market capitalisation and SMP since there will be automatic adjustments between demand and valuation. In contrast, unfavourable ESG media visibility may convey negatively to investors about a firm value and brand image as it signals the firm is not living up to social standards. This may eventually result in higher contract expenses covering financial fines, business constraints, and negative public perception, which could lower demand for the firm's products and services.

2.3 Conclusion

In short, literature review on both dependent variables – SMP and independent variables – E, S, G have been clearly discussed in this chapter. The definition of theories such as stakeholder theory and signalling theory also have been explained to uphold our stance.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Methodology being utilised for our research will be outlined in this chapter, beginning from model specification whereby two models are proposed, followed by data collection method and several tests are going to be utilised to analyse data.

3.1 Model Specification

A base model is first formed with three factors, E, S, and G that may affect SMP.

$$SMP = f[E, S, G] \tag{3.1}$$

where SMP = Stock Market Performance
E = Environmental
S = Social
G = Governance

There are two econometric models proposed in this research:

$$\ln SMP_{it} = \beta_0 + \beta_1 \ln GHG_{it} + \beta_2 \ln UNE_{it} + \beta_3 \ln COC_{it} + \mu_{it} \tag{3.2}$$

$$\ln SMP_{it} = \beta_4 + \beta_5 \ln GHG_{it} + \beta_6 \ln EDU_{it} + \beta_7 \ln COC_{it} + \mu_{it} \tag{3.3}$$

where SMP = Stock Market Performance (measured by Stock Market Capitalisation)
GHG = Total Greenhouse Gas Emissions
UNE = Total Unemployment
EDU = Adjusted Savings: Education Expenditure
COC = Control of Corruption

β_0, β_4 = Intercept

β_1, β_5 = Estimated Coefficient of GHG

β_2 = Estimated Coefficient of UNE

β_3, β_7 = Estimated Coefficient of COC

β_6 = Estimated Coefficient of EDU

μ = Error Term

i = 26 selected countries (Austria, Australia, Brazil, Canada, Chile, Germany, India, Indonesia, Japan, Korea, Luxembourg, Malta, Malaysia, Mauritius, Mexico, Panama, Peru, Philippines, Poland, Singapore, Slovenia, Spain, Sri Lanka, Switzerland, Thailand, United States)

t = Annually period (January 2002 to December 2020)

From the Equation 3.2 and 3.3, there are four independent variables – GHG, UNE, EDU, and COC that may have influence on the dependent variable – SMP. GHG and COC are fixed, while UNE and EDU will be interchanged in both equations. This is because E and G are considered very strong factors in affecting SMP backed by various findings. They have more standardised measurements, which are widely and globally accepted as compared to S pillar. On the other hand, S pillar does not have uniform measurements and different indicators are often used by various researchers. To illustrate, coverage area for S is wider as it considers the interest of all stakeholders such as employees, customers, shareholders, suppliers, government, and the society. However, some researchers might focus solely on a particular area to relate to SMP, resulting in misleading and inaccurate results. Therefore, UNE and EDU variables are employed in our study because they pose significant influences on every stakeholder in the economy rather than on a specific party, and thus higher coverage area. In short, fixing GHG and COC in these two equations along with EDU and UNE can enhance the study and credibility of the relationship with SMP.

3.2 Data Collection Method and Definition

In our research, we will adopt secondary data to determine whether E, S, and G can significantly affect the SMP of the selected countries due to its suitability and easiness of deriving data. The root of all the data is extracted from World Bank database. We will employ balanced panel data, which consists of 26 countries and time frame from 2002 to 2020 on annual basis, totalling up to 19 years. Panel data is a type of data consisting of both cross-sectional and time series data, indicating a more comprehensive type of data and minimum biasness in the results.

Table 3.1

Variables, Indicators, Units of Measurement and Origin of Each Variable

Variable	Indicator	Unit of Measurement
SMP	Market capitalisation of listed domestic companies	Percentage (%) of GDP
E	Total GHG emissions	kt of CO_2 equivalent
S	Adjusted savings: Education expenditure Unemployment, total (modelled ILO estimate)	% of GNI % of Total labour force
G	Control of corruption	Estimate

Table 3.2

Definition of Each Variable

Variable	Indicator	Definition
SMP	Market capitalisation of listed domestic companies	Market capitalisation is the multiplication of stock price and number of stocks remaining for each of the country's domestic listed corporation. Companies that operate mainly to invest in other listed companies, funds from investment and unit

		trust are specifically disregarded in the calculation.
E	Total GHG emissions	Summation of CO_2, other biomass composition, anthropogenic emissions, nitrous oxide, and fluorine gases but minus with those short cycle biomass.
S	Adjusted savings: Education expenditure	Expenditures that only cover the latest operating costs that incurred in structuring education, which contain of salary for academicians but not covering the cost in constructing premises and equipment.
	Unemployment, total	A portion of people in the labour force that is available and actively finding for jobs but could not get one.
G	Control of corruption	The employment of government or public power to fulfil private interest. Baodi and Amegbe (2017) also mentioned corruption is more than just bribery.

Source: World Bank

All data from World Bank has given us the confidence in running the data because its data from are developed from standards that are recognised worldwide. It also has a group of experts that ensures the quality of gathering and spreading the trustworthy data (World Bank, n.d.).

3.3 Methodology

3.3.1 Panel Unit Root Test

This test will be employes to examine if a time series dataset is stationary or non-stationary. Non-stationary of a variable may arise due to the occurrence of unit root

where variables are likely to revert to its mean after facing random shocks, implying the absence of a stable long-term trend. Thus, stationary variables have a predictable and stable trend as opposed to non-stationary variables. It is crucial to ensure that the model excludes any non-stationary variables to evade distorted and fallacious results (Granger & Newbold, 1974). To heighten our results' robustness, panel unit root tests are used as follows:

H_0 : Unit root is existent in time series (non-stationary).

H_1 : No unit root is existent in time series (stationary).

3.3.1.1 Levin-Lin-Chu Test (LLC)

According to Choi (2001), LLC test presumes an identical autoregressive parameter shared among all the panels. Hence, it prohibits the condition where some panels encompass unit root while others do not. It also reflects the basic Augmented Dickey-Fuller (ADF) specification as displayed in Equation 3.4.

$$\Delta y_{it} = \alpha\, y_{it-1} + \sum_{k=1}^{p_i} \beta_1 \Delta y_{it-k} + \bar{X}_{it}\xi + \mu_{it} \tag{3.4}$$

where we presume an identical $\alpha = \rho - 1$ but permit the difference terms' lag order (p_i) to be different among cross-sections. In the null hypothesis, $\hat{\alpha}$ is close to normally distributed as a consequence of a modified t-statistic:

$$t_\alpha{}^* = \frac{t_\alpha - (N\bar{T})S_N\, \hat{\sigma}^{-2} se(\hat{\alpha})\mu_{mT^*}}{\sigma_{mT^*}} \rightarrow N(0, 1) \tag{3.5}$$

where t_α = standard t-statistic for $\hat{\alpha} = 0$; N = cross-sectional units; T = observed periods' number; S_N = average ratio of standard deviation; $\hat{\sigma}^2$ = estimated error term's variance; $se(\hat{\alpha})$ = $\hat{\alpha}$'s standard error; $\mu_{mT}{}^*$ = modified average; $\sigma_{mT}{}^*$ = modified standard deviation. Then, if test statistics is less than critical value, reject the null hypothesis.

