Capital structure and speed of adjustment: the impact of environmental, social and governance (ESG) performance

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Abstract

Purpose – This study aims to examine the impact of sustainable practices as proxied by the environmental, social and governance (ESG) score on capital structure. It also investigates whether ESG performance influences the speed of adjustment (SOA) to target leverage in firms.

Design/methodology/approach – The sample covers 116 non-financial firms listed on the main stock exchanges from five Southeast ASEAN countries (Bursa Malaysia, Indonesia Stock Exchange, Philippines Stock Exchange, Singapore Stock Exchange and Stock Exchange of Thailand) over the period 2012–2019. The study adopts the OLS regression and system-GMM estimators to perform the data analysis.

Findings – The authors show that the ESG score is positively associated with book leverage, suggesting that firms increase their debt capital through sustainable practices. However, they find that the ESG score is negatively associated with market leverage across our model estimations. The authors also reveal that environmental, social and governance pillar scores produce about 7.82%, 2.88% and 0.47% SOAs, respectively, higher than the SOA of the traditional SOA without the ESG factor. The aggregate ESG score has about 3.41% SOA higher than the baseline SOA without the ESG factor.

Practical implications – This study is of interest to investors, corporate firms and policymakers. The study demonstrates that the ESG score increases the firm's SOA to target leverage. By disaggregating the ESG score, the authors establish that ESG pillar scores produce higher SOAs than the traditional SOA (without ESG), with the environmental score inducing the fastest SOA. Practically, the study implies that environmentally sustainable activities reduce environmental transaction costs, benefit firms through better information transparency and enhance a trustful climate between the firm and suppliers of capital. Therefore, this study demonstrates that firms do not only incur the cost of disseminating ESG information but also benefit from lower information asymmetry and a higher SOA with better tax-deductible advantages.

Social implications – The findings have combined advantages for both stakeholders and directors who monitor and manage the firms' resources to improve the quality of ESG practices and initiatives.

Originality/value – To the best of the authors' knowledge, this study is among the first to establish that sustainable practices induce higher debt capital. Secondly, unlike prior research focusing on the cost of capital, the authors examine whether ESG performance affects capital structure patterns. Thirdly, it documents the extent to which sustainable practices influence the SOA towards target leverage in firms. The authors contribute to corporate finance literature that firms reach faster to their target leverage in the presence of ESG performance. Theoretically, through the notion of the stakeholder proposition, the study

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establishes that the firms' pursuance of stakeholder goals further enhances the prediction of the trade-off theory.

Keywords ESG performance, Speed of adjustment, Capital structure, ASEAN countries

Paper type Research paper

1. Introduction

The drive for a sustainable future and zero-carbon emissions has called for the integration of environmental, social and governance (ESG) activities in sustainable investment decisions following the Paris Agreement on climate change in 2015. The Paris Agreement introduces a new paradigm in international climate policy to shape corporate investment decisions, thereby empowering activist investors to pressurize firms in disclosing their ESG activities and policies (Alvarez and Marsal, 2019; Corte *et al.*, 2019). ESG is defined as the firm's involvement in practices concerning social welfare, equitability and sustainability of stakeholders' wealth (Jamali *et al.*, 2017; Mohammad and Wasiuzzaman, 2021). The goal of ESG is to ensure a sustainable environment, better governance, reduced information asymmetry and low cost of capital (Raimo *et al.*, 2021). In addition, due to the signatory voluntary commitment by the United Nations Principles for Responsible Investment (UNPRI) that investee companies should be ESG risk-free for global investment funds, more than 5,132 global investment/institutional investors have become UNPRI signatories, making them avoid facing a shrinking pool of investors. Thus, ESG disclosure is the outcome of the firm's greenhouse emission policies and environmental sustainability required to shape its investment and financing decisions.

Furthermore, policymakers and regulatory authorities are progressively mandating corporate firms to disclose ESG information (Aouadi and Marsat, 2018; Eliwa *et al.*, 2021; Limkriangkrai *et al.*, 2017; Raimo *et al.*, 2021; Wong *et al.*, 2021). For instance, the Association of Southeast Asian Nations (ASEAN) member states (Indonesia, Malaysia, Philippines, Singapore and Thailand) are increasingly oriented to ESG standards and opportunities across corporate boards to pursue sustainable activities relating to green building developments, social impact and transparency. Governments across ASEAN countries are gradually showing interest in affordable housing and sustainability through green projects to reduce the region's infrastructure deficit. Meanwhile, 15 out of the 58 countries to have issued a green bond in the global green bond ecosystem are in the Asia-Pacific region, according to one of the experts of the Asian Development Bank Institute (Azhgaliyeva, 2020). Recently, it has been recognized that ESG adoption in ASEAN member states has generated positive publicity, enhanced reputation, increased shareholder value and increased access to external capital access opportunities. According to the survey conducted by the Morgan Stanley Capital International (MSCI) (2021), a global investment research firm, about 79% of firms in the Asia-Pacific region had significantly increased their ESG investment following the presence of Covid-19.

The Philippine geothermal company issued the first green bond in the ASEAN region in an amount of a $226m renewables project in early 2016. Across the ASEAN region including Indonesia, Malaysia, Singapore and Thailand, about 43% of the green bonds have been used to finance green infrastructure, and about 32% are used to finance energy projects (Azhgaliyeva, 2020). As of 2019, The Stock Exchange of Thailand (SET) held 9th rank, six places ahead of the London Stock Exchange in the global ranking of exchanges based on sustainability disclosure, while Bursa Malaysia (22nd) and Singapore Exchange (24th) were ranked considerably above the New York Stock Exchange (40th) (Corporate Knights, 2019). This is due to the regional standards for green bonds, sustainability bonds and social bonds

launched by the ASEAN Capital Markets Forum with all ten members of the ASEAN bloc. Surprisingly, little is known about how the sustainability practices of ASEAN firms affect their capital structure decisions and target leverage. To fill this gap, we examine whether sustainable practices in ASEAN firms through ESG performance affect the leverage decisions of firms and the extent to which ESG performance influences the speed of adjustment (SOA) to target leverage.

Stakeholders are increasingly interested in the sustainability practices of firms (Freeman, 1984). Stakeholders have paid more interest to understand the importance of sustainable investments in reducing the agency conflict of free cash flow (Erragragui, 2018; Gracia and Siregar, 2021; Islam *et al.*, 2021; Samet and Jarboui, 2017). These interests have created better opportunities for corporate managers to finance future investments at a lower cost of capital. Thus, firms benefit not only from tax-deductible advantages but are also more likely to invest in many positive net present value (NPV) projects in the future due to the engagement in sustainable practices. In this paper, we examine the relationship between ESG performance and leverage. We also investigate the impact of ESG performance on the SOA to target leverage. Based on stakeholder theory, which suggests the importance of investors' protection in creating shareholder value (Freeman, 1984; Jensen, 2001), we explore the dimensional effects of ESG scores on leverage and how they impact the SOA.

Numerous studies have investigated the relationship between ESG and firm performance (Aboud and Diab, 2018; Albitar *et al.*, 2020; Aouadi and Marsat, 2018; Atan *et al.*, 2018; Fatemi *et al.*, 2018; Friede *et al.*, 2015). However, the link between ESG and corporate leverage is still scanty. A few studies on the ESG–leverage nexus have focused more on the cost of debt with less evidence on leverage decisions (Eliwa *et al.*, 2021; Limkriangkrai *et al.*, 2017). Past theories on capital structure have emphasized the assumptions that market mispricing (Baker and Wurgler, 2002), corporate tax (DeAngelo and Masulis, 1980), agency factor (Leland, 1998) and managerial behaviour (Adeneye and Chu, 2020; Wong, 2015) determine the capital structure choice of firms. However, the theoretical assumptions on the role of ESG performance on leverage are limited in corporate finance studies. This study hypothesizes the relationship between ESG performance and leverage. In addition, it hypothesizes the extent to which ESG performance affects the SOA to target leverage.

This paper highlights some relevant findings. Firstly, previous studies have focused on the effect of sustainability on capital structure by assessing sustainability solely from the perspective of corporate social responsibility (CSR) which may lead to mixed findings on the sustainability–financing decision nexus (Dhaliwal *et al.*, 2011; El Ghoul *et al.*, 2011; Gerwanski, 2020; Goss and Roberts, 2011; Reverte, 2012). We build on these studies by providing a better assessment of sustainability using the ESG score which covers the ESG dimensions. We find that ESG performance has a positive impact on book leverage while a negative impact on market leverage. These results are consistent across country-level analysis, ESG pillar scores and financial system typology. The results of our country-level analysis further establish how various ASEAN countries are driving the goal of zero-carbon emission and sustainability. We also show that ESG performance has a positive impact on ASEAN countries that are market-based economies while establishing insignificant results for bank-based economies. Our results support past findings that ESG induces a lower cost of capital, thereby increasing the use of debt capital (Crifo *et al.*, 2015; Gjergji *et al.*, 2021). Moreover, prior studies also fail to establish the extent to which ESG performance would influence the target leverage by impacting the SOA. We find that a firm's sustainability practice does influence the SOA. This complements prior research on the determinants of SOA (Jiang *et al.*, 2021; Öztekin and Flannery, 2012; West *et al.*, 2021).

