

EFFECT OF ENVIRONMENTAL, SOCIAL, AND
GOVERNANCE FACTORS ON FIRM VALUE: A STUDY
ON INFORMATION TECHNOLOGY COMPANIES IN THE
UNITED STATES

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- (1) This Research Project is the end result of my 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 research project 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.
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LIST OF ABBREVIATION

ESG	Environmental, Social and Governance
MTBR	Market-to-book Ratio
CAPEX	Capital Expenditure
ROA	Return of Assets
IND	Independent Directors
PROFIT	Profitability
POLS	Pooled Ordinary Regression Model
FEM	Fixed-Effect Model
REM	Random-Effect Model
GMM	Generalized Method of Moments
BFO	Brusov-Filatova – Orekhova
ROE	Return on Equity

ABSTRACT

The objective of this study is to analyze the relationship between environmental, social and governance factor scoring and firms' value, focusing on information technology companies in the United States. There is a total of 62 companies, where the data was collected ranges from 2016 to 2021. The results portrayed that there is a positive significant relationship between environmental factors and firm value; social factors has a negatively significant relationship with firm value and governance factors has a negative impact to the firm value depending on the methods used to conduct the analysis. These could believe that ESG factors do impact the firm value of the information technology companies in the United States.

Besides, this study contributes to the business field, as it provides an insight to the high management in working on ESG strategy planning wisely. This study as well as provides academic contribution by filling in the gap on limited research on individual ESG factors and the firm value.

CHAPTER 1

INTRODUCTION

This chapter presents the research background, problem statement of the research, research objectives and significant of the study.

1.1 Research Background

Sustainable investment has been raised 15%, reached USD 35.3 trillion over the two years since 2018 to 2020. Majority of the sectors are observing an increase in sustainable investment assets, with Canada recording the highest growth in absolute terms which is 48%, then led by the United States with 42% (Global Sustainable Investment Alliance (GSIA), 2020). Investors are advised by the United Nations Principles for Responsible Investment take into consideration of Environmental, Social, and Governance (ESG) factors when assessing potential financial investment firms (Dinca, Vezeteu and Dinca, 2022). Thus, with the growth and attention on sustainable investment, it can clearly be seen that there are more countries being attentive to sustainable related disclosure by asking ESG disclosures report a mandatory report in the companies such as Singapore (Chun, Tay & Tan, 2021). This same goes to the announcement made by Securities and Exchange Commission (SEC) of United Kingdom on year 2022, new requirement on ESG declaration is made which is mandatory for the public companies that over 500 employees or more than 500 Euro million annual turnover, to declare climate-related disclosures, the impact of climate risk and the risk management for the governance on this (The Companies (Strategic Report) (Climate-related Financial Disclosure) Regulations 2022, 2022).

Also, Corporate Sustainability Reporting Directive in Europe has the same requirement for the companies on ESG reports starting from financial year 2023 onwards (Steinhaeuser, 2022). This can be seen that the role of corporate governance in an organization's management and value is not new. It has been given enhanced importance and linked with the recent global trend of sustainability, especially relating to concerns on the environment and social impact.

Besides, exchange traded fund (ETF) recorded a \$528 millions of inflows fund for the ETF that has a track on environmental, social and governance principles (Nasdaq, 2022). Researcher also mentioned that during the Covid-19 crisis, ESG funds has outperformed conventional funds and industry that aced the market such as healthcare and tech (Barberis & Briere, 2020). Investor perceived ESG funds as a safer choice in the long run and this caused the share prices of the companies with ESG investment rises more than their competitors that do not invest in ESG investment. It has been able to see that ESG investment for the companies could affect the investors' decision, and this impacted the firm value.

Hence, the changes of the “Environmental, Social, and Governance” (ESG) on the firm value become a worthy research focus. Implementation of ESG required short-term costs for a firm as ESG often comes with financial resources to obtain environmental-friendly equipment which impacts the financial status of the firm. Therefore, research is carried out to study the consequences of ESG initiatives on firms' value, for the advantage of the management on the decision of ESG investment. Numerous studies on listed companies did research on determinants of firms' value but lack focus on the roles of ESG. While financial and manufacturing companies tend to be the favorite picks for study in the past, the contemporary era of the 4th Industrial Revolution called for more studies on information technology-related companies.

Over the last few years, technology sector has grown to be very important to the global economy, especially in the United States who currently has the largest technology market which is 33% of the world technology sector. In spite of Covid-19, technology industry has been an uptrend since customers are searching for optional methods to support remote work. Nonetheless, Nasdaq-100 Technology Sector Index, one of the proxy for US stock market, was recorded 100 in 2017 but it has a significant increase on 2021 which is around 350. Since January 2017 until 2022 it recorded a 20.24% on annualized returns on technology stocks (Goldman Sachs, 2022). Otherwise, digital transformation has been a trend for the company, and this is currently growing continuously. The technology industry is anticipated to reach US\$1.8trillion in year 2022 in United States while it will reach US\$ 5.3 trillion worldwide (CompTIA, 2021). Fast growing technology sector has caused climate impact negatively as more energy is needed to sustain huge servers and data banks as well as mining cryptocurrency.

1.2 Statement of Research Problems

Perspectives and debates on value have been inconclusive yet fascinating. In classic economic school of thought, something has value because it involves cost and effort to realize it. For example, pearl have value because it needs labor cost to dive in to get it. Hence, a firm has value because it needs assets, investment, and effort to realize it. Therefore, total assets, equity, debt, and investment are common factors in calculating firm value. Financial perspective not only links the firm value to its assets, capital, and management quality but how these factors grow or potentially grow over time. Expected net present value over a horizon of future for return of assets and profit, potential business or sales revenue growth, market to book value and even goodwill are among common financial criteria to determine firm value. In another contrasting perspective, the marginalist school of thought focuses on perception and willingness to pay based on satisfaction or utility to determine value. This school of thought viewed that pearl have value not because of people dive for it. People dive for pearl because pearl itself has value, which comes from the satisfaction or utility that it can give to someone that consume (owned) it. Applying it back to firm, its value may extend to perception of investors and their willingness to pay for (buy or owned) it based on their satisfaction. Given increasing global awareness on the environmental, social, and governance, collectively known as ESG impact to business operation, investors may gauge the value of investment or firm based on their perception on the firm's engagement of ESG (Gao, Li & Zou 2022).

The United Nations' Sustainable Development Goals (SDGs) required participating countries like United States to achieve its seventeen goals regarding the environment, social inclusiveness and welfare, and governance. The SDG not only affects government policies at the national level but is also impactful to the firms' practices and values. Thus, the environmental, social, and governance aspects have become new and important factors, either individually or collectively. Across the research available, there are still no conclusive findings on the roles of ESG to firm value, either through their individual proxy or collectively as an index of ESG achievement. Furthermore, there is still a lack of research on ESG implications on the firm's value on public companies that specifically in technology sectors. ESG has been frequently mentioned by society, and further enforced by the department of corporate governance, which is currently happening worldwide. However, the issue of how ESG

operations have an impact on the firm's value is still extensively investigated (Fatemi, Glaum and Kaiser, 2018). Furthermore, the ESG strategy taken into consideration by the board of management has increased the confidence of investors is under observation (Chen and Xie, 2022). Nonetheless, the recent studies encourage exploring to a greater depth on each of the ESG dimensions as thus far, there are lacking studies conducted for the specific categories of ESG on firm value. (de la Fuente, Ortiz, and Velasco, 2022; Aouadi and Marsat, 2018).

Besides, the function for technology sector in ESG is currently understudies, although it brings a significant effect to ESG. Technology companies, act as datacenter providers who provide essential components of cloud computing infrastructure are consuming a lot of energy as more enterprises store the data on cloud (Marsh and Robinson, 2021) which causes pollution to the world. Since most modern technologies run on electricity, there is an increase in power consumption, which is depleting potential energy at a rate ten times faster than it was. Technologies accelerates the depletion of non-renewable fossil fuels, so increased use of technology is equivalent to increased use of energy. Furthermore, humanity has become dependent on technological devices such as phones, tablets, desktop which increases WiFi and internet access that causes the increases of radiation production. While research shown that environmental and climate change is the biggest risk to grow for tech companies (KPMG, 2020) there is only 26% of tech companies have meaningfully incorporated ESG into their strategy planning, according to a recent CEO poll (Bubenzer-Paim, 2022). Contemporary issues on ESG and firm value have raised two worthy research questions for this study. What is the impact of ESG on firm value? On one hand, ESG may enhance the firm value as it calls for a sustainable business model and bodes well with investors' perception and evaluation of the firm. If the firm does take into consideration potential environmental impacts such as climate change that have potential effect to the business operation, input or natural resources availability and cost of production, then the firm may have better preparation, resilient and sustainability. These will enhance the firm value, thus the relationship between environmental factor and firm value is observed to be positive. However, compiling to good environmental practices may lead to higher operational costs and disturbance to existing efficient business model such as transition from a cost-effective method to green technology production. Such adverse impacts may give a negative relationship between environmental factor to firm value.

On the social factor, practicing and taking into consideration issues like fair wages, labor standard, employees' welfare, ethical practice in the firm's employment and supply chain may bold well with investor perception and valuation but also not so cost-effective to adhere. Hence, how will taking into consideration the social factors impacted the firm value? On the governance aspect, it is rational that good governance which include transparency, integrity, accountability, and good leadership have positive impact to firm value, yet this view is not conclusive. Contrary, the commitment to ESG may cause higher cost of doing business, hence negatively impacting firm value. In short, current environmental, social, and financial issues increasingly led policy maker, business stakeholders and investors to incorporate the sustainability aspects in decision making, the question of how ESG principles may affect firm value remain debatable (Cesarone, Martino & Carleo 2022). Thus, more research work is needed to investigate the implications of ESG in terms of various methodologies in technology sectors. Consequently, the advantages of management to have a better overview of ESG investment and managerial insights to better handle issues related to ESG followed by the continuous increasing importance of ESG in achieving sustainability in business.

The research questions for this study are as follows.

- (i) What is the relationship between environmental factor scoring on firms' value?
- (ii) What is the relationship between social pillar factor on firms' value?
- (iii) What is the relationship between governance factor scoring on firms' value?

1.3 Research Objectives

The general objective of the study is to examine the effect of environmental, social, and governance (ESG) factors on firm value. The following three specific research objectives aim to answer the mentioned research questions.

- (i) To analyse the relationship between environmental factor scoring and firms' value
- (ii) To analyse the relationship between social pillar factor and firms' value
- (iii) To analyse the relationship between governance factor scoring and firms' value

1.4 Significant of the Study

Since ESG is the current new global trend and awareness in accordant with the United Nation's Sustainable Development Goals (SDG) and there are more companies putting awareness on ESG, especially after the Covid-19 pandemic. The companies realize the importance of building resilience in the business model, at the same time contribute to the society. This research could provide insights to high-level management of a company to decide and understand whether ESG investment can increase, decrease or no effect on firm value. By having this insight, the management can plan on the costing to maximize firm profit and asset optimization from ESG investment. Concurrently, the research result could facilitate the companies' top management in comply to the regulatory and legal without compromise the companies' firm value. In case of pursuing ESG factor harming firm value, companies can take ratification action to adjust the company strategies.