3.3.1.2 Im-Pesaran-Shin Test (IPS)

IPS test, however, grants the occurrence of unit root in certain panels. Since everything is heterogeneous, the easiest way is to calculate individual ADF test statistics and aggregate them. Following the prediction of the individual ADF regressions, a mean of their t-statistics is then modified as presented in Equation 3.6 to acquire the most coveted test statistics:

$$\overline{t_{NT}} = (\sum_{i=1}^{N} t_{iT_i}(p_i)) \ / \ N \tag{3.6}$$

where t_{iT_i} = individual ADF regression's t-statistic; p_i = coefficients of autoregressive; N = cross-sectional units' number. Further, IPS also warrants that $\overline{t_{NT}}$ will be asymptotic normally distributed when the lag order in each individual ADF regression is non-zero for certain cross-sectional units:

$$W_{\overline{t_{NT}}} = \frac{\sqrt{N}\,(\overline{t_{NT}} - N^{-1} \sum_{i=1}^{N} E(\overline{t_{iT}}(p_i))}{\sqrt{N^{-1} \sum_{i=1}^{N} Var\,(\overline{t_{iT}}(p_i))}} \rightarrow N(0, 1) \tag{3.7}$$

where $E\big(\overline{t_{iT}}(p_i)\big)$ = estimated average while $Var\big(\overline{t_{iT}}(p_i)\big)$ = estimated variance of t-statistics of ADF regression. Then, if test statistics is less than critical value, reject the null hypothesis.

3.3.1.3 Augmented Dicky-Fuller (ADF) Choi Z Statistics

ADF test, emanated from the Dickey-Fuller test, is better since it can support and handle more intricate and sizeable time series models than AR(1) model. Since the ADF statistic is a negative value, the likelihood of rejecting the null hypothesis will escalate with its magnitude. An asymptotic outcome will be reached under the null hypothesis if ω is termed as each individual unit root tests' p-value as follows:

$$-2 \sum_{i=1}^{N} log\ (\omega_i) \rightarrow X_{2N}^2 \tag{3.8}$$

Moreover, Choi also illustrates that:

$$Z = \frac{1}{\sqrt{N}} \sum_{i=1}^{N} \theta^{-1}(\omega_i) \rightarrow N(0, 1) \quad (3.9)$$

where θ^{-1} = reverse of the cumulative distribution function.

3.3.2 Panel Cointegration

The concept of cointegration was initiated by Engle and Granger (1987) to determine the existence of linkages among non-stationary time series variables in the long term. More specifically, it investigates the residuals of a static regression conducted employing I(1) variables. The residuals are I(0) if variables exhibit a cointegration; otherwise, they remain I(1). Thereafter, cointegration testing is flourished by Pedroni (1999), Pedroni (2004), and also Kao (1999) to incorporate non-stationary panel data within the Engle-Grager framework. Two panel cointegration tests will be executed with hypotheses:

H_0 : No cointegration exists.
H_1 : Cointegration exists.

3.3.2.1 Pedroni Test

Pedroni test scrutinises the occurrence of cointegration in non-stationary panels using seven test statistics, which concede heterogeneous slope and intercept coefficients among cross-sections (Pedroni, 1999). The regression is shown in Equation 3.10. It does not consider normalization and specific number of cointegrating relations unlike typical time-series analysis.

$$y_{it} = \lambda_i + \xi_i t + \beta_{1i} x_{1it} + \ldots + \beta_{Mi} x_{Mit} + \varepsilon_{it} \quad (3.10)$$

Based on Equation 3.10, firstly presume y_{it} and x_{it} are I(1) as well as set the individual and trend impacts (λ_i and ξ_i) to zero if we wished for while ε_{it}, residuals which will equal I(1) in the case of the null hypothesis. Afterwards, perform the pooled auxiliary regression for each cross-sectional units to figure out if ε_{it} are I(1) and through residual from Equation 3.11, the cointegration statistic will be formed.

$$\varepsilon_{it} = \rho_i \varepsilon_{it-1} + \mu_{it} \tag{3.11}$$

3.3.2.2 Kao Test

Kao test, fundamentally, employs a methodology similar to Pedroni test. Nevertheless, it designates homogeneous coefficients and cross-sectional specific intercepts for the initial regressors in the panel (Kao, 1999). As for the bivariate scenario proposed, the following regression exists:

$$y_{it} = \lambda_i + \xi_i t + \beta_i x_{it} + \varepsilon_{it} \text{ for } y_{it} = y_{it-1} + u_{it} \text{ and } x_{it} = x_{it-1} + \mu_{it} \tag{3.12}$$

First, conduct the initial stage regression, Equation 3.10 so that λ_i is heterogeneous while ξ_i is homogeneous in the cross-sections; further, place a zero value on every trend coefficient and perform the pooled auxiliary regression similar to Equation 3.11 and finally, a cointegration statistic with asymptotic normal distribution will be formed from the residual.

3.3.3 Panel Long Run Estimates

It is indispensable to identify the magnitude to which the variables impact one another in the long run when cointegration is existent among them. The standard OLS regression may provoke biased and inconsistent estimators with non-stationary variables; henceforth, FMOLS and DOLS will be exerted to conjecture more consistent and unbiased coefficients (Çifçi et al., 2018).

3.3.3.1 Fully-Modified Ordinary Least Squares (FMOLS)

Phillips and Moon (1999) proposed pooled FMOLS to embellish the standard FMOLS estimators expanded by Phillips and Hansen (1990) in a direct way. The regressand and serial correlation in the error terms are adjusted respectively as depicted in Equation 3.13 and 3.14 after considering the average long-term covariance estimates ($\hat{\Lambda}$ and $\hat{\Omega}$).

$$\tilde{y}_{it}^{+} = \tilde{y}_{it} - \hat{w}_{12}\hat{\Omega}_{22}^{-1}\hat{u}_2 \tag{3.13}$$

$$\hat{\lambda}_{12}^{+} = \hat{\lambda}_{12} - \hat{w}_{12}\hat{\Omega}_{22}^{-1}\hat{\Lambda}_{22} \tag{3.14}$$

Then, the estimator of pooled FMOLS is provided by Equation 3.15. Note that it solely performs the summation of cross-sections in the denominator and numerator. Estimators, $\hat{\Lambda} = \Sigma_{i=1}^{N} \hat{\Lambda}_i$ and $\hat{\Omega} = \Sigma_{i=1}^{N} \hat{\Omega}_i$, are devised through simple cross-section averages with each cross-section' individual long-run covariances estimates.

$$\hat{\beta}_{FP} = (\Sigma_{i=1}^{N}\Sigma_{t=1}^{T}\tilde{X}_{it}\tilde{X}_{it}{}')^{-1}\Sigma_{i=1}^{N}\Sigma_{t=1}^{T}(\tilde{X}_{it}\tilde{y}_{it}^{+} - \hat{\lambda}_{12}^{+}{}') \tag{3.15}$$

Regarding EViews, it utilises the moments of independent variables to set up a consistent estimator as exhibited in Equation 3.16.

