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Bank diversification and ESG activities: A global perspective

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ABSTRACT

The present study uses data from 1385 banks in 89 countries from 2009 to 2020 to analyze whether the banks' environmental, social, and governance (ESG) activities around the world affect their diversification. We use a two-step system dynamic generalized method of moments technique and find that the relationship between ESG activity and bank diversification is non-linear. Environmental and social factors negatively impact bank diversification, whereas governance has a positive impact. Bank diversification is affected by ESG overall and individual ESG dimensions more in developed countries. In high-income countries, banks generate more scope for diversification through environmental disclosures. The social activities of the executive management and the board of directors in high-income countries are intended more to satisfy their own needs than those of their banks. Governance disclosure increases income and asset diversification more for banks in high- and upper-middle-income countries. Capitalization, management quality, and liquidity are the channels through which ESG affects bank diversification. We argue that policy makers and regulators need to design and implement tailor-made frameworks and incentivize banks to embrace sustainable finance best practices. The adoption of these practices and the financing of socially responsible projects would drive interest by various stakeholders and thereby attract higher investor interest and bank valuation.

1. Introduction

Banks have significant impacts on the economy, society, the environment, and, indirectly, through their lending and investment activities. The United Nations Environment Programme (UNEP) Report on Responsible Banking (2021) argues that, as the impact of banking is linked to banks' clients and customers, they have a pivotal steering function in the economy at a broader level. By channeling monetary flows to sustainable activities, banks can contribute significantly to sustainable activities and future demands of society (UNEP, 2022). Sustainalytics Thematic Research (2014) argues that banks enable economic growth, innovation, and prosperity and that the role of banks is no longer restricted to their traditional intermediation function. Banks also impact society and the environment through their actions and governance mechanisms. Therefore, an increasing need is felt around the world to evaluate their effectiveness in meeting these expectations.

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Banks' profitability, asset quality, capital strength, funding, and liquidity are adversely affected by environmental, social, and governance (ESG) risks and have become of increasing concern to banks (Bhaskaran et al., 2021). Because of the large-scale adoption of the ESG criteria by regulators, rating agencies, and institutional investors, the strengths of banks are increasingly tested in terms of their ability to withstand threats arising from ESG risks. Banks also face sizable fines due to governance failures to prevent money laundering and breaches in tax regulations. Therefore, the ever-increasing interest among researchers and hence scholarly publications in sustainable banking comes as no surprise (Aracil et al., 2021). Over time, articles on sustainable banking are more dominant in environmental studies journals than in business ethics journals. An analysis of the ESG scores of over 3476 US companies over the period 2000–2016 indicates a positive and significant association between ESG and banks' financial performance (Brogi & Lagasio, 2019) but not firms from other countries. However, environmental awareness drives profitability at banks.

A comparative assessment of leading banks in Europe using the framework of Global Reporting Initiative performance indicators reflects that banks' contribution to the sustainable development goals is low (Avrampou et al., 2019). As finance plays a pivotal role in ensuring sustainability, financial institutions should incorporate ESG risk assessment into their financial decision-making process (Ziolo et al., 2019). Because of increasing ESG risk in the financial and natural spheres, a sustainable financial system needs to be developed (Zioło et al., 2021). This, in turn, is dependent on the awareness of managers and financial institutions. The concept of sustainability is more entrenched and forms the foundation of the financial system in Germany and Japan, less so for capital market institutions that follow the Anglo-Saxon model.

Because of the increasing importance of ESG and its effect on banks and the absence of any detailed analysis of the impact of ESG on bank diversification, a detailed analysis is in order. The effects of ESG on bank performance, however, are well researched (Aracil et al., 2021; Azmi et al., 2021; Bhaskaran et al., 2021; Nizam et al., 2019; Paltrinieri et al., 2020; Shakil et al., 2019). Few papers have been published on the impact of ESG on bank diversification. A study at the global level is expected to add a new dimension to the evaluation of bank performance under the banner of ESG, as it could foster a clearer understanding about the strategic orientation of the banks to meet the ESG standards among regulators, investors, and other stakeholders. Our study examines the effects of ESG on bank diversification around the world over the period 2009–2020.