The contribution of this paper is fivefold. Firstly, our study is among the first to establish that sustainable practices, proxied by ESG scores, induce a higher debt capital, suggesting that the use of free cash flow on sustainability initiatives would further enhance the leverage decisions of the firms. Secondly, unlike past studies that focused on the cost of capital (Gerwanski, 2020; Gracia and Siregar, 2021; Eliwa *et al.*, 2021; Muttakin *et al.*, 2020; Bryl and Fijałkowska, 2020), we examine whether ESG performance affects capital structure patterns (i.e. leverage). We confirm that the effect of ESG performance is stronger and negative for market leverage than book leverage. Thirdly, this study is among the first research to document the extent to which sustainability practices influence the SOA towards target leverage in firms. Unlike prior research that focuses on timing factors in improving the SOA (Flannery and Rangan, 2006; Haron *et al.*, 2013), we contribute to corporate finance by further establishing that ESG practices increase the adjustment speed faster to target leverage. Fourthly, we further disaggregate ESG score into its components and find that environmental pillar and social pillar scores enhance leverage and SOA while the relationship is insignificant for governance pillar score. Finally, our results imply agency conflicts between shareholders and managers that the latter can reduce free cash flow by investing in sustainable activities which reduces the cost of borrowing rather than maintaining high-interest expenses that induce financial risk on shareholders. It also has an impact on firms' managers who are averse to the unfavourable and costly capital market by engaging in sustainability initiatives that would help mitigate the effect of the costly capital market.

The rest of the paper is organized as follows. Section 2 presents the related theories and literature on sustainability and capital structure. Section 3 provides the empirical model, variable measurements and sample selection procedures. Section 4 presents the results of our baseline analysis, including a battery of robustness tests. Section 5 concludes the paper.

2. Literature review and hypotheses development

2.1 Theoretical background

Since the pioneer work of Modigliani and Miller (1958), theoretical developments on companies' financing behaviour have been established due to capital market imperfections. Modigliani and Miller argue that capital structure does not determine firm value in the presence of capital market perfections such as no taxes. However, as market imperfections exist, several theorists have argued that capital structure does matter in the presence of information asymmetry, taxes and interests. Thus, several theories of capital structure have been developed and examined including trade-off theory (Miller, 1977), agency theory (Jensen and Meckling, 1976) and stakeholder theory (Freeman, 1984).

2.1.1 Trade-off theory. The trade-off theory claims that firms choose to be financed by a mix of debt and equity determined by balancing the costs (i.e. bankruptcy cost) and benefits (i.e. tax shield) of debt. Financially, firms benefit from debt, through lower taxes, as it is considered as a tax-deductible expense (Modigliani and Miller, 1958). The trade-off theory allows predicting both the costs and benefits of debt financing to reach optimal leverage level. It states that by achieving such a level, the firm value would be maximized (Titman and Tsyplakov, 2007). Thus, any deviations from the target leverage levels should be quickly adjusted (Frank and Goyal, 2009) to preserve the firm value.

2.1.2 Agency theory. The agency theory, introduced by Jensen and Meckling (1976), assumes that the interests between managers (agents) and lenders (principal) are antagonists insofar as managers tend to pursue their interests at the expense of those of lenders. As a means of prevention, lenders could introduce debt covenants and restrictions, leading to both higher agency costs and debt pricing. The theory considers that companies

can reduce agency conflicts and information asymmetry by providing detailed information on their sustainable practices which may result in reduced cost of debt and easier access to debt financing (Cheng *et al.*, 2014; Asimakopoulos *et al.*, 2021).

2.1.3 Stakeholder theory. The stakeholder theory assumes that corporate firms pursue both short-term profits and long-term goals of stakeholders (Freeman, 1984). It states that the firm's pursuance of transparency and reduction in information asymmetry enhances stakeholders' trust and brings competitive advantage. The theory explains the finance–sustainability nexus that sustainable practices enhance firm value. Thus, according to the stakeholder theory, sustainability practice lowers financing cost and increases debt usage (El Ghoul *et al.*, 2011; Gerwanski, 2020).

2.2 Hypotheses development

2.2.1 ESG performance and capital structure. Capital is, commonly known, as a source for funding a firm's business to generate added value for the stakeholders and is reflected either in a form of debt and/or equity, which both have attached costs and benefits (Myers, 2001; Pilvere-Javorska *et al.*, 2020). Thus, a lower cost of capital enhances more access to finance, increases leverage and lowers information asymmetry. As sustainability is gaining in importance among academicians, a vast strand of research has focused on the effect of using an individual or combined ESG practices on both, cost of equity (Cheng *et al.*, 2014; Ng and Rezaee, 2015; Crifo *et al.*, 2015) and cost of debt (Goss and Roberts, 2011; Cooper and Uzun, 2015; Hoepner *et al.*, 2016). By conducting a systematic literature review, Cantino *et al.* (2017) notice that the relationship between ESG sustainability and cost of equity is well defined, suggesting that sustainable firms benefiting from a decreased information asymmetry and have better access to equity financing. However, the authors emphasize that the association between ESG sustainability and debt financing is far from clear and requires more investigation.

Several studies use stakeholder theory and agency theory to explain the relationship between sustainable practices and the cost of debt. The stakeholder theory, introduced by Freeman (1984), does not only consider short-term shareholder profit but also focuses on the interests of all stakeholders including suppliers, customers, employees and creditors (Freeman, 1984; Jensen, 2001). The theory claims that firms promoting transparency and trust among their stakeholders benefit from the competitive advantage over others (Jones, 1995). Therefore, undertaking sustainable activities could be one of the firm's strategies to serve multiple stakeholders by promoting communication and interaction with stakeholders (Benabou and Tirole, 2010; Cheng *et al.*, 2014). Sustainable behavioural practices in organisations could also reduce firm-related risks (i.e. financial cost) and maximize the firm value (Sassen *et al.*, 2016; Peng and Isa, 2020; Wong *et al.*, 2021). Jones (1995) considers that CSR practices are crucial for firms to attract financial resources and stakeholder support. According to stakeholder theory, stronger sustainable actions should be associated with lower costs. In line with this point of view, Cooper and Uzun (2015) examine, by using a sample of US firms over the period 2006–2013, the relationship between CSR and the cost of debt. They report that socially responsible firms have a lower cost of debt. Their findings suggest that firms contributing to stakeholders' well-being are perceived as less risky in the eyes of creditors and thus make them able to get easier and less expensive access to support and resources than other competitors.

Furthermore, some studies have focused on the association between environmental issues and leverage. For example, Chava (2014) addresses the relationship between environmental concerns and the cost of equity and debt. The author notes that firms causing environmental externalities have higher equity and debt costs. In addition, Chang *et al.* (2021) add that firms with greater environmental liabilities, measured using the amount of

toxic production-related waste produced by firms, exhibit lower debt-to-assets ratios. Furthermore, Ginglinger and Moreau (2019) find that greater climate risk results in lower leverage, as captured by market leverage and book leverage, in the post-2015 period, that is, after the Paris Agreement. More recently, Nguyen and Phan (2020) investigate the causal effect of carbon risk on the firm capital structure using two measures of financial leverage, book leverage and market leverage. They indicate that carbon risk leads to an increase in firms' financial distress risk, which results in a decrease in financial leverage. While these studies address the effect of individual sustainable activities on debt financing access, other researchers have focused on the combined sustainable activities which join ESG dimensions. In this sense, Eliwa *et al.* (2021) provide empirical evidence, in support of the legitimacy theory, that lending institutions value ESG performance and reward firms with stronger ESG performance by lowering the cost of debt. In addition, Jang *et al.* (2020) suggest that the higher the ESG scores, the lower the cost of debt financing for bond issuers. Furthermore, Aslan *et al.* (2021) investigate the relationship between ESG performance and the probability of corporate credit default. They report, based on a sample of 902 publicly listed firms in the USA from 2002 to 2017, that firms with high ESG performance have a lower probability of corporate credit default.

From the agency theory perspective introduced by Jensen and Meckling (1976), agency problems may occur between lenders (principal) and the company (agent). Lenders could offer their money to a company under the condition of receiving this money back, increased by the charged interest. As agents hold more information about firm performance than outsiders, a problem of adverse selection may appear (Gerwanski, 2020). As a response, lenders could introduce debt covenants and restrictions, leading to higher agency costs and debt pricing consequently (Muttakin *et al.*, 2020). By providing detailed information, companies can reduce both agency costs and information asymmetry between managers and lenders which results in reduced cost of debt (La Rosa *et al.*, 2018; Bryl and Fijałkowska, 2020). Cheng *et al.* (2014) and Asimakopoulos *et al.* (2021) advocate the beneficial effect of ESG on reducing information asymmetry, and as a consequent debt pricing. Specifically, Asimakopoulos *et al.* (2021) focus on the impact of being ESG rated on a firm's debt structure and conclude that optimal market and book leverage ratios decrease when the firm becomes ESG rated. Moreover, Cheng *et al.* (2014) show that firms with higher ESG have lower capital constraints because of the mitigation of agency problems and information asymmetry. Considering the above, we formulate our first hypotheses as follows:

H1. Companies with higher ESG performance exhibit an increase in financial leverage.