$$\hat{V}_{FP} = \hat{w}_{1.2} \cdot \hat{M}_{FP}^{-1} \tag{3.16}$$

where $\hat{M}_{FP} = \frac{1}{N}\Sigma_{i=1}^{N}(\frac{1}{T^2}\Sigma_{t=1}^{T}\tilde{X}_{it}\tilde{X}_{it}{}')$

3.3.3.2 Dynamic Ordinary Least Squares (DOLS)

Merlin and Chen (2021) stated that DOLS is a better estimation technique for providing results than FMOLS since it can eradicate association among regressors. The DOLS estimator was developed by Mark and Sul (2003), Kao and Chiang

(2000) and Pedroni (2001) for panel data analysis. As such, panel DOLS exists with the addition of ΔX_{it}'s specific lags and leads in cross-sections to cointegrated panel regression which is shown in Equation 3.17 to mitigate serial correlation and asymptotic endogeneity.

$$\tilde{y}_{it} = \tilde{X}_{it}'\beta + \sum_{k-q_i}^{r_i} \Delta\tilde{X}_{it+k}'\delta_i - \tilde{v}_{1it} \tag{3.17}$$

where $\tilde{y}_{it}$ and $\tilde{X}_{it}$ = the data where individual deterministic patterns are removed. Further, it is accepted that coefficients of the short-term dynamics being cross-sectional specific and intermix $\Delta\tilde{X}_{i+t}$ with cross-sectional dummy variables for $\tilde{Z}_{it}$ to be regressors and then, let $\widetilde{W}_{it}' = (\tilde{X}_{it}', \tilde{Z}_{it})'$, formulating the estimated pooled DOLS that is distributed asymptotically as follows:

$$\left[\frac{\hat{\beta}_{DP}}{\hat{\gamma}_{DP}}\right] = \left(\sum_{i=1}^{N} \sum_{t=1}^{N} \widetilde{W}_{it}\widetilde{W}_{it}'\right)^{-1} \left(\sum_{i=1}^{N} \sum_{t=1}^{N} \widetilde{W}_{it}\tilde{y}_{it}'\right) \tag{3.18}$$

3.3.4 Panel Dumitrescu-Hurlin Granger Causality Test

Granger Causality Test is conducted to evaluate causal linkages between variables in the short term. Specifically, it determines how the past values of *y* can affect its current value, followed by justifying the reasoning through adding lagged terms of *x*. When *x* can contribute to the estimation of *y* subsequently, *y* will demonstrate a causal relationship with *x.* EViews presents two ways to identify the causal relationship for panel data regression with hypotheses:

H_0 : Variable x does not Granger-cause variable y.

H_1 : Variable y does not Granger-cause variable x.

First, compute all cross-sections independently through an ordinary Granger Causality test. Then, conduct bivariate regressions exposed in Equation 3.19 and 3.20 for the panel data.

$$y_{i,t} = \lambda_{0,i} + \lambda_{1,i} y_{i,t-1} + \cdots + \lambda_{k,i} y_{i,t-k} + \beta_{1,i} x_{i,t-1} + \cdots + \beta_{k,i} x_{i,t-k} + \varepsilon_{it} \quad (3.19)$$

$$x_{i,t} = \lambda_{0,i} + \lambda_{1,i} x_{i,t-1} + \cdots + \lambda_{k,i} x_{i,t-k} + \beta_{1,i} y_{i,t-1} + \cdots + \beta_{k,i} y_{i,t-k} + \varepsilon_{it} \quad (3.20)$$

In our research, the method employed by Dumitrescu and Hurlin (2012) is emphasised where it presupposes that every coefficient in the cross-sections is heterogeneous as manifested below:

$$\lambda_{0,i} \neq \lambda_{o,k}, \lambda_{1,i} \neq \lambda_{1,k}, \ldots, \lambda_{l,i} \neq \lambda_{l,k}, \forall i, k \quad (3.21)$$

$$\beta_{1,i} \neq \beta_{1,k}, \ldots, \beta_{l,i} \neq \beta_{lk} \forall i, k \quad (3.22)$$

3.4 Conclusion

To summarise, this segment listed the statistical approaches to be used in the following chapter so that statistical analysis can be performed smoothly.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

The statistical evaluation under this subsection will be performed with the assistance of EViews based on the methodology proposed in the previous chapter.

4.1 Panel Unit Root Test

Table 4.1

Panel Unit Root Tests Results for Each Variable

	LLC		IPS		ADF	
	Level (Trend & intercept)	First difference (Intercept)	Level (Trend & intercept)	First difference (Intercept)	Level (Trend & intercept)	First difference (Intercept)
SMP	-0.279	-5.257***	-2.732	-9.427 ***	-1.211	-8.916***
	(0.390)	(0.000)	(0.003)	(0.000)	(0.113)	(0.000)
GHG	0.501	-9.616***	1.181	-9.690***	1.348	-8.737***
	(0.692)	(0.000)	(0.881)	(0.000)	(0.911)	(0.000)
UNE	1.018	-1.404*	1.016	-5.258***	0.939	-5.423***
	(0.846)	(0.080)	(0.845)	(0.000)	(0.826)	(0.000)
EDU	19.954	-1.835**	-0.551	-4.062***	2.302	-2.504***
	(1.000)	(0.033)	(0.291)	(0.000)	(0.989)	(0.006)
COC	0.848	-5.835***	1.057	-7.649***	1.046	-7.826***
	(0.802)	(0.000)	(0.855)	(0.000)	(0.852)	(0.000)

Note: LLC, IPS, and ADF tests investigate the null hypothesis of non-stationary. *, ** and *** denote the rejection of the null hypothesis at 10%, 5%, and 1% significance level respectively. The test statistic values are shown in the figure without a bracket while the parentheses values are the probability values. The lag length is chosen based on Akaike Information Criterion (AIC) with a maximum lag of 4.

The results of the three panel unit root tests conducted for the time series of the dependent variable and each independent variable are summarised in Table 4.1.

Based on the results, every variable is non-stationary at the level form. Nonetheless, these findings vary when they are examined at the first difference. It demonstrates that all variables are stationary at 10%, 5%, and 1% significance level in the three tests, except for UNE and EDU which only reject the null hypothesis at 10% and 5% individually in LLC test. In short, consistent results are obtained in the tests where all variables are stationary at 10%, revealing the existence of a stationary panel regression model.

4.2 Panel Cointegration Test

As stated in Chapter 3, two models are constructed to investigate SMP where GHG and COC are fixed while UNE and EDU exist in each model respectively. Hence, Pedroni and Kao tests are carried out to inspect the presence of cointegration among non-stationary time series variables in both models.

Table 4.2

Panel Cointegration Test Results for Model 1 and Model 2

	Model 1	Model 2
A) Pedroni		
Panel cointegration statistics (within-dimension)		
Panel v-Statistic	0.209 (0.417)	0.279 (0.390)
Panel rho-Statistic	-1.597* (0.055)	-1.365* (0.086)
Panel PP-Statistic	-9.333*** (0.000)	-9.911*** (0.000)
Panel ADF-Statistic	-9.209*** (0.000)	-9.542*** (0.000)
Group mean panel cointegration statistics (between-dimension)		
Group rho-Statistic	0.353 (0.638)	0.776 (0.781)
Group PP-Statistic	-10.532*** (0.000)	-13.169*** (0.000)
Group ADF-Statistic	-10.134*** (0.000)	-10.541*** (0.000)
B) Kao		
ADF	1.706** (0.044)	2.162** (0.015)

Note: Pedroni and Kao tests investigate the null hypothesis of no cointegration exists. *, ** and *** denote the rejection of the null hypothesis at 10%, 5%, and 1% significance level

respectively. The test statistic values are shown in the figure without a bracket while parentheses values are the probability values. The lag length is automatically adopted based on AIC.

