Green Finance

Green Finance, 7(2): 288–331.
DOI: 10.3934/GF.2025011
Received: 31 August 2024
Revised: 20 January 2025
Accepted: 19 February 2025
Published: 09 April 2025

https://www.aimspress.com/journal/GF

Research article

ESG and bank profitability: the moderating role of country sustainability in developing and developed economies

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Abstract: This article analyzes how country sustainability determines the effects of environmental, social and governance (ESG) scores on bank profitability in developing and developed economies. Using a sample of 159 banks from 42 countries during the period 2018–2023 (835 observations), we find that, generally, better ESG scores have negative effects on profitability in developing countries with low or moderate sustainability levels. As country sustainability increases, this negative effect is reduced and ends up not being significant. Moreover, if the country's sustainability reaches a high level, the ESG–profitability relationship is reversed and superior ESG ratings lead to higher financial returns. In contrast, for developed economies, the effects of the country's sustainability on the ESG–profitability relationship are generally less beneficial than in developing economies.

Keywords: country sustainability; ESG; bank profitability; developing countries, developed countries

JEL Codes: G21, Q01, O57

1. Introduction

In the last few years, sustainable development has been an essential priority, especially since the adoption of the Sustainable Development Goals (SDGs), which should be achieved by 2030. In this context, the ESG (environmental, social and governance) paradigm has received increased attention as a key tool for reaching sustainable development. The banking sector, in particular, plays an essential

role in the achievement of the SDG goals, which is why a vast strand of literature has examined the relationship between ESG efforts and bank profitability (Aebi et al., 2012; Agnese et al., 2024; Azmi et al., 2021; Bătae et al., 2021; Finger et al., 2018; La Torre et al., 2021). This evidence is mixed and not conclusive because ESG actions can have both positive and negative effects on financial performance. On the one hand, ESG practices can have a positive effect because they lead to a better reputation, enhanced investor confidence and customer loyalty, efficiency gains, and lower funding costs (Agnese and Giacomini, 2023; Igbudu et al., 2018). On the other hand, ESG investments may not significantly impact on profitability, or even have negative effects, if the previous benefits are offset by the expensive costs that sustainable compromises require (Shah et al., 2019).

This inconclusive evidence on the ESG–bank profitability relationship may be due to other factors that can shape this relationship, especially those related to the institutional context where banks operate, such as their home country's sustainability levels (Vargas-Santander et al., 2023; Xiao et al., 2018). Country sustainability, which has scarcely been explored, can exert an important moderating role, since it can lead to superior financial stability, asset quality improvements, and better funding conditions for banks (Hoepner et al., 2016; Sol-Murta and Gama, 2024; Stellner et al., 2015), thereby intensifying the potential benefits that ESG might have for financial performance. However, several authors argue that the competitive advantages provided by country sustainability could be relatively less important if it is very high and if ESG issues are institutionalized with strong and well-executed regulations. In these contexts, integrating ESG aspects is seen as the norm, and stakeholders take it for granted that ESG improvement is a country's duty (Xiao et al., 2018). Banks will be forced to align with these ESG principles as well just to maintain their legitimacy and comply with current societal expectations. This context is more common in developed countries; nevertheless, emerging regions have fewer opportunities to improve their sustainability performance because they have other priorities (economic growth or poverty alleviation), less strict regulations, lower ESG awareness, and fewer resources to fully integrate sustainable actions (Goel et al., 2022). Their poorer sustainability levels may represent a source of competitive advantage for the national banking sector if the country improves these levels and banks strengthen their compromises regarding ESG. Stakeholders would provide increased legitimacy to these ESG actions because their initial expectations for them are much lower than in developed countries, and hence banks can gain additional profits (Barnett, 2007).

On the basis of these assumptions, several articles have analyzed how country sustainability shapes the ESG–profitability relationship (Luo et al., 2024; Siregar et al., 2024; Vargas-Santander et al., 2023; Xiao et al., 2018). However, they present certain limitations. First, all of them focus on the nonfinancial sector but no one specifically considers the banking industry. Understanding how country sustainability can condition the impact of ESG investments on banks' performance is essential, given that the financial sector is a key element in ensuring an effective implementation of the SDGs and the 2030 Agenda. Second, none of them account for the development of the countries analyzed. Although Xiao et al. (2018) acknowledged that the more beneficial effects observed in countries with low sustainability scores may come from developing economies, they did not formally test this assumption. Third, they do not quantify how the marginal effects of ESG on profitability vary with the degree of country sustainability. This implies a narrower interpretation of the results, and it is more difficult to control for the fact that countries' sustainability scores differ significantly across world regions (developing and developed ones).

Therefore, this article provides two contributions to the existing literature. First, we analyze how country sustainability conditions the effects of ESG ratings on bank profitability across developing and

developed regions. Second, we quantify how the marginal effect of ESG ratings on financial performance varies with the degree of the country's sustainability indicators. We achieve that by interacting continuous variables (ESG ratings and country sustainability scores) for developing and developed economies. Since the country sustainability indicator can adopt infinite values between 0 and 100, it is possible to fully analyze how the ESG–profitability relationship varies for any value of this indicator by using plots. This approach provides a more precise understanding for financial entities, bank regulators, and governments of how national institutional factors can favor the ESG–bank profitability relationship.

Our empirical analysis comprises a sample of 159 banks from 42 countries over the period 2018–2023 (835 observations) and employs a system Generalized Method of Moments (GMM) methodology (Arellano and Bond, 1991). Our results show that in developing economies, in general, if the global country's sustainability is low or moderate, banks with better ESG ratings experience a reduction in their profitability levels. As the country's sustainability improves, better ESG performance has a less negative effect and ends up not having a significant impact on bank profitability. Furthermore, when the country's sustainability scores are high, the ESG–profitability relationship is reversed and superior ESG ratings boost banks' financial returns. On the other hand, the effects of country sustainability on the ESG–financial performance relationship are normally less beneficial in developed countries than in developing economies.

The rest of the article is structured as follows. Section 2 reviews the previous background, Section 3 describes the literature on the topic, Section 4 presents the empirical analysis and the main results, and Section 5 concludes the paper.

2. Background

With the advent of the ESG paradigm, numerous countries have enacted regulations mandating large corporations to disclose sustainability-related information. These regulations significantly impact the institutional context within which banks operate and their ESG performance. Consequently, this background section provides a summary of some of the most pivotal regulations worldwide.[1]

In the European Union (EU), the Non-Financial Reporting Directive (NFRD) was adopted in 2014, mandating large companies to disclose nonfinancial information on various areas such as environmental, social, and human rights. These disclosure requirements, which came into effect in 2017, were revised with the implementation of the Corporate Sustainability Reporting Directive (CSRD) in 2022. This directive, to be gradually implemented until 2027, will increase the number of companies required to disclose nonfinancial information and expand and standardize sustainability reporting requirements (Hummel and Jobst, 2024). Additionally, the information must be disclosed in accordance with the taxonomy of regulations adopted by the EU in 2020, which establishes a classification system for environmental activities (Garcia-Torea et al., 2024). Furthermore, the EU adopted the Sustainable Financial Reporting Disclosure Regulation (SFDR) in 2019 to enhance transparency on the sustainability of financial products, alongside the Capital Requirements Regulation II (CRR II), which outlines disclosure requirements on ESG risks in accordance with Pillar 3's disclosure requirements.

In the United States, the House of Representatives passed the Environmental, Social, and Governance (ESG) Disclosure Simplification Act in 2021. This legislation requires the Securities and

[1] We thank an anonymous referee for this suggestion.

Exchange Commission (SEC) to define and standardize metrics for listed companies to disclose ESG information (Wang et al., 2023). The SEC approved disclosure rules for public companies in March 2024, setting requirements for the disclosure of emissions and financial expenses by 2027. However, in April 2024, the SEC made these disclosure requirements voluntary, pending the resolution of federal litigation. Consequently, sustainability disclosure remains primarily state-focused. In California, climate disclosure legislation was enacted in 2024, and other states are considering similar legislation.

Other countries have also developed or are developing various regulations on sustainability disclosure (Singhania and Saini, 2022). For instance, in South Africa, the Johannesburg Stock Exchange has long prioritized the disclosure of corporate governance and sustainability information through the incorporation of the King Codes and their sustainability disclosure guidance. Since 2018, the Companies and Intellectual Property Commission has required certain companies to prepare an extended financial report annually. In 2024, the disclosure requirements were updated to include a voluntary Extensible Business Reporting Language (XBRL) taxonomy module, aligned with the International Sustainability Standards Board's International Financial Reporting Standards (IFRS S1 and IFRS S2). In the United Kingdom, mandatory climate disclosure was introduced in 2022 for certain large companies, with IFRS standards expected to become mandatory in 2026. In Brazil, the Comissão de Valores Mobiliários (CVM) mandated the disclosure of information in accordance with IFRS S1 and IFRS S2 standards, starting in 2026. In Canada, the Canadian Sustainability Standards Board (CSSB) released the Canadian Sustainability Disclosure Standards (CSDS 1 and 2) in 2024 as voluntary guidelines to enhance transparency in sustainability and environmental reporting. A new mandatory disclosure proposal is expected in 2025. In Japan, since 2021, the Tokyo Stock Exchange has required major companies to disclose climate-related financial information, with ongoing measures to mandate disclosure by publicly listed companies.

3. Theoretical framework and hypotheses development

In line with the previous regulatory background, the objective of this article is to analyze how country sustainability shapes the relationship between ESG and profitability. Therefore, we need to combine two strands of the theoretical literature. The first strand (Section 3.1) considers the ESG–profitability relationship, while the second strand (Section 3.2) explains how country sustainability can moderate this relationship both in developing and developed regions, and proposes our research hypotheses.

3.1. ESG and bank profitability

As we mentioned previously, the SDGs that should be achieved by 2030 have reinforced the importance of ESG principles. Companies that integrate these principles into their business implement actions aimed at satisfying all their stakeholders instead of the traditional objective of just maximizing shareholders' wealth (Valls-Martínez et al., 2020). The financial sector can play a crucial role in reaching sustainable development objectives through its ESG practices. In this regard, banks can impact the sustainability levels of other industries through their lending channel (Scholtens, 2009). For instance, banks can select investments that protect the environment (green finance), favor projects that contribute to a decarbonized economy like those that do not rely on fossil fuel resources (climate finance), or promote financial inclusion through certain products such as microcredit (Gangi et al., 2019; Nosratabadi et al., 2020). They can also incorporate ESG factors to offer supply chain financing

instruments, such as factoring, thereby enhancing their role as finance providers and facilitators of the SDGs.[2] Moreover, banks can provide the huge investments that certain initiatives require, such as the Paris Agreement[3] (Lang et al., 2023).

Due to the essential role that banks play in the achievement of the SDGs, several researchers have tried to identify how ESG compromises by financial institutions can generate sustainable value for society, as well as serving the banks' own economic interests. In particular, a vast strand of literature has analyzed how ESG impacts bank profitability, leading to mixed and inconclusive results. While some papers suggest that there is a positive relationship between ESG and bank profitability, others propose a negative one or just a nonsignificant relationship.

On the one hand, some articles propose that ESG efforts influence positively banks' financial performance because these efforts improve reputation, boost investors' confidence, and reinforce the loyalty of customers, aspects which are especially valued in the financial sector, given that banks normally have very close relationships with their customers (Ferreira et al., 2015; Gatzert, 2015; Igbudu et al., 2018). Furthermore, as ESG initiatives improve reputation and customer loyalty, they can be an important source of the reduction in banks' funding costs. For instance, they can lower the cost of issuance bonds in the primary market (Agnese and Giacomini, 2023). Moreover, investors reward environmentally friendly actions, so green bonds have lower yields than conventional bonds (Hachenberg and Schiereck, 2018). The implementation of ESG practices strengthens future sustainable standards in the banking industry, thus raising competitors' costs (Clarkson et al., 2011; Hart, 1995). As a result, the financial situation of banks that invest more in ESG will be relatively better, which could lead to superior profits. ESG initiatives can also increase employees' motivation and retention, since they may appreciate the opportunity to integrate ESG issues into their work (Pampurini and Quaranta, 2018). This superior motivation will make employees more productive and efficient, thus increasing profitability expectations. Finally, higher levels of ESG activism imply more transparency, higher quality of earnings, and reinforced moral standards. These aspects can alleviate adverse selection and moral hazard problems, which are the main causes of nonperforming loans (Goss and Roberts, 2011; Lopatta et al., 2016). Di Tommaso and Thornton (2020) demonstrated that ESG scores are associated with a reduction in banks' risk-taking, as measured by the Z-score. Similarly, Galletta et al. (2023) provided evidence supporting this association in the context of operational risk. Furthermore, Galletta and Mazzù (2023) found that banks with fewer ESG controversies tend to engage in less risk-taking. Therefore, better asset quality may promote banks' funding stability and increase profitability opportunities.