H1a. ESG performance is positively associated with book leverage.

H1b. ESG performance is positively associated with market leverage.

2.2.2 ESG performance and speed of leverage adjustment. In line with the trade-off theory, firms tend to adjust their leverage to an optimal level when the benefits of such adjustment exceed its costs (Myers, 1984; Myers and Majluf, 1984). By balancing the benefits and the costs of debt financing, firms achieve their leverage target level at which firm value would be maximised. As mentioned earlier, prior studies put into evidence the decreasing cost of debt associated with high sustainability performance (Eliwa *et al.*, 2021; Jang *et al.*, 2020; Cooper and Uzun, 2015; Chava, 2014), resulting in easier access to debt funding and thus, in a faster SOA (Huang *et al.*, 2021). In addition, information asymmetry has been widely considered in the literature as a vital factor affecting financing decisions (Myers and Majluf, 1984; Yang *et al.*, 2017). Information asymmetry constitutes a major risk for investors as it could deter their ability to find investment opportunities and reduce consequently the ability

of managers to get funding and their ability to adjust the leverage level (Jin *et al.*, 2020). Thus, the adverse selection problem could lead to an increase in the cost of adjustment resulting in a lower SOA (Faulkender *et al.*, 2012). In this regard, Aflatooni and Khazaei (2020) show that a higher level of information asymmetry increases the leverage deviation and that firms with a lower information asymmetry tend to adjust faster to target leverage.

A strand of research highlights the role of both individual or combined ESG practices in mitigating information asymmetry. For instance, prior studies support that CSR led to an increase in transparency and a reduction of information asymmetry (Yang *et al.*, 2017; Samet and Jarboui, 2017), enabling companies to preserve higher debt in the capital structure. Accordingly, since CSR exhibits its ability in mitigating information asymmetry, it is expected that firms engaging in socially responsible actions are more likely to adjust faster to their target leverage. Consistent with this point of view, Do *et al.* (2018) demonstrate that better CSR performance is associated with faster leverage adjustments towards an optimal capital structure level. Their findings support the stakeholder theory and suggest that implementing CSR strategies offer to investors more transparency and reliability on financial information which may facilitate firms financing access and leverage adjustment. Moreover, Do *et al.* (2018) propose that CSR activities may attenuate asymmetric information and ensure a trustful climate between firms and creditors, resulting in lower costs of leverage adjustment and consequently faster leverage SOA. Furthermore, Tascon *et al.* (2020) analyse how environmental transaction costs affect the SOA. They provide evidence on European listed firms over the period 2005–2015, in support of the trade-off theory, that the SOA is slower for carbon emitters. More recently, Ho *et al.* (2021) focus on the effect of corporate sustainability performance on the speed of leverage adjustment towards target levels. Using an international sample over the period 2002–2008, they find that firms with higher corporate sustainability performance tend to adjust faster toward their target leverage ratios. Overall, we assume that firms with higher sustainable performance may benefit from better information transparency and lower cost of debt which induce lower costs of leverage adjustment and thus a faster speed of leverage adjustment. Meanwhile, there are scanty studies on how ESG performance influence the SOA to target leverage. Evidence on whether the firm's environmental sustainability performance influences SOA better than social and governance sustainability is almost absent and leaves a gap in the corporate finance literature, for financial analysts and policymakers. Hence, evidence on which of sustainability's dimensions increasingly drive the SOA requires further investigation. Given that, we formulate our second hypothesis as follows:

H2. Higher ESG performance is associated with a faster leverage adjustment speed.

H2a. A higher environmental performance is associated with a faster leverage adjustment speed.

H2b. A higher social performance is associated with a faster leverage adjustment speed.

H2c. A higher governance performance is associated with a faster leverage adjustment speed.

2.3 Control variables – determinants of capital structure

Since the seminal work of Modigliani and Miller, an extensive range of research has identified various determinants of capital structure decisions (Graham and Harvey, 2001; Moradi and Paulet, 2019; Rajan and Zingales, 1995; Titman and Wessels, 1988; Pontoh and Budiarso, 2018). Traditionally, several studies (Frank and Goyal, 2009) have emphasized

firms' specific characteristics to explain the variations in leverage. Profitability, market to book value, tangibility, firm size and non-debt tax shield are identified as core determinants of capital structure at the firm's level. More recently, an array of countries' specific characteristics (e.g. inflation and gross domestic product [GDP]) which contribute to leverage variation have been incorporated into the traditional determinants of capital structure (Zafar *et al.*, 2019).

2.3.1 Profitability. Previous studies (Antoniou *et al.*, 2008; Moradi and Paulet, 2019; Zafar *et al.*, 2019) consider profitability as one of the main determinants of capital structure. The trade-off theory and the pecking order theory provide distinct predictions on the relationship between profitability and leverage. The trade-off theory predicts that more profitable firms could enjoy larger tax benefits of debt and thus should exhibit higher leverage. In contrast, the pecking order theory predicts that firms with higher profitability rely more on their retained earnings rather than external funds which explains their lower leverage.

2.3.2 Market-to-Book ratio. According to Frank and Goyal (2009), the market-to-book (MTB) ratio is considered as one of the most significant core determinants of capital structure. Previous studies provide different perspectives regarding the relationship between the MTB ratio and leverage. Some studies (Flannery and Rangan, 2006; Frank and Goyal, 2009), in support of the pecking order theory, perceive a higher MTB as a signal of greater growth opportunities which firms tend to maintain by limiting their leverage level.

2.3.3 Tangibility. In line with the trade-off theory, past research (De Jong *et al.*, 2008; Hovakimian *et al.*, 2004) report a positive relationship between tangibility and leverage, suggesting that firms with higher tangibility are more likely to benefit from reduced bankruptcy costs, and consequently, more debt access (Hovakimian *et al.*, 2004). Such findings have been contradicted by other studies (Uddin, 2015) establish a negative relationship between tangibility and financial leverage.

2.3.4 Firm size. Firm size has been widely viewed as one of the main drivers of capital structure decisions (Titman and Wessels, 1988; Frank and Goyal, 2009; Moradi and Paulet, 2019). Consistent with the trade-off theory, it was argued that larger firms are likely to exhibit higher leverage because of their lower cash flow volatility, lower propensity for financial distress and easier access to financial markets (Rajan and Zingales, 1995; M'ng *et al.*, 2017).

2.3.5 Non-Debt tax shield. The concept of a non-debt tax shield supports the assumption of the trade-off theory which suggests that firms with a higher depreciation expenses tend to issue less debt for tax shield purposes. In support of this view, Fama and French (2002) show that there is a negative relationship between leverage and the non-debt tax shield.

2.3.6 Inflation. Along with the firm's specific characteristics, many researchers (Aderajew *et al.*, 2019; Chen and Strange, 2005; Desai *et al.*, 2004; Frank and Goyal, 2009) have considered inflation as a driver of capital structure decision at the country level and the findings were mixed. On one hand, inflation could be seen as a sign of the tax shield benefit of debt due to the greater real value of tax deductions (Jõeveer, 2013). In support of this point of view, Desai *et al.* (2004) and Chen and Strange (2005) report a positive relationship between inflation and leverage level. On the other hand, consistent with the trade-off theory, a higher inflation could decrease the leverage benefits due to greater bankruptcy costs of debt (Gungoraydinoglu and Öztekin, 2011). In line with this point of view, Aderajew *et al.* (2019) stipulate that inflation negatively affects the debt-to-equity ratio.

2.3.7 Gross domestic product. Previous studies (Frank and Goyal, 2009; Öztekin and Flannery, 2012; Zafar *et al.*, 2019) have used GDP growth as one of the country-level determinants of capital structure and provide inconclusive results on whether GDP affects positively or negatively the leverage level. For instance, Cheng and Shiu (2007) report, using

a data set of 45 countries, that GDP has a significant negative effect on firms' leverage, suggesting that firms in poorer countries have more leverage than those in wealthier countries. Moreover, Zafar *et al.* (2019) focus on 16 Asian countries and conclude that GDP growth rates negatively influence firms' leverage. Nevertheless, Desai *et al.* (2004) and Chen and Strange (2005) report that GDP growth rates, affect significantly and positively the leverage level.

3. Data and research methodology

This section presents the sources of data, the empirical model that mathematically represents the research hypotheses, the measurement of variables and the sample selection procedures.