Two models' test results are presented in Table 4.2. For both models, there are at least four within seven test statistics rejecting the null hypothesis of no cointegrating nexus for our variables at 10% significant level under the Pedroni tests. Meanwhile, Kao tests reveal a long-term cointegration among the variables at 5% significance level, matching with the findings of Pedroni tests. Therefore, a conclusion that all variables are cointegrated in the long term is drawn for Model 1 and Model 2.

4.3 Panel Long Run Estimates

Table 4.3

Panel DOLS and FMOLS Results for Model 1 and Model 2

Independent Variable	DOLS		FMOLS	
	Model 1	Model 2	Model 1	Model 2
GHG	0.383**	0.745***	0.539***	0.616***
	(0.017)	(0.000)	(0.000)	(0.000)
UNE	-0.211*	–	-0.192**	–
	(0.083)		(0.033)	
EDU	–	-0.940**	–	-0.479*
		(0.027)		(0.062)
COC	1.200***	1.122**	0.547*	0.714**
	(0.004)	(0.030)	(0.050)	(0.010)
Adjusted R^2	0.893	0.869	0.862	0.864
S.E. of regression	0.218	0.242	0.251	0.249

Note: DOLS and FMOLS investigate the long-term cointegrating relationships between the variables. *, ** and *** imply the rejection of the null hypothesis at 10%, 5%, and 1% significance level respectively. The coefficient estimates are shown in the figure without a bracket while the parentheses values are the probability values. Leads and lags are automatically chosen in accordance with AIC criterion.

The results from panel DOLS and FMOLS techniques used to assess the long-term impacts of each E, S, and G on SMP for two models are exhibited in Table 4.3. It

first revealed that in the big picture, all regressors have a substantial linkage with the regressand, evidenced in their p-values.

In Model 1, there is a positive link between GHG and SMP as well as COC and SMP, whereas a negative link between UNE and SMP in the long run. Based on the parameter estimated by DOLS, 1% rise in GHG and COC induces growth of 0.383% and 1.20% in SMP respectively. FMOLS, however, estimates an increase of 0.539% and 0.547% in SMP for every 1% increase in GHG and COC. As for UNE, 1% increase in UNE will cause a fall of 0.211% in SMP for DOLS and 0.192% for FMOLS. The long-run equation for Model 1 can be written as follows:

$$\text{DOLS: } \ln SMP_{it} = 0.383\ln GHG_{it}^{**} - 0.211\ln UNE_{it}^{*} + 1.200\ln COC_{it}^{***} \quad (4.1)$$

$$\text{FMOLS: } \ln SMP_{it} = 0.539\ln GHG_{it}^{***} - 0.192\ln UNE_{it}^{**} + 0.547\ln COC_{it}^{*} \quad (4.2)$$

When replacing the independent variable under the social pillar from UNE to EDU in Model 2, a consistent result is obtained where a positive long-term relationship exists between SMP with GHG and COC, except for their effects on SMP. Explicitly, both DOLS and FMOLS denote that one percent rise in GHG will result in greater SMP (0.745% for DOLS and 0.616% for FMOLS). As estimated by DOLS, 1% increase in COC contributes to a growth of 1.122% in SMP but it is slightly lower than the result of Model 1. For FMOLS, 1% rise of COC will lead to an escalation of 0.714% in SMP. In contrast, EDU has a negative relationship with SMP in which 1% increase in EDU causes a noble decline in SMP (0.94% for DOLS and 0.479% for FMOLS) as compared to UNE in Model 1. The long-run equation for Model 2 can be written as follows:

$$\text{DOLS: } \ln SMP_{it} = 0.745\ln GHG_{it}^{***} - 0.940\ln EDU_{it}^{**} + 1.122\ln COC_{it}^{**} \quad (4.3)$$

$$\text{FMOLS: } \ln SMP_{it} = 0.616\ln GHG_{it}^{***} - 0.479\ln EDU_{it}^{*} + 0.714\ln COC_{it}^{**} \quad (4.4)$$

To summarise, positive correlation between GHG and SMP was acquired. As claimed by Bolton and Kacperczyk (2021a), companies with high GHG emission

will be required to compensate their shareholders with greater return since the shareholders bear the carbon risk. Therefore, stock price will increase if the companies do not reduce their emission of GHG to the atmosphere. From firm's perspective, it has been proven by Miao (2023) that firms that produce more products will emit more GHG but at the same time, they will gain higher earnings which contributes to SMP advancement.

Besides, there is a negative relationship between UNE and SMP (Bernanke & Kuttner, 2005; Boyd et al., 2005; Jareño & Negrut, 2016). Rising UNE rates signify a recession which results in lower consumption, aggregate demand, and overall economic activity. This severely affects firms' financial performance and stock prices in a bearish market sentiment. On the contrary, stock prices and returns rise when there is a prosperous economy denoted with low UNE.

Next, EDU is negatively correlated with SMP backed by various findings. Dong et al. (2023) claimed that students with higher GPAs may pay more attention to their academics than making investments. It is because investor distraction and insufficient ability to manage information (Grinblatt et al., 2011) can adversely impact SMI, market liquidity, and thus the SMP.

Last, COC and SMP displayed a positive correlation. Principally, a higher COC denotes a low corruption, hence, leading to a finer performance of stock market of a country. This result is parallel with Hussain et al. (2017) that established a direct linkage of both COC and SMP. They proved that a country's SMP will increase by 4.3% when 1% increase in the management of corruption. In brief, investors believed that a well-built COC could open to a lower occurrence of corruption in a country and in the end, enjoy a sizeable return.

4.4 Panel Dumitrescu-Hurlin Granger Causality Test

Table 4.4 and Table 4.5 show the results from the panel causality test implemented to recognise the causal connection between variables for Model 1 and Model 2.

Further, the causality linkages between the variables for Model 1 and Model 2 are summarized graphically in Figure 4.1 and Figure 4.2 separately.

Table 4.4

Panel Dumitrescu-Hurlin Granger Causality Test Results for Model 1

Null Hypothesis	Probability	Conclusion
GHG does not homogeneously cause SMC	0.013**	GHG ↔ SMP
SMC does not homogeneously cause GHG	0.042**	
UNE does not homogeneously cause SMC	0.585	SMP → UNE
SMC does not homogeneously cause UNE	0.000***	
COC does not homogeneously cause SMC	0.014**	COC → SMP
SMC does not homogeneously cause COC	0.480	
UNE does not homogeneously cause GHG	0.093*	UNE → GHG
GHG does not homogeneously cause UNE	0.402	
COC does not homogeneously cause GHG	0.548	GHG → COC
GHG does not homogeneously cause COC	0.000***	
COC does not homogeneously cause UNE	0.629	–
UNE does not homogeneously cause COC	0.212	

Note: The panel causality test investigates the null hypothesis of no causality relationship from variable X to variable Y in short run. The optimal lag length is 3. *, ** and *** indicate the rejection of the null hypothesis at 10%, 5%, and 1% significance level respectively. X→Y represents the Granger causality directing from variable X to variable Y while bidirectional causal relations between variable X and variable Y for X↔Y.