Some empirical findings confirm this positive relationship between ESG and profitability. In this regard, Torre-Olmo et al. (2021) revealed that sustainable banks, in terms of those that have voluntarily joined the United Nations Principles for Responsible Banking (UNEP Finance Initiative), are more profitable. La Torre et al. (2021) showed that ESG compromises produce an increase in banks' market performance in Europe, while Azmi et al. (2021) obtained the same evidence for emerging countries. Shakil et al. (2019) also found that in developing nations, ESG positively affects banks' financial performance. Brogi and Lagasio (2019) reported that it is the environmental dimension (E) of ESG that is significant and positively associated with financial performance for US banks. Similar evidence was

[2] For instance, Arnone and Leogrande (2024) showed that the social dimension of ESG (S) influences positively the total factoring value.

[3] The purpose of this agreement is to limit global warming to below 2ºC.

obtained by Buallay (2019) in Europe. El Khoury et al. (2021) found a positive association between ESG scores and profitability in terms of return on assets (ROA) and return on equity (ROE), although this beneficial relationship is reversed when ESG levels are high. Gurol and Lagasio (2023) showed that governance factors, including board size, the ratio of women on the board, and the ratio of independent directors, are positively and significantly associated with ESG disclosure. This, in turn, enhances bank profitability. Birindelli et al. (2018) found a similar positive association between board composition and ESG performance, but this relationship was significant only for gender-balanced boards.

On the other hand, the implementation of ESG practices might be at the expense of greater costs and lower efficiency levels, which could outweigh or even exceed the potential benefits of these practices, at least in the short run (Shah et al., 2019). Furthermore, if banks put too much emphasis on ESG issues, they might disregard other areas of the business and lose efficiency. In addition, trying to satisfy all the stakeholders can lead to an inefficient use of resources, which can adversely affect financial performance (Aupperle et al., 1985; Ullman, 1985).

For these reasons, some empirical evidence has reported a nonsignificant or even a negative ESG–bank profitability relationship. For instance, Agnese et al. (2024) showed that European banks that are more exposed to ESG controversies, and hence perform worse in terms of ESG, display better profitability ratios. Bătae et al. (2021) found that improvements in the governance dimension (G) of ESG negatively affects banks' financial performance. Environmental costs (E) adversely influence bank profitability, as shown in the paper of Jo et al. (2015), whereas the social dimension (S), through product responsibility, is a negative predictor of ROA and ROE (Esteban-Sánchez et al., 2017). However, Finger et al. (2018) showed that banks' financial performance does not significantly react to the adoption of Equator Principles (EPs)[4] in developed countries. Aebi et al. (2012) revealed that better levels in the corporate governance index (G) had a nonsignificant effect on banks' stock returns during the financial crisis, while Harkin et al. (2020) reported the same nonsignificant impact on ROA. Lamanda and Tamásné Vőneki (2024) reported a lack of connection between ESG disclosure and financial performance in Central European countries.

3.2. The moderating role of country sustainability in the ESG–profitability relationship

One aspect that can explain the lack of consensus in the analysis of the ESG–bank profitability relationship, which has scarcely been explored, is the national context where banks operate and especially their home country's sustainability (Xiao et al., 2018). Institutional theory proposes that ESG actions by banks or firms depend on their institutional framework (Campbell, 2007). On the other hand, stakeholder theory suggests that these actions are conditioned by society's expectations as well (Chen and Roberts, 2010). Both aspects (the institutional context and society's expectations) may vary across countries, thus leading to different results in terms of sustainable performance.

Country sustainability reflects how nations prioritize their environmental and social issues and how the country is developed in terms of ESG levels (Capelle-Blancard et al., 2019; Wagner, 2010). This country's sustainability can benefit the ESG–profitability relationship for domestic banks through credit risk reductions and more funding opportunities. On the one hand, national sustainable practices can reduce environmental and social risks, leading to more stable economic conditions, fewer defaults,

[4] Equator Principles (EPs) represent a set of best practice principles aimed at guiding banks that are involved in project finance to manage social and environmental risks (Macve and Chen, 2010).

and a more resilient financial sector. On the other hand, if countries prioritize sustainable issues, they will implement stronger regulations and banks will be more engaged in ESG reporting (Van Hoang et al., 2023), which will increase transparency and reduce uncertainties, thus contributing to financial stability. As a result, banks' asset quality will improve, which will reduce their funding costs and boost their profitability levels. Stellner et al. (2015) showed that corporate social actions in Europe reduce corporate bonds' Z-spreads if their country's ESG scores are above average. Therefore, risk alleviation requires not only firms investing in ESG actions but also an institutional context that recognizes and acknowledges the relevance of these actions. Similarly, as Stellner et al. (2015) explain, customers in countries with higher environmental performance are more likely to pay a higher premium for products from national firms that are strongly committed to environmental protection. Furthermore, countries with stronger sustainable policies may have a buffer against shocks, better credit ratings, and lower sovereign risk (Hübel, 2022). A lot of papers have shown that lower levels of sovereign risk may enhance banks' access to funding (Cantero-Saiz et al., 2014, 2022; CGFS, 2011), thus leading to more profitability opportunities. At the same time, Hoepner et al. (2016) reported that an increase in country sustainability scores is associated with a decrease in the cost of debt. Finally, countries with better sustainability performance not only have healthier financial systems but also more projects to finance, which will enhance the banks' lending supply, thus increasing the potential of achieving additional returns. In this regard, Sol-Murta and Gama (2024), in a sample of world countries, found that countries' sustainability efforts lead to greater amounts of domestic credit as well as better quality of loans.

Consequently, all the previous aspects could amplify the positive effects that ESG practices have on profitability or, at least, could mitigate the potential negative ones. Nevertheless, these beneficial effects may be relatively more relevant in developing countries than in developed ones because sustainable practices in the former countries are less common and hence much less normalized among stakeholders (Chapple and Moon, 2005; Yin and Zhang, 2012). The paper by Goel et al. (2022) summarizes the main reasons for this pattern. First, developing nations have fewer resources to invest in sustainable initiatives and may prioritize other aspects, such as economic growth or poverty alleviation. Second, ESG regulations tend to be less strict in these countries. Developing nations are normally more exposed to corruption issues and lower standards of law and political instability, which is why strong and well-executed ESG rules are less common. Third, in emerging countries, there is normally lower awareness of, as well as less education about, ESG issues. Fourth, in these regions, capital markets are less developed and often do not have the necessary technology and infrastructure, so it is more difficult to fully implement and finance sustainable strategies.

As a result, societal expectations about developing countries' sustainable responsibilities decrease. Banks that operate in countries with stronger ESG norms and disclosure requirements will necessarily adopt more intensive ESG practices. Moreover, ESG actions from national banks depend not only on the formal regulations of their countries but also on the informal values of society (Matten and Moon, 2008). Therefore, banks will be more prone to invest in ESG if they belong to a country that places strong emphasis on sustainability issues and individuals implicitly assume that they should adopt such behavior (Campbell, 2007). Since this context is less likely to occur in developing countries, banks that voluntarily redouble their individual ESG efforts will receive more increased legitimacy from society, which can have positive effects on financial performance (Barnett, 2007). Furthermore, if the home country reinforces sustainable compromises as well, it will enjoy an important source of differentiation and competitive advantage in the global market. National credit ratings could improve, thus lowering sovereign risk significantly, which is normally quite high in emerging economies

(Cantero-Saiz et al., 2022). These facts will provide further stability, more important risk reductions, and relatively greater funding opportunities for national banks, as these benefits are more difficult to obtain in these countries. Razak et al. (2020) provided empirical support for this idea because they found that country sustainability amplifies the credit risk reductions caused by improvements in corporate social performance, but only for low values of country sustainability, which are more common in developing economies. However, very high levels of country sustainability do not significantly alter credit risk. All these difficulties encountered by emerging regions could be more valued by stakeholders, so country sustainability in these regions might favor the ESG–profitability relationship to a greater extent.

On the basis of all the previous assumptions, we propose our first hypothesis (H1):

H1: In developing countries, higher levels of sustainability amplify (attenuate) the positive (negative) effects of ESG practices on bank profitability.

In contrast, while developing countries are still struggling with many sustainability issues, developed countries have more opportunities to implement and expand sustainable initiatives, so they are not perceived to be as meritorious as in developing countries. In fact, these initiatives in developed regions have been institutionalized and taken as the norm (Schultz and Wehmeier, 2010), so they may not represent a differentiated source of risk reduction and improvement in funding conditions for domestic banks. During the 1970s and 1980s, country sustainability performance in developed regions was relatively low and there was a certain pressure to integrate what was known as "corporate social responsibility (CSR) actions," so banks could probably still gain significant profits if they incorporated these actions into their businesses (Jones, 1995). However, after the global financial crisis of 2008, during which the reputation of banks was seriously damaged because they focused too much on financial results only, and since the later adoption of the SDGs and the 2030 Agenda, there has been stronger, better enforced regulations and more social pressure to ensure that banks strictly orient their business towards sustainable principles (Cornett et al., 2016). The initial CSR concept has rapidly evolved into the ESG paradigm, which is also a way of committing to sustainable issues, but with an active and measurable improvement across a wide range of concrete aspects (environmental, social, and governance) (Kotsantonis et al., 2016). In this context, stakeholders are no longer so sensitive and responsive to sustainable improvements, and banks may benefit less from their country's sustainability, as they are forced to adopt ESG strategies just to maintain their legitimacy and comply with current regulations and society's expectations (Barnett, 2007; Campbell, 2007).

Moreover, although ESG actions tend to be more institutionalized in developed countries, significant differences also arise from variety in the approach to capitalism (Carnevale and Mazzuca, 2014). Banks in coordinated market economies (CMEs) may face greater pressure to implement ESG practices compared with those in liberal market economies (LMEs) or mixed market economies (MMEs). CMEs rely more on nonmarket relationships, such as cooperation among businesses, unions, and the government. They also have stricter regulatory frameworks, higher social and cultural expectations for banks to act responsibly, and competition that is more quality-based rather than price-based. In contrast, LMEs and, to a lesser extent, MMEs, rely more on market competition and hierarchical relationships. This can result in less pressure to adopt ESG principles, as banks in these economies are more focused on cost efficiency and short-term profit maximization. Conversely, Khanna and Palepu (2006) posit that banks in LMEs and MMEs might be incentivized to address this institutional void, thereby fostering more comprehensive and pertinent ESG practices and disclosures.

Regardless of the underlying reasons, sustainability issues are well established in developed economies, which make it more challenging for banks to achieve additional returns through competitive advantages linked to ESG commitments. In this context, banks that try to outperform stakeholders' expectations by investing more in ESG initiatives might incur additional costs that outweigh the potential benefits of these initiatives. In other words, any attempt to boost bank profitability through ESG initiatives would be less effective than in developing countries, and the nation's sustainability level would lose the potential to benefit domestic banks. The current higher and more stable sustainability levels of developed countries may have generated standardization and stabilized market performance because the differences between the "best" and "typical" banks are now less evident (Jackson et al., 2020).

Several empirical studies have analyzed the potential links between country sustainability and the ESG–profitability relationship. Xiao et al. (2018) used a sample of manufacturers located in 22 countries and showed that country sustainability negatively moderates the relationship between corporate social responsibility and financial performance. Therefore, corporate social responsibility actions are more financially effective in countries with low levels of sustainable performance. These authors suggest that these countries are more likely to be developed ones, although they did not formally test this assumption. Vargas-Santander et al. (2023) reported similar results for a larger sample of 47 countries. In contrast, Luo et al. (2024) found that the ESG–financial performance relationship is stronger for firms located in countries with a more favorable governance environment, whereas Siregar et al. (2024) revealed that country sustainability does not a play a significant role in Southeast Asian nations.

On the basis of these assumptions, we propose our second hypothesis (H2):

H2: The effects of country sustainability on the ESG–bank profitability relationship are less beneficial in developed countries than in developing ones.

To test H1 and H2, we carry out an empirical analysis in the next section.

4. Research design

4.1. Sample

We selected all the banks included in the Morgan Stanley Capital International All Country World Index (MSCI ACWI Banks). This index is composed of large and middle capitalization bank stocks across 23 developed-market countries and 24 emerging-market countries. We used the BankFocus database to get the banks' financial data, Morgan Stanley Capital International (MSCI) to obtain the ESG scores, SolAbility Sustainable Intelligence for the country-level sustainability scores[5], the World Development Indicators of the World Bank, and the Oxford COVID-19 Government Response Tracker databases for the rest of the macroeconomic variables.

Since we used the country's sustainability proxies, we could only consider those countries that also have sustainability scores in SolAbility Sustainable Intelligence. Furthermore, we could only include those banks with financial data available in BankFocus in our sample. Following previous studies, we used consolidated data if they were available. Otherwise, we used unconsolidated ones

[5] Many previous articles have used MSCI to measure ESG scores (Albuquerque et al., 2019; Cantero-Saiz et al., 2023, 2024; Sabbaghi, 2022) and SolAbility to compute country-level sustainability scores (Herciu and Ogrean, 2014; Qazi and Al-Mhdawi, 2024; Sol-Murta and Gama, 2024).

(Cantero-Saiz et al., 2024). We also eliminated those banks without the necessary financial data for the variables used in our analysis. Finally, we removed banks with data available for less than four consecutive years, which was a necessary condition to perform the second-order serial correlation test. This test serves to ensure the robustness of the estimates made by the system GMM (Arellano and Bond, 1991). The final sample consists of an unbalanced panel of 159 banks from 42 countries[6] between 2018 and 2023 (835 observations). Table 1 shows the distribution of the sample across countries and years.