This study could benefit the investor to understand a company's firm value based on ESG investment. ESG investor often a value-based investor that focuses on long term return, thus, this type of investor often understands ESG investment required a longer time frame to create more firm value. The research may aid in provide insights in companies' sustainable development capabilities for the investor to make a better investment decision based on their preferences, such as ESG intensification, firm value maximization or both.

In term of government policy, any positive findings can provide encouragement and justification to the government to create and enforce policies to further boost the environmental, social and governance achievement levels. Any negative findings can prompt the government to re-strategies its existing policy on ESG to negate harm to firm value. These are important in order to achieve high level of environment care, social responsibility and governance without jeopardizing firm value.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Determining firm value is an evergreen issue for investors and researchers but various of doubt and confusion remain. The conceptualization of firm value is ambiguous and its relationships with variety of possible determinants are inconclusive. Contemporary global trend towards sustainable development has linked firm value to the environmental, social and governance aspects, which collectively known as ESG. Environmental, social and governance (ESG) taken by the investor to consider it as one of the sources in investment decision making, be it financially or non-financially factors. The idea that ESG issues can be financially material has gained traction not only among investors, but also among businesses and, increasingly, regulators with proven records of ESG related materials has been produced by various companies (Freiberg, et al., 2020). Investors perceived that ESG measures are more valuable for risk revealing instead of competitive positioning (Amel-Zadeh & Serafeim, 2017; Park & Jang, 2021). This is due to risk management plays a big part in a business especially after the Covid-19 pandemic hits to improve business sustainability where the article of Howard-Grenville (2021) revealed that ESG is currently the most extensively utilized indicator of sustainability criteria for holding companies accountable. Numerous studies highlight the advantages of incorporating sustainability and environmental indicators into the credit risk management (Bauer and Hann, 2010). Weber et al. (2010) demonstrated how sustainability criteria may be utilized to enhance the predictive validity of the credit rating process and forecast a debtor's financial performance. They found that that sustainability affects a company's financial performance, including its creditworthiness. Literature review on roles of ESG are further elaborated based on respective selected proxy for firm value, namely market-to-book ratio, profitability and return on assets.

2.2 Firm Value

Firm value generally is a notion in economics that depicts the worth of a company which is the value that a company deserves at a specific time. So, maximize the companies' firm value is important to the management or investors. A management has performed well in terms of achievement for the organization if they are able to boost firm value. Investors may be incentivized to invest in the company if they perceive that the increasing stock price signifies an enhancement in the firm's value, which in turn, reflect favorably on the business (Triani & Tarmidi, 2019).

Firm value could be measured by various statistics and calculations such as the calculation of abnormal returns and cumulative abnormal returns, Tobin's Q and market-to-book value. Tobin's Q often known as the market value to replace value ratio of a company's assets and its application as the proxy for firm value is the most crucial application (Sauaia & Castro, 2002). Tobin's Q can represent long term, intangible investment rewards at the same time is an all-encompassing performance indicator. This is due to it integrates various elements of business performance, notably earnings, sales, cash flow and revenue volatility, to facilitate valuing the business (Haryanto, Chariri & Yeyetta, 2021). It has proven that companies that do better have a greater Tobin's Q than those that perform worse.

Likewise, the measurement of Tobin's Q not only limited to measure the past performance of the companies, it also an indicator of the companies' growth opportunities correspondingly to the value of Tobin's Q (Sauaia & Castro, 2002). Tobin's Q enumerated annually and determined as the addition of market value of the shareholders' equity and the book value of assets deduct the book value of the shareholders' equity divided by the book value of assets. Due to the validity and reliability of Tobin's Q, various researchers have adopted Tobin's Q as indicator to measure firm value (Haryanto, Chariri & Yeetta, 2021; Wahidawati & Ardini, 2021; Bose et al., 2022).

Nevertheless, a value of Tobin's Q greater than 1 suggests that one organization has less debt, whereas the q value lesser than 1 indicates the opposite. Thus, Tobin's Q value is expected to be higher for new or intangible intensive firms because new firms are likely to have less debt in their capital structure. Tobin's Q could be partially proven through various variables

computation without the existence of last economic theory, intangible assets or growth opportunities (Cardio-Pito, 2022). In other words, Tobin's Q could measure the organizational' growth opportunities and its debt level. This could be a great indicator for investors as a reference in decision-making for investing.

While for market-to-book-ratio (MTBR), its derived by dividing the stock's market recent quarter's book value per share by the stock's current closing price. Companies with higher market-to-book ratio have lower leverage ratios where commonly known as. This indicate that company with lower leverage ratio has a stable revenue stream and not distributing most of its cash flow to paying off debts.

2.3 Environmental, Social and Governance (ESG)

ESG does not has a universal definition as each of the scale that used to measure ESG define them differently, which is different with corporate social responsibility(CSR). This is owing to the fact that the criteria adopted to measure ESG is nonfinancial attributes and dependent on companies' self-reports. ESG is generally a standard and technique used by the investors to gauge corporate conduct and potential future financial performance. The three fundamental components, which are environmental (E), social (S) and governance (G) are the most significant aspects to take into consideration during the process of investment research and decision-making as an investment concept for assessing the sustainable development of businesses. During the COVID-19 outbreak, the phenomena of including ESG in the investment decision-making process has grown even more as economic development is highly dependent on environmental quality. According to a statement made by the Norwegian Central Bank Investment Management Agency (NBIM), investments will not be made in firms with inadequate ESG performance. The same holds true for the circumstances in South Korea. By 2022, the National Pension Service intends to have invested 50% of its assets under management in organization that have an emphasis on ESG (Chang and Lee, 2022). Thus, ESG is an investment that seeks long-term value growth that supports with a comprehensive, practical governance approach (Li, et al., 2021).

Moreover, multiple ESG related research has been carried by the researchers. The research on ESG principally concentrated on social responsibility, and organizational level of firms. Topics

of happiness, shareholder value, performance of an organization, institutional theory are the areas that ESG research focus widely and majorly. Likewise, academic people from different countries have cooperated with each other to conduct research on ESG. The collaboration between United States and Europe is leading among all developed countries, which also demonstrated a high centralized practice. However, there is still an absence of close and extensive cooperation between the researchers, thus the ESG research is still fragmented (Li, et al., 2021).

From past research, it can be seen that the developed countries have put attention on ESG. Thus, there are association that focuses to develop scales of measuring ESG as a whole, and ESG individual score. It is crucial to remember that various rating companies want to emphasize the uniqueness of ESG metrics. While certain companies place a greater emphasize on the environmental assessment and give greater weight to environmental problems such as climate change, pollution and biodiversity loss, other companies place a greater emphasis on materiality in financial aspect such as risk management, innovation and cost reduction. In addition, some companies may utilize social governance metrics such as employee engagement, diversity, equity and inclusion as their prime focus (Senadheera, et al., 2021). Therefore, it is important for investors and stakeholders to consider the different perspective and priorities of ESG rating agencies when evaluating the sustainability performance of companies.

One of ESG rating agencies is Thomson Reuters Eikon (which is now known as Refinitiv) defined ESG by grouping them to environmental, social and governance in assessing company ESG performance. Environmental often stands for resource use, emissions and innovation, while social stands for workforce, human rights, community and product responsibility. Management, shareholders and CSR strategy categorized under governance. The ESG scores will be measured based on the relevant data provided by the company publicly. ESG scores are accumulated from the 10 category weights mentioned, and further calculated based on Refinitiv magnitude matrix. Refinitiv ESG emphasize on transparency as it is important for investor to make informed decision by using the data provided (Refinitiv, 2022).

Besides, Refinitiv Eikon has widely adopted by other researchers in examine ESG scores (de la Fuente, Ortiz & Velasco, 2022; Pozzoli, Pagani & Paolone, 2022; Anergis, Poufinas & Antonopoulos, 2022). Refinitiv has trained the professional content research analyst across the

world in collecting ESG data. To ensure the data quality is being met, consolidation of algorithmic and human processes is employed. Also, the ESG data is being updated weekly to assure that the data is on its latest (Refinitiv, 2022). This can be proved that Refinitiv Eikon is reliable in collecting ESG data and being professional in calculating the ESG scores.

Apart from Thomson Reuters Eikon, there are various ESG measurement developed by different ESG information provider agencies (IPAs) such as KLD's Domini 400 Social Index, Ethibel Sustainability Index, and FTSE4Good. Research of Escrig-Olmedo et al. (2010) proven that each agencies gauge companies based on a variety of criteria that are not always standardized that consequently caused challenges for investors to obtain ESG information directly from the ESG scorings.

2.4 ESG and IT Industries

In contrast to other industries, such as manufacturing business that particularly concerned with environmental challenges, IT businesses do not have a high ESG rating compared to other industries. The results demonstrated that IT firms are not industry leaders in ESG aspect are placed behind most industries. This is mostly because of the particulars of the business's nature. Besides, the environmental factors and social pillars ratings for IT firms are among the lowest compared to other sectors (Egorova, Grishunin, and Karminsky, 2022). However, it is undeniable that IT companies do cause an impact to environmental and social factors. From the aspect of environmental factor, IT companies that serve as datacenter providers are using a lot of natural energy, which is polluting the environment (Marsh and Robinson, 2021). Also, when the energy consumption increases, it could release massive amount of heat energy, where contributed to greenhouse effect. Addition to that, research by Senadheera and his colleagues (2021) pointed out that the severity of several interrelated environmental problems has increased. Notably, these problems include soil degradation, water scarcity and poor air quality, as well as global warming, biodiversity loss and excessive use of naturally occurring source of wealth under technological advancement. These environment challenges are often interconnected and can have far-reaching impacts on human health, ecosystem functioning and socio-economic development. Hence, it is essential for individual and organizations to take proactive steps to address these pressing environmental issues and promote a more sustainable future for all.

Whereas for social pillars aspect, numerous IT firms provides datacenter as a service which are infrastructures made up of networked hardware, storage system and computational facilities, to assembler, process, store and distribute huge amounts of information to facilitate companies operations daily. The main social risks are the many IT firms has accessibility to sensitive data that may be used improperly. Any information theft, whether it involves corporate or individual information, increases the danger of regulatory scrutiny, and can harm a company's brand and financial prospect (Egorova, Grishunin, and Karminsky, 2022). While governance factors serve another important prospect in IT firms to avoid litigation, particularly in antitrust cases that are usually in IP-focused area of technology industry for example software as a service company, hardware devices and semiconductor design.

Firms in the information technology (IT) industries are model of companies that are on track to include ESG principles in business strategies. It could be seen that the IT industry is one of the last to adopt ESG practices, but at the same time, this gap provides IT organizations with a chance to boost their market value and draw in investment by enhancing ESG components and filling in sustainability related gaps. As long as the IT firms can utilize the resources and execute the ESG to companies wide strategy wisely, IT firms may improve their placement in ESG ranking and, as a result, draw in more investors, boost their market value and improve their financial performance (Egorova Grishunin, and Karminsky, 2022).

2.5 ESG and Firm Value

ESG activities implementation might potential significantly enhance the value of company. ESG initiatives have been found to increase a company's operational effectiveness, capital market advantages and risk management. At the same time, ESG activities not only intensify corporate image and develop exceptional relationship with shareholders, it also contribute to attract quality and qualified employees. However, the cost of execution ESG initiatives and its implication on the firm value has always been taken into consideration (Tahmid et al., 2022).