Table 4.5

Panel Dumitrescu-Hurlin Granger Causality Test Results for Model 2

Null Hypothesis	Probability	Conclusion
GHG does not homogeneously cause SMC	0.013**	GHG ↔ SMP
SMC does not homogeneously cause GHG	0.042**	
EDU does not homogeneously cause SMC	0.662	SMP → EDU
SMC does not homogeneously cause EDU	6.E-07***	

COC does not homogeneously cause SMC	0.014**	COC → SMP
SMC does not homogeneously cause COC	0.480	
EDU does not homogeneously cause GHG	0.000***	EDU → GHG
GHG does not homogeneously cause EDU	0.290	
COC does not homogeneously cause GHG	0.548	GHG → COC
GHG does not homogeneously cause COC	0.000***	
COC does not homogeneously cause EDU	0.387	EDU → COC
EDU does not homogeneously cause COC	0.015**	

Note: The panel causality test investigates the null hypothesis of no causality relationship from variable X to variable Y in short run. The optimal lag length is 3. *, ** and *** indicate the rejection of the null hypothesis at 10%, 5%, and 1% significance level respectively. X→Y represents the Granger causality directing from variable X to variable Y while bidirectional causal relations between variable X and variable Y for X↔Y.

Figure 4.1

Causal Direction between the Variables for Model 1

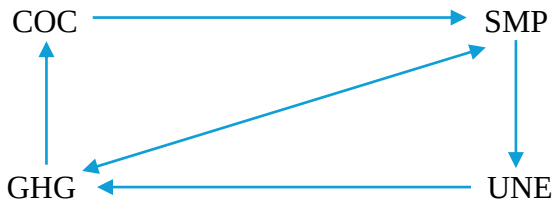
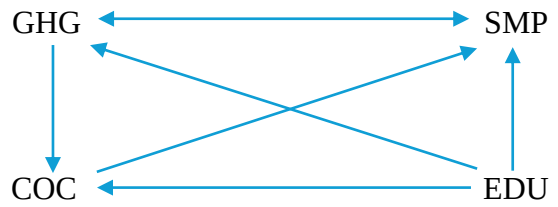


Figure 4.2

Causal Direction between the Variables for Model 2



For Model 1, there is unidirectional causality running from SMP to UNE, from UNE to GHG, from GHG to COC, and from COC to SMP; meanwhile, only one bidirectional causality exists between GHG and SMP. First, the result of the SMP granger causes UNE is consistent with the causality test result between these two variables of Pan (2018), Ağırman (2018) and Algieri et al. (2020). Previous findings such as Cui et al. (2022) and Xin et al. (2023) also discovered that UNE is the

granger cause of GHG where greenhouse gas emissions escalate with increased unemployment as environmentally friendly products and services are becoming less accessible, especially for those unemployed given their mounting financial burdens. Next, the unidirectional relationship of GHG with COC is presented indirectly. Based on Halkos and Paizanos (2013), when environmental issues like rising greenhouse gas emissions become more severe, government expenditure as a percentage of GDP will be increased to address it. Accordingly, it may create more opportunities for public servants to engage in corrupt practices for their benefits and therefore, higher COC will be required. Besides, COC's unidirectional causation to SMP supports the work of Mai et al. (2023). To illustrate, less corruption oversight will erode investor confidence, harming the country's stock market performance. Furthermore, the causal relationship between GHG and SMP can firstly be explained by the firms with high greenhouse gas emissions revealing higher productions are able to generate abnormal profits and thus lead to optimistic stock market growth (Miao, 2023). Moreover, firms have to compensate investors with greater return for bearing the carbon risk which resulted in better SMP (Bolton & Kacperczyk, 2021a). In contrast, the causal direction from SMP to GHG is in an indirect way. A sophisticated stock market will attract more foreign direct investment inflows which subsequently contribute to more environmental emissions (Huang et al., 2022; Ramirez, 2018).

As for Model 2, a bidirectional causal linkage is displayed between GHG and SMP as well. Apart from unidirectional causality from COC to SMP and from GHG to COC being the same as Model 1, another three exist. First, EDU is the granger cause of COC. Capasso and Santoro (2017) stated that corruption will increase when government spending on education increases. As a result, greater control will be needed to combat corruption. Moreover, EDU has a unidirectional causal relation with GHG and this result matches with the finding by Zaman et al. (2021) where higher education expenditures in the country lead to lower environmental emissions as the residents will be more educated and often make eco-friendly decisions. Last, SMP granger causes EDU indirectly where the stock market positively impacts government tax revenues, signalling more funds may be allocated in the education sector (Plíhal & Urbanovský, 2017).

4.5 Conclusion

Comprehensive results from all the tests conducted above have been acquired through EViews to provide a meaningful insight into our research.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.0 Introduction

Lastly, key findings relating to our results, implication of our study and the limitation together with recommendation for future studies will be laid out.

5.1 Discussion on Key Findings

Given that our variables are stationary at first level and cointegrating relationship exists in long term from panel unit root and cointegration tests' results, FMOLS and DOLS have been conducted to determine SMP's response towards each independent variable.

Referring to Chapter 4, we concluded that GHG is significant positively correlated to SMP. Relating to the studies conducted by Bolton and Kacperczyk (2021a), Bolton and Kacperczyk (2021b) as well as Li and Wu (2017), it is clearly shown that an increase in GHG emission will result in better SMP. For instance, investors of polluting companies are exposed to carbon risk since the world is putting effort in dealing with climate change and carbon emission. Thus, whenever there is amendment in the policy related to GHG emission, the polluting companies and investors may suffer losses. Due to this reason, investors will demand for greater compensation in terms of carbon premium for the risk borne. Miao (2023) mentioned that firms will earn higher profit by increasing the production that emit more GHG. Consequently, stock return rises for polluting firms and vice versa; hence, our result is consistent with the above-mentioned research.

Apart from that, the result of UNE is inversely connected to SMP which is backed by some of the prior studies (Bernanke & Kuttner, 2005; Boyd et al., 2005; Jareño

& Negrut, 2016). High UNE rates imply an economic downturn or recession, leading to a lower consumer spending and consumption, aggregate demand, and eventually economic activity. This will inversely impact firms' growth potential in terms of profitability and dividends paid. Inevitably, this can severely jeopardise the stock prices and returns since investors are pessimistic about the stock market. On the other hand, stock prices and stock returns will increase in a booming economy with low UNE as investors are more confident about firms' growth prospects.

Next, a significant reverse linkage occurs between EDU and SMP. This finding is supported by Dong et al. (2023) who revealed that students with higher GPAs may emphasise on their coursework over investing as their distraction and failure to handle information (Grinblatt et al., 2011) can negatively affect trading behaviour, reaction to firm updates and income reports (Pantzalis & Ucar, 2018), and institutional oversight (Kempf et al., 2017). Furthermore, Vaarmets et al. (2019) revealed that individuals in education, retail, health, and social career fields often exhibit increased risk aversion due to their caring and sympathetic qualities that against the stock market nature, which deter them from trading stocks. They further mentioned that knowledgeable people who are not competent in financial market operations may experience impediments such as unequal cognitive aptitude and suffering to obtain appropriate data for investment decision-making can negatively influence SMI. As such, a decline in SMI will result in lower stock market liquidity which subsequently adversely impact SMP.