4.2. Econometric model and methodology

Our econometric model is based on previous studies on the ESG–bank profitability relationship (Azmi et al., 2021; Finger et al., 2018; Jo et al., 2015). These studies regress financial performance indicators against ESG proxies and several control variables. We contribute to the existing literature by including ESG ratings and their interactions with country regions (developing vs. developed) and several indicators of country sustainability. Our baseline model is represented in Equation (1)

$$\begin{aligned} ROAA_{i,t} = {} & \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 (DEV_m * ESG_{i,t-1}) + \beta_3 COUNSUST_{m,t} \\ & + \beta_4 \left(ESG_{i,t-1} * COUNSUST_{m,t}\right) + \beta_5 \left(DEV_m * ESG_{i,t-1} * COUNSUST_{m,t}\right) \\ & + \beta_6 SIZE_{i,t-1} + \beta_7 CAP_{i,t-1} + \beta_8 CREDRISK_{i,t-1} + \beta_9 HHI_{m,t} + \beta_{10} EFFIC_{i,t-1} \\ & + \beta_{11} LIQRISK_{i,t-1} + \beta_{12} \Delta GDP_{m,t} + \beta_{13} INFL_{m,t} \\ & + \sum_{t=1}^{t} \pi_t Year_t + \sum_{m=1}^{m} \vartheta_t Country_m + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The dependent variable in Equation (1), ROAA, represents the profitability of the bank and is captured by the return on average assets ratio. The use of average yearly values of assets is more accurate than the end-year values (Petria et al., 2015).[7]

Our independent variables include bank-specific indicators and macroeconomic factors[8]

[6] The countries are Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, the Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kuwait, Malaysia, Mexico, the Netherlands, Norway, the Philippines, Poland, Qatar, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, the United Arab Emirates, the United Kingdom, and the United States.

[7] We replace ROAA with ROAE (return on average equity) in a robustness check.

[8] Bank-specific variables are lagged by 1 year to avoid endogeneity bias.

Table 1. Distribution of the sample.

Country	Banks	Obs.	Country	Banks	Obs.
Australia	3	17	Japan	8	42
Austria	1	6	Kuwait	1	5
Belgium	1	6	Malaysia	6	35
Brazil	3	15	Mexico	3	15
Canada	6	34	Netherlands	2	9
Chile	3	17	Norway	1	6
China	21	110	Philippines	3	16
Colombia	1	6	Poland	4	24
Czech Republic	2	10	Qatar	3	12
Denmark	1	5	Saudi Arabia	8	32
Egypt	1	5	Singapore	3	18
Finland	1	5	South Africa	4	24
France	3	17	South Korea	5	26
Germany	1	6	Spain	4	22
Greece	4	23	Sweden	3	17
Hungary	1	5	Switzerland	1	5
India	6	29	Thailand	2	12
Indonesia	4	23	Turkey	2	8
Ireland	2	10	United Arab Emirates	4	19
Israel	4	23	United Kingdom	5	24
Italy	4	21	United States	14	71
Total banks		**159**	**Total Obs.**		**835**

Year	2018	2019	2020	2021	2022	2023	**Total**
Obs.	81	137	159	159	156	143	**835**

Obs.: observations

ESG refers to the environmental, social and governance ratings published by MSCI (Albuquerque et al., 2019; Sabbaghi, 2022). MSCI ESG bank ratings measure banks' resilience to environmental, social, and governance risks, and how well they manage these risks compared with their peers to identify industry leaders, average and laggards.[9] As shown in Table 2, we construct a variable that takes a whole number from 0 to 6 according to the ESG rating scale provided by MSCI (Cantero-Saiz et al., 2024). Banks with better ESG scores may enjoy a superior reputation, which can attract more customers and lower funding costs, thus increasing profitability levels (Gatzert, 2015; Igbudu et al., 2018). Therefore, a positive relationship between ESG and ROAA can be expected. However, ESG strategies are costly and can reduce efficiency, which may outweigh or even exceed their potential benefits, so a negative or a nonsignificant relationship can also be expected (Ullman, 1985).

[9] See https://www.msci.com/our-solutions/esg-investing/esg-ratings-climate-search-tool.

Table 2. ESG scores.

MSCI ESG categories	MSCI ESG rating	ESG score assigned
Laggard	CCC	0
	B	1
Average	BB	2
	BBB	3
	A	4
Leader	AA	5
	AAA	6

DEV is a dummy variable that takes the value of 1 if a bank operates in a developed country and 0 if it is in a developing region.[10] This variable is interacted with the ESG indicator (DEV*ESG), which serves to test how the effects of ESG on ROAA differ across developed and developing countries.

COUNSUST captures the country-level sustainability score based on the Global Sustainable Competitiveness Index (GSCI) provided by SolAbility Sustainable Intelligence (Herciu and Ogrean, 2014; Qazi and Al-Mhdawi, 2024; Sol-Murta and Gama, 2024). This index, which provides comparability across countries, is based on data from the World Bank, various United Nations agencies, the International Monetary Fund, and other nongovernmental institutions (SolAbility, 2023). The scale of this index ranges from 0 to 100, with the highest value representing the best sustainable performance.[11]

Better country sustainability can lead to more stable conditions, superior credit ratings, and a lower sovereign risk, which may improve banks' asset quality and their access to funding (Hübel, 2022; Stellner et al., 2015). As a result, bank profitability will increase, so there can be a positive relationship between COUNSUST and ROAA. However, if the country's sustainability is high and there are strong and well-established regulations that guarantee it, stakeholders may take it for granted that this is a country's duty, making more difficult for national banks to get benefits from it. Moreover, rules will be stricter, and banks will be forced to comply with certain norms, disclose nonfinancial information, and maintain certain sustainable standards, thus incurring additional costs that would not be offset by increased legitimacy, thereby depressing profitability or just not altering it significantly (Vargas-Santander et al., 2023; Xiao et al., 2018). Therefore, the relationship between COUNSUST and ROAA can also be negative or nonsignificant.

To analyze how the country's sustainability moderates the ESG–profitability relationship, in Equation (1), we include the interaction term between ESG scores and the country sustainability indicator (ESG*COUNSUST). Furthermore, to test the differences across developed and developing economies, we add the interaction term of the dummy DEV, the ESG scores, and the country sustainability variable (DEV*ESG*COUNSUST). In our H1, we propose that in developing regions, countries' sustainability amplifies (attenuates) the positive (negative) effects of ESG efforts on profitability. In developed areas, however, the benefits of country sustainability for the ESG–profitability relationship can be less pronounced, as we suggest in our H2. To properly test H1 and H2, since we are interacting ESG scores with continuous variables that can adopt infinite values between 0 and 100 (COUNSUST), it is necessary

[10] We consider the World Bank's classification of high- (developed) and low- and middle-income (developing) countries, which is based on the gross national income (GNI) of the countries in each of the years of the sample (calculated using the World Bank Atlas method).

[11] See https://solability.com/.

to compute how the marginal effects of ESG on profitability, and their coefficients and significance, vary with the degree of COUNSUST for developing (DEV = 0) and developed (DEV = 1) countries. We will later construct plots that represent these marginal effects.

SIZE represents the size of a bank and is calculated as the natural logarithm of total assets (deflated) (Behr et al., 2010; Goldberg and Rai, 1996). Larger banks can benefit from economies of scale, which may increase efficiency and reduce costs (Smirlock, 1985). So, a positive relationship between SIZE and ROAA can be expected. However, the management of large banks can lead to higher agency costs and bureaucratic expenses, and hence size can also have negative effects on profitability (Pasiouras and Kosmidou, 2007).

CAP denotes the capitalization of each bank and is expressed as the equity-to-asset ratio (Sanfilippo-Azofra et al., 2013). More poorly capitalized banks have higher funding costs, which lead to lower margins (Tregenna, 2009). Moreover, banks with higher levels of capital can have more business opportunities and receive additional returns (Athanasoglou et al., 2008). As a result, the relationship between CAP and ROAA should be positive.

CREDRISK captures credit risk and represents the ratio of loan loss reserves to loans. Poor-quality loans may generate potential profitability losses; hence, we expect a significant and a negative coefficient for CREDRISK (Mansur et al., 1993).

HHI is the Herfindahl–Hirschman index and controls for market concentration. It is calculated as the sum of the squared market share in terms of the assets of all the banks that operate in a market (Beck et al., 2006; De Nicoló et al., 2004). For each country, HHI is calculated using all the banks available in the BankFocus database (Sanfilippo-Azofra et al., 2013). Banks that operate in more concentrated markets have superior market power and can receive noncompetitive rents by imposing higher prices on customers, which increases returns (Demsetz, 1982). Therefore, the coefficient of HHI should be significant and positive.

EFFIC is the cost-to-income ratio and is an indicator of bank efficiency.[12] If operating costs are higher in relation to bank income, the profitability levels will be lower, so there should be a negative relationship between EFFIC and ROAA (Akbas, 2012).

LIQRISK measures the liquidity risk through the loans-to-deposits and short-term funding ratio (Fries and Taci, 2005). Banks with higher liquidity levels are more likely to meet their obligations, which reduces the risk of failure, as well as financial costs, thus improving profitability (Alexiou and Sofoklis, 2009). Therefore, the relationship between LIQRISK and ROAA can be positive. Nevertheless, if loans exceed the deposit base, there is a funding gap that should be covered by turning to financial markets. Financial markets are more volatile than retail funding, so banks with high loan volumes in relation to deposits will be riskier and, as a result, will probably experience more funding costs and reduced profits (Van den End, 2016). Thus, there can also be a negative relationship between liquidity risk and profitability.

ΔGDP represents the annual GDP growth of each country. Better economic conditions increase bank activity with a higher demand for credit, which positively affects the profit margins (Sufian and Chong, 2008). As a result, we expect a positive relationship between ΔGDP and ROAA.

INFL captures each country's annual inflation rate. If banks anticipate higher inflation levels, they may increase the interest rates charged to loans, thus raising bank profitability (Petria et al., 2015). Therefore, a positive sign for the variable INFL should be expected. However, if banks do not

[12] BankFocus calculates the cost-to-income ratio as follows: overheads / (net interest revenue + other operating income).

anticipate this inflation, they can bear unexpected higher funding costs, so the relationship between INFL and ROAA can be negative too (Petria et al., 2015).

Finally, year and country dummies are included to control for year- and country-fixed effects. The error term is $\varepsilon_{i,t}$, where i = 1, 2, …, I refers to a specific bank i; m = 1, 2, …, M denotes a particular country m; and t = 1, 2, …, T represents a specific year t.

Table 3 summarizes the independent variables and their expected relationship with the dependent variable. Table 4 represents the main descriptive statistics, Table 5 shows the correlations between variables, and Table 6 depicts the variance inflation factor (VIF) for the predictor variables. The value of VIF for all the predictor variables is lower than 10, which means that in our model, there are no problems with multicollinearity (the highest VIF value is 2.05).

The baseline model of Equation (1) was estimated using a two-step system GMM approach with robust standard errors, ensuring consistency in the presence of heteroscedasticity and autocorrelation. This technique effectively addresses endogeneity issues, providing consistent and unbiased estimates by employing lagged independent variables as instruments (Arellano and Bond, 1991). All variables were treated as endogenous, except for the country and time dummies, which were considered exogenous. We normally used third lags for the endogenous variables, while the exogenous variables were instrumented by themselves.

Table 3. Summary of the independent variables.

Variable	Proxy	Expected sign
ESG	ESG numerical scores (from 0 to 6) based on MSCI ESG ratings (from CCC to AAA)	Positive/negative/N.S.
DEV*ESG	Interaction term between ESG and DEV (dummy variable: 1 (developed countries); 0 (developing countries))	Positive/negative/N.S.
COUNSUST	SolAbility Global Sustainable Competitiveness Index (from 0 to 100).	Positive/negative/N.S.
ESG*COUNSUST	Interaction term between ESG and COUNSUST	Positive/negative/N.S.
DEV*ESG*COUNSUST	Interaction term between DEV, ESG, and COUNSUST	Positive/negative/N.S.
SIZE	Log (total assets)	Positive/negative
CAP	Equity/assets	Positive
CREDRISK	Loan loss reserves/loans	Negative
HHI	Herfindahl–Hirschman index in terms of assets	Positive
EFFIC	Cost-to-income ratio	Negative
LIQRISK	Loans/deposits and short-term funding	Positive/negative
ΔGDP	Annual GDP growth	Positive
INFL	Annual inflation rate	Positive/negative

N.S.: not significant

Table 4. Descriptive statistics

Variable	N. OF Obs.	Mean	St. Deviat.	Minimum	Maximum
ROAA	835	0.9940	0.8193	−4.0532	7.0983
ROAE	835	10.5015	6.3645	−46.3692	74.1742
ESG	835	3.5629	1.2549	0	6
COUNSUST	835	49.2430	5.1470	36.3715	62.0999
SIZE	835	19.3027	1.3540	15.7889	22.3767
CAP	835	9.1790	3.7220	3.1463	32.9087
CREDRISK	835	2.9725	3.2796	0.0173	25.0743
HHI	835	4.4497	3.1599	1.2054	23.6051
EFFIC	835	50.8799	19.7910	−334.9818	110.1241
LIQRISK	835	77.1576	22.3395	2.0712	198.7120
ΔGDP	835	2.4511	4.1566	−11.1673	15.1252
INFL	835	3.3243	3.2839	−2.5403	33.8848
COVID	835	6.1930	5.4870	0	13.7597

Note: Although the variables ROAE (return on average equity) and COVID (1 + log of the number of new COVID-19 deaths per million individuals) are not included in the baseline model, we show their descriptive statistics because they will be considered later in robustness checks.