3.1 Sources of data

We source ESG score data from the Refinitiv Eikon database. We define ESG performance as a sustainability disclosure score that measures the extent of the firm's environmental disclosure as part of ESG data. The ESG score ranges from 0 for firms disclosing the lowest or minimum amount of ESG data to 100 for those that disclose all the items of sustainability by Refinitiv Eikon Database. Disaggregating the ESG score, the environmental pillar score measures the amount of environmental data disclosed by a company publicly such as those relating to greenhouse gas emissions and environmental pollution. The social pillar score measures the amount of socially related data, often industry-specific, that the firm reports publicly. The governance pillar score measures the amount of governance data (e.g. board of directors) that the firm disclosed publicly. We obtained the ESG score and each pillar's scores from the Refinitiv Eikon database. According to the Refinitiv ESG score, the environmental pillar score has three main categories that are assessed with 68 processed data points: emissions (12%), innovation (11%) and resource use (11%). The social pillar score has four main categories with 62 processed data points. These four social categories are a community (8%), human rights (4.5%), product responsibility (7%) and workforce (16%). Concerning the governance pillar score, it has three main categories with about 56 processed data points: CSR strategy (4.5%), management (19%) and shareholders (7%).

This paper examines the extent to which ESG performance impacts leverage, and the SOA to target leverage for the period 2012–2019 in corporate firms across ASEAN countries (Indonesia, Malaysia, Philippines, Singapore and Thailand). Although there have been regulatory requirements across these countries to make ESG score disclosure mandatory, we focus on firms that have been voluntarily disclosing their ESG scores, probably to reduce information asymmetry and enhance investors' confidence. For instance, the Sustainability Framework 2015 in Malaysia requires firms to mandatorily disclose their ESG scores. Moreover, the "Sustainability Amendments" issued by the Bursa Malaysia, require firms to disclose a narrative statement of the management of material economic, environmental and social risks and opportunities (Sustainability Statement) as a criterion for the Main Market and access, certainty, efficiency (ACE) market listings. Equally, in 2014, FTSE4Good Bursa Malaysia Index requires firms to adopt the Sustainable Development Goals in a way for firms to increase ESG disclosures to achieve a drastic reduction in information asymmetry and improve transparency, required for investors to make investments and portfolio decisions. Recently, Mohamad *et al.* (2021) noted that the Malaysian firm's ESG practices are expected to be under intense scrutiny due to the downgrade from Tier 2 to Tier 3 as in the US State Department's Trafficking in Persons Report on the allegations that Malaysian firms have used forced labour during their production process. Such a downgrade may be expected to reduce foreign ownership in stocks and visibility.

Similarly, in 2014, the securities and exchange commission in Thailand (SET) requires. Thai firms to disclose CSR policies and activities mandatorily while the KPI-based ESG reporting is not mandatory. Thailand has the SET's sustainability-themed index and information about listed Thai firms for their sustainability performance in ESG. The index provides ESG ratings from global and local rating agencies for Thai investors to make informed decisions. Meanwhile, in 2020, SET mandates Thai firms to engage publicly in ESG sustainability reporting as contained in Form 56–1 One Report (The Stock Exchange of Thailand, 2022).

3.2 Model specification

In our model specification, leverage (a proxy of capital structure) is a function of ESG score, profitability, firm size, non-debt tax shield, MTB value, tangibility, inflation and GDP growth. The relationship connecting these variables is presented in equation (2).

Motivated by Fama and French (2002), we give preference to book leverage as it better captures the active adjustment behaviour. Although market leverage captures adjustment to market fluctuation, we compare how ESG influences the two measures of leverage: book and market leverage, hence, determining the SOA. The standard adjustment model is presented below to capture the dynamic adjustment towards the target leverage:

$$Lev_{i,t} - Lev_{i,t-1} = \delta\left(\boldsymbol{Lev_{i,t}} - Lev_{i,\ t-1}\right) + \varepsilon_{i,t} \tag{1}$$

The notation δ denotes the average SOA to the target leverage. The notation $\boldsymbol{Lev_{i,t}}$ is the target leverage while $Lev_{i,\ t}$ and $Lev_{i,\ t-1}$ are the current and past (lagged one period) values of the leverage ratio, respectively. The dynamic adjustment model assumes that the firm exhibits target leverage that minimizes the cost of capital. In practice, firms deviate from the target leverage and thus, incur a cost of deviation. Thus, it is expected that firm adjusts to the target leverage once the cost of deviation is higher than the cost of adjustment. A full adjustment is put at 1 while no adjustment denotes 0. The dynamic partial adjustment model helps to provide the actual adjustment in leverage, which is expected to be between 0 and 1.

The target leverage is obtained from a regression model of observed leverage, which is a function of firm-level characteristics (Fama and French, 2002; Flannery and Rangan, 2006). The standard determinants of firm-level variables used in this study are similar to those used in advanced countries (Baker and Wurgler, 2002; Rajan and Zingales, 1995; Titman and Wessels, 1988), and in the ASIAN contexts (Cho *et al.*, 2021; Chua *et al.*, 2022; Haron *et al.*, 2013). The observed regression model is given as follows:

$$\begin{aligned}\boldsymbol{Lev_{i,t}} = {} & \alpha_i + \beta_{1i}\, ESGscore_{it} + \beta_{2i}\, PROF_{it} + \beta_{3i}\, FSIZE_{it} + \beta_{4i}\, NDTS_{it} + \beta_{5i}\, MTB_{it} \\ & + \beta_{6i}\, TANG_{it} + \beta_{7i}\, INF_{it} + \beta_{8i}\, GDP_{it} + \beta_{9i}\, Yeardum_{it} + \beta_{10i}\, Indusdum_{it} \\ & + \beta_{11i}\, Countrydum_{it} + \varepsilon_{it}\end{aligned} \tag{2}$$

Leverage is used to measure the capital structure. ESG score is Environmental Social Governance (ESG) score. PROF is profitability, TANG is tangibility, FSIZE is firm size, NDTS is non-debt tax shield and MTB is market-to-book value. We also control for country-level variables by using inflation (INF) and gross domestic product (GDP) growth. Unlike past studies that did not include sustainability practice (i.e. ESG performance), this study contributes by including ESG score as another determinant of leverage as firms borrow externally to finance sustainability initiatives (Gjergji *et al.*, 2021). We included in the

estimations; yeardum, indusdum and countrydum, which represent dummies for years, industries and countries, respectively. The use of year and industry dummies follows the suggestion by Flannery and Rangan (2006) and Lemmon *et al.* (2008).

Furthermore, we substitute the target leverage in equation (2) into the dynamic partial adjustment model in equation (1) to estimate the model. By substituting equation (2) into equation (1), we obtain equation (3) as follows:

$$Lev_{i,t} = \delta\beta X_{i,t} - (1-\delta)Lev_{i,t-1} + \beta_i\ Yeardum_{it} + \beta_i\ Indusdum_{it} + \beta_i\ Countrydum_{it} + \varepsilon_{i,t} \quad (3)$$

The notation, δ represents the SOA, which is determined by subtracting the coefficient of the lagged leverage from 1 (Haron *et al.*, 2013). The notation, $X_{i,t}$ represents the determinants of capital structure in equation (2) including the ESG score.

Concerning the empirical estimation of the SOA, this study uses the system GMM estimator. Prior studies have adopted the system GMM estimator (Antoniou *et al.*, 2008; Lemmon *et al.*, 2008), because of its advantages: it produces efficient results over the difference GMM and two-stage least squares, and it uses orthogonal deviations to eliminate fixed effects in the sample using instruments as the first difference of the lagged dependent variable (Arellano and Bover, 1995; Roodman, 2009).

3.3 Variable measurements

Table 1 presents the details of the measurements of the dependent (leverage), main independent variables (ESG score and its pillars) and control variables (i.e. capital structure determinants).

The study uses the OLS regression and panel dynamic GMM estimators to analyse the empirical models. Panel data can give more informative data, more variability and more degrees of freedom with more efficient estimates (Baltagi *et al.*, 2013).

3.4 Sample selection

A total of 116 listed non-financial firms on the main stock exchanges in ASEAN countries firms are sampled from top five of the exchange markets in Southeast Asia including Bursa Malaysia, Indonesia Stock Exchange, Philippines Stock Exchange, Singapore Stock Exchange and SET. Although relative to the total listed firms in ASEAN countries, the sample is small due to the exclusion/inclusion criteria observed. We include non-financial firms that disclose ESG scores voluntarily throughout the sample period. That is, we exclude firms with SIC codes 6000–6999 for financial firms due to special regulations. Firms with incomplete ESG scores data were also excluded. We also exclude firms that exhibit zero-leverage practices as in Asimakopoulos *et al.* (2021) since we further examine the extent to which ESG scores influence the SOA to target leverage. Thus, the inclusion of zero-leverage firms (e.g. firms having one year of zero debt – Morais *et al.*, 2022) may document inconsistent findings. The distribution of the sample size is presented in Table 2.

Our exclusion of firms with missed data on ESG follows past studies (Asimakopoulos *et al.*, 2021). Past studies on ESG have equally adopted some criteria to identify firms in their study (Del Bosco and Misani, 2016; Rustam *et al.*, 2019; Sharma *et al.*, 2020). For instance, Del Bosco and Misani (2016) used cross-listing criterion to sample firms with incomplete ESG information for the firms that entered the ASSET4 database after 2008.