Lastly, we concluded a positive linkage between COC and SMP. This is consistent with some of the past literatures. Commonly, investors hope to earn as much as returns that they can to offset their investment cost and gain outrageous profit. However, concern on corruption management in a country remained as a key consideration for investors since country-level governance will pressure firm-level governance. Thus, when a country has trouble in managing its corruption, investors will not find the country lucrative or profitable to pour their money in. In the end, the SMP of the country will be impacted terribly. Essentially, the abovementioned statements are proved to be true by Lee et al. (2019) and Mauro (1995).

5.2 Implications of Major Findings

5.2.1 Investors, Shareholders, and Firms

This study could be beneficial to investors, shareholders, and firms since they are the parties that closely related to the dependent variable, SMP. Any changes in the SMP will eventually influence their interests and benefits; hence, this study can broaden the horizon through investigating the impact of E, S and G on the SMP respectively. Since ESG has become a popular trend and increasingly important in the financial market, our study will help investors and shareholders by providing them with a fresh insight into ESG for their informed decision-making on strategic investment planning. Furthermore, firms may raise higher awareness on the importance of ESG initiatives by building more ethical and sustainable operations to achieve sustainability goals which enable them to move in tandem with government direction of a greener economy. Meanwhile, this assists companies in enhancing reputation, tapping into a broader local and foreign investors base, and thus boosting their desire to invest in the companies. For instance, it was shown that the stock return of firms that emit more GHG to the atmosphere is greater since the investors would receive compensation for bearing the carbon risk. Firms may also consider enforcing well control of corruption on firm-level that has proved to be positively correlated with the SMP to maximise corporate wealth.

5.2.2 Policymakers

Policymakers are one of the players in the financial market. With deeper understanding on the effect of ESG on SMP, they may establish and impose policies that will boost the SMP for the overall welfare and common good. In terms of environmental, this study may serve as a reference for the policymakers to deal with environmental issues, given that there is a positive connection between GHG emission and SMP. Moreover, it was concluded that UNE and EDU are negatively associated with SMP, so the policymakers could pursue and achieve the objectives desired with sufficient knowledge about the impacts of UNE and EDU on SMP. On

top of that, the positive relationship between COC and SMP may give a signal to the policymakers to implement comprehensive regulatory frameworks and procedures for the COC on firm and national levels to attract FDI into the country.

5.2.3 Researchers

There were numerous available research using a single total ESG score to investigate its impact on the SMP. Rather, this research examined the impact of E, S, and G individually on the SMP, which is a new method that is definitely rare or in fact, new as compared to past literatures. With that being said, our study can serve as a first step in providing more insights to the future researchers to employ the new method while considering the limitations and recommendations that are described in subsequent sections. As such, future researchers may extend this study to further strengthen and broaden the current scope of literature for the benefits and interests that align with all the stakeholders in the economy.

5.3 Limitations of Study

Given the nature of imperfections, our study possesses some degree of limitations that impede us from progressing this research at the initial stage of the journey. To begin with, the method of employing the datasets in our findings is an uncommon technique that is least used by past authors that we discovered. We engaged GHG, UNE and EDU, as well as COC as the proxies for E, S, and G respectively to examine their relationships with SMP. The rationale for this settlement was caused by the one and only root problem, inadequate data, for both independent and dependent variables.

First, engaging with ESG score as the proxy was our original and primary contemplation due to its wide coverage and comprehensiveness that reflects all of the ESG activities done by a company, which eventually resulted in the overall ESG score of a country. Nevertheless, this idea was disappointedly removed as there

were only six countries with stock exchanges disclosed their ESG scores and the longest number of years available are only 19 via the data collection from Refinitiv. This may be due to the government of myriad countries do not emphasise on encouraging the firms to reveal their E, S, and G score individually in the past. Thus, the final ESG score in the countries were unable to obtained. One fact that we cannot deny is people in the past were not interested in knowing the sustainability or ESG level of a firm. Nonetheless, ESG has become a trend and a factor that investors would look up to when investing in a firm. For instance, Malaysia government required all of its public listed companies to obligatory submit their sustainability report starting from the last eight years only (Raj, 2022). In 2024, the government is planning to showcase the ESG level of Malaysian firms by incorporating stringent actions in the ESG reporting, given the rising needs of sustainability disclosure in the business world (The Star, 2024). In short, we derived the data of each proxy through World Bank DataBank due to the weaknesses of ESG scores.

Second, even with the datasets from World Bank, the similar issue was not preventable but occurred in the indicator of SMP – SMC. For instance, New Zealand, Italy, United Kingdom, Myanmar, the Netherlands, and Portugal are partial of the countries with incomplete market capitalisation data. Hence, to achieve a satisfied number of observations in ensuring the reliability of our findings, we settled the concern by deploying selected countries in the three different regions – Asia Pacific, Americas, and Europe. Not only that, but the transparency issue with stock exchanges in several countries has also caused the root problem to occur as not every country is willing to unveil most of its information, not to mention, ESG information.

In fines, we believe that there are chances of eliminating or minimising the aforesaid restraints with our recommended ideas as well as the gradual realisation of ESG as an important element in affecting SMP of a country.

5.4 Recommendations for Future Research

Given the sole constraint – insufficient data, it has led to several contagious consequences mentioned above. Hence, recommendations aiming to improve the similar study in the time to come are necessary, especially with the influence of the uplifting development of ESG. Before all else, recognition of the inevitable roles played by government in every country has been stressed since beginning. Thus, action plans specifically by governments will be emphasised.

First, we propose governments and associated organisations or authorities worldwide to openly disclose a greater extend of data and information that relates to ESG so that everyone, especially researchers can have access to it freely without any barrier when doing research. Certainly, the disclosure will add up the transparency level of the dataset, implying a more trustable research conclusion as well as policy inauguration by researchers and policymakers respectively. The rationale is that policymakers normally design and execute policies by referring to the studies done by various researchers. Therefore, when public have faith on the research, they will acknowledge and credit the policy enacted as well. Clearly, both parties should be helping each other given their direct relationship. Realisation on the importance of ESG in today's world can be rewarding for a country as its significance is getting prioritised and apparent by the principal party – investors, who act exceptionally supreme in a country as a form of FDI. In brief, accessible and generous data disclosure will greatly benefit researchers in coming out with research that are relatable and useful for governments to design and conduct policies that can be lucrative for FDI, which will ultimately better off the country.

Furthermore, governments may levitate the disclosure of ESG-related information and data by incentivising firms with various means such as tax deductions and suitable grants and subsidies. Such means do not only rally existing firms that proactively unveil their ESG-related information, but also able to stimulate those firms that do not practice ESG or disclose their ESG activities to actively engage in government's plan in promoting and uplifting the ESG score in the country.

In a nutshell, the measurements above are proposed to better off the future research. We hope that relevant governments and authorities can take these into consideration to alleviate the limitations that we encountered.

5.5 Conclusion

All in all, the reviews in above parts – Key discussions, implication and shortcomings of this research along with suggestions for future researchers have been concluded in our last chapter, Chapter 5.