Table 5. Correlations.

	ESG	COUNSUST	SIZE	CAP	CREDRISK	HHI	EFFIC	LIQRISK	ΔGDP	INFL	COVID
ESG	1										
COUNSUST	0.2081***	1									
SIZE	0.1772***	0.4980***	1								
CAP	−0.3079***	−0.5658***	−0.5953***	1							
CREDRISK	−0.2016***	−0.3474***	−0.3274***	0.3542***	1						
HHI	0.0377	−0.2017***	−0.3064***	0.1826***	0.1137***	1					
EFFIC	0.1633***	0.2586***	0.1516***	−0.2281***	−0.1374***	−0.2085***	1				
LIQRISK	0.0619*	0.0277	−0.2974***	0.1980***	−0.1419***	0.2521***	−0.0010	1			
ΔGDP	−0.0428	−0.0941***	0.0184	−0.0084	0.0384	−0.0423	−0.1362***	−0.1167***	1		
INFL	0.1054***	−0.1062***	−0.1987***	0.0639*	0.0596*	−0.0023	0.0127	−0.0167	0.2078***	1	
COVID	0.0431	0.1157***	−0.0139	0.0182	0.0025	0.0340	0.0583*	−0.0311	0.0083	0.1496***	1

*** indicates a level of significance of 0.01; and * indicates a level of significance of 0.1.

Table 6. VIF value for the predictor variables.

VARIABLE	VIF	1/ VIF
ESG	1.18	0.8459
COUNSUST	1.80	0.5569
SIZE	2.00	0.5006
CAP	2.05	0.4887
CREDRISK	1.29	0.7728
HHI	1.22	0.8200
EFFIC	1.15	0.8661
LIQRISK	1.33	0.7520
ΔGDP	1.11	0.9123
INFL	1.16	0.8612
COVID	1.07	0.9383

4.3. Empirical results and discussion

4.3.1. Baseline model

Table 7 shows the results of our baseline model. Both the second-order serial correlation statistic (m_2) and the Hansen test are not significant, which indicates that the lagged values are valid instruments in our model. The variable ESG is negative and significant. Country sustainability (COUNSUST) has a negative and significant coefficient, while the interaction term ESG*COUNSUST is significant and positive, and DEV*ESG and DEV*ESG*COUNSUST are not significant. However, we should bear in mind that we are interacting ESG with other variables (DEV and COUNSUST), so ESG reflects the impact of environmental, social, and governance actions on profitability when the rest of the variables are zero. In any case, as we are interacting ESG scores with a continuous variable (COUNSUST) that can adopt infinite values from 0 to 100, to fully interpret how COUNSUST moderates the ESG–profitability relationship, it is necessary to quantify the marginal effect of the variable ESG on ROAA by taking the first derivative of Equation (1) in relation to ESG:

Table 7. Results of the baseline model (effects of ESG ratings on ROAA).

ESG	−2.1169**
	(0.9739)
DEV*ESG	0.5745
	(0.6034)
COUNSUST	−0.1408**
	(0.0708)
ESG*COUNSUST	0.0410**
	(0.0193)
DEV*ESG*COUNSUST	−0.0118
	(0.0119)
SIZE	−0.1306
	(0.1621)
CAP	0.0387
	(0.0376)
CREDRISK	−0.0996**
	(0.0407)
HHI	−0.0420
	(0.0539)
EFFIC	−0.0025
	(0.0037)
LIQRISK	−0.0081
	(0.0062)
ΔGDP	0.0108
	(0.0143)
INFL	−0.0179
	(0.0255)
CONS	11.6739**
	(5.2217)
Number of observations	835
Number of banks	159
Country-fixed effects	Yes
Year-fixed effects	Yes
m_2	0.355
Hansen	0.116

Note: First, the results show the coefficients associated with each variable. Second, they represent the level of significance of each variable: ** indicates a level of significance of 0.05. Third, they depict (in brackets) the robust standard errors. CONS is the intercept term; m_2 is the *p*-value of the second-order serial correlation statistic; Hansen is the *p*-value of the over-identifying restriction test.

$$\frac{\partial ROAA_{i,t}}{\partial ESG_{i,t-1}} = \beta_1 + \beta_2 DEV_m + \beta_4 COUNSUST_{m,t} + \beta_5 \left(DEV_{m,t} * COUNSUST_{m,t}\right) \quad (2)$$

In Equation (2), the marginal effect of ESG on profitability depends on the dummy DEV and the country sustainability indicator (COUNSUST), which is a continuous variable and, as we mentioned, can take infinite values. Thus, to quantify the marginal effect of ESG and its significance for all the possible values of COUNSUST, we carry out linear restriction tests of the sum of the coefficients β_1, β_2, β_4, and β_5 in Equation (2) for different values of COUNSUST and DEV, and we construct plots to correctly interpret the results. The dummy DEV only takes two possible values (0 or 1), so the marginal effect in Equation (2) is divided into two scenarios.

- First scenario: Developing countries (DEV = 0):

$$\frac{\partial ROAA_{i,t}}{\partial ESG_{i,t-1}} = \beta_1 + \beta_4 COUNSUST_{m,t} \quad (3)$$

- Second scenario: Developed countries (DEV = 1):

$$\frac{\partial ROAA_{i,t}}{\partial ESG_{i,t-1}} = \beta_1 + \beta_2 DEV_m + \beta_4 COUNSUST_{m,t} + \beta_5 \left(DEV_{m,t} * COUNSUST_{m,t}\right) \quad (4)$$

In the first scenario (Equation (3)), β_1 represents the marginal effect of ESG for banks located in developing countries (DEV = 0) when COUNSUST is zero. $\beta_1 + \beta_2$COUNSUST reflects the marginal effect of ESG for banks in developing economies when COUNSUST is different from zero. In the second scenario (Equation (4)), $\beta_1 + \beta_2$DEV captures the marginal effect of ESG for banks operating in developed nations (DEV = 1) when COUNSUST is zero, whereas $\beta_1 + \beta_2$DEV + β_4COUNSUST + β_5(DEV*COUNSUST) refers to the marginal effect of ESG for banks in developed areas when COUNSUST is different from zero.

Figure 1 shows the marginal effect of ESG scores on bank profitability in relation to country sustainability (COUNSUST). On the left-hand side, we represent the developing countries' scenario (Equation (3)), and the right-hand side shows the one for developed countries (Equation (4)). The dotted lines represent the 90% confidence interval (Aiken and West, 1991). Confidence intervals of 90% show when ESG ratings have a statistically significant effect on profitability (whenever both the upper and lower bounds of the 90% confidence interval are either above or below zero). Gray bars display the percentage of observations in each of the possible values that the country sustainability indicator can adopt, so they show more precisely how our sample is distributed.

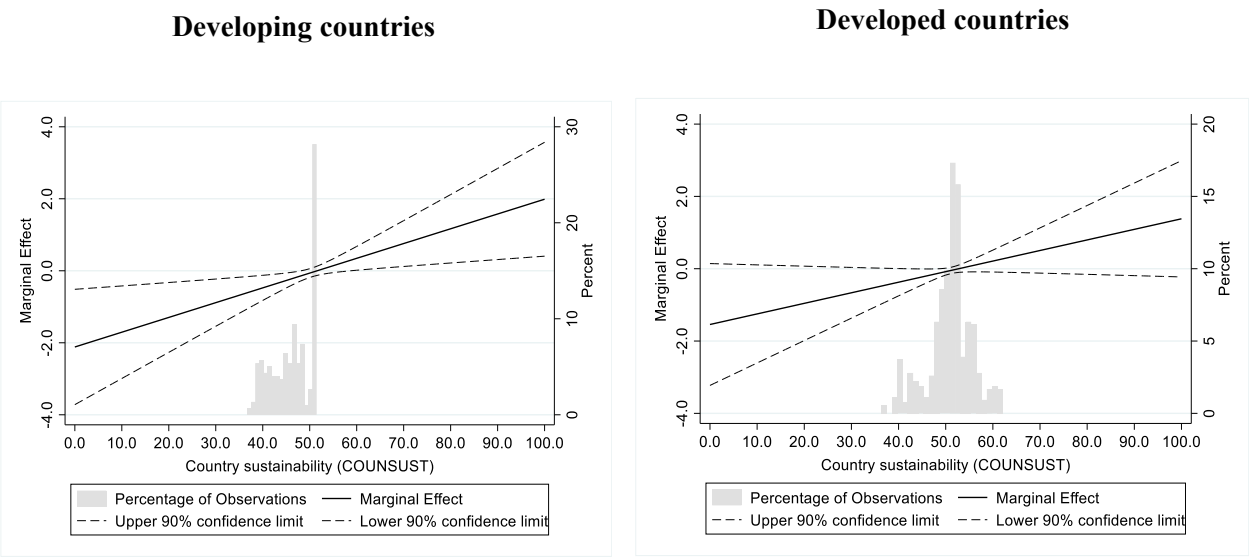

Figure 1. Marginal effect of ESG on ROAA (based on Table 7, baseline model).

The plot of the developing economies scenario (Equation 3) on the left-hand side shows that if the country sustainability index (COUNSUST) is equal to or lower than 48.1,[13] the marginal effect is negative and significant, and implies that ESG improvements are statistically associated with a reduction in ROAA. However, this negative effect is reduced as COUNSUST increases and ends up not being significant if COUNSUST is greater than 48.1 and lower than 58.8.[14] Hence, in these countries, ESG actions from banks would not significantly alter their financial performance levels.[15] These results align with those suggesting a negative or nonsignificant ESG–profitability relationship. ESG commitments are costly, potentially leading to significant losses and efficiency reductions, thereby outweighing their potential benefits (Agnese et al., 2024; Finger et al., 2018; Harkin et al., 2020).

Finally, our results show that if the COUNSUST index was greater than or equal to 58.8, the marginal effect would be positive and significant, so better ESG scores would be associated with profitability gains. Several papers confirm this positive association, as ESG practices improve reputation, enhance investors' confidence and customer loyalty, and lower funding costs (Azmi et al., 2021; La Torre et al., 2021; Shakil et al., 2019). At this moment, none of the developing countries analyzed has reached this sustainable competitiveness value, but this result suggests that if emerging economies redoubled their efforts in the future and increased their sustainable competitiveness level beyond 58.8, they could reverse the ESG–profitability relationship for their domestic banks.

This result supports H1 for our sample because ESG actions are followed by profitability reductions when the country's sustainable competitiveness is low or moderate. However, as the country's sustainable competitiveness increases, this profitability reduction is less pronounced and

[13] The countries that had a COUNSUST level lower than 48.1 throughout the whole sample period are India, Indonesia, Malaysia, Mexico, Philippines, South Africa, and Thailand.

[14] In this interval, the marginal effect is not significant because the lower bound of the 90% confidence interval is below zero while the upper bound is above zero.

[15] These countries are China for the whole sample period, and Brazil and Colombia in some years only.

ends up not being significant. Furthermore, when the country's sustainable competitiveness is high, the ESG–profitability relationship becomes positive and significant, which means that ESG initiatives lead to superior profits. The benefits provided by a stronger sustainable environment, along with the intrinsic benefits provided by ESG improvements in terms of reputation or customer loyalty, will probably partially or totally offset the high costs associated with ESG efforts. In emerging economies, sustainable issues are less institutionalized and normalized, and society's expectations about them are lower (Chapple and Moon, 2005; Yin and Zhang, 2012). Therefore, any attempt to improve the nation's sustainable compromises receives legitimacy and is rewarded more significantly, especially if banks voluntarily align with these compromises and integrate their own ESG strategies as well.

On the right-hand side of Figure 1, we show the results of the COUNSUST indicator for developed countries (Equation 4). Unlike the scenario of developing countries, the marginal effect is not significant, so ESG practices do not significantly alter financial performance in developed nations regardless of the COUNSUST values. Therefore, there is no evidence in our sample that banks in developed economies can take significant advantage from their home country's sustainability efforts. The impact of these efforts on the ESG–profitability relationship is thus less beneficial in developed countries than in developing ones, which supports H2.