Table 1.
Description of variables

Variables	Proxy	Measurement	Sources
Dependent variables:			
Book leverage	Book leverage	Total debt to total book value of asset	Refinitiv Eikon database
Market leverage	Market leverage	The ratio of the book value of debt to the market value of equity plus the book value of debt	Refinitiv Eikon database
Independent variables:			
ESG performance	*ESG score*	ESG score aggregated on ENV pillar score, social pillar score and governance pillar score	Refinitiv ESG
	Environmental pillar score	A firm's environmental performance score is between 0 (minimum) and 100 (maximum). The score is calculated on three items: resource use, emissions and innovation	Refinitiv ESG
	Social pillar score	A firm's social performance score is between 0 (minimum) and 100 (maximum). The score is calculated on four items: workforce, human rights, community and product responsibility	Refinitiv ESG
	Governance pillar score	A firm's corporate governance performance score is between 0 (minimum) and 100 (maximum). The score is calculated on three items: management, shareholders and corporate social responsibility strategy	Refinitiv ESG
Control variables:			
Traditional firm-level determinants	*PROF: Profitability*	The ratio of earnings before interest and taxes to the total book value of assets	Refinitiv Eikon database
	MTB: Market-to-book value	The ratio of market value to book value	Refinitiv Eikon database
	TANG: Tangibility	The proportion of net property, plant, and equipment to the total book value of assets	Refinitiv Eikon database
	FSIZE: Firm size	The logarithm of the total book value of assets	Refinitiv Eikon database
	NDTS: Non-debt tax shield	The ratio of accumulated depreciation on the total book value of assets	Refinitiv Eikon database
Control variables:			
Country-level determinants	*INF: Inflation*	The annual growth in the consumer price index	World development indicators
	GDP: Gross domestic product growth	The annual growth in nominal GDP	World development indicators

Country/Industry	No. of firms	Average total assets
Panel A: Sample distribution by country		
Indonesia	20	4,743.939
Malaysia	35	6,737.324
Philippines	15	9,300.801
Singapore	32	14,664.39
Thailand	14	13,152.23
Panel B: Sample distribution by industry		
Industries		No. of firms
Communication services		15
Consumer discretionary		9
Consumer staples		19
Energy		13
Health care		3
Industrials		29
Information technology		2
Materials		9
Real estate		10
Utilities		7

Table 2.
(a) Sample distribution by country and (b) sample distribution by industry

4. Results

We provide the results for the descriptive statistics, correlation matrix, main regression results and dynamic regression analysis to test our formulated research hypotheses.

4.1 Descriptive statistics

Table 3 presents the results for the descriptive statistics. The range of the ESG score is from 0% and 100%. The mean (median) values for the ESG score and its pillar scores are 45.371 (46.114) for the ESG score, 39.489 (38.438) for the environmental pillar score, 47.643 (48.095) for the social pillar score and 48.256 (50.000) for governance pillar score. These sustainability values indicate that ASEAN firms have not achieved good ESG results because their mean values are quite lower than 70% as suggested by Velte (2016). The distribution for ESG score, social pillar and governance score is skewed to the left because

Variables	*N*	Mean	Median	Standard deviation	Minimum	Maximum
ESG score	928	45.3714	46.1148	20.0534	3.0682	89.0753
Environmental pillar score	928	39.4898	38.4380	24.3482	0.0000	93.9838
Social pillar score	928	47.6437	48.0958	23.8503	0.0527	97.3238
Governance pillar score	928	48.2567	50.0000	22.8411	0.5936	95.4817
Book leverage	928	0.2764	0.2767	0.1717	0.0000	1.4791
Market leverage	920	1.1396	0.5893	1.9497	0.0174	23.6601
MTB	922	2.3263	1.7237	1.6541	0.6690	5.9022
Profitability	923	5.9006	4.5000	7.1231	−12.4000	62.1000
Tangibility	928	0.6290	0.5783	0.4543	0.0000	2.4890
Firm size	928	8.5591	8.6236	1.1556	5.2857	11.4828
NTDS	928	0.0173	0.0000	0.0372	−0.0095	0.2340
GDP growth	928	4.7155	4.8431	1.3624	0.9845	7.2428
Inflation	928	2.1970	2.1044	1.8087	−0.9004	6.4125

Table 3.
Descriptive statistics

their median values are higher than their mean values. As expected, the mean score of the market leverage is higher than the book leverage. We included control variables in our analysis to mitigate a potential omitted variable bias problem. We controlled for both firm-level and country-level variables. Our firm-level controls are important to assess the SOA to target leverage as any omission of these variables may affect the estimation results of the SOA. We follow the main determinants of capital structure documented in Titman and Wessels (1988) and Graham and Leary (2011). Tangibility and NDTS have mean values of 0.6290 and 0.0173, respectively. On average, the sample firms have 5.90% profitability, proxied as return on assets. As for the country-level characteristics, GDP growth and inflation have mean values of 4.715 and 2.197, respectively.

4.2 Correlation analysis

Table 4 provides the results for the Pearson correlation matrix for ESG performance and determinants of capital structure. Book leverage correlates positively with ESG scores including environmental and social pillar scores while market leverage correlates negatively with ESG performance and its dimensions. This suggests that financial lenders and institutions consider the book value of assets for firms practicing ESG by increasing debt rather than considering the market value as the firm may be mispriced or overvalued. Concerning the determinants of leverage, MTB and profitability are negatively correlated with book and market leverage, which supports the assumption of the pecking order theory. Tangibility, firm size and NTDS are positively correlated with book and market leverage. As expected, the correlation between ESG score and its components is highly correlated. This does not affect our model specification and estimation as individual components are considered as a single independent variable in our analyses. Overall, our results reveal no case of multicollinearity problem and hence, our regression estimates are valid and reliable.

4.3 Baseline regression results

4.3.1 Results for ESG score and leverage. Table 5 provides the results for the relationship between ESG score and capital structure (measured using the book and market leverage). The coefficient of the ESG score is positive and significant at 1% with book leverage, suggesting that the ESG score has a positive impact on book leverage in ASEAN firms. Thus, *H1a* is supported. The results also suggest that firms benefit from higher leverage as the level of ESG practices and initiatives increases. This finding is in line with past studies that documented that ESG reduces the cost of borrowing, thereby increasing debt capital (Cheng *et al.*, 2014; Jang *et al.*, 2020; Asimakopoulos *et al.*, 2021; Eliwa *et al.*, 2021). ASEAN firms tend to have access to more debt finance to fund ESG-related activities as ESG practices induce and trigger a lower cost of capital (Gjergji *et al.*, 2021). In contrast, the ESG score has a negative and significant at the 1% with market leverage which contradicts our sub-hypothesis *H1b*.

Concerning the control variables, MTB is found to have a negative and significant impact on market leverage but is insignificant for book leverage. In addition, profitability has a negative and significant impact on book leverage but is insignificant for market leverage. We find also a positive significant result for firm size and non-debt tax shields for book and market leverage. In summary, MTB, profitability, the size of the firm and non-debt tax shields determine the capital structure decisions of firms in both positive and negative ways. MTB and profitability contribute to leverage negatively, thus, supporting the proposition of the pecking order theory (Fama and French, 2002; Myers and Majluf, 1984). In line with the trade-off theory (Frank and Goyal, 2009; Titman and Tsyplakov, 2007), we find support for the results of firm size. The *R*-square and adjusted *R*-square are satisfactory for

Table 4. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) ESG score	1.000					
(2) Environmental pillar score	0.866*** (0.000)	1.000				
(3) Social pillar score	0.921*** (0.000)	0.776*** (0.000)	1.000			
(4) Governance pillar score	0.697*** (0.000)	0.383*** (0.000)	0.466*** (0.000)	1.000		
(5) Book leverage	0.085*** (0.010)	0.140*** (0.000)	0.069** (0.035)	−0.024 (0.469)	1.000	
(6) Market leverage	−0.076** (0.022)	−0.013 (0.702)	−0.057* (0.085)	−0.149*** (0.000)	0.456*** (0.000)	1.000
(7) MTB	−0.016 (0.637)	−0.068** (0.040)	−0.025 (0.448)	0.060* (0.069)	−0.110*** (0.001)	−0.348*** (0.000)
(8) Profitability	0.113*** (0.001)	0.049 (0.139)	0.100*** (0.002)	0.114*** (0.001)	−0.185*** (0.000)	−0.273*** (0.000)
(9) Tangibility	0.270*** (0.000)	0.176*** (0.000)	0.287*** (0.000)	0.164*** (0.000)	0.052 (0.110)	−0.006 (0.845)
(10) Firm size	0.062* (0.060)	0.158*** (0.000)	0.050 (0.127)	−0.035 (0.283)	0.292*** (0.000)	0.177*** (0.000)
(11) NTDS	0.194*** (0.000)	0.010 (0.769)	0.176*** (0.000)	0.229*** (0.000)	0.113*** (0.001)	0.037 (0.257)
(12) GDP growth	−0.104*** (0.002)	−0.135*** (0.000)	−0.116*** (0.000)	0.023 (0.487)	0.047 (0.156)	−0.071** (0.031)
(13) Inflation	−0.043 (0.189)	−0.104*** (0.001)	−0.037 (0.261)	0.039 (0.240)	−0.025 (0.444)	−0.097*** (0.003)

Notes: *p*-values are in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

(*continued*)

Table 4.