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APPENDICES

Appendix 4.1: LLC Test for SMP (Level)

Null Hypothesis: Unit root (common unit root process)
Series: SMC
Date: 03/26/24 Time: 21:24
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 364
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-0.27895	0.3901

Appendix 4.2: LLC Test for SMP (First Difference)

Null Hypothesis: Unit root (common unit root process)
Series: D(SMC)
Date: 03/26/24 Time: 21:24
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 338
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-5.25688	0.0000

Appendix 4.3: LLC Test for GHG (Level)

Null Hypothesis: Unit root (common unit root process)
Series: GHG
Date: 03/26/24 Time: 17:02
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 449
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	0.50056	0.6917

** Probabilities are computed assuming asympotic normality

Appendix 4.4: LLC Test for GHG (First Difference)

Null Hypothesis: Unit root (common unit root process)
Series: D(GHG)
Date: 03/26/24 Time: 17:03
Sample: 2002 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 429
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-9.61640	0.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.5: LLC Test for UNE (Level)

Null Hypothesis: Unit root (common unit root process)
Series: UNE
Date: 03/26/24 Time: 17:37
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 442
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	1.01793	0.8456

** Probabilities are computed assuming asympotic normality

Appendix 4.6: LLC Test for UNE (First Difference)

Null Hypothesis: Unit root (common unit root process)
Series: D(UNE)
Date: 03/26/24 Time: 17:38
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 416
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-1.40395	0.0802

** Probabilities are computed assuming asympotic normality

Appendix 4.7: LLC Test for EDU (Level)

Null Hypothesis: Unit root (common unit root process)
Series: EDU
Date: 03/27/24 Time: 17:14
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 350
Cross-sections included: 25 (1 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	19.9544	1.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.8: LLC Test for EDU (First Difference)

Null Hypothesis: Unit root (common unit root process)
Series: D(EDU)
Date: 03/27/24 Time: 17:15
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 325
Cross-sections included: 25 (1 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-1.83467	0.0333

** Probabilities are computed assuming asympotic normality

Appendix 4.9: LLC Test for COC (Level)

Null Hypothesis: Unit root (common unit root process)
Series: COC
Date: 03/26/24 Time: 16:58
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 442
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	0.84783	0.8017

** Probabilities are computed assuming asympotic normality

Appendix 4.10: LLC Test for COC (First Difference)

Null Hypothesis: Unit root (common unit root process)
Series: D(COC)
Date: 03/26/24 Time: 16:59
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 416
Cross-sections included: 26

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-5.83521	0.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.11: IPS Test for SMP (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: SMC
Date: 03/27/24 Time: 17:12
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 4
Total (balanced) observations: 364
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-2.73232	0.0031

Appendix 4.12: IPS Test for SMP (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(SMC)
Date: 03/27/24 Time: 17:13
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 4
Total (balanced) observations: 338
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-9.42746	0.0000

Appendix 4.13: IPS Test for GHG (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: GHG
Date: 03/26/24 Time: 17:04
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Total number of observations: 449
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	1.18106	0.8812

** Probabilities are computed assuming asympotic normality

Appendix 4.14: IPS Test for GHG (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(GHG)
Date: 03/26/24 Time: 17:05
Sample: 2002 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Total number of observations: 429
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-9.69037	0.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.15: IPS Test for UNE (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: UNE
Date: 03/26/24 Time: 17:40
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 442
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	1.01553	0.8451

** Probabilities are computed assuming asympotic normality

Appendix 4.16: IPS Test for UNE (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(UNE)
Date: 03/26/24 Time: 17:40
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 416
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-5.25763	0.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.17: IPS Test for EDU (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: EDU
Date: 03/26/24 Time: 17:45
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 4
Total (balanced) observations: 350
Cross-sections included: 25 (1 dropped)

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-0.55125	0.2907

** Probabilities are computed assuming asympotic normality

Appendix 4.18: IPS Test for EDU (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(EDU)
Date: 03/26/24 Time: 17:46
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 4
Total (balanced) observations: 325
Cross-sections included: 25 (1 dropped)

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-4.06174	0.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.19: IPS Test for COC (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: COC
Date: 03/26/24 Time: 16:59
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 442
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	1.05719	0.8548

** Probabilities are computed assuming asympotic normality

Appendix 4.20: IPS Test for COC (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(COC)
Date: 03/26/24 Time: 17:00
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 416
Cross-sections included: 26

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-7.64936	0.0000

** Probabilities are computed assuming asympotic normality

Appendix 4.21: ADF Test for SMP (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: SMC
Date: 03/26/24 Time: 21:22
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 4
Total (balanced) observations: 364
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	80.3725	0.0070
ADF - Choi Z-stat	-1.21103	0.1129

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.22: ADF Test for SMP (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(SMC)
Date: 03/26/24 Time: 21:23
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 4
Total (balanced) observations: 338
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	196.435	0.0000
ADF - Choi Z-stat	-8.91619	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.23: ADF Test for GHG (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: GHG
Date: 03/26/24 Time: 17:05
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Total number of observations: 449
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	59.8017	0.2135
ADF - Choi Z-stat	1.34823	0.9112

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.24: ADF Test for GHG (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(GHG)
Date: 03/26/24 Time: 17:06
Sample: 2002 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Total number of observations: 429
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	201.195	0.0000
ADF - Choi Z-stat	-8.73653	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.25: ADF Test for UNE (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: UNE
Date: 03/26/24 Time: 17:41
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 442
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	53.1657	0.4291
ADF - Choi Z-stat	0.93865	0.8260

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.26: ADF Test for UNE (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(UNE)
Date: 03/26/24 Time: 17:42
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 416
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	117.746	0.0000
ADF - Choi Z-stat	-5.42297	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.27: ADF Test for EDU (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: EDU
Date: 03/26/24 Time: 17:47
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 4
Total (balanced) observations: 350
Cross-sections included: 25 (1 dropped)

Method	Statistic	Prob.**
ADF - Fisher Chi-square	56.0123	0.2595
ADF - Choi Z-stat	2.30193	0.9893

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.28: ADF Test for EDU (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(EDU)
Date: 03/26/24 Time: 17:48
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 4
Total (balanced) observations: 325
Cross-sections included: 25 (1 dropped)

Method	Statistic	Prob.**
ADF - Fisher Chi-square	90.2460	0.0004
ADF - Choi Z-stat	-2.50393	0.0061

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.29: ADF Test for COC (Level)

Null Hypothesis: Unit root (individual unit root process)
Series: COC
Date: 03/26/24 Time: 17:01
Sample: 2002 2020
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 442
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	36.2356	0.9525
ADF - Choi Z-stat	1.04576	0.8522

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.30: ADF Test for COC (First Difference)

Null Hypothesis: Unit root (individual unit root process)
Series: D(COC)
Date: 03/26/24 Time: 17:02
Sample: 2002 2020
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 416
Cross-sections included: 26

Method	Statistic	Prob.**
ADF - Fisher Chi-square	152.369	0.0000
ADF - Choi Z-stat	-7.82579	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix 4.31: Pedroni Test for Model 1