Sustainability standards in developed nations are typically higher, more stable, and regarded as the norm, with specific and stringent regulations, often accompanied by mandatory disclosures. Stakeholders assume that banks and countries must behave according to well-defined sustainable standards, and it is thus more difficult to outperform current expectations and obtain competitive advantages through both ESG efforts and a more favorable country sustainability environment. Vargas-Santander et al. (2023) and Xiao et al. (2018) also support the previous ideas, although they found that country sustainability negatively moderates the relationship between corporate social performance and financial returns. This contrasts with our findings for developed countries, where country sustainability does not significantly influence the ESG–profitability relationship. However, Xiao et al. (2018) also acknowledged that in developed countries, companies cannot expect significant financial benefits from improvements from corporate social performance, although they did not formally test this assertion. The results of H1 and H2 hold significant implications, as they indicate that institutional differences across countries result in varied effects on the ESG–profitability relationship.[16]

As regards the control variables, CREDRISK is negative and significant, so banks with poorer quality loans and superior credit risks are less profitable (Mansur et al., 1993).

4.3.2. Robustness check: replacing ROAA with ROAE

As a robustness check, we performed additional analyses of our baseline model. First, we replaced the dependent variable ROAA with ROAE (return on average equity) (Petria et al., 2015). In general, these results, which are shown in Table 8 and in Figure 2, are similar to those reported previously, so they support H1 and H2. The control variable CREDRISK is negative and significant, consistent with the baseline model. Additionally, LIQRISK is also significant with a negative coefficient, suggesting that banks with higher liquidity risk may experience lower profitability levels (Van den End, 2016). However, since this variable was not significant in the baseline model, we cannot conclusively determine how liquidity risk affects performance.

[16] We will discuss the implications of our results more deeply in the conclusion section.

Table 8. Results of the robustness check: Replacing ROAA with ROAE (effects of ESG ratings on ROAE).

ESG	−17.3265*
	(9.7121)
DEV*ESG	7.2953
	(5.1934)
COUNSUST	−1.0468
	(0.6682)
ESG*COUNSUST	0.3489*
	(0.1995)
DEV*ESG*COUNSUST	−0.1524
	(0.1062)
SIZE	−1.6871
	(1.1494)
CAP	−0.4211
	(0.3509)
CREDRISK	−1.2348***
	(0.3550)
HHI	−0.1272
	(0.3444)
EFFIC	−0.0472
	(0.0562)
LIQRISK	−0.1461**
	(0.0589)
ΔGDP	0.0286
	(0.1248)
INFL	−0.1140
	(0.2203)
CONS	117.8013***
	(44.7218)
Number of observations	835
Number of banks	159
Country Fixed Effects	YES
Year Fixed Effects	YES
m_2	0.299
Hansen	0.163

Note: First, the results show the coefficients associated with each variable. Second, they represent the level of significance of each variable: *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, and * indicates a level of significance of 0.1. Third, they depict the robust standard errors in brackets. CONS is the intercept term, m_2 is the *p*-value of the second-order serial correlation statistic, and Hansen is the *p*-value of the over-identifying restriction test.

4.3.3. Robustness check: controlling endogeneity issues through two-stage least square

Endogeneity could be a potential drawback, which is why we attempted to address this issue by using the system GMM methodology. To further address endogeneity issues, we carried out an additional robustness check on the baseline model by employing the two-stage least square (2SLS) methodology and instrument the ESG practices. In the first stage, we used a panel fixed effect regression to predict ESG scores including all our control variables as exogenous indicators and two instruments. In the second stage, we used the predicted value of ESG scores (ESGPRED)[17] instead of the actual one (ESG) and repeated the estimation of the baseline model through system GMM.[18] Following many studies in the literature, we used two instruments to address the endogeneity associated with ESG practices (Azmi et al., 2021; Benlemlih and Bitar, 2018; Bhandari and Javakhadze, 2017; Cheng et al., 2014; El Ghoul et al., 2011). In particular, we used the lagged value of our ESG indicator (ESGLAG) and the mean ESG score (excluding the bank itself) of the world region where each bank operates (ESGMEAN).[19]

Table 9 and Figure 3 show the results of this estimation. The instruments chosen for the first stage (ESGLAG and ESGMEAN) are valid if they only impact the dependent variable (ROAA) through its effect on the endogenous variable (ESG) (Bhandari and Javakhadze, 2017). To evaluate the validity of the instruments, we used three statistics. The Cragg–Donald Wald F-statistic is equal to 348.935, which exceeds the critical value from Stock and Yogo (2005) for a bias lower than 10% (19.93). Moreover, the *p*-value of the Anderson LM statistic is lower than 0.05 (0.000), while the *p*-value of the Sargan statistic exceeds 0.05 (0.254). These three results reject the null hypothesis of weak-, under-, and over-identification, respectively, and suggest that our instruments are relevant.

The results of the second stage show a slightly different pattern for developing countries in relation to those of the baseline model. Unlike the previous results, in this case, we do not observe a negative ESG–profitability relationship for any value of the country sustainability indicator (COUNSUST). Alternatively, ESG actions do not significantly affect financial returns if COUNSUST

[17] Given that the ESG score can only take a value between 0 and 6 according to the MSCI ESG rating scale, we limited the predicted value to this interval to mitigate the effects of unrealistic ESG scores. We used logit transformation to convert values within the specific range (0–6) into an unbounded scale to ensure that the values are appropriately scaled for the analysis. We then used inverse logit transformation to convert these scaled values back to their original range, ensuring that the predicted values remained within the specified bounds (Wang et al., 2024). This process is essential for maintaining the interpretability and validity of the results within the context of the original ESG data.

[18] Following a similar approach to the one of the baseline model, in the second stage, we interacted the predicted ESG variable with the dummy DEV and the country sustainability indicator (DEV*ESGPRED, ESGPRED*COUNSUST, and DEV*ESGPRED*COUNSUST).

[19] This approach requires restricting the sample to regions or countries with at least five banks (Azmi et al., 2021). Since our sample is composed of many countries, each with a reduced number of banks, we calculated the mean ESG at the world region level instead of the country level. More specifically, we defined the following world regions and removed those with less than five banks: Asian developed countries, Asian developing countries, Europe, Latin America, Middle East and North Africa (MENA countries), North America, Oceania, and Sub-Saharan Africa. We also removed those banks with missing values for the ESGLAG indicator. Moreover, we eliminated those banks with data available for less than four consecutive years after applying the previous filters, which is essential for the system GMM estimation of the second stage (Arellano and Bond, 1991). This reduced our sample to 123 banks from 37 countries between 2019 and 2023 (555 observations).

is lower than 52. However, if COUNSUST exceeds this value, the marginal effect becomes significant and positive, suggesting that in these countries, ESG practices in the banking sector boost profits, which is similar to the results of the baseline model. Moreover, this positive marginal effect becomes more relevant as COUNSUST increases. In any case, these findings partially confirm H1, suggesting that in developing nations, country sustainability intensifies the positive impact of ESG on profitability, but only when COUNSUST is moderate or high. For developed economies, the marginal effect is not significant, which is consistent with our previous findings. This result confirms H2, and thus the beneficial effects of COUNSUST on the ESG–profitability relationship are more relevant in developing nations than in developed ones. In conclusion, our main findings are still valid after alleviating endogeneity problems. Similar to the baseline model, the control variable CREDRISK is negative and significant. EFFIC is also negative and significant, which might suggest that less efficient banks are less profitable (Akbas, 2012), although this result is not consistent across estimations.

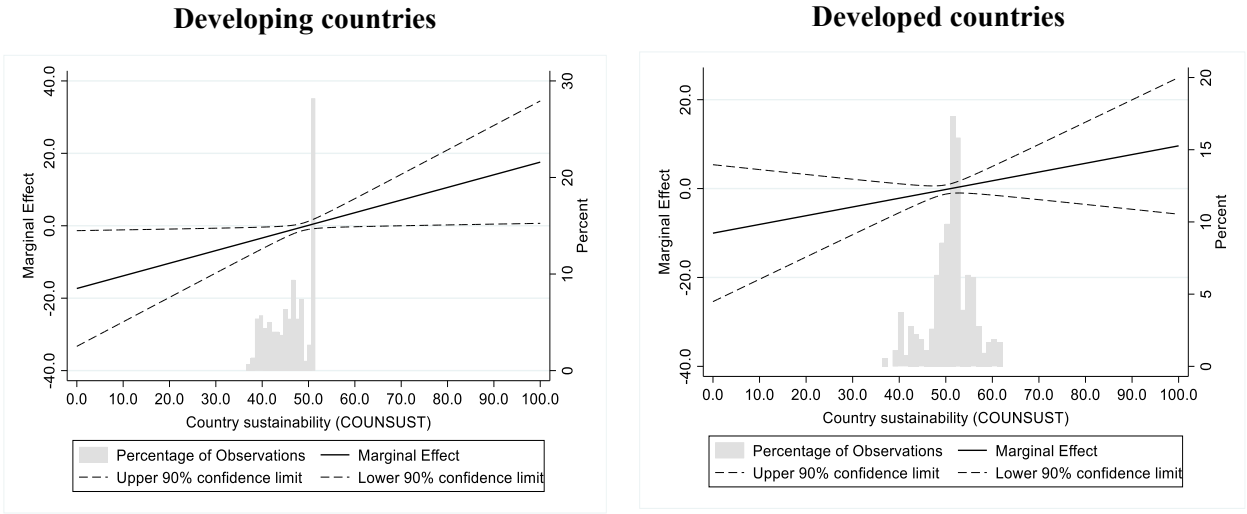

Figure 2. Marginal effect of ESG on ROAE (based on Table 8, robustness check replacing ROAA with ROAE).

Table 9. Results of the robustness check: controlling endogeneity issues through 2SLS (effects of ESG ratings on ROAA).

	First stage		Second stage
ESGLAG	0.0821***		
	(0.0272)		
ESGMEAN	−71.1436***		
	(2.9058)		
ESGPRED			−0.7425
			(0.5153)
DEV*ESGPRED			−0.5372
			(0.8840)
COUNSUST	0.0232		−0.1093**
	(0.0160)		(0.0481)
ESGPRED*COUNSUST			0.0159*
			(0.0096)
DEV*ESGPRED*COUNSUST			0.0106
			(0.0181)
SIZE	0.7099***		−0.0158
	(0.2059)		(0.1505)
CAP	0.0041		0.0222
	(0.0244)		(0.0498)
CREDRISK	0.0351*		−0.1665***
	(0.0201)		(0.0361)
HHI	−0.0453		0.0082
	(0.0738)		(0.0678)
EFFIC	−0.0008		−0.0035*
	(0.0008)		(0.0021)
LIQRISK	−0.0053		−0.0038
	(0.0036)		(0.0106)
ΔGDP	0.0091		0.0013
	(0.0062)		(0.0173)
INFL	0.0222*		0.0312
	(0.0114)		(0.0215)
CONS	245.3549***		7.3179**
	(11.2610)		(3.0327)
Number of observations	555		555
Number of banks	123		123
Country-fixed effects	Yes		Yes
Year-fixed effects	Yes		Yes
R-squared	0.7933	m_2	0.324
Cragg-Donald Wald F-statistic	348.935	Hansen test	0.225
Anderson's LM statistic	0.000		
Sargan statistic	0.254		

Note: First, the results show the coefficients associated with each variable. Second, they represent the level of significance of each

variable: *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, and * indicates a level of significance of 0.1. Third, they depict the robust standard errors in brackets. CONS is the intercept term, m_2 is the *p*-value of the second-order serial correlation statistic, Hansen is the *p*-value of the over-identifying restriction test.

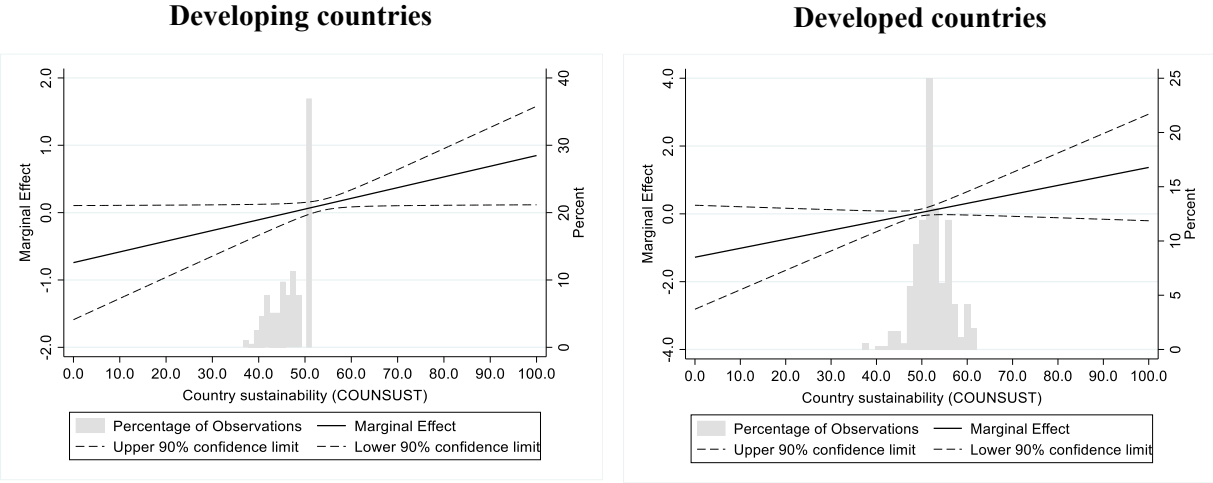

Figure 3. Marginal effect of ESG on ROAA (based on Table 9, robustness check controlling endogeneity issues through 2SLS).