Variables	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) ESG score							
(2) Environmental pillar score							
(3) Social pillar score							
(4) Governance pillar score							
(5) Book leverage							
(6) Market leverage							
(7) MTB	1.000						
(8) Profitability	0.641*** (0.000)	1.000					
(9) Tangibility	0.124*** (0.000)	0.084** (0.011)	1.000				
(10) Firm size	−0.377*** (0.000)	−0.366*** (0.000)	−0.024 (0.474)	1.000			
(11) NTDS	0.111*** (0.001)	0.096*** (0.003)	0.594*** (0.000)	−0.053 (0.107)	1.000		
(12) GDP growth	0.168*** (0.000)	0.154*** (0.000)	0.010 (0.758)	−0.085** (0.010)	0.057* (0.082)	1.000	
(13) Inflation	0.164*** (0.000)	0.203*** (0.000)	0.127*** (0.000)	−0.137*** (0.000)	0.064** (0.051)	0.507*** (0.000)	1.000

Variables	(1) Book leverage	(2) Market leverage
ESG score	0.0288*** (0.0015)	−0.3590*** (0.0006)
MTB	0.0016 (0.7087)	−0.3273*** (0.0000)
Profitability	−0.0036*** (0.0002)	−0.0160 (0.1505)
Tangibility	−0.0208 (0.1942)	−0.3009 (0.1036)
Firm size	0.0378*** (0.0000)	0.1069* (0.0673)
NTDS	0.6386*** (0.0005)	8.1574*** (0.0001)
GDP growth	0.0288* (0.0778)	−0.0529 (0.7778)
Inflation	0.0100*** (0.0038)	−0.0013 (0.9739)
Constant	−0.2152*** (0.0004)	2.1895*** (0.0015)
Observations R-squared	917 19.98%	915 17.67%
Adj R^2	18.83%	16.49%
F-stat	17.3443***	14.8789***
Root MSE	0.15463	1.774
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
Country dummies	Yes	Yes

Notes: p-values are in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 5. ESG Performance and leverage

both measures of leverage but higher in book leverage. The model fit estimator (F-stats) is significant at the 1% level.

4.3.2 Results for ESG performance on the speed of adjustment. The speeds of adjustment are 39.92% for ESG score, 44.33% for environmental pillar score, 39.39% is social pillar score and 36.98% for governance pillar score, which are higher than the SOA of 36.51% when ESG is not conditioned in the capital structure dynamics. Thus, *H2* is supported that ESG performance is associated with a faster SOA. The findings imply that without an ESG score, only 36.51% of the difference between the actual and desired level of leverage is closed each year. These results are consistent with Flannery and Rangan (2006) that document a closer SOA of 34.4%. However, it is inconsistent with some studies in developed markets (Baker and Wurgler, 2002; Fama and French, 2002; Lemmon *et al.*, 2008), and with Haron *et al.* (2013) that found a lower SOA of 12.7% for Malaysian firms.

Theoretically, the higher SOAs documented in this study support the trade-off theory, suggesting that ASEAN firms prioritize adjustment behaviour. After introducing the ESG score and the three ESG pillar scores, we find that the adjustment speed increases more than the baseline SOA (without ESG factors) for the ESG score, environmental pillar score, social pillar score and governance pillar score by 3.41%, 7.82%, 2.88% and 0.47%, respectively. Thus, sub-hypotheses *H2a*, *H2b* and *H2c* were supported as they have higher SOAs than the non-conditioned SOA (without ESG variables). These results suggest that the adjustment speed is much faster when the environmental pillar score is considered as the baseline SOA increases by about 7.82% more. Consistent with the submission of Flannery and Rangan (2006), the SOA is thus higher for firms that prioritize rebalancing towards the target leverage while lower for firms exhibiting timing behaviour. Our result also suggests that ASEAN firms benefit from a declining adjustment cost to adjust faster to their target leverage. Contrary to the assertion of Haron *et al.* (2013) that the timing variable reduces the adjustment cost, we find more consistent results when ESG sustainability and practices are captured to reduce the cost of adjustment (Table 6).

Table 6.
Speed of adjustment and leverage – the impact of ESG performance

Variables	(1) ESG	(2) ENV	(3) SOCIAL	(4) GOV	(5) Without ESG Score
Book leverage (−1)	0.6008*** (7.7606)	0.5567*** (7.0811)	0.6061*** (7.3746)	0.6302*** (7.2811)	0.6349*** (6.9773)
ESG score	0.0324* (1.7206)				
Environmental pillar score		0.0455*** (2.7082)			
Social pillar score			0.0238 (1.5781)		
Governance pillar score				0.0078 (0.5904)	
MTB	0.0475*** (2.8553)	0.0562*** (2.8912)	0.0463*** (2.8330)	0.0424** (2.5545)	0.0406** (2.4922)
Profitability	−0.0223** (−2.3100)	−0.0268** (−2.3801)	−0.0217** (−2.3170)	−0.0197** (−1.9897)	−0.0191** (−1.9642)
Tangibility	−0.0203 (−0.8007)	−0.0302 (−0.9956)	−0.0200 (−0.7823)	−0.0092 (−0.4113)	−0.0081 (−0.3664)
Firm size	−0.0345 (−0.7338)	−0.0416 (−0.7887)	−0.0342 (−0.7382)	−0.0270 (−0.6148)	−0.0283 (−0.6555)
NTDS	0.3033 (0.5546)	0.4947 (0.7594)	0.3121 (0.5873)	0.2877 (0.5638)	0.3039 (0.6246)
GDP growth	−0.0035 (−0.2024)	0.0085 (0.4261)	−0.0033 (−0.1940)	−0.0080 (−0.5342)	−0.0080 (−0.5394)
Inflation	0.0094 (1.5981)	0.0108 (1.5799)	0.0092 (1.5732)	0.0085 (1.5290)	0.0083 (1.5077)
Constant	0.3070 (0.6980)	0.3287 (0.7271)	0.3338 (0.7898)	0.3239 (0.7554)	0.3618 (0.9185)
Speed of adjustment (SOA)	39.92%	44.33%	39.39%	36.98%	36.51%
Impact of ESG presence	3.41%	7.82%	2.88%	0.47%	—
Observations	801	765	801	801	801
No. of groups	116	115	116	116	116
Instruments	35	35	35	35	34
AR(1)	0.002	0.007	0.001	0.001	0.000
AR(2)	0.278	0.333	0.288	0.285	0.299
Hansen test	0.600	0.539	0.556	0.478	0.464
Wald Chi^2	1,434.32***	1,151.45***	1,462.24***	1,767.87***	1,800.20***
Year dummies	Yes	Yes	Yes	Yes	Yes

Notes: p-values are in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

4.4 Robustness test and endogeneity tests

In this sub-section, we perform a set of battery tests to substantiate our findings in the previous sub-sections. We consider firstly the different dimensions of the ESG score to establish which of the dimensions exerts more effects on leverage decisions. Concerning possible endogeneity tests, the results of our GMM estimations are consistent and we confirm that our findings are robust to endogeneity issues. GMM estimator caters for heterogeneity and endogeneity issues by using instruments to address them (Baltagi *et al.*, 2013). Although the results of our SOA are taken from the GMM estimation, our results of a positive link between ESG performance and capital structure are consistent.

4.4.1 Disaggregated ESG scores and leverage. Table 7 presents the disaggregated results for the impact of ESG pillar scores on leverage. We find consistent results with our baseline models for both book leverage and market leverage. Our findings reveal that the environmental pillar score (beta = 0.0288; p-value = 0.0000) is positive and significant at the 1% while the social pillar score (beta = 0.0191; p-value = 0.0112) is positive and significant at the 5%. Contrary to the results on the nexus between ESG pillars and book leverage, we find that ESG pillars have negative impacts on market leverage, which is significant at the 1% level for social pillar score (beta = −0.2596; p-value = 0.0027) and for governance pillar score (beta = −0.4509; p-value = 0.000).

4.4.2 ESG re-writing and re-shuffling. There is a growing concern among researchers and investors concerning the widespread and repeated changes to the historical ESG scores of Refinitiv ESG. Refinitiv ESG is an ESG rating provider that offers a comprehensive ESG database (Refinitiv, 2020). The initial ESG scores were constructed by ASSET4 (a firm acquired by Thomson Reuters in 2009) which later became Refinitiv in 2018. In September 2018, Refinitiv adjusted the ESG's scoring methodology to establish ESG scores rewriting. Studies established that the ESG reshuffling affects investment decisions (e.g. Berg *et al.*, 2020). ESG scores have a positive relationship with stock returns only for the reshuffling data (09/2018 to date) but not for the initial data (before the reshuffling date – the year 2017 and below). Due to this change, scholars have suggested that ESG researchers should "verify whether the initial data are needed to test hypotheses by performing back-testing strategies or developing new ESG-related investment strategies" (Berg *et al.*, 2020, p. 2). Thus, we divide our sample into two subsamples: ESG_2017 Data (2012–2017) and ESG Reshuffling Data (2018–2019). Contrary to claims that ESG reshuffling scores perform better, we find a consistent relationship between ESG score and leverage for ESG_2017 Data and ESG Reshuffling Data (Table 8). We find that the ESG score has a positive relationship with book leverage while a negative impact on market leverage, consistent with the baseline results. Although the ESG score has a positive link with book leverage in the ESG Reshuffling Data, the coefficient appears insignificant. We attribute it to the small-sample size of the ESG Reshuffling Data. Thus, reshuffling the ESG scores seems to favour investment decisions over financing decisions.