Pedroni Residual Cointegration Test
Series: SMC GHG UNE COC
Date: 03/26/24 Time: 15:54
Sample: 2002 2020
Included observations: 494
Cross-sections included: 26
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on AIC with a max lag of 3
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.209471	0.4170	-1.071697	0.8581
Panel rho-Statistic	-1.597220	0.0551	-1.785736	0.0371
Panel PP-Statistic	-9.333376	0.0000	-9.190935	0.0000
Panel ADF-Statistic	-9.209274	0.0000	-9.280663	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.353101	0.6380
Group PP-Statistic	-10.53249	0.0000
Group ADF-Statistic	-10.13417	0.0000

Appendix 4.32: Pedroni Test for Model 2

Pedroni Residual Cointegration Test
Series: SMC GHG EDU COC
Date: 03/26/24 Time: 16:50
Sample: 2002 2020
Included observations: 494
Cross-sections included: 26
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on AIC with a max lag of 3
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.278711	0.3902	-1.066250	0.8568
Panel rho-Statistic	-1.364718	0.0862	-1.768718	0.0385
Panel PP-Statistic	-9.911333	0.0000	-10.58892	0.0000
Panel ADF-Statistic	-9.541689	0.0000	-10.44788	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.775630	0.7810
Group PP-Statistic	-13.16913	0.0000
Group ADF-Statistic	-10.54051	0.0000

Appendix 4.33: Kao Test for Model 1

Kao Residual Cointegration Test
Series: SMC GHG UNE COC
Date: 03/26/24 Time: 15:53
Sample: 2002 2020
Included observations: 494
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on AIC with a max lag of 4
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	1.705996	0.0440
Residual variance	0.075814	
HAC variance	0.030530	

Appendix 4.34: Kao Test for Model 2

Kao Residual Cointegration Test
Series: SMC GHG EDU COC
Date: 03/26/24 Time: 16:50
Sample: 2002 2020
Included observations: 494
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on AIC with a max lag of 4
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	2.162314	0.0153
Residual variance	0.077098	
HAC variance	0.030557	

Appendix 4.35: Panel DOLS for Model 1

Dependent Variable: SMC
Method: Panel Dynamic Least Squares (DOLS)
Date: 03/26/24 Time: 15:57
Sample (adjusted): 2003 2020
Periods included: 18
Cross-sections included: 26
Total panel (unbalanced) observations: 426
Panel method: Pooled estimation
Cointegrating equation deterministics: C
Automatic leads and lags specification (based on AIC criterion, max=*)
Coefficient covariance computed using default method
Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for coefficient covariances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GHG	0.383392	0.159516	2.403461	0.0172
UNE	-0.210989	0.121184	-1.741060	0.0833
COC	1.200086	0.416184	2.883546	0.0044

R-squared	0.951435	Mean dependent var	4.228898
Adjusted R-squared	0.893056	S.D. dependent var	0.666928
S.E. of regression	0.218101	Sum squared resid	9.180597
Long-run variance	0.024899		

Appendix 4.36: Panel DOLS for Model 2

Dependent Variable: SMC
Method: Panel Dynamic Least Squares (DOLS)
Date: 03/26/24 Time: 16:40
Sample (adjusted): 2003 2020
Periods included: 18
Cross-sections included: 26
Total panel (unbalanced) observations: 428
Panel method: Pooled estimation
Cointegrating equation deterministics: C
Automatic leads and lags specification (based on AIC criterion, max=*)
Coefficient covariance computed using default method
Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for coefficient covariances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GHG	0.745305	0.208048	3.582373	0.0004
EDU	-0.939888	0.422210	-2.226113	0.0271
COC	1.121959	0.512516	2.189119	0.0297

R-squared	0.938167	Mean dependent var	4.226118
Adjusted R-squared	0.868644	S.D. dependent var	0.667385
S.E. of regression	0.241881	Sum squared resid	11.75980
Long-run variance	0.038804		

Appendix 4.37: Panel FMOLS for Model 1

Dependent Variable: SMC
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 03/26/24 Time: 15:55
Sample (adjusted): 2003 2020
Periods included: 18
Cross-sections included: 26
Total panel (balanced) observations: 468
Panel method: Pooled estimation
Cointegrating equation deterministics: C
Coefficient covariance computed using default method
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GHG	0.538699	0.118660	4.539856	0.0000
UNE	-0.191855	0.089738	-2.137948	0.0331
COC	0.547077	0.278663	1.963220	0.0503

R-squared	0.870702	Mean dependent var	4.211229
Adjusted R-squared	0.862455	S.D. dependent var	0.675482
S.E. of regression	0.250516	Sum squared resid	27.55098
Long-run variance	0.082761		

Appendix 4.38: Panel FMOLS for Model 2

Dependent Variable: SMC
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 03/26/24 Time: 16:40
Sample (adjusted): 2003 2020
Periods included: 18
Cross-sections included: 26
Total panel (balanced) observations: 468
Panel method: Pooled estimation
Cointegrating equation deterministics: C
Coefficient covariance computed using default method
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GHG	0.616188	0.120931	5.095371	0.0000
EDU	-0.478576	0.256065	-1.868964	0.0623
COC	0.713569	0.277202	2.574181	0.0104

R-squared	0.871929	Mean dependent var	4.211229
Adjusted R-squared	0.863760	S.D. dependent var	0.675482
S.E. of regression	0.249325	Sum squared resid	27.28949
Long-run variance	0.084590		

Appendix 4.39: Panel Dumitrescu-Hurlin Granger Causality Test for Model 1

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 07/28/24 Time: 13:02
Sample: 2002 2020
Lags: 3

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
GHG does not homogeneously cause SMC	6.02145	2.47782	0.0132
SMC does not homogeneously cause GHG	5.63641	2.03701	0.0416
UNE does not homogeneously cause SMC	4.33371	0.54560	0.5853
SMC does not homogeneously cause UNE	7.25064	3.88507	0.0001
COC does not homogeneously cause SMC	6.00793	2.46235	0.0138
SMC does not homogeneously cause COC	4.47400	0.70621	0.4801
UNE does not homogeneously cause GHG	5.32632	1.68200	0.0926
GHG does not homogeneously cause UNE	4.58876	0.83760	0.4023
COC does not homogeneously cause GHG	4.38193	0.60081	0.5480
GHG does not homogeneously cause COC	6.94162	3.53129	0.0004
COC does not homogeneously cause UNE	4.27914	0.48312	0.6290
UNE does not homogeneously cause COC	4.94718	1.24794	0.2121

Appendix 4.40: Panel Dumitrescu-Hurlin Granger Causality Test for Model 2

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 07/28/24 Time: 13:01
Sample: 2002 2020
Lags: 3

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
GHG does not homogeneously cause SMC	6.02145	2.47782	0.0132
SMC does not homogeneously cause GHG	5.63641	2.03701	0.0416
EDU does not homogeneously cause SMC	3.47529	-0.43716	0.6620
SMC does not homogeneously cause EDU	8.22866	5.00476	6.E-07
COC does not homogeneously cause SMC	6.00793	2.46235	0.0138
SMC does not homogeneously cause COC	4.47400	0.70621	0.4801
EDU does not homogeneously cause GHG	7.02146	3.62269	0.0003
GHG does not homogeneously cause EDU	4.78225	1.05911	0.2895
COC does not homogeneously cause GHG	4.38193	0.60081	0.5480
GHG does not homogeneously cause COC	6.94162	3.53129	0.0004
COC does not homogeneously cause EDU	4.61310	0.86547	0.3868
EDU does not homogeneously cause COC	5.98223	2.43292	0.0150