4.3.4. Robustness check: Controlling for selection bias and omitted variables bias through PSM and the COVID-19 crisis

Our empirical strategy may be susceptible to both selection bias and omitted variables bias, particularly due to the time period analyzed, which was significantly impacted by the COVID-19 crisis. This crisis induced abnormal conditions and made the banking sector rethink its ESG issues (Gonzalez-Ruiz et al., 2024); therefore, to mitigate its potential bias and other biases that might arise during the sample selection process, we conducted an additional robustness check by incorporating the COVID-19 crisis and employing the propensity score matching method (PSM). On the one hand, we quantified the COVID-19 crisis using the variable COVID, defined as the logarithm of the sum of 1 and the new COVID-19 deaths per million individuals in a year (Bitar and Tarazi, 2022; Çolak and Öztekin, 2021). On the other hand, we applied the PSM methodology to identify a control group of banks (from developing countries, DEV = 0) that closely resembles the treatment group (banks from developed countries, DEV = 1) when evaluating the moderating effect of country sustainability on the ESG-profitability relationship, thereby facilitating a matching analysis. This approach effectively reduces sample selection bias and mitigates the cofounding bias of observed variables, such as control variables and other observable factors. Consequently, by selecting the characteristics of each bank as the matching variable for both groups, the PSM method can better avoid the estimation bias and address the issue of endogeneity as well (Titus, 2007). Thus, the purpose of this analysis is to identify matching samples with a good balance of covariates and then repeat the estimations using system GMM to check whether the results of the baseline model hold.

To implement the PSM methodology, we calculated the propensity score value through a logit model of the probability of a bank to belong to a developed country (DEV = 1, treatment group) based on several covariates. The selected covariates include ESG, COUNSUST, ESG*COUNSUST,

CREDRISK, HHI, LIQRISK, ΔGDP, and COVID.[20] After estimating the propensity scores, we identified and removed observations with very high or very low scores (45 observations). These are the observations outside the common support region, where there is no overlap between the treatment (DEV = 1) and control (DEV = 0) groups. We further applied the four consecutive years filter, since this is essential to repeat the system GMM estimation after we have achieved a good matching quality (Arellano and Bond, 1991).[21] We performed the matching[22] using ROAA as the outcome variable and assessed its quality through the kernel density function graph before and after matching, the balance test, and the average treatment effect (ATE). The kernel density function graph (Figure 4) shows that the two lines after matching are much closer than those before, which indicates that the matching effect is better than before. The balance test of all covariates is lower than 20 (see Table 10), which suggests that the covariates are well-balanced between the groups, and hence the treatment and control groups are comparable (Rosenbaum and Rubin, 1985). Table 10 also shows that the *p*-value of ATE is higher than 0.05 (0.293), which means that there are no statistically significant differences between the banks from developed countries (treatment group) and those from developing ones (control group). Therefore, any observed differences in ROAA between both groups of countries could be due to random variation rather than systematic biases.

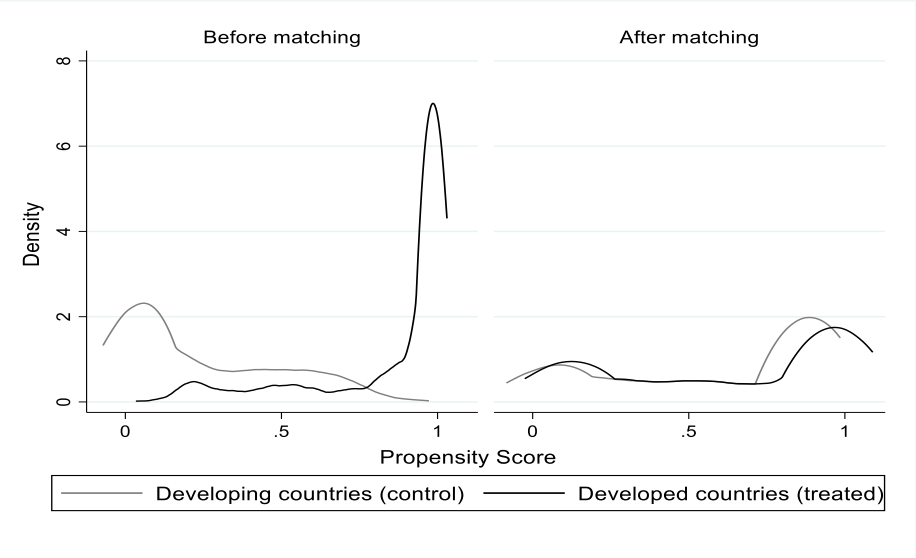

Figure 4. Kernel density function graph.

[20] We excluded SIZE, CAP, EFFIC, and INFL because they show a bad covariate balance between developed (treatment) and developing (control) countries. It means that their standard absolute bias is higher than 20 (Rosenbaum and Rubin, 1985).

[21] Our final sample consists of 146 banks from 36 countries between 2018 and 2023 (770 observations).

[22] We conducted 1:1 matching with a caliper of 0.01.

Table 10. Data balance matching.

Variable	Mean		% bias	*t*-test
	Treated (DEV = 1)	Control (DEV = 0)		(*p*-value)
ESG	3.0462	2.9923	4.4	0.674
COUNSUST	49.6050	49.3140	7.1	0.437
ESG*COUNSUST	150.8900	147.1100	6.2	0.553
CREDRISK	3.2999	3.6132	-11.1	0.521
HHI	2.9587	3.2169	-12.0	0.306
LIQRISK	67.6730	70.1570	-12.2	0.285
ΔGDP	2.2763	2.4105	-3.3	0.773
COVID	5.7355	6.3302	-11.2	0.318
ATE (p-value)	0.294			

Table 11 and Figure 5 present the results of the system GMM estimation conducted on the new sample, following the identification of good matching performance through PSM. Year- and country-fixed effects are controlled to mitigate endogeneity issues. The results for developing countries align with those reported in the baseline model, thereby supporting H1. However, the findings for developed economies exhibit slight deviations from the baseline model. Figure 5 demonstrates that in developed nations, ESG practices result in significant reductions in profitability when the level of country sustainability (COUNSUST) is low (lower than 43.3).[23] If COUNSUST surpasses this threshold, the marginal effect becomes insignificant and ESG actions do not substantially impact financial performance. Conversely, in the baseline model, ESG practices do not significantly affect profitability, irrespective of the COUNSUST level. Consequently, for developed countries, there is no conclusive evidence regarding the real impact of ESG strategies on bank profitability when COUNSUST is low. Nevertheless, our findings still support H2, as the moderating role of country sustainability on the ESG–profitability relationship is more advantageous in developing nations than in developed ones. In developing countries, country sustainability not only mitigates or neutralizes the negative effects of ESG on profitability but also reverses this relationship, leading to increased profitability gains from ESG efforts if the COUNSUST indicator is high. This positive ESG–profitability relationship is not observed for banks in developed economies. In the best-case scenario for banks in developed countries, country sustainability merely neutralizes the potential profitability reductions associated with ESG practices. In summary, the results of this robustness check indicate that potential selection biases or omitted variable biases in our sample do not appear to affect our main findings related to H1 and H2. Like in the baseline model, the control variable CREDRISK is negative and significant.

[23] In our sample, these countries are Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates and represent less than 9% of the developed countries sample.

Table 11. Results of the robustness check: Controlling selection bias and omitted variables bias through PSM and the COVID-19 crisis (effects of ESG ratings on ROAA).

ESG	−2.8133**
	(1.4169)
DEV*ESG	0.9386
	(1.0311)
COUNSUST	−0.1826*
	(0.0964)
ESG*COUNSUST	0.0581**
	(0.0289)
DEV*ESG*COUNSUST	−0.0216
	(0.0207)
CREDRISK	−0.1025**
	(0.0459)
HHI	−0.0030
	(0.0727)
LIQRISK	−0.0069
	(0.0060)
ΔGDP	−0.0021
	(0.0199)
COVID	0.0078
	(0.0138)
CONS	10.9472**
	(5.0097)
Number of observations	770
Number of banks	146
Country-fixed effects	YES
Year-fixed effects	YES
m_2	0.239
Hansen test	0.346

Note: First, the results show the coefficients associated with each variable. Second, they represent the level of significance of each variable: ** indicates a level of significance of 0.05 and * indicates a level of significance of 0.1. Third, they depict the robust standard errors in brackets. CONS is the intercept term, m_2 is the *p*-value of the second-order serial correlation statistic, Hansen is the *p*-value of the over-identifying restriction test.

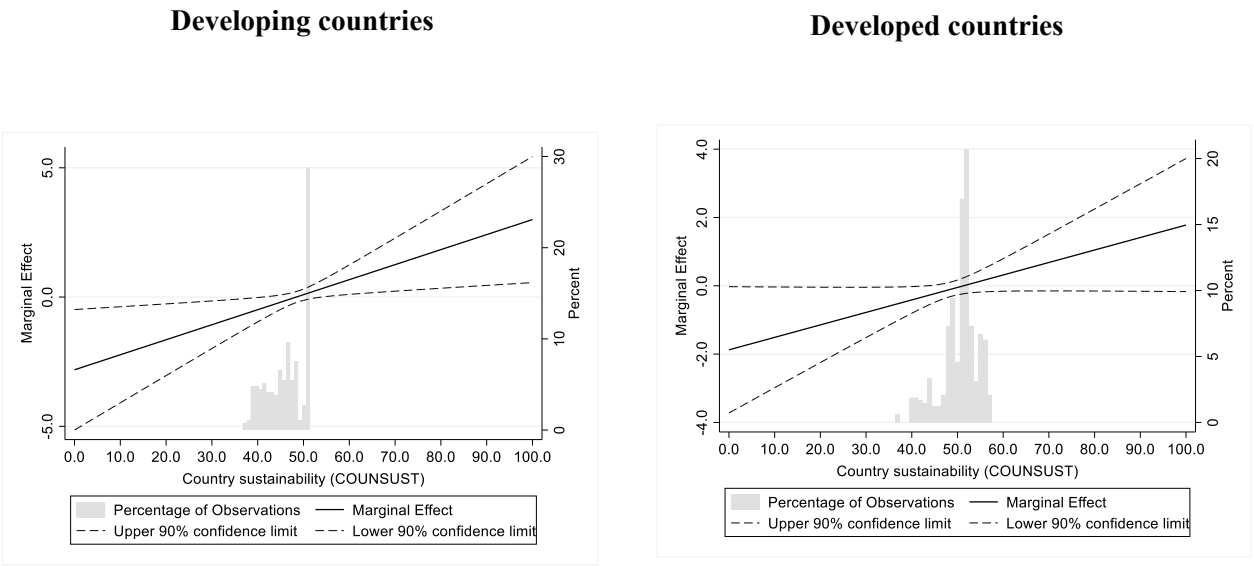

Figure 5. Marginal effect of ESG on ROAA (based on Table 11, robustness check controlling selection bias and omitted variables bias through PSM and the COVID-19 crisis).

4.3.5. Robustness check: disaggregating the country sustainability index

The country sustainability index (COUNSUST) provided by SolAbility includes five dimensions or subindexes:[24] (i) Social capital of the country in terms of the cohesion between generations, genders, income groups, and other society groups, since social cohesion is necessary for the prosperous development of human capital; (ii) resource intensity, which reflects the ability of the country to use the available resources in the most efficient way; (iii) governance capabilities, which consider the direction and framework provided by government interventions, expenditure, and investments; (iv) intellectual capital, which is the ability to compete and generate wealth in a globalized competitive market; and (v) natural capital, which controls for the physical environment and natural resources of the country (land, water, climate, biodiversity, food production and capacity, energy, and mineral resources). To check which specific dimensions are influencing the results of our baseline model, we conducted an additional robustness analysis by substituting the global indicator COUNSUST with a variable that individually captures each of the described dimensions (COUNSUSTD).

Table 12 and Figures 6, 7, 8, 9, and 10 illustrate the results of this analysis. In Table 12, in Model (a), we consider social capital as our COUNSUSTD indicator, whereas in Models (b), (c), (d), and (e), COUNSUSTD refers to resource intensity, governance capabilities, intellectual capital, and natural capital, respectively. Social capital replicates the same pattern of results as global country sustainability (COUNSUST) for developing countries (see Figure 6, left-hand side), which again supports H1. In this regard, better bank ESG scores reduce profitability in developing countries with low or moderate scores in the social capital dimension. As this score increases, the marginal effect is not significant, thus the negative effects of ESG on profitability vanish. However, if the social capital score is high, the marginal

[24] The scale of these subindexes also ranges from 0 to 100, with the highest values representing the best sustainable performance in the respective dimension.

effect is significant and positive, which means that the ESG–profitability relationship is reversed, and better ESG performance leads to profitability increases. The resource intensity dimension follows a trend similar to that of the baseline model, with minor differences (see Figure 7, left-hand side). In this case, better resource intensity performance attenuates or even neutralizes the ESG–profitability relationship. However, contrary to the pattern of the baseline model, this relationship is not reversed. Nonetheless, the results of the resource intensity subindex still partially support H1. The rest of the subindexes do not exhibit practically significant results for any of the possible values they can adopt, so governance capabilities, intellectual capital, and natural capital do not significantly modify the ESG–profitability relationship in developing countries (see Figures 8, 9, and 10, left-hand sides).[25] These results do not support H1 for these three subindexes and suggest that in developing nations, the global impact of country sustainability (COUNSUST) is primarily driven by the results of the social capital dimension and, to a lesser extent, by those of the resource intensity subindex. This likely compensates for the lack of significance, or the very limited effects, of the remaining subindexes (governance capabilities, intellectual capital, and natural capital).