Extensive studies have been carried out on the effect of ESG on firm value in various industries and countries. However, the results are inconsistent among the studies across multiple industries. According to one of the point of views, ESG performance of a company is associated

with its market value (Ionescu, et al., 2019) and similar study conducted on ESG performance and company's financial performance showed that there are significant (Zahroh & Hersugondo, 2021; Abdi, Li & Camara-Turull, 2021). This may reason to ESG policies can increase stakeholders' trust by building social capital and fostering their loyalty to the company.

Moreover, research conducted in Malaysia listed companies across various sectors by Wong and colleagues (2021) found out that there is a very tiny increase in firm value measured using Tobin's Q after first year of ESG inclusion and a jump in the second year. This graphical proof offers circumstantial support for the favorable effect of ESG rating on firm value. The ESG disclosure has resulted in the increase of Tobin's Q as the beneficial effect of ESG certification on business value, it ought to promote both activist and responsible investing it. It is also significant for regulators to consider the requirement of ESG information disclosure as a policy tool. The same research explained that the stock market is more open to the endorsement of ESG ratings than the debt market is. This suggest that the top focus in corporate credit choices might not be ESG transparency.

In a similar investigation conducted on Indian energy sector demonstrated that ESG scores has a positive effect on firm value proxied by Tobin's Q, specifically in a long run (Behl et al., 2022). It's pointed out that due to the increased instability of the political and institutional framework in developing countries like India, it required longer duration to develop intangible resources for instances corporate culture and reputational in the market. A lag time is found to see the advantages of ESG investments in the firm value because consumers might not be prepared to pay extra in the early years for sustainable or green items. Its evidence that ESG investments increase reputation over time, which may incurred an amount of cost in the short term but has long-term benefits such as lowering risk exposure through the development of intangible resources and a decrease in the volatility of stock prices and firm value. By utilizing ESG, investors may choose to channel long-term wealth creation, while reducing the short-term growth potential of the company.

Notwithstanding, another research carried out on pharmaceutical industry verified that ESG does offer much better marketing performance, which might result in increased revenue growth positively (Paolone et al., 2022). The findings explicit the governance pillars score has massive impact on contributing to a high level of marketing performance, compared to social and

environmental related scores. It believes that firms operate holistically as a whole under a good governance, could also benefits to social and environmental pillars, which eventually generate values to the client. Specifically in pharmaceutical sector, long-term strategy and operate transparently is a necessity through fostering the good governance due to the special nature of this industry that conflicts easily take place between profits and ethical standards. To cater to the ESG demand of the worlds in attracting more investor, pharmaceutical industry must fundamentally alter their both business models and approaches to sustain (Paolone et al., 2022).

Yet, with regards to the automotive sector, the findings of Dinca, Vezeteu and Dinca (2022) in one study demonstrate that ESG elements have not yet showed their impact on firm value in the automobile sector. Inconsistent findings yielded using Cross-Lagged Panel Model that only from the year of 2015 to 2018, ESG overall score has a mixture of effect on firm value, albeit for the year of 2019 to 2022, ESG overall score and firm value has a no significant impact. Environmental score has positive implications on firm value from 2015 to 2016 whereas the other cross-lagged effects are not significant. While for governance score, there are mixed effect on firm value from year-to-year, in the period of 2015 to 2020. Lastly for social pillars, the social scores were claimed invalidated. It suggested that the financial market of this sector has not responded to changes in ESG scores when it comes to firm valuation. More specifically, those making investment decision in this area appear to have been influenced by variables outside ESG. The lack of standards in ESG ratings can also be used to explain this hesitancy.

Furthermore, in a very much alike research carried out by Ersoy and his colleagues (2022) on banking industry in the sample of 151 United States (US) commercial banks pointed a U-shaped relationship invertedly between market value and ESG and scoring of individual ESG factors. This meant that after a certain threshold, a rise in ESG investments results in a fall in bank market value. Having said that, ESG investments have a positive immediate consequences but negative eventual outcomes. Hence for bank industry, to rationalize ESG investments and shareholder value generation, bank should identify tipping points in which the effect of ESG investment on market value becomes negative. However, investment in governance and environmental pillars positively impact the bank market value in the long run whereas investment in social pillars contribute to a U-shaped relationship (Ersoy et al., 2022).

Further down to each factor, both of the studies agreed that governance factors have a positive and significant effect on firm value (Zahroh & Hersugondo, 2021; Abdi, Li & Camara-Turull, 2021). In particular, the actions taken to ensure the firm's responsibility and to equally distribute rights and obligations among the boards of directors and stakeholders create firm value. Thus, it is important to have sufficient audit committee, that could effectively help in controlling and monitoring the top management to improve finance performance. A general good corporate governance mechanism of a company could uplift efficiency and productivity which benefits the profitability and eventually the firm value of the company (Ekasari & Noegroho, 2020). On contrary, research of Tahmid et al. (2022) claimed that the governance pillar score is insignificant to firm value, indicating that a business's ESG activities for creating a board and adopting a CSR plan would not improve firm performance. Study of Yoon, Lee and Byun (2018) portrayed similar result, which the corporate governance score is insignificant statistically.

While for the environmental factors, the research by Abdi and peers (2021) and Zahroh and Hersugondo (2021) both claimed a negative and insignificant result on environmental factor and firm value. This indicated that the environmental aspect caused a non-favorable effect on firm value, specifically return on assets and market-to-book ratio. It is noteworthy to point out that consider environmental factors in firm operation cause higher cost which lower the return on asset although the firm be more responsible to the environmental concerns (Alareeni & Hamdan, 2020). Hence, achieving green and sustainable development goals can be a daunting task since doing so might pose a significant challenge to the company's profit margin. Yet, the prominently concerns for profit margins is ongoing sustainability risk management programmes and green efforts that improve industrial processes (Senadheera et al., 2021). It appears that the financial consequences are more imperative, as investors believe that the cost of environmental initiatives do not clearly benefit the enterprises (Ionescu, et al., 2019). However, markets punish businesses for poor environmental management, and business that fail to disclose such operations on carbon emission that carries high potential in facing fines and increasing legal costs, especially firms that in the industry of energy and allied (Behl et al., 2022). From the above, it can be seen that environmentally sustainable activities is either decrease firm value or being non-significant to firm value. In the olden days, environmental protection and social responsibility used to be seen as costly and as being incompatible with

industrial expansion. Most of the time, businesses engaged in the industrialization process disregarded societal ideals in favour of expansion (Chang and Lee, 2022).

On the other hand, the study by San Ong, Teh and Ang (2014) shed light on companies focus on environmentally sustainable activities facilitate firms increase in return of asset (ROA) that used to indicate financial performance. Firms that involve in recycle input materials, reducing waste, recycle water helps to decrease cost of production in long run and eventually growth in the profit of the firm. Consumer preferences for eco-friendly and socially conscious products, consciousness of ethical management and business prospect will all rise in tandem with the industry's expansion, and the business will boost their firm value via non-financial performance like the creation of eco-friendly goods and social responsibility marketing (Chang and Lee, 2022). Besides, firm involved in environmentally sustainable activities and disclose the report to the public could help firms to comply with legislation, obtain investors' trust, improve brand reputation and exacta (Brooks & Oikonomou, 2018). Yet, there are other factors that caused a decrease of ROA and ROE such as products and services, compliances. Firms increased costs as a result of complying with environmental laws and regulations, which lowers the firm's profit (San Ong, Teh and Ang, 2014).

Moreover, study shows social pillars scores demonstrated positively significant with firm value represented by market-to-book ratio and financial performances that proxied by Tobin's Q (Tahmid et al., 2022). Besides, research on Korean firm has also explained that socially responsible principles is highly appreciated by investors (Yoon, Lee and Byun, 2018) which possibly led to company success by enhancing the firm value. Since social pillar score has a favourable and considerable impact on company success, its recommends that a company's ESG measures such as workforce, human rights, community is effective and efficient in improve firms' reputation, and subsequently increase the value of the company. The same study has also pointed out that social pillars has more impact compared to environmental and governance pillars.

Although there is the existence of mixed relationship, it is crucial to understand that previous studies have seldom investigate the individual ESG factors that particularly in US information technology public listed companies. Besides, in view of the literature review, inclusive of ESG strategy in business activities may have different impact on different sectors. On top of that,

the impact on each ESG pillars varies on the sensitivity of a business; thus, a study of the individual reverberation of the environmental, social, and governance pillars on the performance of the enterprises is necessary (Paolone et al., 2022). In light of the literature review, we hypothesize the following:

Hypothesis 1a: There is no relationship between environmental factor scoring on firms' value.

Hypothesis 1b: There is a relationship between environmental factor scoring on firms' value.

Hypothesis 2a: There is a no relationship between social pillar factor on firms' value.

Hypothesis 2b: There is a relationship between social pillar factor on firms' value.

Hypothesis 3a: There is a no relationship between governance factor scoring on firms' value.

Hypothesis 3b: There is a relationship between governance factor scoring on firms' value.

2.6 Theoretical Framework

2.6.1 Stakeholder Theory

Stakeholder theory, a part of organization theories has stated that the company's objective is recognized to maximize shareholders' profits at the same time without neglecting the importance of business ethics and moral values. Stakeholders assume that the resources they provide to businesses will be used to further their interest, that not only restricted to reward in the aspect of economic, legal and contractual items. Freeman (1984), the founder of stakeholder theory agrees that participating corporate social responsibility (CSR) elements into business strategies can improve the value of stakeholder in multiple aspects including economic, social and environmental. There have been a few research demonstrating that high CSR performance in favorable to the welfare and positive brand image of corporate. However, the foundation of the Stakeholder theory is conflicting and lacking universally acknowledged definition.

According to stakeholder theory, ESG operations can be integrated or synergized into a firm's market performance. ESG activities can settle the disputes between management and stakeholders which shows a favorable impact on business performance based on the research of Jo and Harjoto (2012). Simultaneously, ESG activities contribute to the foundation of

corporate governance consideration, and information asymmetry may be addressed through ESG disclosure to create a more inclusive stakeholder environment (Huang, 2022). This suggests that safeguarding the bottom line and raising shareholder value are both made possibly by the practices of active ESG activities. Research of Peng and Isa (2020) indicated that companies with good ESG practices perform better, which is in line with the stakeholder thesis based on effective management techniques. Therefore, the stakeholder theory supports that ESG practices and disclosures should provide business-oriented benefits to the organization (Dooms, 2019).

2.6.2 Brusov- Filatova – Orekhova (BFO)

BFO theory, a modern theory based on capital structure developed on year 2008, mentioned that sustainability of the companies should be dependent on the companies' financial performance instead of the companies' age (Brusov et al., 2015). BFO subsequently revealed firm value is dynamic that caused by the finite amount of time on its presence, and further affect the capital cost and the weighted average cost of capital due to the existence of taxes (Brusov et al., 2018). However, capital cost will increase, followed by the firm value rises with the presence of taxes. BFO believes that to companies has its own duration of golden age, when its achieve that the firm is maximized, and the capital cost is minimized. Its believe that every firm should increase the golden age of a firm by always maximize the firm value of a firm. (Brusov et al., 2015). Bringham and Ehrhard (2017) further shed light that firm value meant that all assets and future cash flows can generate based on current value after deducting the weighted average of the capital cost of the company. Hence, based on BFO theory the firm value that represent in this research is return of assets (ROA) that helps to calculate the return based on the firm total assets, the profitability of the firm and the market-to-book ratio that indicates to understand the market value and book value of the firm.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter analyses the effect of environmental factor, social factor, and governance (collectively known as ESG) on the firm's value. There are several measurements and therefore different proxies for firm value. This study uses the firms' market to book ratio and Tobin's Q as representation of firm value. This research focus on information technology companies in United States. In this chapter, research design is firstly reported, following by the description of the independent variables, dependent variables, and control variables that were used in this research. Then, data analysis and a summary will be at the end of Chapter 3.