We make several contributions to the literature on bank diversification in terms of ESG standards and expectations. This study is the first to assess the impact of ESG on bank diversification around the world. Second, we study the impact of ESG not only at the overall level but also for the individual ESG dimensions (environmental, social, and governance). Third, we specify the channels through which ESG overall and its dimensions and sustainability performance have positive or negative impacts on the diversification of banks. We achieve this by including interaction terms between ESG and CAMEL (capitalization, asset quality, management efficiency, and liquidity). Fourth, the identification of the ESG effects on bank diversification would spark regulation of the ESG market by the central banks to monitor banks' health and design appropriate government policies. Fifth, we divide our panel data into subpanels and assess the impact of possible linkages of ESG with bank diversification across countries at various levels of development and income levels. This approach reduces the difficulty of identifying differences in the relationship between ESG and bank diversification across countries. Identification of country-specific factors is critical for tailoring policies to the individual needs of the countries at various levels of income and development, rather than adopting a common approach, which may not lead to optimal policy performances. Sixth, to assess the robustness of our findings on the relationship between ESG and bank diversification, we use two proxies for bank diversification: income diversification and asset diversification. Our paper also focuses on measuring the initiatives of banks to foster sustainable finance in the global economy and their impact on bank diversification. We analyze the panel data using the dynamic panel estimation method and use the generalized method of moments (GMM) technique to consider profit persistence and endogeneity. Finally, our study shows the need for recognition of ESG issues and recommends more robust policy initiatives by governments and appropriate regulatory actions by banks.

Our analysis finds that ESG activity and bank diversification is related in nonlinear fashion. The findings also indicate that environmental and social factors negatively impact bank diversification, whereas governance has a positive effect. We find that banks in developed economies are more affected by the ESG overall and the individual ESG dimensions than those in developing countries. Our findings suggest that banks in high-income countries have more scope for diversification through environmental disclosures. The social activities of the executive management and the board of directors in high-income countries are intended more to satisfy their own needs than those of their banks. We find that governance disclosure increases income and asset diversification more for banks in high- and upper-middle-income countries than in other countries. We also find that capitalization, management quality, and liquidity are the channels through which bank diversification is affected by ESG activities. However, better ESG does not affect bank diversifications via changes in asset quality.

In Section 2 we provide some background and a review of the literature on ESG and bank performance and a debate on bank diversification. In Section 3, we develop our main hypothesis. In Section 4 we describe the data and the method used in the study. We present our empirical results, in Section 5, and we draw conclusions in Section 6.

2. Literature review

2.1. Theoretical framework

The trade-off theory and the stakeholder theory offer contrary predictions about the association between the ESG scores and the financial performance of firms. The proponents of the stakeholder theory (Carroll, 1999; Freeman, 1984, 2010; Freeman et al., 2004; Jones, 1995; McWilliams and Siegel, 2001) argue about firms' ethical obligation to maximize the expectations of all its stakeholders,

such as customers, debt providers, regulatory agencies, and the employees. Hence, by engaging in ESG activities, firms signal their willingness to meet the expectations of their stakeholders, resulting in additional opportunities and a competitive advantage, which translates to improved financial performance. Stewardship theory and the resource-based view of firms (which is akin to the stakeholder theory of the firm) argue that ESG activities are strategic investments that give firms a competitive advantage, resulting in superior performance and firm value. The trade-off theory (Aupperle et al., 1985; Brown and Caylor, 2006; Devinney, 2009; Friedman,1970; Galant and Cadez, 2017) consider maximizing profit and shareholders' value the objective of firms. Hence, according to this theory, the ESG activities of firms are an inefficient use of crucial resources, resulting in increased costs, adversely affecting the profitability and competitive edge of firms. The stewardship theory argues that managers are committed to improving the long-term value of firms by addressing the competing interests of various stakeholders through ESG activities. Agency theory, however, argues that managers, especially those with improper incentives (Jensen and Meckling, 1976) and less entrenched CEOs (Jiraporn and Chintrakarn, 2013), pursue ESG activities for their own private benefit, adversely affecting firm value.