We now compare more precisely the results of each subindex in emerging countries in relation to those in developed nations. First, in regard to the social capital dimension, its effects in emerging economies are more beneficial than those in developed regions, which supports H2 (see Figure 6). In developing countries, ESG efforts lower profitability significantly if social capital is lower than 47.3. The same negative effect is observed in developed countries if social capital is below 54. Therefore, the interval where ESG practices reduce profits is relatively larger in developed countries (social capital < 54) than in developing ones (social capital < 47.3). In both groups of countries, as social capital increases, the negative marginal effect is less pronounced and ends up being nonsignificant, so superior social capital performance neutralizes the adverse impact of ESG on profitability. This alleviation is more relevant in developing countries because social capital neutralizes the negative ESG–profitability relationship for a lower social capital value (≥ 47.3) than in developed areas (social capital ≥ 54). Nevertheless, in developing countries, the ESG–profitability relationship is reversed and becomes positive when social capital is higher than 61.4. From this point, better performance in terms of ESG leads to an increase in financial returns. At this moment, none of the developing countries analyzed has reached this social capital value, but this result suggests that if emerging economies intensify their social compromises in the future, they could reverse the ESG–profitability relationship for their national banks. In any case, this positive effect is not observed in developed regions for any of the possible values that social capital can adopt.

Second, the results of the resource intensity subindex are more favorable for developing countries, which again supports H2 (see Figure 7). In these countries, banks experience lower returns after ESG improvements if they operate in countries with resource intensity levels below 31.4, while ESG initiatives do not significantly alter profitability if resource intensity exceeds this level. Conversely, in developed economies, the marginal effect is not significant for any values that resource intensity can

[25] For the intellectual capital dimension only (Figure 9), the marginal effect is negative and significant when COUNSUSTD ranges between 48.5 and 56.9. However, this marginal effect is nearly zero, and the banks affected by this negative impact constitute 13% of the developing countries sample. For the remaining banks, the marginal effect is not significant. Therefore, regarding the intellectual capital subindex, the significant effects of ESG on profitability are very limited and only occur at moderate levels of COUNSUSTD, but not at low or high values of this indicator. Consequently, we do not have sufficient evidence to support H1.

adopt. Thus, in developing economies, the reduction in profitability caused by ESG practices can be neutralized through certain levels of resource intensity (at least 31.4), whereas developed regions do not have significant potential to alter the ESG–profitability relationship of the domestic banks regardless of their resource intensity efforts.

Third, the results of governance capabilities and intellectual capital are practically nonsignificant in both groups of countries (see Figures 8 and 9).[26] Therefore, for these two dimensions of country sustainability, there is no support for H1 and H2.

Finally, natural capital is the only pillar where developed nations can obtain better competitive advantages from their ESG efforts than developing ones, which is the opposite to the effects proposed by H2 (see Figure 10). While natural capital does not show a significant marginal effect in developing countries, in developed ones, this marginal effect is negative and significant if natural capital is lower than 37.1, but beyond this value, the marginal effect becomes not significant. Therefore, in developed areas, natural capital mitigates and even neutralizes the potential adverse impact of ESG policies on banks' financial performance.

As regards the control variables, CREDRISK is negative and significant in Table 12, as it was in the baseline estimation, but only for Models (b), (c), (d), and (e). CAP has a significant and positive coefficient in the same models in Table 12, which may suggest that more capitalized banks enjoy better funding conditions, have more business opportunities, and hence obtain superior profits (Athanasoglou et al., 2008; Tregenna, 2009). Finally, LIQRISK has a statistically significant coefficient with a negative sign in all the models in Table 12, so liquidity risk might reduce profitability. In any case, both CAP and LIQRISK were not significant in the baseline model.

[26] Similar to the case of developing regions, only the intellectual capital dimension exhibits a significant and negative marginal effect when COUNSUSTD in developed economies ranges between 39.6 and 53.3. Although this significant and negative effect for the intellectual capital subindex encompasses a larger proportion of developed countries compared with developing nations (33% vs. 13%), its overall impact remains negligible. Furthermore, this effect is confined to countries with moderate intellectual capital scores. Conversely, for developed economies with either low or high intellectual capital values, the marginal effect is not significant. Consequently, we lack robust evidence to support H2.

Table 12. Results of the robustness check: disaggregating the country sustainability index (effects of ESG ratings on ROAA).

	(a) Social capital	(b) Resource intensity	(c) Governance capabilities	(d) Intellectual capital	(e) Natural capital
ESG	−1.4731**	−0.3865**	0.1902	−0.6820	−0.1413
	(0.6566)	(0.1970)	(0.5130)	(0.5665)	(0.2801)
DEV*ESG	0.4502	0.1588	0.2107	0.1173	−0.3000**
	(0.4151)	(0.1551)	(0.1544)	(0.2647)	(0.1200)
COUNSUSTD	−0.0666*	−0.0136	0.0141	−0.0361	−0.0156
	(0.0387)	(0.0144)	(0.0405)	(0.0300)	(0.0228)
ESG*COUNSUSTD	0.0276**	0.0071*	−0.0049	0.0099	0.0024
	(0.0124)	(0.0038)	(0.0092)	(0.0095)	(0.0057)
DEV*ESG*COUNSUSTD	−0.0103	−0.0030	−0.0036	−0.0013	0.0068***
	(0.0084)	(0.0020)	(0.0030)	(0.0042)	(0.0021)
SIZE	−0.1480	0.0036	0.0408	−0.1973	−0.0343
	(0.1579)	(0.1660)	(0.2212)	(0.2423)	(0.2051)
CAP	0.0260	0.0873***	0.0988***	0.0481*	0.0900***
	(0.0301)	(0.0287)	(0.0316)	(0.0261)	(0.0320)
CREDRISK	−0.0904	−0.0899***	−0.0777*	−0.1014**	−0.0891**
	(0.0590)	(0.0342)	(0.0414)	(0.0466)	(0.0378)
HHI	0.0344	−0.0353	0.0159	−0.0536	0.0158
	(0.0339)	(0.0490)	(0.0313)	(0.0686)	(0.0344)
EFFIC	−0.0019	−0.0035	−0.0023	−0.0022	−0.0007
	(0.0044)	(0.0037)	(0.0041)	(0.0050)	(0.0029)
LIQRISK	−0.0142*	−0.0120**	−0.0150**	−0.0192**	−0.0184**
	(0.0084)	(0.0056)	(0.0069)	(0.0087)	(0.0076)
ΔGDP	0.0006	0.0031	−0.0039	0.0090	0.0095
	(0.0120)	(0.0136)	(0.0132)	(0.0129)	(0.0093)
INFL	0.0043	0.0031	0.0022	−0.0003	0.0217
	(0.0209)	(0.0227)	(0.0149)	(0.0278)	(0.0187)
CONS	8.7888*	2.4585	0.3213	8.8739	3.3010
	(5.0461)	(3.5725)	(5.9381)	(6.8705)	(4.9243)
Number of observations	835	835	835	835	835
Number of banks	159	159	159	159	159
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
m_2	0.426	0.338	0.495	0.529	0.635
Hansen test	0.359	0.513	0.390	0.359	0.813

Note: First, the results show the coefficients associated with each variable. Second, they represent the level of significance of each variable: *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, and * indicates a level of significance of 0.1. Third, they depict the robust standard errors in brackets. CONS is the intercept term, m_2 is the *p*-value of the second-order serial correlation statistic, and Hansen is the *p*-value of the over-identifying restriction test.

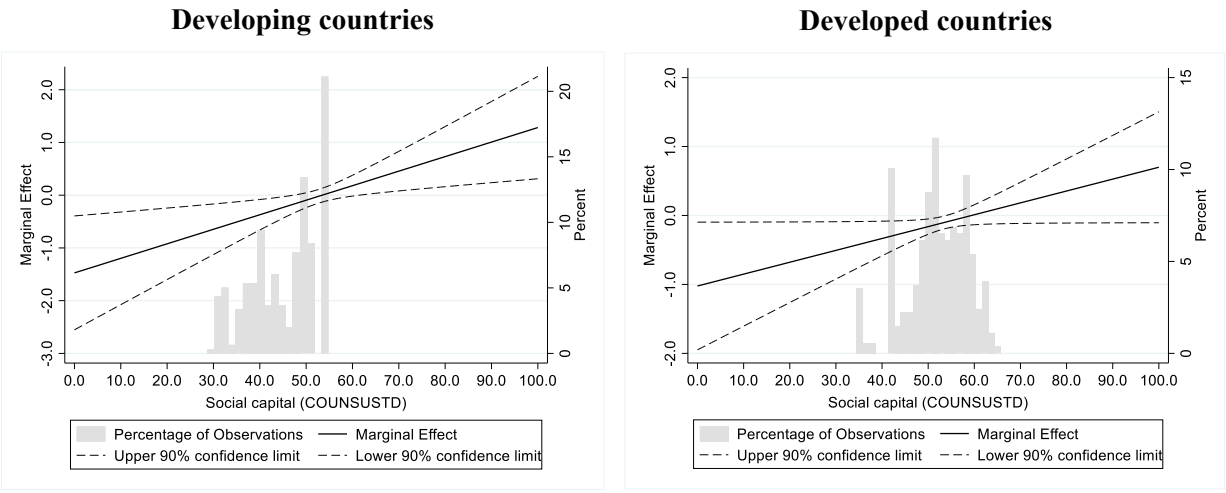

Figure 6. Marginal effect of ESG on ROAA (based on Table 12, Model (a), robustness check disaggregating the country sustainability index). COUNSUSTD, social capital.

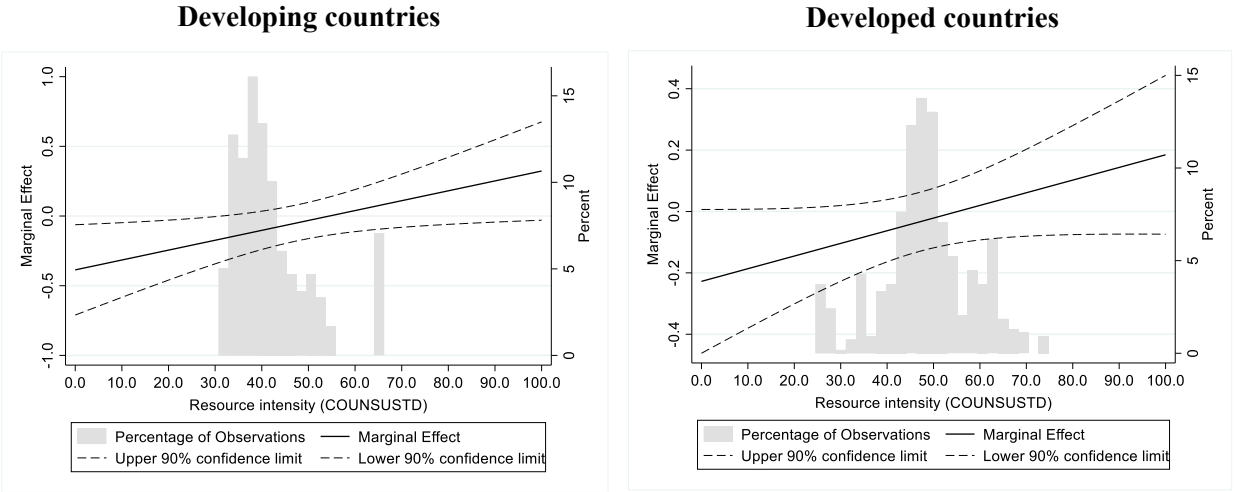

Figure 7. Marginal effect of ESG on ROAA (based on Table 12, Model (b), robustness check disaggregating the country sustainability index). COUNSUSTD, resource intensity.