3.2 Research Design

The significance of choosing the appropriate methodology for analysing research issues is important (Punch, 1998). Two distinct research approaches, namely quantitative and qualitative, have been employed by researchers worldwide. The qualitative analysis is a useful, non-numerical approach of data collecting to comprehend the research questions. Whereas quantitative approach makes use of many forms of factual research and convey more accurate estimations, unflappable quality, and recoverability. For improved outcomes and explanation, some analysts are combining the two methods.

However, the quantitative method is adopted in the research, by collecting secondary data. Primary data for example questionnaire, experimental research is not being used in this study. The secondary data is collected from Refinitiv Eikon being used to determine the independent variables, dependent variables, and control variables.

3.3 Sample Used

The sample of the information technology companies in the United States is selected based on the Refinitiv Eikon Database categorization as Refinitiv Eikon collected the information by using firms audited and standardized report and publicly accessible information. Besides, it has the most comprehensive ESG databases which consisting of over information of 12,000 global companies (Refinitiv, 2022). This study focuses on stocks from the United States Technology Equipment and Supplies subsector. Conducive to eradicate structural breaks due to economic crisis, the sample picked ranges from 2016 to 2021, which is the most recent available yearly data. There is a total of 62 public listed company chosen due to the accessible data is restricted. The dependent, independent and control variables used, their abbreviation and source of data are as Table 1.

Table 1: List of Variables Used

Variable	Abbr.	Role	Reference
Market to book ratio	MTBR	Dependent	Abdi, Li and Camara-Turull (2021).
Tobin's Q	Tobin's Q	Dependent	Behl et al. (2021); Abdi, Li and Camara-Turull (2021).
Environment factor	e	Independent	Abdi, Li and Camara-Turull (2021).
Social factor	s	Independent	Abdi, Li and Camara-Turull (2021).
Governance	g	Independent	Abdi, Li and Camara-Turull (2021).
Independent Directors	IND	Control	Na, et al. (2022).
Capital Expenditure	CAPEX	Control	Cherkasova and Nenuzhenko, (2022); Aouadi and Marsat (2018).
Return on Asset	ROA	Control	Abdi, Li and Camara-Turull (2021).
Profitability	PROFIT	Control	de la Fuente, Ortiz and Velasco (2022).

Note: Abbr. means Abbreviation, Reference is adoption of variables based on past literature.

3.4 Dependent Variables

This research paper studies the effect of environmental, social and governance (ESG) on the firms' market to book ratio and firms' Tobin's Q on information technology companies in United States. The dependent variable is firm value. Market to book ratio (MTBR) and Tobin's Q adopted in this paper as proxies for firm value. There are number of studies show that the

most general used firm value variables are market to book ratio (Abdi, Li and Camara-Turull, 2021) and Tobin's Q (Behl et al., 2021; Abdi, Li and Camara-Turull, 2021). Tobin's Q is employed to quantify firm value as it may be used to measure intangible investment values in long-run. Also, in order to be more impartial in valuing the company, Tobin's Q comprises several factors of company performance including such earnings, sales, cash flow and revenue volatility which makes it a comprehensive performance metric. To obtain Tobin's Q value, it requires to use the difference between the book value of the shareholders' equity and the book value of the assets, less that difference, divided by the book value of the assets that calculated yearly. Whereas for MTBR, it determines as the total market value equity divided by total book value of equity. MTBR is chosen as it enables us to assess whether a company's value is under or overvalued. MTBR is considered as a relatively stable measure, and the use of standardize accounting practices across firms allows for straightforward comparisons of MTBR between companies. The utilization of MBTR as a dependent variable can provide valuable insights into the market's perception of a company's financial performance and future prospect (Hamid et al., 2022). Thomson Reuters' DataStream was employed to collect the financial data needed on the United States (US) public listed companies.

3.5 Independent Variables

The independent variables are environmental factor, social factor, and governance respectively. According to Eikon (2017), scores is calculated by grouping them into 10 divisions to reformulate the three pillar scores of environmental, social and governance respectively, to mirror the ESG performance of a company. For environmental factor, it is based on emission, innovation, resource use; for social factor, it is based on human rights, product responsibility, workforce, community; lastly for governance factor, it is based on management shareholders and CSR strategy as the theme's coverage for respective categories (Refinitiv, 2022). Senadheera, *et al.* (2021) that the initiation of sustainable development concept has encouraged stockholders to deliberate environmental sustainability in their choices. This implies the important of environmental factor not only in investment decision but also the firm perceived value. Similarly, the social and governance factors such as employee welfare, international labor standards adherence, impact to society, strong management, ethical practice, and corporate social responsibility are highly regarded in determining the firm value (MSCI, 2021; Sustainalytics, 2021). Each of the Environment (E) factor, Social (S) factor, and Governance

(G) factor are fused in firm valuation through the sustainable finance philosophy and therefore are expected to have positive relationship with firm value.

3.6 Control Variables

At the same time, the identified control variables are independent directors, return on assets (ROA), profitability, and capital expenditure. This is due to the control variables identified may also contribute to the varies of dependent variables; thus, the control variables is being identified to decrease the changes of firm value. Drawing on Abdi and his colleagues (2021) research, this research adopt the natural logarithm of a firm's total assests as an indicator of its size. Additionally, we employ the return on assets (ROA) as a measure of the company's operating profitability, which is calculated by dividing the firm's operating profit before financing costs by its total assets. It is hypothesized that firms with higher profitability are better positioned to invest in sustainability initiatives, which csan lead to long-term benefits such as improved environmental and social outcomes, enhanced corporate reputation, and increased stakeholder satisfaction. Nonetheless, the research of de la Fuente, Ortiz and Velasco (2022) has employed profitability as control variables. It is anticipated that profitability will exert a favorable influence on a firm's value, given that value is created when a firm's business strategy yields a greater gain than its opportunity cost. The relationship is grounded in the principles of financial management, where a firm's ability to generate profits is regarded as a key driver of its value creation potential.

At the same time, capital expenditure is used as one of the control variables (Cherkasova & Nenuzhenko, 2022; Aouadi & Marsat, 2018) . Capital expenditure intensity of a company can be estimated by dividing its capital expenditure by total assets, and firms that have higher level of capital expenditure may be better positioned to make investments in stakeholder welfare and expand the operations. This is due to high capital expenditure levels are often indicative of a company's commitment to long-term growth and investment, and may signal a willingness to allocate resources toward sustainability initiatives and other stakeholder-centric endeavors. Nevertheless, independent directors is used as control variables in this research, as well (Na, et al., 2022). This is owing to the fact that companies that have relatively weaker governance mechanisms may experience more pronounced positive market reactions than those with stronger governance. Strong governance mechanisms are generally viewed as beneficial for

mitigating agency problems and protect stakeholder interests, there may be instances where weaker governance arrangements result in better financial outcomes (Xie, Lin & Li, 2022).

3.7 Data Analysis

The collected secondary data will use statistical software, Stata to perform descriptive analysis, correlation matrix, panel data analysis and quantile regression. Static panel regression consists of Pool Ordinary Least Squared (POLS) where all the data are pooled together as a time series, Fixed Effect Model (FEM) where the group means are fixed to capture possible unobserved heterogeneity, and Random Effect Model (REM) where the group means are random. Hausman test was run on the panel data to determine whether Fixed Effects Model (FEM) or Random Effects Model (REM) should be selected for the study. Dynamic model of Panel Generalized Method of Moments (Dynamic GMM and System GMM) is used due to possibility of the present of endogeneity in the model. Meanwhile, quantile regression enables the relationships to be analyze according to different levels (quantiles) of the dependent variable.

3.7.1 Descriptive Analysis

One of the essential elements for doing statistical data analysis is performing descriptive analysis, which aids researchers in effectively describing, summarizing, and presenting the data points. Descriptive analysis is used to give unprocessed data a genuine meaning by adding meanings and correlations to the data collected and turning it into reported findings (Loeb et al., 2017). Common descriptive statistics measurements are mean, standard deviation, minimum value, and maximum value. Mean give an indication of the average value of the data while standard deviation indicates the dispersion of the data from the average value. Maximum and minimum values represent the highest and lowest range of the data.

3.7.2 Correlation Matrix

The Table 2 displays the general Pearson Correlation Coefficient guidelines that will be utilized to assess the significance, strength, and the direction of the relationship between the independent variables and the dependent variables. The correlation will be in the range of -1.0

to +1.0 where ‘-’ indicates a negative correlation relationship, and ‘+’ indicates a positive correlation relationship between the variables.

Table 2: Rule of Thumb of Pearson Correlation Analysis

Coefficient Range	Strength of Association
0.91 to 1.00	Very Strong
0.71 to 0.90	High
0.41 to 0.70	Moderate
0.21 to 0.40	Small but definite relationship
0.00 to 0.20	Slight, almost negligible

3.7.3 Panel Data Analysis

The panel data regression model was used in this study to analyse the data since it has been recommended that this model is effective for controlling cross sectional data and time series, where the same unit cross section is recorded at various times. Additionally, panel data contains more sample variability and degrees of freedom by differentiating with cross-sectional data. Hence, the efficiency in estimating the econometric model can be improvised. Also, panel data controlled the consequences of omitted variable in economic model. Stata Software is adopted to run the panel regression model. Pursue from the model suggested by, the estimated quotation by taking the market to book ratio and Tobin’s Q of the information technology firms as the firm value determinant is as follow:

The general empirical model:

$$Y_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 Z_{it} + \mu_{it}$$

Where the equation symbolize Y represent the dependent variables, which are of firm value in this research and proxy by MTBR and Tobin’s Q; α_i is the constant; β_1 is slope coefficient for the main independent variable, and β_2 is slope coefficient for the control variable. The main independent variable X_1 are the environmental factor, social factor and governance factor; Z_i is control variables, namely return on asset, capital expenditure, independent directors and profitability; while ε refers to cross-section error component is inconstant or random, i

refers to the information technology companies (cross section variables) and μ refers to the mix of cross-sectional and time series error component.

The specific empirical model:

$$mtbr_{it} = \alpha_i + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 ROA_{it} + \beta_5 capex_{it} + \beta_6 Ind_{it} + \beta_7 \ln profit_{it} + \eta_t + \varepsilon_{it}$$

$$tobinq_{it} = \alpha_i + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 ROA_{it} + \beta_5 capex_{it} + \beta_6 Ind_{it} + \beta_7 \ln profit_{it} + \eta_t + \varepsilon_{it}$$

Firstly, pooled ordinary linear regression model (POLS) is used to indicate result based on poolability of the data but ignores the panel structure of the data. Next model to be performed is random effect model (REM) which holds the constants for each section as random parameter. Then, the fixed effect model (FEM) where the constant is taken as group specific which means the model allows for different constants for each firm. Thus, the error term is separated into the fixed-effect component η_t and the random error term ε_{it} . The Poolability F-test is performed to select between POLS and FEM, where the null hypothesis refers to POLS is preferred and therefore the alternative hypothesis is FEM is preferred. The Breusch-Pagan test (BP LM Test) is test is performed to select between POLS and REM, where the null hypothesis refers to POLS is preferred and therefore the alternative hypothesis is REM is preferred. Moreover, Hausman Test is used to select between REM and FEM; where the null hypothesis refers to REM is preferred.