2.2. ESG and bank performance

Empirical studies exploring the relationship of ESG activities to banks' financial performance report contradictory findings. Based on their analysis of 385 banks in the US using ordinary least squares regression, Simpson and Kohers (2002) find that banks' social performance of banks is positively related to their financial performance. Cornett et al. (2014) analyze the ESG scores and financial performance of 3000 US banks from 2003 to 2011. They find that the largest banks have more Corporate Social Responsibility (CSR) strengths and concerns during the period studies, hence the higher financial performance. In their analysis of bank performances in 29 countries in the Asia-Pacific region, European economies, the US, and Canada, Jo et al. (2015) find that lowering environmental costs has more social impact. It helps to build banks' reputation and to achieve better financial performance. Nizam et al. (2019) analyze the possible impact of financing environmentally friendly projects with access to finance at 713 banks in 75 countries from 2013 to 2015. They find that environmental financing and access to finance have a significant and positive effect on banks' financial performance. The effect is channeled through management quality and loan growth of the banks.

Analyzing financial data on 65 CSR and 60 non-CSR banks in 18 countries from 2000 to 2009, Shen et al. (2016) find that non-CSR banks are outperformed by CSR banks. Esteban-Sanchez et al. (2017), in their analysis of 154 financial firms in 22 countries for the period 2005–2010, conclude that banks with a better mechanism for corporate governance and employee relations had better financial performance before the financial crisis. However, the relationship was negatively moderated during the crisis, indicating corporate governance failures. Finger et al. (2018) analyze the performance of 78 banks in 34 countries that have signed on to the Equator Principle (EP) from 2003 to 2015. They find that banks' adoption of this principle in developed countries has increased their funding activities and their income. However, the effect in developing economies is the opposite. Finger et al. conclude that the adoption of EP is a strategic decision by banks in developing economies, unlike greenwashing by banks in developed countries. In an analysis of 235 banks in EU countries over the period 2007–2016, Buallay (2019) finds that ESG activities by banks have a significantly positive effect on their financial performance.

In their analysis of 520 financial companies in 34 countries, Chih et al. (2010) find no relationship between CSR and financial performance. Soana (2011) obtains similar results in an analysis of the relationship between CSR and the financial performance by 21 international banks. Wu et al. (2017) study 194 commercial, savings, and cooperative banks using a multilevel matching method in 22 countries from 2003 to 2009. They find that CSR activities have a slightly asymmetric V-shaped relationship to the financial performance of banks.

El Khoury et al. (2021) find a nonlinear relationship between ESG activities and performance by 46 listed banks in the Middle East, North Africa, and Turkey (MINAT) region during the period 2007–2019. They report that incremental investment in ESG activities by banks adds to their financial performance until a point of inflection. Employing the GMM estimation method in a study of 441 banks in 44 emerging market economies, Azmi et al. (2021) find that ESG activities and bank performance are related in a nonlinear pattern. They also find that a low level of ESG activities has a positive impact on bank value, but at high levels, the returns to scale diminish. Azmi et al. also report that the environmentally related activities by banks and their value are positively related but find no relationship between bank value and the governance and social components of ESG.

2.3. The bank diversification debate

Whether bank diversification adds to bank value and systemic stability has been extensively researched. In the era of financial liberalization before the global financial crisis, regulators and policy makers allowed banks to widen their scope of operations and diversify into other financial sectors. Thereafter, in general, banks became less dependent on traditional interest income. Earlier studies (Baele et al. 2007; Hebb and Fraser, 2002; Kroszner and Rajan, 1994; Puri, 1996) argue that, due to the scope and information economy, diversification reduces the cost of operations and improves loan origination and management of credit risk and, hence, bank value. However, Berger et al. (1999) argue that diversification reduces risk. Based on an analysis of 967 banks in 22 countries in Asia from 1995 to 2009, Lee et al. (2014) find that diversification into non-interest activities reduces risk but not profitability. They argue that the results become complex if the specialization of banks and the income level of individual countries are considered. Wagner (2010) argues in his theoretical framework that, although bank diversification results in the risk of individual bank failures, it increases systemic risk. This is supported by the empirical studies of De Jonghe (2010) and Brunnermeier et al. (2012). However, Saunders et al. (2014) do not find that lower bank profitability is associated with higher non-interest income. Edirisuriya et al. (2015) find that, as banks diversify from only interest income, their solvency and market valuation improve up to a