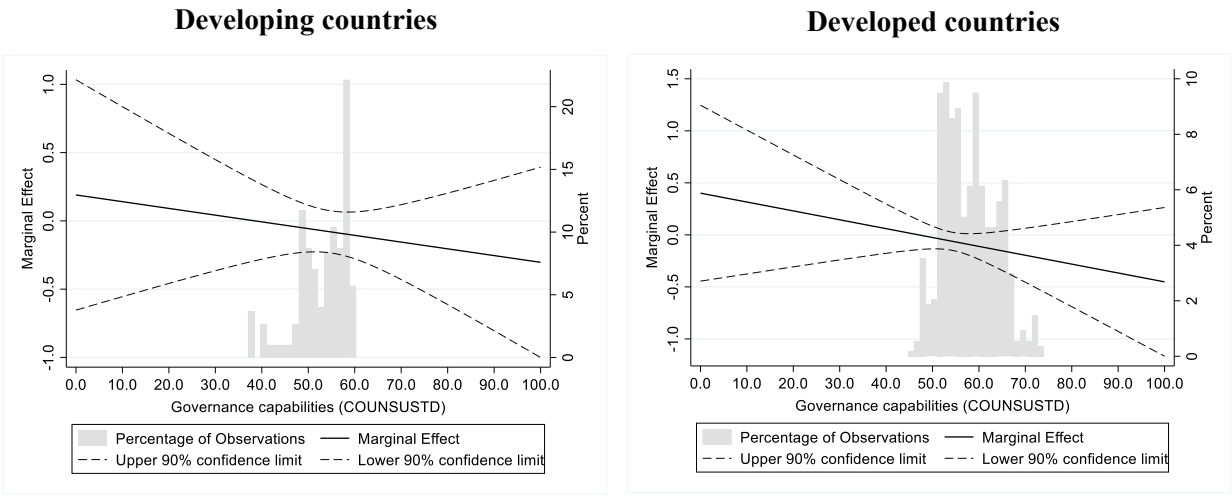

Figure 8. Marginal effect of ESG on ROAA (based on Table 12, Model (c), robustness check disaggregating the country sustainability index). COUNSUSTD, governance capabilities.

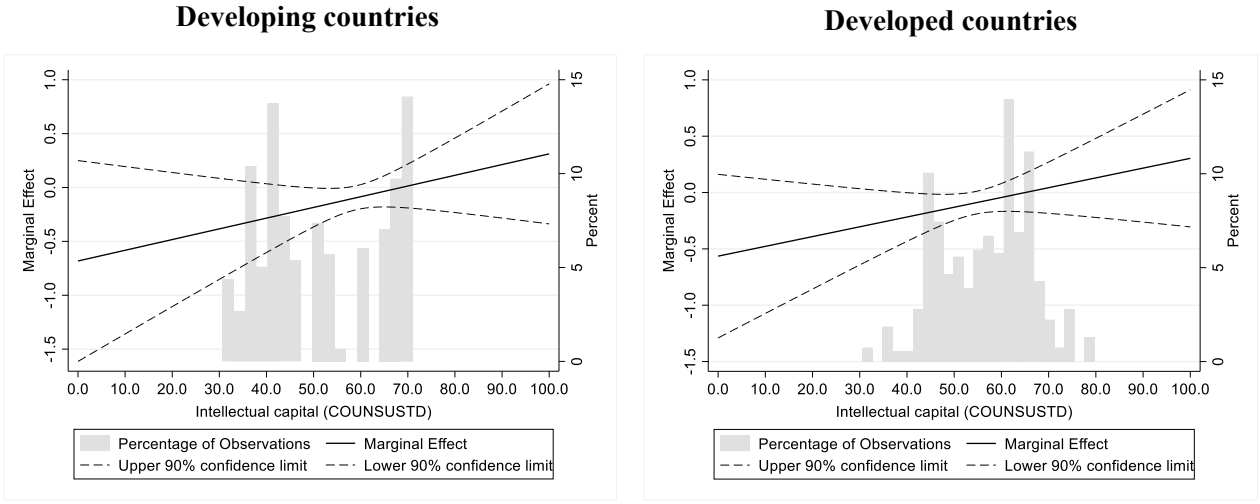

Figure 9. Marginal effect of ESG on ROAA (based on Table 12, Model (d), robustness check disaggregating the country sustainability index). COUNSUSTD, intellectual capital.

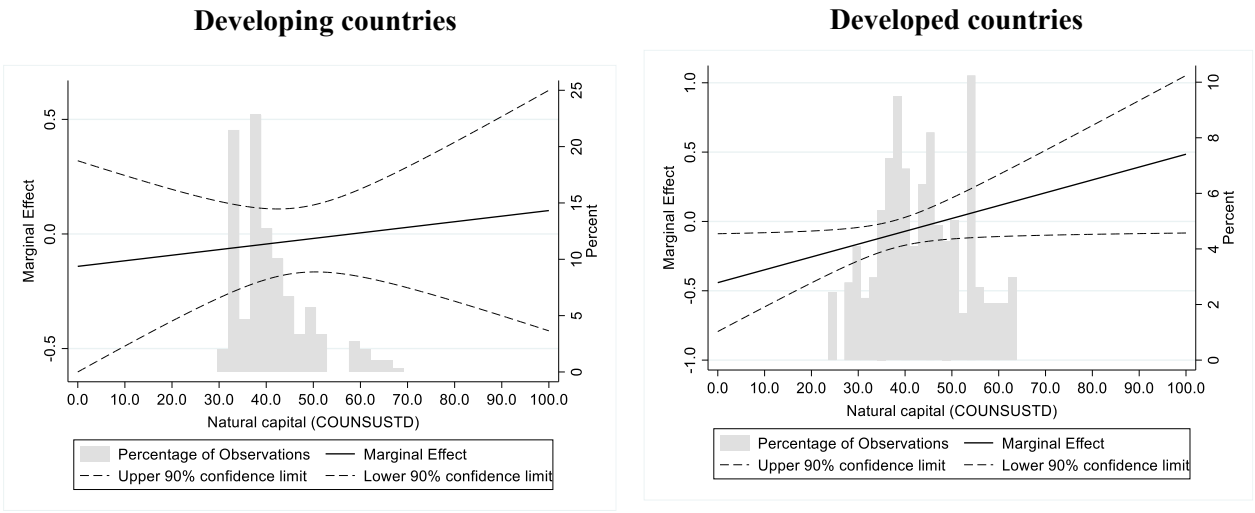

Figure 10. Marginal effect of ESG on ROAA (based on Table 12, Model (e), robustness check disaggregating the country sustainability index). COUNSUSTD, natural capital.

In summary, the results of the disaggregation of the country sustainability index (COUNSUST) indicate that H1 is supported for the social capital and resource intensity variables. This means that in developing regions, higher levels of social capital and resource intensity attenuate the negative effects of ESG on bank profitability. Furthermore, high social capital performance even reverses these negative effects, whereas this reversing impact is not observed for the resource intensity subindex. The remaining dimensions, such as governance capabilities, intellectual capital, and natural capital, do not significantly influence the ESG–profitability relationship in developing countries, and thus H1 is not supported.

H2 is supported for the social capital and resource intensity subindexes. Consequently, these dimensions shape the marginal effects of ESG on profitability in a more favorable manner in developing countries than in developed ones. The results of the governance capabilities and intellectual capital subindexes are practically nonsignificant in both groups of countries, which is not consistent with H1 and H2. Finally, the results of the natural capital indicator are the opposite of those proposed by H2 because the moderating effects of this pillar in the ESG–profitability relationship are comparatively more beneficial in developed countries than in emerging ones. Several reasons can justify these results. Developing countries face pressing social issues such as poverty, inequality, healthcare, and education. Moreover, a more efficient implementation of these social initiatives can create jobs, improve basic services, and thus stimulate economic growth, which is crucial in emerging areas. Addressing these immediate human needs through social initiatives and efficient use of the more limited resources available could be more critical and more valued by stakeholders compared with other sustainable issues. For these reasons, social capital and resource intensity could benefit domestic banks in emerging economies by favoring their ESG–profitability relationship to a greater extent. In addition, social capital and, to a certain extent, resource intensity could be the dimensions that explain the global country sustainability index (COUNSUST) effects in developing nations, overcoming the nonsignificant or very limited effects of other sustainable dimensions that may have comparatively less priority, such as governance capabilities, intellectual capital, and natural capital.

In developed nations, as immediate human needs are generally more satisfied, social initiatives may not represent a differentiated source of competitive advantages in comparison with those in developing countries. It is thus more feasible to focus on environmental aspects. In fact, certain natural aspects, such as ecological transition, climate change, and how the risks associated with them can be measured and managed, nowadays represent a top priority in the agenda of many developed nations. Furthermore, more developed countries generate higher CO_2 emissions, so they are relatively worse than developing areas in terms of climate change and environmental degradation (Hickel, 2020). Therefore, stakeholders could be more sensitive and responsive to these issues in developed countries, especially in the 2030 Agenda framework, and reward ESG improvements from banks more significantly if they operate in an environment that validates this behavior by giving stronger emphasis to physical and climate considerations. The results from Chang et al. (2021) would support the previous reasoning regarding the different perceptions of social and natural issues across developing and developed regions. They found that banks in developed Asian countries become more cost-efficient through environmental activities, whereas banks in developing Asian regions boost their cost efficiency through socially responsible actions.

5. Summary and conclusion

This article analyzes how the effects of ESG ratings on bank profitability are conditioned by country-level sustainability scores across developing and developed economies. Using a sample of 159 banks from 42 countries between 2018 and 2023, we find that in developing regions, ESG actions negatively affect profitability when sustainability scores are low or moderate. As country sustainability increases, these negative effects decrease and end up being nonsignificant. Furthermore, if a country achieves a high sustainability performance, these effects are reversed and ESG practices lead to superior profits. These results are driven by the social capital and resource intensity indicators. Furthermore, the effects of country sustainability on the ESG–bank profitability relationship are more favorable in developing nations than in developed ones in all the dimensions, except for the natural capital indicator. Contrary to developing economies, where the natural capital dimension is not significant, in developed areas, natural capital attenuates or even eliminates the potential adverse effects of ESG actions on returns. In these countries, improving natural capital may represent a source of competitive advantage for banks in terms of the ESG–profitability relationship, whereas in emerging nations, natural capital efforts would not significantly impact on domestic banks in this respect.

These results have important implications for policymakers and financial institutions because they suggest that institutional factors condition how ESG practices can benefit banks, as well as the development of the country where these banks operate. Sustainable practices in certain countries still raise concerns due to their costs. However, they can offer significant benefits to national banks in terms of profitability. This can enhance the resilience of the banking sector and bolster its role as a finance provider, thereby facilitating the SDGs and fostering greater interaction between economic growth and social development processes. In this regard, policymakers and regulators in developing countries should promote their sustainable performance, since there is still more room to help banks take competitive advantages of their own ESG practices through country sustainability. Superior country sustainability and banks' profitability levels could favor other objectives that represent top priorities in emerging economies, such as financial inclusion through credit expansion, poverty alleviation, or economic growth. Furthermore, our results suggest that country sustainability efforts in developed

nations have already been more institutionalized and more normalized among society, which is why they favor the ESG–profitability relationship less. In any case, this has relevant implications for financial institutions in these countries, as they should not abandon this sustainable perspective, since the consequences could be more detrimental than in emerging economies. For instance, if banks do not meet the higher societal norms and expectations of ESG aspects in countries with good and stable sustainability performance, these banks will lose legitimacy and will be more susceptible to regulatory and reputational risks, which, in turn, may further depress profitability levels. On the other hand, policymakers in developed areas should redouble their efforts in terms of protecting their natural environment. In fact, banks are highly exposed to certain natural issues through the environmental and climate risks of the firms to which they lend, and it seems that stakeholders are still sensitive and responsive to these factors in developed areas. These aspects can provide a source of competitive advantage to those banks that, for example, invest more in environmental initiatives or in those that promote ecological transition, and operate in a country that also gives strong emphasis to natural capital issues. In any case, developing countries should also adopt stricter regulations on environmental and climate issues to reduce disparities between developed and developing economies. This would enable all banks to benefit more equally from their ESG practices. Such harmonization necessitates global cooperation and is crucial for achieving the Paris Agreement goals related to global warming.

This article has tried to shed light on the institutional factors that can explain the lack of consensus regarding the real effects that ESG practices in the banking industry have on financial performance. We acknowledge certain limitations in our analysis. Although it includes an international sample, it is limited to listed banks, which may not fully represent the global banking industry. Additionally, country sustainability indicators may not entirely capture other aspects of the institutional context in which banks operate. For instance, in Europe, the single supervisory mechanism (SSM) of the European Central Bank (ECB) distinguishes between significant institutions, which are directly supervised by the ECB, and less significant ones, which are overseen by national supervisory authorities (NSAs). This supervision may lead to differences in ESG commitments even within the same country. Banks under ECB supervision are subject to more scrutiny and more rigorous ESG disclosure rules, incentivizing them to enhance their ESG practices to meet these standards, rather than being solely influenced by their home country's sustainability scores. Furthermore, in developed countries, substantial and specific differences may also emerge from the approach to capitalism. Thus, future research should consider analyzing larger samples that include nonlisted banks or samples with more specific institutional contexts.

Author contributions

María Cantero-Saiz: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Supervision, Project administration. **Sergio Sanfilippo-Azofra:** Conceptualization, Methodology, Software, Validation, Formal analysis, Writing – Review & Editing, Visualization, Supervision. **Begoña Torre-Olmo:** Conceptualization, Validation, Resources, Writing – Review & Editing, Supervision, Funding acquisition. **Violeta Bringas-Fernández:** Conceptualization, Writing – Review & Editing, Supervision.

Use of AI tools declaration

The authors declare they have not used artificial intelligence (AI) tools in the creation of this article.

Acknowledgments

We would like to thank Santander Financial Institute (SANFI) for its financial support.

Conflict of interest

All authors declare that they have no conflicts of interest in this paper.

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