Following with Hausman Test, the estimation commenced is the Generalized Method of Moments (GMM). This approach involved the econometric investigation of dynamic economic interactions in panel data using difference GMM and system GMM. Serial correlation, heteroscedasticity, and any endogeneity issues were all taken into consideration under the GMM method. Pursue from the model suggested by, the estimated quotation by taking the market to book ratio and Tobin's Q of the information technology firms as the firm value determinant is as follow:

GMM regression model:

$$mtbr_{it} = \alpha_i + \gamma mtbr_{i,t-1} + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 ROA_{it} + \beta_5 capex_{it} + \beta_6 Ind_{it} + \beta_7 \ln profit_{it} + \eta_t + \varepsilon_{it}$$

$$\text{tobinq}_{it} = \alpha_i + \gamma \text{tobinq}_{i,t-1} + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 \text{ROA}_{it} + \beta_5 \text{capex}_{it} + \beta_6 \text{Ind}_{it} + \beta_7 \ln \text{profit}_{it} + \eta_t + \varepsilon_{it}$$

3.7.4 Quantile Regression

Consecutively, quantile regression is employed as panel data regression could not generalize the relationships in different level. The benefits of quantile regression with bootstrap replications were endorsed in this paper to considering the differences correlations among various quantile levels of market to book ratio and Tobin's Q disparity. The likelihood of data grouping in various quantiles and non-normally distributed data provide another motivation for choosing the quantile regression approach. Scatter plots is used to explain and predict data clustering and evaluate whether data are normal. While the latter is the popular and most effective statistical inference test for normal distribution, the former is based on visualization. Follow the model presented by, the equation for quantile regression as follow:

Quantile regression model:

$$\text{mtbr}_{i,t}(\tau|X_{i,t}) = \beta_i + \beta_{1,\tau} E_{i,t} + \beta_{2,\tau} S_{i,t} + \beta_{3,\tau} G_{i,t} + \beta_{4,\tau} \text{ROA}_{i,t} + \beta_{5,\tau} \text{capex}_{i,t} + \beta_{6,\tau} \text{Ind}_{i,t} + \beta_{7,\tau} \ln \text{profit}_{i,t} + \varepsilon_i$$

$$\text{tobinq}_{i,t}(\tau|X_{i,t}) = \beta_i + \beta_{1,\tau} E_{i,t} + \beta_{2,\tau} S_{i,t} + \beta_{3,\tau} G_{i,t} + \beta_{4,\tau} \text{ROA}_{i,t} + \beta_{5,\tau} \text{capex}_{i,t} + \beta_{6,\tau} \text{Ind}_{i,t} + \beta_{7,\tau} \ln \text{profit}_{i,t} + \varepsilon_i$$

In this equation, the β_τ symbolize the coefficient at the particular quantile τ level of firm value (MTBR and Tobin's Q) and ε is the individual effects that remains unobserved. The firm value is expected to have a positive relationship with ESG in order to represent that firms imply ESG play a role in increasing the firm value. It is thought provoking to understand whether ESG does contribute to the upsurge of firm value as the current trend has pay more attention on firms' ESG strategies. This indicate that a better ESG implementation a firm used, the higher the firm value.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter pay attention at the data analysis of secondary data collected as mentioned in Chapter 3. The data is being processed with Stata Software which is famously knowns as a statistical software too. Descriptive data, correlation table, static and dynamic panel and quantile regression is then being presented respectively. The findings of analysis is subsequently used to reveal the acceptance of hypothesis concluded in Chapter 2, then following with the explanation of the acceptance and rejection of the hypothesis.

4.2 Descriptive Analysis

Descriptive analysis is applied to transform unprocessed data into reported conclusions with the addition of meanings and relationships to the data gathered in order to yield the data a true meaning (Loeb et al., 2017). Descriptive statistics of all variables that being adopted for our study is reported in Table 3. One of the dependent variables in this study is MTBR. The mean of the variable, MTBR is about 3 and the standard deviation (SD) is about 8.47. While another dependent variable, TOBINQ, the mean score is 1.75, and the SD is 1.44. From the mean score, it can be seen that MTBR explained more on firm value with higher mean score whereas from the perspective of standard deviation, TOBINQ has a lower SD which shows more consistency at the same time more reliable in explaining firm value. Then, the minimum value of MTBR is a negative value while for TOBINQ, it is a positive value.

Table 3: Descriptive Analysis

Variable	Observation	Mean	Std. Deviation	Min	Max
MTBR	344	3.064	8.4731	-54.09	101.7
E	344	40.5405	26.4492	.76	97.97
S	344	50.5790	24.4783	4.49	94.8

G	344	57.0190	20.4305	4.24	95.95
ROA	344	4.9884	12.0196	-57.52	47.72
CAPEX	344	4.0390	4.8526	.06	25.68
IND	344	80.7873	10.4549	37.5	93.33
PROFIT	344	4.4084	21.5161	-146.62	58.8
TOBINQ	344	1.7505	1.4367	0.1517	9.6014

For independent variables, the Environmental factor (E), the Social factor (S) and Governance (G) have the mean score of 40.54 (SD = 26.45), 50.58 (SD = 24.48) and 57.02 (SD = 20.43) respectively. To compared among the three individual pillars scores, governance factors has the highest mean score and lowest standard deviation. This pointed out that governance factors explains more among the individual pillars at the same time being the most reliable factor to ESG scores. Then, it showed that environmental pillars has the lowest mean score and highest standard deviation among the three individual pillars score. Though for minimum and maximum value, the independent variables are having an identical trend as the others, but for environmental factor, the minimum value is at 0.76, which is relatively lower than the other two pillars, that are more than 4.00 respectively.

Moreover, four control variables that being identified in this research is return of assets (ROA), capital expenditure (CAPEX), independent directors (IND) and profitability (PROFIT). The mean score and standard deviation of ROA, CAPEX, IND and PROFIT are 4.98 (SD = 12.02), 4.04 (SD = 4.85), 80.79 (SD = 10.45) and 4.41 (SD = 21.52) respectively. Independent directors (IND) recorded the highest mean score of 80.79 (SD = 10.45) and the lowest mean score, 4.04 (SD = 4.85) goes to capital expenditure (CAPEX). Besides, CAPEX recorded the lowest standard deviation among the four control variables that used in this study.

While for minimum and maximum value, both ROA and PROFIT reported negative values for minimum values as these two control variables have multiple huge negative numbers as indicator. It generally meaning that these information technology companies are not making positive value on ROA and PROFIT. Then, the control variables are most having the similar maximum value which are all in positive values. Table 1 reported that independent directors (IND) has the highest maximum value, subsequently followed by return of asset (ROA),

profitability (PROFIT) and capital expenditure (CAPEX). The independent directors (IND) has the highest maximum number as according to New York Stock Exchange (NYSE) (New York Stock Exchange, n.d.), a majority of a board must be composed of independent directors at the same time the current rules and regulations mentioned an audit committee for public listed companies must consists of a minimum of three independent directors (NYSE, n.d.).

4.3 Correlation Martix

Table 4: Correlation Table

	MTBR	E	S	G	ROA	CAPEX	IND	PROFIT	TOBINQ
MTBR	1.0000								
E	0.0727	1.0000							
S	0.0642	0.7514	1.0000						
G	-0.0648	0.4576	0.5463	1.0000					
ROA	0.0848	0.3027	0.3616	0.3425	1.0000				
CAPEX	0.0072	0.0242	0.1009	-0.0614	0.1251	1.0000			
IND	0.0500	0.1849	0.3335	0.4499	0.2081	-0.0600	1.0000		
PROFIT	0.0577	0.2754	0.2733	0.3273	0.8739	0.0686	0.1129	1.0000	
TOBINQ	0.3450	0.2468	0.1460	0.1988	0.4563	-0.0400	0.2393	0.3173	1.0000

To validate the research project, Table 4 illustrates the correlation analysis that utilised to clarify the link between all of the independent variables as well as the control variables to use in the regression analysis. From the table, it is observed that the correlation between environmental and social is 0.751, which indicates that there is a positive relationship between the variables. It is also notable observation that return on asset (ROA) and profitability (PROFIT) has a positive relation, which is 0.873. Both of this relationship that range between 0.71 to 0.90 considered the relationship is relatively strong. Strong relationship often determine that both variables are associated with each other, but not determining the causation of each other.

It is worth to mention the correlation between capital expenditure and governance factor is -0.0614, which implies that there is a negative relationship between the variables. Also, -0.0600 is the correlation between capital expenditure and independent directors, which demonstrates a negative relationship between the variables. The relationship that range between 0.00 to 0.20 is categorized as slight and almost negligible. Although capital expenditure and social pillar has a positive relationship, the value is 0.1009 which the relationship is also categorized under

slight and almost negligible. This happens to the variables between capital expenditure and return on asset (ROA), environmental factor and independent directors and independent directors and profitability.

4.4 Static and dynamic panel for MTBR and the determinants

Table 5: Result of static and dynamic panel data for MTBR to ESG and control variables

VARIABLES	POLS	FEM	REM	DGMM	SGMM
E	0.0268 (0.0266)	0.0364 (0.0563)	0.0278 (0.0361)	0.0725 (0.3832)	0.2363 (0.2259)
S	0.0175 (0.0314)	0.0225 (0.0562)	0.0252 (0.0397)	0.0057 (0.2523)	-0.0420 (0.1915)
G	-0.0847*** (0.0294)	-0.0592 (0.0399)	-0.0627* (0.0329)	-0.0753 (0.2310)	-0.0836 (0.1732)
ROA	0.0790 (0.0824)	0.0061 (0.0817)	0.0268 (0.0765)	1.1731 (0.8340)	0.0277 (0.4113)
CAPEX	-0.0431 (0.0961)	-0.0066 (0.1726)	-0.0120 (0.1223)	-1.6784 (2.2011)	0.2231 (0.7732)
IND	0.0714 (0.0502)	-0.0076 (0.0775)	0.0295 (0.0606)	-0.8730** (0.4439)	0.1545 (0.3654)
PROFIT	-0.0073 (0.0449)	-0.0536 (0.0461)	-0.0329 (0.0425)	-0.6569* (0.3684)	0.0648 (0.2522)
L.mtbr				-0.1674 (0.1564)	0.3143 (0.3152)
Constant	-0.0362 (3.6630)	4.6697 (6.2023)	1.8331 (4.5858)		-14.4426 (27.8919)
Observations	344	344	344	220	282
Hausman		0.3494			

R-squared	0.0352	0.2024		
Number of code	62	62	62	62

Note: Standard errors in parentheses; Static model selection is REM preferred. *, ** and *** indicate significant at 10%, 5% and 1% level respectively

According to Table 5, POLS model shows negatively significant at 1% with MTBR and governance whereas it shows insignificant relationship for MTBR and environmental and social respectively. Subsequently, Hausman test is used in this study to examine whether random effect model (REM) or fixed effect model (FEM) is preferable. The rejection of null hypothesis happens when fixed effect model (FEM) is preferable. Controversially, does not reject null hypothesis indicates that random effect model (REM) is preferable. 0.3494 is the probability value obtained from Hausman test which symbolized the null hypothesis was not rejected, hence; REM is more preferable.