4.4.3 Country-level analysis of ESG score. Table 9 provides country-level analysis of the relationship between ESG score and leverage. Furthermore, we find that ESG score has positive and significant impacts at the 1% levels on book leverage for Philippines (beta = 0.0551; p-value = 0.0044 < 1%), and Singapore (beta = 0.0437; p-value = 0.0011 < 1%). Consistent with our baseline results, ESG score has negative impacts on market leverage which is significant at the 1% level for Malaysia (beta = −1.0068; p-value = 0.0003) and Thailand (beta = −2.7651; p-value = 0.0004) and at 5% for Philippines (beta = −0.3051; p-value = 0.0469). We find also that the ESG score is not significant for Indonesia for both book leverage and market leverage. We attribute this finding to the corporate debt structure. As suggested by Asimakopoulos *et al.* (2021), ESG-rated firms often redistribute their

Table 7.
ESG dimensions (environmental, social and governance pillars) and leverage

Variables	(1)	(2) Book leverage	(3)	(1)	(2) Market leverage	(3)
Environmental pillar score	0.0288*** (0.0000)			−0.1150 (0.1532)		
Governance pillar score		0.0039 (0.5926)			−0.4509*** (0.0000)	
Social pillar score			0.0191** (0.0112)			−0.2596*** (0.0027)
MTB	0.0005 (0.9130)	0.0008 (0.8555)	0.0013 (0.7669)	−0.3305*** (0.0000)	−0.3272*** (0.0000)	−0.3238*** (0.0000)
Profitability	−0.0037*** (0.0002)	−0.0034*** (0.0005)	−0.0036*** (0.0002)	−0.0184 (0.1223)	−0.0160 (0.1448)	−0.0169 (0.1301)
Tangibility	−0.0263 (0.1067)	−0.0155 (0.3328)	−0.0211 (0.1891)	−0.3604* (0.0632)	−0.3910** (0.0320)	−0.2906 (0.1180)
Firm size	0.0364*** (0.0000)	0.0382*** (0.0000)	0.0373*** (0.0000)	0.1214* (0.0558)	0.0745 (0.1998)	0.1134* (0.0531)
NTDS	0.7461*** (0.0001)	0.6949*** (0.0002)	0.6656*** (0.0003)	7.4636*** (0.0007)	9.2186*** (0.0000)	7.8797*** (0.0002)
GDP growth	0.0299* (0.0739)	0.0277* (0.0915)	0.0295* (0.0714)	−0.0435 (0.8255)	−0.0028 (0.9878)	−0.0635 (0.7352)
Inflation	0.0103*** (0.0046)	0.0096*** (0.0060)	0.0101*** (0.0037)	−0.0003 (0.9937)	0.0070 (0.8595)	−0.0026 (0.9490)
Constant	−0.1927*** (0.0007)	−0.1319** (0.0265)	−0.1772*** (0.0019)	1.2534* (0.0620)	2.7578*** (0.0000)	1.7868*** (0.0062)
Observations	868	917	917	866	915	915
R-squared	20.84%	19.11%	19.66%	16.44%	19.23%	17.42%
Adj R^2	19.64%	17.95%	18.50%	15.17%	18.07%	16.23%
F-stat	17.2982***	16.4118***	16.9991***	12.8983***	16.5035***	14.6208***
Root MSE	0.15529	0.15547	0.15494	1.8299	1.7571	1.7767
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *p*-values are in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 8. ESG Re-shuffling and re-writing on leverage

Variables	ESG_2017 data Book leverage	ESG_2017 data Market leverage	ESG Reshuffling data Book leverage	ESG Reshuffling data Market leverage
ESG score	0.0350*** (0.0009)	−0.3055*** (0.0009)	0.0356 (0.1115)	−0.6390* (0.0960)
MTB	0.0045 (0.3775)	−0.2727*** (0.0000)	0.0121 (0.1615)	−0.3815** (0.0105)
Profitability	−0.0033*** (0.0030)	−0.0085 (0.3791)	−0.0047* (0.0626)	−0.0555 (0.1965)
Tangibility	−0.0171 (0.3829)	−0.2684 (0.1202)	0.0234 (0.4347)	−0.2871 (0.5757)
Firm size	0.0412*** (0.0000)	0.1543*** (0.0048)	0.0429*** (0.0000)	0.0741 (0.6279)
NTDS	0.6017*** (0.0068)	6.4468*** (0.0010)	0.2285 (0.5312)	11.4580* (0.0679)
GDP growth	0.0026 (0.9022)	−0.1813 (0.3225)	0.0585** (0.0381)	0.8394* (0.0822)
Inflation	0.0039 (0.3049)	−0.0056 (0.8675)	−0.0005 (0.9584)	−0.2515 (0.1078)
Constant	−0.2040*** (0.0062)	1.7631*** (0.0066)	−0.2808** (0.0240)	3.6805* (0.0836)
Observations	689	687	228	228
R-squared	0.1407	0.2006	0.1852	0.1386
Adj R^2	0.1280	0.1888	0.1437	0.0948
F-stat	11.0998	16.9657	4.4629	3.1607
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Notes: p-values are in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 9. Country-level analysis of ESG performance and leverage

	(1)	(2)	(3)	(4)	(5)
			Book leverage		
Variables	Indonesia	Malaysia	Philippines	Singapore	Thailand
ESG score	−0.0288 (0.2795)	−0.0049 (0.7897)	0.0551*** (0.0044)	0.0437*** (0.0011)	−0.0617 (0.1647)
MTB	−0.0553*** (0.0002)	0.0019 (0.8292)	−0.0327*** (0.0001)	0.0033 (0.6837)	0.0073 (0.4201)
Profitability	−0.0029 (0.3124)	0.0016 (0.2933)	−0.0287*** (0.0008)	−0.0002 (0.9737)	−0.0125*** (0.0000)
Tangibility	−0.3219*** (0.0000)	−0.0063 (0.7907)	0.0971** (0.0128)	0.0969** (0.0258)	−0.0479 (0.3924)
Firm size	0.0100 (0.5734)	0.0365*** (0.0012)	0.0019 (0.8946)	0.0379*** (0.0000)	0.0387*** (0.0020)
NTDS	3.1600*** (0.0000)	0.0272 (0.9281)	0.0564 (0.9278)	−0.9713* (0.0613)	−0.6238 (0.1133)
GDP growth	0.0531 (0.7844)	−0.0690 (0.5867)	0.1028 (0.5602)	−0.0344 (0.1687)	−0.0148 (0.4639)
Inflation	−0.0006 (0.9475)	−0.0023 (0.8792)	0.0108 (0.2778)	0.0066 (0.2837)	−0.0050 (0.6157)
Constant	0.5962 (0.1107)	0.1284 (0.5562)	0.1307 (0.7271)	−0.2642*** (0.0047)	0.3972** (0.0304)
Observations	160	276	120	249	112
R-squared	0.5381	0.1961	0.4189	0.204	0.4621
Adj R^2	0.5037	0.1626	0.3713	0.174	0.403
F-stat	15.6718***	5.8552***	8.8093***	6.8060***	7.8105***
Root MSE	0.15143	0.15182	0.09465	0.13568	0.11043
Industry dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes

Notes: *p*-values are in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

(*continued*)

Table 9.

Variables	(1) Indonesia	(2) Malaysia	(3) Market leverage Philippines	(4) Singapore	(5) Thailand
ESG score	0.0109 (0.9663)	−1.0068*** (0.0003)	−0.3051** (0.0469)	−0.0494 (0.6487)	−2.7651*** (0.0004)
MTB	−0.4480*** (0.0016)	−0.7503*** (0.0000)	−0.4027*** (0.0000)	−0.1162* (0.0804)	−0.3015* (0.0502)
Profitability	0.0002 (0.9934)	0.0399* (0.0813)	−0.0987 (0.1397)	−0.0369 (0.3403)	−0.0255 (0.4731)
Tangibility	−3.0577*** (0.0000)	0.1281 (0.7198)	0.6689** (0.0314)	0.0392 (0.9118)	2.7868*** (0.0040)
Firm size	−0.0691 (0.6916)	−0.0273 (0.8703)	0.3297*** (0.0061)	0.2205*** (0.0001)	0.2230 (0.2829)
NTDS	27.7081*** (0.0000)	4.1378 (0.3596)	−3.1616 (0.5250)	−0.8681 (0.8375)	3.1312 (0.6372)
GDP growth	0.7865 (0.6740)	−2.0691 (0.2774)	−1.3702 (0.3357)	−0.2142 (0.2946)	−0.3419 (0.3183)
Inflation	0.0080 (0.9314)	−0.0067 (0.9766)	−0.0254 (0.7479)	−0.0376 (0.4555)	−0.2139 (0.2060)
Constant	3.0074 (0.4095)	9.7855*** (0.0030)	3.3366 (0.2662)	−0.1154 (0.8791)	9.9904*** (0.0015)
Observations	159	276	119	249	112
R-squared	0.37	0.2122	0.5462	0.1814	0.4614
Adj R^2	0.3228	0.1793	0.5087	0.1506	0.4022
F-stat	7.8482***	6.4634***	14.5781***	5.8841***	7.7888***
Root MSE	1.4712	2.2768	0.75512	1.1103	1.872
Industry dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes

capital to internal financing from bonds debts to bank loans. Indonesian firms do take more trade credits, which account for a large percentage of their total debts. The use of trade credits is often predominant in countries with poorly developed capital markets including Indonesia (Hyndman and Serio, 2010; Mara *et al.*, 2021) as the benefits of using trade credit outperform the costs associated with trade credit. Thus, ESG-rated firms in Indonesian firms with debt restructuring towards trade credit may seem to benefit less from a lower cost of capital due to the country's underdeveloped market-based financial structure.