Based on REM model, only governance factor has a negative and significant relationship with firm value proxy by MTBR at 10% significant level. The other two component of ESG factors, namely the environmental factor and social factor are not significant. Return on assets (ROA) has positive relationship with firm value but shockingly profit is negatively related to firm value.

Consecutively, difference GMM (DGMM) and system GMM (SGMM) is examined. Dynamic panel data shows that MTBR has a insignificant relationship with all the independent variables which are environmental, social and governance. In furtherance of analysing which GMM model is more appropriate, Arellano-Bond test and Hansen-Sargan test were carried out. Then, scalar testing shows p value of 0.1149 which is not significant. It claims do not reject null hypothesis and thus, system GMM (SGMM) is a preferred model. Based on the SDGMM, no variables are significant including the lag of firm value itself, doubting the existence of dynamic relationship between the independent variables and firm value. Therefore, there is a need for further analysis. This research applies quantile regression to further analysis the relationship nexus based on different levels (quantiles) of firm values.

4.5 Diagnostic test for MTBR – REM preferred

Furthermore, there are other diagnostic test has been examine. The summary of the result for these tests is shown in Table 4. According to the results, we can conclude that there is one way time effects, no cross-sectional correlation and no auto correlation problem in the REM model.

Table 6: Summary Table for Diagnositic Test for MTBR – REM Preferred

Diagnostic Test	Ho	Probability (Test value)	Decision
Test between one way or two ways (time) effects	There is one way time effects in the REM model	0.559	Do not reject H0 at 1% significant level
Pesaran CD test	There is no cross-sectional correlation in REM model.	0.060	Do not reject Ho at 1% significant level
Language-Multiplier test	There is no autocorrelation occurs in REM model.	0.4538	Do not reject Ho at 1% significant level

AS for multicollinearity test, VIF is performed on both models using MTBR and Tobin-q as proxy for firm value. The results are presented in Table 5.

Table 7: VIF results for MTBR and Tobin-q Models

Variables	Abbr.	MTBR Model	Tobin-q Model
ROA	roa	4.76	4.76
Profit	profit	4.53	4.53
Environment factor	e	2.87	2.87
Social factor	s	2.40	2.40
Governance	g	1.75	1.75
Independent director	ind	1.34	1.34
Capital expenditure	capex	1.06	1.06
Mean VIF		2.67	2.67

Note: Abbr. is abbreviation for the variables. The numbers in the table are VIF values.

All individual VIF results are less than 5.00 for both MTBR model and Tobin-q model. The mean VIF values is 2.67. These indicate no serious multicollinearity problem. These imply that

there is no collinearity between independent or control variables that can distort their respective relationship to the dependent variable, namely the form value.

4.6 Static and dynamic panel for Tobin's Q and the determinants

Table 8: Result of static and dynamic panel data for Tobin's Q to ESG and control variables

VARIABLES	POLS	FEM	REM	DGMM	SGMM	FEM Robust
E	0.0182*** (0.0038)	-0.0002 (0.0070)	0.0085* (0.0051)	-0.0101 (0.0355)	0.0062 (0.0256)	-0.0057 (0.0063)
S	-0.0196*** (0.0045)	0.0099 (0.0070)	-0.0035 (0.0055)	0.0411 (0.0384)	0.0054 (0.0376)	-0.0053 (0.0073)
G	0.0004 (0.0042)	0.0032 (0.0050)	0.0022 (0.0044)	-0.0181 (0.0329)	-0.0048 (0.0237)	0.0011 (0.0042)
ROA	0.0943*** (0.0118)	0.0713*** (0.0102)	0.0755*** (0.0099)	0.2313 (0.2387)	0.0970 (0.0888)	0.0600*** (0.0205)
CAPEX	-0.0252* (0.0137)	0.0197 (0.0215)	-0.0016 (0.0170)	-0.1487 (0.2006)	-0.0721 (0.0928)	0.0303** (0.0121)
IND	0.0228*** (0.0072)	0.0083 (0.0097)	0.0131 (0.0083)	-0.0920 (0.1688)	0.0208 (0.0302)	0.0002 (0.0093)
PROFIT	-0.0259*** (0.0064)	-0.0255*** (0.0057)	-0.0254*** (0.0055)	-0.1078 (0.1470)	-0.0060 (0.0409)	-0.0211** (0.0085)
2017.year						0.1718* (0.0976)
2018.year						0.5113*** (0.1582)
2019.year						0.3033** (0.1408)
2020.year						0.7078*** (0.1762)
2021.year						1.0773***

						(0.2814)
L.tobinq				-0.2194	0.4047*	
				(0.4462)	(0.2104)	
Constant	-0.1092	0.0799	0.1275		-1.0753	1.3859**
	(0.5234)	(0.7728)	(0.6357)		(2.1900)	(0.6125)
Observations	344	344	344	220	282	344
R-squared	0.3150	0.2024				0.3134
Number of code		62	62	62	62	62

Note: standard errors in parentheses; Static model selection is REM preferred. *, ** and *** indicate significant at 10%, 5% and 1% level respectively

According to Table 7, POLS model shows negatively significant at 1% with Tobin's Q and social whereas it shows positively significant relationship for Tobin's Q and environmental; and insignificant relationship for governance and Tobin's Q. For random effect model (REM), Tobin's Q and environmental has significant relationship at 10%. Tobin's Q and the other three independent variables has not significant relationship. Subsequently, Hausman test proved that fixed effect model (FEM) is preferable with probability value less than .05, that indicates null hypothesis rejected. Diagnostic test is then examined to test whether there is any autocorrelation on FEM model since FEM is the preferred model based on Hausman test result. The robust FEM model implies that all ESG factors, namely the environmental factor, social factor and governance are not significant to firm value proxy by Tobin-q. In contrast, return on assets (ROA) and capital expenditure (CAPE) have positive relationship with firm value. These findings are consistent with the research done by Fatemi, Glaum and Kaiser (2018) indicated ROA is positively correlated with Tobin-q and CAPEX significant positively associated with firm value (Liu, Li & Lin, 2022). Surprisingly, profit has negative relationship with firm value. In addition, the results also reveal that collective events happened in 2018 to 2021 also have positive and significant impact to firm value at 5% significant level. Analyzing major events in those years may yield some insights. Klaus Schwab has popularized the term Fourth Industrial Revolution that will be spreadhead through digital technology revolution in 2015. Covid-19 pandemic strike in December 2019, resulting in lockdown worldwide and thus accelerating the use of digital technology in various aspects of work and social life. These two events could have contributed to the aggregate or macroeconomic impact to the value of technology firms.

For example, the positive impact in the Covid era (2020 and 2021) are relatively bigger while the coefficient (impact) in 2021 is about ten times the impact from year 2017.

Whilst for DGMM and SGMM, it shows that all independent variables (ESG) have insignificant relationship with Tobin's Q. For System GMM (SGMM), the lagged dependent variables show significant. Therefore, this is more like an AR(1) model. Then, scalar testing shows p value of 0.807 which is not significant. It claims do not reject null hypothesis and thus, system GMM (SGMM) is a preferred model. Based on the SDGMM, no variables are significant except the lag of firm value itself, which is weakly significant at 10% level. Therefore, there is a need for further analysis. This research applies quantile regression to further analysis the relationship nexus based on different levels (quantiles) of firm values.

4.7 Quantile Regression for Tobin's Q and its determinants

Results for quantile regressions are shown in Table 4.5 for MTBR model and Table 4.6 for Tobin-q model. Five quantiles are selected, which are the 15th quantile (Q15), the 25th quantile (Q25), the 50th quantile (Q50), the 75th quantile (Q75) and the 95th quantile (Q95).

Table 9: Result of quantile regression for MTBR Model

VARIABLES	Q15 MTBR	Q25 MTBR	Q50 MTBR	Q75 MTBR	Q95 MTBR
E	0.0073* (0.0039)	0.0086** (0.0038)	0.0114** (0.0054)	0.0068 (0.0094)	-0.0427 (0.0373)
S	-0.0085* (0.0051)	-0.0003 (0.0060)	0.0092 (0.0083)	0.0163 (0.0148)	0.1014 (0.0646)
G	0.0022 (0.0059)	0.0058 (0.0055)	-0.0048 (0.0072)	-0.0133 (0.0148)	-0.0425 (0.0562)
ROA	0.0029 (0.0411)	0.0509 (0.0385)	0.1067** (0.0445)	0.1703** (0.0660)	0.3142** (0.1579)
CAPEX	-0.0014 (0.0168)	0.0036 (0.0219)	-0.0253 (0.0310)	-0.0604 (0.0476)	-0.1448* (0.0793)
IND	0.0075 (0.0081)	0.0047 (0.0070)	0.0241*** (0.0089)	0.0437** (0.0200)	0.1508*** (0.0541)
PROFIT	0.0112 (0.0243)	-0.0131 (0.0215)	-0.0347 (0.0233)	-0.0429 (0.0289)	-0.1166* (0.0670)
Constant	0.5943* (0.3595)	0.4920 (0.3450)	-0.1811 (0.5916)	-0.0878 (1.2569)	-4.1342 (2.6306)

Observations	344	344	344	344	344
Pseudo R2	0.0104	0.0223	0.0573	0.1047	0.2040

Note: *, ** and *** respectively represent significant at 1%, 5% and 10%.

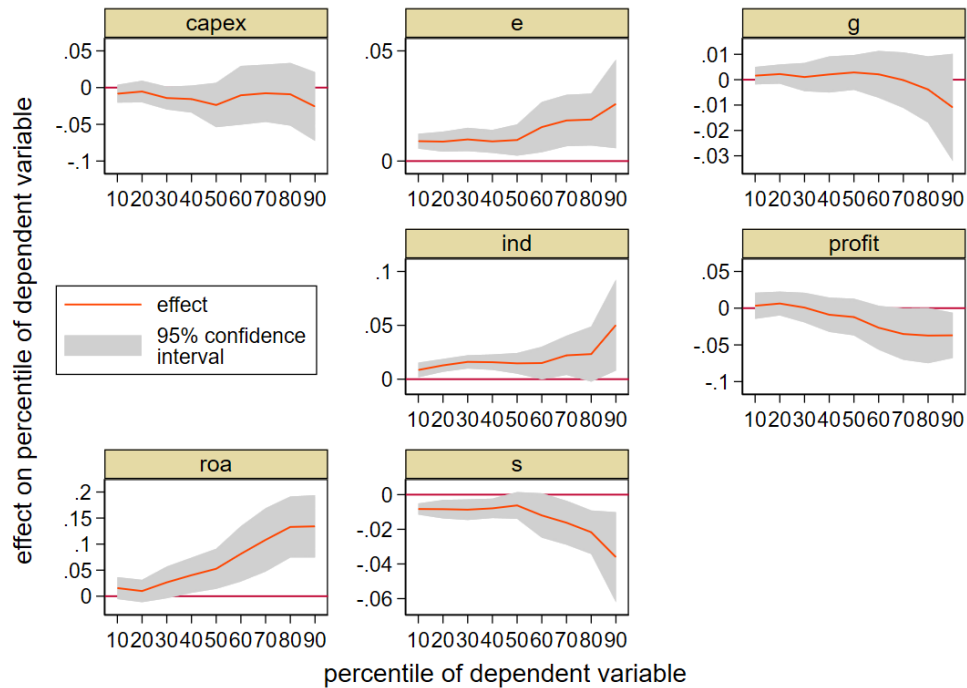
Table 10: Result of quantile regression for Tobin-q Model

VARIABLES	Q15 TobinQ	Q25 TobinQ	Q50 TobinQ	Q75 TobinQ	Q95 TobinQ
E	0.0092*** (0.0019)	0.0105*** (0.0027)	0.0096** (0.0039)	0.0226*** (0.0063)	0.0165 (0.0142)
S	-0.0084*** (0.0020)	-0.0089*** (0.0031)	-0.0062 (0.0039)	-0.0200*** (0.0073)	-0.0431** (0.0176)
G	0.0023 (0.0019)	0.0015 (0.0026)	0.0029 (0.0038)	-0.0009 (0.0068)	-0.0076 (0.0167)
ROA	0.0154 (0.0098)	0.0220* (0.0121)	0.0527*** (0.0165)	0.1249*** (0.0303)	0.1706*** (0.0398)
CAPEX	-0.0076 (0.0067)	-0.0102 (0.0084)	-0.0237 (0.0172)	-0.0006 (0.0218)	-0.0596* (0.0332)
IND	0.0087*** (0.0026)	0.0146*** (0.0033)	0.0147*** (0.0051)	0.0191* (0.0099)	0.0766*** (0.0221)
PROFIT	0.0026 (0.0069)	0.0029 (0.0082)	-0.0121 (0.0104)	-0.0380** (0.0165)	-0.0586*** (0.0182)
Constant	-0.0912 (0.1614)	-0.3362* (0.1834)	-0.1257 (0.3294)	0.4209 (0.8159)	-0.4924 (1.4511)
Observations	344	344	344	344	344
Pseudo R2	0.1114	0.1104	0.1341	0.1920	0.3292

Note: *, ** and *** respectively represent significant at 1%, 5% and 10%.

Alternatively, graphical representation of the results is in Figure 4.1 for Tobin-q model and Figure 4.2 for MTBR model. Graph of coefficient values (vertical axis) are plotted according to quantile level (horizontal axis) for the Tobin's Q model in Figure 4.1 and for the MTBR model in Figure 4.2. For instance, the quantile graph for CAPEX, the vertical axis is the beta (coefficient) for CAPEX at Q10, Q20, Q30, ..., Q80, Q90 on horizontal axis. Panel data explained cross-sectional and time series effect, which is a group data that could not reflect the relationship of each quantile. Compared to other regression techniques, quantile regression offers more flexibility to find various correlations at various points along the dependent variable's distribution. The difference of each quantile has different impact towards the determinants and helps understanding the relationship between variables holistically.

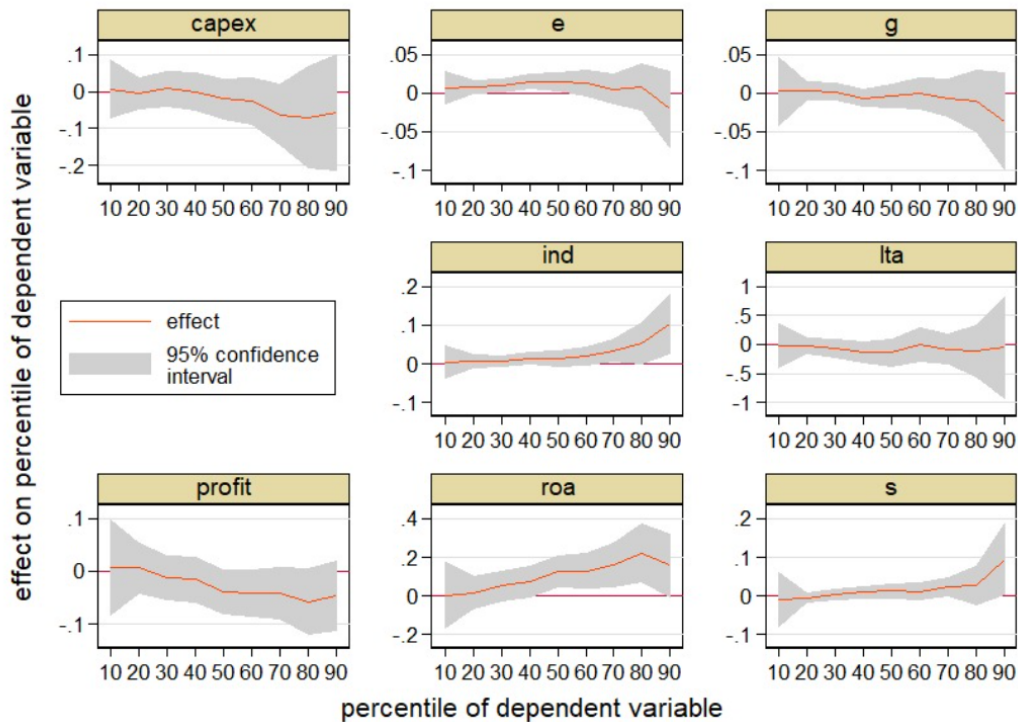
Figure 1: Graph of Tobin's Q and its determinants



The graph shown that the determinant on lower quantile has minimal effect towards Tobin's Q and the higher quantile has more impact on Tobin's Q. For environmental, Tobin's Q increases positively in each quantile starting from 50% where reflects that higher quantile that works more on environmental effect will impact more firm value. Whereas for governance, higher quantile shows a negative relationship with Tobin's Q value. The Tobin's Q value decreases when the quantile increases which meant that companies focus more on governance will slightly impact the Tobin's Q value negatively. Lastly, for sustainability, it has negative relationship with Tobin's Q. Figure 1 pointed out the companies works more on sustainability, the Tobin's Q value decreases. Using sustainability compared to governance, its explicated sustainability at higher quantile decreases the Tobin's Q value more.

4.8 Quantile Regression for MTBR and its determinants

Figure 2: Graph of MTBR and its determinants



Graph of MTBR (Y-axis) against independent variable (X-axis), are displayed in Figure 2. For environmental and governance, both has negative effect started from higher quantile, which is at 80%. At 80% quantile, MTBR, proxy of firm value decreases when the companies focus more on governance and environmental strategy. Whilst for sustainability, it only shows positive effect at 80% quantile. Firms that considered more on sustainability strategy brings positive effect to MTBR.

4.9 Hypotheses Testing

Based on the results showed, in static and dynamic panel, market-to-book ratio (MTBR) has insignificant relationship with environmental and a negatively significant relationship at 80% quantile demonstrated by quantile regression test, which is aligned with the research done by Aydogmus, Gülay and Ergun (2022). One reason that could be identified on this as environmental related investment required a longer time to benefits the firms. In reality, projects that involved environmental investment take years to accomplished before reflecting the profitability on firm value. Study of Behl and colleagues (2021) has proved that environment scores are negatively associated with firm value in the first three years. Thus, it

explained that environmental factors have more impact at larger quantile as larger companies may did environmental investment earlier than the companies at smaller quantile.

Moreover, social pillar shows insignificant relationship with MTBR, while quantile regression indicated social pillar and MTBR has positive significant relationship at 80% quantile. Corporates that consider employees' career development, human rights and unbiased training opportunities directly contribute to better firms' reputation, and subsequently attracts more productive employees that eventually contribute positively to firm value Besides, corporates that involved in charity activities ultimately build a better brand impression positively impact the firm value as well (Xie, et al., 2019). However, the results present only the companies that at larger quantile does has a positive impact on firm value by investing in social factors. This may owing to the fact that smaller companies has a lesser employees to manage thus it has insignificant relationship at lower quantile.

In addition, governance pillars have a significant relationship with MTBR on static panel. However, quantile regression shows that only at 80% quantile, governance factors show negatively significant relationship. The result is contradicted with the research of Zahroh and Hersugondo, 2021; Abdi, Li and Camara-Turull, 2021. One reason that could be identified may because of the needed of corporate governance are related to legislation, which involved additional cost to comply to the law and the benefits is uncertain (Durden and Pech, 2006).

Whereas for environmental pillars and Tobin's Q, on static panel, it has demonstrated a positive significant relationship. On the other hand, quantile regression, has also shown a similar result, whereby environmental and Tobin's Q has a positively significant relationship at 10% quantile. These results are found to be consistent with the research by San Ong, Teh and Ang (2014). This is primarily due to the working on environmental sustainability which includes the use of renewable resources and reuse of raw materials that results in cost reductions thus causing the immediate raise in the company's profitability. It can also be seen that companies which focus on pollution reduction will eventually lower the firm's equity financing cost and deduct companies' environmental cost. Hence, the firm value will be enhanced when the use of natural resources is maximized (Li, Liao & Albitar, 2020).

Nevertheless, the result on static panel illustrates that social pillars and Tobin's Q has negatively significant relationship; and quantile regression test has exhibited identical result whereby social pillars, and Tobin's Q has negatively significant relationship. This implied that social pillars do have an impact to the firm value but negatively impacting it. This may due to the additional cost needed in social pillar investment as it does not directly profit the shareholders or investors. Firms that do-good things to the society may directly harm the interests of shareholders as it does not bring profitability to the firm directly. Therefore, company that invested in social pillars are negatively impacting the firm value.

Besides that, governance pillars and Tobin's Q explicit an insignificant relationship on static panel while quantile regression shows negatively significant relationship at 70%. It can be seen that compared to environmental and social pillars, corporate governance factors have no or minimal contribution to firm value based on the results portrayed, which is aligned with the studies conducted by Yoon, Lee and Byun (2018). So, these three-score metrics (ESG) essentially assess a company's advocacy on behalf of its stakeholders. Yet, the governance scores put an emphasis on how a firm behaves toward its shareholders whereas the environmental and social ratings assess a company's practices toward its clients, suppliers, employees, and exacta. Besides, firms with excellent governance processes are bound to maintain the legal compliances, but those procedures may not necessarily set them apart from rivals or give them a major financial performance benefit. Hence, governance factors have shown lesser significant compared to environmental and social pillars.

CHAPTER 5

CONCLUSION

5.1 Summary on Findings

Based on the results of our analysis on the impact of ESG factors on MTBR and Tobin's Q, our findings suggest that the use of different estimation methods yielded contrasting results. Specifically, REM is more preferable and shown that governance has negative and significant relationship on MTBR. Whereas for Tobin's Q, FEM is more preferable and shown that environmental factor and Tobin's Q has a positive and significant relationship at 10%. However, our dynamic GMM estimation revealed that all independent variables had an insignificant relationship with both MTBR and Tobin's Q.

To provide a more comprehensive understanding of our results, we employed quantile regression to analyze the relationship between ESG factors and MTBR or Tobin's Q at different quantiles. Our quantile regression analysis indicated that environmental factors had a positive and significant relationship with MTBR at the 10% level of significance up to the Q50 quantile, while social factors had a negative and significant relationship with MTBR at the 10% level of significance at the lowest Q15 quantile.

In the case of Tobin's Q, our quantile regression analysis revealed that environmental factors had a positive and significant relationship at the 5% level of significance up to the Q65 quantile, while social factors had a negative and significant relationship at the 5% level of significance across almost all quantiles.