4.4.4 Financial structure and ESG performance. Motivated by the classification of the financial system by Demirguc-Kunt *et al.* (2011) and Liu *et al.* (2021) using the ratio of bank credit to market capitalisation to gauge the degree to which the financial system is relatively bank-based or market-based, Malaysia, Thailand and Singapore are grouped as market-based economies using the level of financial sector efficiency, while the Philippines and Indonesia are grouped as bank-based economies using the degree of banking net interest margins. Demirguc-Kunt *et al.* (2011) posit that countries are characterized by different financial and institutional factors. In addition, firms rely heavily on higher debt and trade financing in bank-based economies when compared with their counterparts in the market-based economies (Aktas *et al.*, 2019; Iqbal and Kume, 2014), which may affect the financing of sustainability practices.

As presented in Table 10, our findings reveal that the ESG score is significant for only market-based economies while insignificant for bank-based economies. We further find that ESG score has a positive impact on book leverage and significant at the 1% level (beta = 0.0269; p-value = 0.0034 < 1%), but it has a negative impact on market leverage and significant at the 1% (beta = −0.3577; p-value = 0.0006 < 1%). Thus, we further confirm that ESG practices enhance the book leverage of firms while having negative impacts on market leverage. This finding suggests that firms benefit from favourable equity markets to raise finance and avoid the costly debt markets, consistent with the market timing theory of Baker and Wurgler (2002). As such, firms reduce the cost of adjustment speed to leverage when the cost of financing reduces following their sustainable investments. Investors consider sustainable assets in their investment portfolios which increases the capital available for firms to finance more NPV projects (Gracia and Siregar, 2021; Islam *et al.*, 2021). Thus, firms in market-based economies benefit from a faster SOA to target leverage than those in bank-based economies where the cost of debt is relatively high.

5. Conclusion and discussion

The concerns for ESG sustainability have been an issue in recent years, especially for investors in their quest for better investment decisions. Although the cost of sustainable activities and engagement is increasingly becoming a challenge to many firms, whether firms would benefit from a faster SOA to leverage when they invest in ESG practices is still a gap in corporate finance literature. This paper investigates the impact of sustainability practices through ESG performance on capital structure patterns and on the SOA to target leverage. Interestingly, we also investigate the disaggregated pillars score (ESG) on SOA.

Using a sample of ASEAN firms covered by the Refinitiv database between 2012 and 2019, we examine how ESG performance, and its pillars affect leverage and the SOA to target leverage. We find that ESG score increases book leverage while it decreases market leverage, which is attributed to substitution in debt structure, access to external funding, financial flexibility limit, cost of bonds and cost of sustainability information disclosure. We also find that firms with higher ESG score experience and exhibit a faster SOA to target leverage. Specifically, we document that the environmental pillar score induces more than 7% of the initial adjustment speed (without ESG score), followed by social pillar score with

Table 10. ESG performance and leverage in market-based vs bank-based economies

	(1)	(2)	(1)	(2)
	Book leverage		Market leverage	
Variables	Bank-based economies	Market-based economies	Bank-based economies	Market-based economies
ESG score	−0.0288 (0.2795)	0.0288*** (0.0015)	0.0109 (0.9663)	−0.3590*** (0.0006)
MTB	−0.0553*** (0.0002)	0.0016 (0.7087)	−0.4480*** (0.0016)	−0.3273*** (0.0000)
Profitability	−0.0029 (0.3124)	−0.0036*** (0.0002)	0.0002 (0.9934)	−0.0160 (0.1505)
Tangibility	−0.3219*** (0.0000)	−0.0208 (0.1942)	−3.0577*** (0.0000)	−0.3009 (0.1036)
Firm size	0.0100 (0.5734)	0.0378*** (0.0000)	−0.0691 (0.6916)	0.1069* (0.0673)
NTDS	3.1600*** (0.0000)	0.6386*** (0.0005)	27.7081*** (0.0000)	8.1574*** (0.0001)
GDP growth	0.0531 (0.7844)	0.0288* (0.0778)	0.7865 (0.6774)	−0.0529 (0.7778)
Inflation	−0.0006 (0.9475)	0.0100*** (0.0038)	0.0080 (0.9314)	−0.0013 (0.9739)
Constant	0.5962 (0.1107)	−0.2152*** (0.0004)	3.0074 (0.4095)	2.1895*** (0.0015)
Observations	160	917	159	915
R-squared	0.5381	0.1998	0.3700	0.1767
Adj R^2	0.5037	0.1883	0.3228	0.1649
F-stat	15.6718	17.3443	7.8482	14.8789
Root MSE	0.15143	0.15463	1.4712	1.774
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Notes: *p*-values are in parentheses; $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

more than 2.88% and governance pillar score by 0.47%. On average, the aggregate ESG score results to about 3.41% higher than the initial adjustment speed.

5.1 Theoretical and practical implications

Our study contributes both to corporate finance and ESG sustainability literature. Regarding the latter, our study demonstrates that ESG score increases the firm's SOA to target leverage in ASEAN listed firms. This occurs because ESG firms can access external capital markets which triggers lower adjustment costs and could cover the costs of disseminating ESG disclosure. Thus, firms that invest in higher ESG activities incur lower cost of capital which assist them to correct deviations from target leverage. By disaggregating the ESG score into the three pillar scores, the study reveals that environmental score induces the fastest SOA, with about 7.83% higher than initial SOA without the role of environmental performance. This is consistent with the stream of literature confirming that:

- environmentally sustainable activities reduces environmental transaction costs (Tascon *et al.*, 2020);
- environmental score enhances a trustful climate between the firm and suppliers of capital (Do *et al.*, 2018); and
- high environmental performance implies lower carbon emission below the industry average, and firms benefit from better information transparency (Ho *et al.*, 2021).

Such environmental benefits confirm that assumption of the stakeholder theory and trade-off theory. Hence, the firm's focus on environmentally sustainable activities produces a faster SOA to target leverage, triggering the preservation of a higher debt in the capital structure and a promotion of trust and transparency among stakeholders required to enhance the competitive advantage.

Our study also adds to the ongoing debate on factors influencing the SOA in corporate finance literature by establishing ESG performance and its pillar score are drivers of the firm's SOA to target leverage (Do *et al.*, 2018). With the increasing demands for zero-carbon emissions and sustainable stocks by investors in their investment portfolios, firms do not only incur the cost of disseminating ESG information but benefits from lower information asymmetry and a higher SOA with better tax-deductible advantages. Thus, practically, regulators and policymakers should encourage proactive sustainable behaviour and environmental legislation in firms which may also reduce the cost of regulations and access of external finance.

Managers must pay greater attention to poor ESG practices to avoid a high cost of information asymmetry by building a trustful climate between firms and capital providers to reduce financing costs to increase the firm's SOA to target leverage. As ESG score impacts the SOA faster to the target leverage, firms could set sustainability targets for managers and members of sustainability committees to meet certain ESG performance thresholds. The importance of ESG performance documented in this study would make managers re-think approaches to improve and increase their sustainability practices such as recycling programmes, renewable energy and corporate governance mechanisms to enhance their ESG performance. Managers should not only perceive governance mechanisms as tools in tackling earnings manipulations, but also as good governance signals required for lowering the costs of adjustment speed to target leverage. Managers may need to further look into the percentage contribution of each sustainability practice to ESG performance. Our findings reveal that environmental performance increases the SOA more than social

and governance performance, which suggests that firms should further strengthen their environmental practices while investing more in social and governance practices.

5.2 Limitations and future research directions

There are a few limitations in the present study. First, this study does not consider the sensitivity analysis of ESG impact on firm value by considering both book and market leverage. Moreover, it neglects the regulatory effect of environmental policies on capital structure decisions. Future research should study whether regulatory policies on carbon emission (such as carbon taxes) affect the ESG–capital structure relationship. In addition, further studies should investigate whether shareholders' or investors' switching behaviour reduces in the presence of ESG performance. For example, further studies may be conducted on investors' reactions to the ESG–capital structure nexus. These are possible interesting research gaps that may have regulatory and policy implications.

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