5.2 Discussion on Findings

In recent years, the analysis of the effects of environmental, social and governance (ESG) factors on firm value is a crucial research topic that has yielded significant attention. ESG factors are categorized as non-financial indicators that determine the sustainability and ethical

consequences of a corporate's operations on the ESG practices. Besides, the inclusion of ESG factors in investment and business strategy has become substantially imperative, especially when stakeholders are putting more attention on the impact of organizations on the environment and society. Thus, a growing body of research has been done to explore the relationship between ESG factors and firm value across various industries.

Yet, the recent collapse of Silicon Valley Banks which had an excellent rating for its ESG policies caused some reservation on the benefits ESG to the firm value. Is the Silicon Valley Banks case an exception or one-off case that not relevant to ESG? The findings of this paper cannot give a definite answer to that question but provide some interesting insights on the relationship between ESG and firm value. Given wide-ranging research on ESG and firm value over the last few years, similar literature on the information technology industry is relatively insufficient, which also added value to this paper. This paper addresses this gap by investigating the impact of individual ESG pillars on firm value in the information technology sectors. Based on static panel findings for both Tobin-q and MTBR models, only the Environment (E) factor positively affecting firm value at a 10% significant level. All ESG factors are not significant in dynamic models, implying limited importance of Environmental, Social and Governance factors on firm value. Deeper analysis using quantile regression shows that the Environmental (E) factor have positive relationship at lower (quantile) levels of firm values. These imply that once the firm values, both measured by MTBR and Tobin-q reached above the 50% quantile and 60% quantile respectively, the environment factor is not significant. Surprisingly, the Social (S) factor has a negative relationship with Tobin-q at almost all quantiles. This finding prompts for due diligent on the social scoring (S) factors, including review on whether companies should reduce emphasis on this factor and what qualitative aspects within the Social Scoring metrics that are harmful to company firm value. Another aspect of ESG, namely the governance factor has no significant relationship with firm value, which is not consistent with common perception of an expected positive relationship. In contrast, independent director factor, one of the aspects of corporate governance, has positive relationship with firm value in all levels in Tobin-q model and significant positive relationship at higher levels in MTBR model. Therefore, due diligence and further research also need to be done on the importance of governance factor within the ESG framework to firm value.

The results of this paper demonstrated that the individual ESG pillars has limited significant effect to the firm value of information technology companies, both positively and negatively. It generally portrayed different results on the effect of individual ESG factors on firm value when the proxy to represents the firm value is different. This is due to Tobin-q and MTBR measure the different aspects of a company's firm value. Tobin-q is calculated by using the total market value divided by total assets. It mostly adopted as a measurement to measure a company's investment opportunities and the potential for a firm to generate growth. Thus, on Tobin-q measurement, only environmental factors have a positive relationship with firm value. It indicated that investing in environmental sustainability increase the potential for a firm grows as it is effective in cost savings by deducting the operational costs, environmental risk reduction that could avoid lawsuits and regulatory fines. Besides, it has more investment opportunities for a corporate as investing in environmental sustainability helps to promote innovation and growth. This could efficiently facilitate the organization to develop new products and services that meet the growing demand for sustainable solutions.

While for MTBR, the measurement is based on the total market value equity divided by total book value of equity. MTBR used to measure that whether the investors are willing to pay more for the companies' shares than the assets, which often believe that the firm can generate growth, or the intangible assets of the firm could increase its value. For MTBR, ESG pillars generally have significant relationship at higher quantile. This could mean that when the firm has higher MTBR or firm value, investors will start looking into the sustainability investment. Sustainability investment strategy of a company could affect its companies' long-term growth, and its help the investors to better mitigate risk. The ESG risks could also come with the regulation and policy changes where directly impact the firms' reputation and indirectly increase the risk for the investors. However, indecisive results to support good effect of ESG to firm value should prompt the government and companies to delay or not aggressively implement policies to strengthen its commitment to ESG activities.

5.3 Implications on the Study

Thus, our findings are highly application to the scholarly literature as well as information technology companies. From the academic point of view, the research contributes to an advance in the relationship between individual ESG factors and firm value. The complicated

relationship between individual ESG factors, financial performance and value creation are being addressed in this study by drawing new insights and filled in the gaps in previous research. By drawing the new insights, this research can help to share the future direction of academic inquiry in this field.

While from the business perspective, the corporate managers, investors, policymakers and fund managers are particularly interested in various practical consequences of this research. Firstly, this study has provided evidence for stakeholders and management that implementation of sustainability criteria does have implications for firm value. Secondly, the high management could understand that ESG does not necessary bring positive impact to firm value despite the government has been enforcing ESG to be integrated in business activities. By referring to our findings, this could facilitate the managers to allocate limited available resources to ESG activities.

Another potential implication for business is enhancing stakeholder engagement or relationship by planning and executing ESG activities. Stakeholder engagement, inclusive of employees, clients, suppliers and communities, is relatively important for a successful ESG activities. Companies may strengthen connections and produce more beneficial social and environmental results by including the stakeholders in decision-making processed and discuss together on environmental and social concerns.

For the government and regulatory bodies, sustainable development is an ongoing priority in relation to the future economic development of the nations by industrial economy. The government should firstly analysed the necessities of firm that involved in ESG activities instead of just for the sake of legislation compliance. Then, financial incentives could be given by relevant authorities to the firms that take the initiative to integrated sustainable activities in the business. Next, the relevant regulatory authority is recommended to work in a more constructive ESG information disclosure system so that the information attain by public is reliable and validated.

The promotion of sustainable development requires collaboration between various stakeholders, including governments, regulatory bodies, and private enterprises. Effective policy frameworks and financial incentives can encourage companies to engage in ESG

activities that benefit not only their stakeholders, but also the broader society and environment. Through the implementation of a constructive ESG information disclosure system, investors and other interested parties can make informed decisions that take into account the social and environmental impacts of their investments. Moreover, information technology companies could play a role in promoting sustainable development. Blockchain technology, for instance, can assist in preventing environment and social abuses by enhancing transparency and accountability in supply chains. Similar to this, artificial intelligence may assist businesses in better identifying and addressing ESG risks and opportunities. ESG activities are not a one-time solution, but it would be a continuous process of evaluation and improvement. By working together, stakeholders can create a more sustainable future that is characterized by economic growth and social progress.

5.4 Limitations of the Study

Like some of the other empirical research projects, this study consists of certain limitation as well. As our results are determined from Thomson Reuters Eikon DataStream, which the data is publicly available for scoring, the undisclosed parameters may not cover. Besides, there is no way to verify the validity and the reliability on the publicly available data as it is based on the willing of the company on disclosure. Second, this research is only conducted in the United States (US) specific companies, which could not generalize to information technology sectors worldwide. Yet, although sustainable investment returns can also be expressed in terms of qualitative dimensions, this paper adopted the quantitative approach to analyze the impact.

The following problem is the Fixed Effect Model (FEM) was employed in this analysis. The main drawback of FEM is the underappreciated of heterogeneity due to the unmeasured properties that change over time. There are no other significant theoretical or empirical issues even though this fundamental limitation is very recognized. This can be explained in part by the fact that only a small number of graduate schools in sociology include panel data processing as part of the required teaching.

5.5 Recommendations for future research

Every limitation comes with a solution so that the improvement on research can be happened. Hence, the recommendation is highlighted for future researcher in order to have a deeper understanding on the topic of ESG and the impact of firm value in information technology industry. Firstly, it is recommended for future research to pick other ESG scaling report such as Bloomberg and FTSE4Good index series as an alternative.

Following to the utilization of a different ESG scaling methodology in this study, it is suggested that further research should be conducted to investigate the consistency of findings across different cultural and contextual settings, particularly in the information technology sector. This is significant because varying cultural and contextual factors may yield different outcomes and offer unique insights. Additionally, given the rapid development of the information technology industry in most countries, it is worth exploring the impact of firm value on ESG adoption in diverse setting.

Moreover, it is recommended that future researchers consider employing mixed methods research approaches, including fostering method such as conducting face-to-face interviews and applying thematic analysis to reports that are publicly accessible. This will enable a comprehensive understanding of the factors that influence ESG adoption and their relationship with firm value. Lastly, it is suggested that future research should focus on indirect relationship studies, considering new mediating and moderating variables that can provide further insight into the complex relationship between ESG adoption and firm value. Overall, these recommendations can enhance the understanding of the complex relationship between ESG and firm value and inform organizations' strategic decision-making processes.

5.6 Conclusion

As a summary, this research had conducted the findings from the effect of environmental, social, and governance factors on firm value in the sector of information technology. This research required extensive information evaluation from articles, linked journals, and other sources in order to be completed and to provide the readers a comprehensive picture of the overall findings. Then, by gathering the data from DataStream, statistical analysis has been conducted on a total of 77 public listed companies, to obtain the objective of the research.

Overall, the result concluded that environmental factor has positive effect to Tobin's Q while insignificant relationship to MTBR. While for social pillar, it has an insignificant relationship with MTBR and a negatively significant result with Tobin's Q. For governance pillar, significant relationship has been demonstrated with MTBR and Tobin's Q. On quantile regression, the independent variables, environmental, social and governance shows impact on higher quantile instead of lower quantile.

Finally, the limitation faced during the research conduction period and suggestions for future researchers also included in this chapter as well.

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APPENDIX

No.	Company
1	ScanSource, Inc.
2	ADTRAN Inc.
3	Stratasys Ltd.
4	DZS Inc.
5	Synaptics Inc.
6	Insight Enterprises Inc.
7	Harmonic Inc.
8	National Instruments Corporation
9	FormFactor, Inc.
10	Seagate Technology Holdings plc
11	Quantum Corporation
12	NETGEAR, Inc.
13	SYNNEX Corporation
14	GSI Technology Inc.
15	ON Semiconductor Corporation
16	Ribbon Communications Inc.
17	Marvell Technology Group Ltd.
18	NVE Corporation
19	Kopin Corporation
20	Wolfspeed, Inc.
21	Microchip Technology Inc.
22	Viavi Solutions Inc.
23	Super Micro Computer, Inc.
24	Lattice Semiconductor Corporation
25	Infinera Corporation
26	EchoStar Corporation
27	Cirrus Logic, Inc.
28	Cisco Systems, Inc.
29	Broadcom Inc.
30	Qualcomm Incorporated
31	Power Integrations, Inc.
32	Calix, Inc.
33	NVIDIA Corporation
34	NXP Semiconductors N.V.
35	Juniper Networks, Inc.
36	3D Systems Corporation
37	Ambarella, Inc.
38	Ciena Corporation
39	Viasat, Inc.

40	Arista Networks, Inc.
41	Rambus Inc.
42	CDW Corporation
43	Applied Optoelectronics Inc.
44	Avnet, Inc.
45	Motorola Solutions, Inc.
46	Texas Instruments Incorporated
47	Analog Devices, Inc.
48	HP Inc.
49	Western Digital Corporation
50	CommScope Holding Company, Inc.
51	Semtech Corporation
52	Intel Corporation
53	Skyworks Solutions, Inc.
54	Diodes Incorporated
55	Advanced Micro Devices, Inc.
56	AstroNova, Inc.
57	Vishay Intertechnology, Inc.
58	Apple Inc.
59	Micron Technology, Inc.
60	Qorvo, Inc.
61	Lumentum Holdings Inc.
62	Switch, Inc.

Table A: List of Public Listed Companies for Information Technology in US