point, but afterward the relationship turns negative. In a study of commercial banks in 17 West European countries from 2002 to 2010, Saghi-Zedek (2016) argues that the economies obtained from diversification benefit banks, resulting in higher profits, less volatile earnings, and reduced risk of default. In their analysis of banks in 34 OECD countries for the period 2002–2012, Kim et al. (2020) find that the relationship between financial stability and bank diversification is U-shaped.

Based on an analysis of commercial banks in the US from 2000 to 2013, Yang et al. (2020) report that diversification increases systemic risk, and the phenomenon is more pronounced in at large and medium-size banks. Kim and Kim (2020), based on their analysis of the performance of US banks from 2000 to 2013, argue that, as banks engage in non-interest activities, there is a negative effect on performance in the first stage, but gradually obtain benefits in the second stage. In their study of 84 banks in 21 European economies over the period 2005–2017, Chiaramonte et al. (2021) find that increasing bank diversification reduces bank stability. They argue that diversification may not be beneficial when managers do not fully understand the consequences of geographic expansion or highly correlated activities. In their analysis of 736 commercial banks in 14 Asia-Pacific economies during the period 2011–2016, Wang and Lin (2021) argue that in emerging market economies policies that encourage income diversification foster financial stability. Nguyen et al. (2021), analyzing the insolvency risk of commercial banks in 28 countries before and after the global financial crisis, find an inverse relationship between nontraditional and traditional income streams at banks. In his analysis of a sample of 466 banks, Velasco González (2021) contends that regulatory capital is inversely related to bank diversification, which may increase bank value.

Becchetti et al. (2018) find that firms with lower ESG scores are more exposed to litigation with stakeholders (stakeholder risk) in the future. Because of investor demand, firms with high ESG scores reduce their systemic risk (Albuquerque et al., 2019; Pástor et al., 2021). Kim et al. (2014) find that firms that pursue high transparency lower their crash risk. Boubaker et al. (2020) find that firms with high ESG scores have less risk of financial distress and, hence, are less vulnerable to financial default. Joliet and Titova (2018) argue that funds that rank high in terms of ESG scores, orient their portfolio toward assets with the highest ESG compliance. Kim et al. (2014), Albuquerque et al. (2019), and Pástor et al. (2021) find that ESG can mitigate negative fallout from financial markets, that is, the contagion risk. Lins et al. (2017) suggest that firms' investment in social capital strengthens the bond between their investors and stakeholders. This investment pays off when corporations have a trust deficit, and the market is negatively affected by a shock. Nofsinger and Varma (2014) and Becchetti et al. (2015) report that, during crisis periods, conventional funds are outperformed by ESG funds but in noncrisis periods, ESG firms pay a cost in the form of lower returns. They argue that, during market turmoil, ESG investing can be viewed as a shield. Cerqueti et al. (2021) argue that greater portfolio diversification, at both the micro and macro level, can be achieved by tilting the portfolio toward assets with high ESG scores. This can also strengthen systemic stability by mitigating the spillover effect from fire sales.

3. Hypothesis development

3.1. ESG activity and bank diversification

As reported in the literature, we posit a nonlinear relationship between ESG and bank diversification activities. Some ESG activities of banks may add increasing value due to stronger relationships with their stakeholders and adopting greater transparency. With higher ESG scores, banks are likely to be assessed as low-risk firms (Broadstock et al., 2021; Albuquerque et al., 2020). Following trade-off theory, we also argue that there is likely to be a tipping point beyond which increased investment in ESG activities decrease returns to scale (Brammer and Millington, 2008; Haans et al., 2016). Hence, our first hypothesis is that the allocation of additional resources by banks to support their ESG activities increases opportunity costs:

Hypothesis 1. ESG and bank diversification have a nonlinear relationship.

3.2. Environmental performance and bank diversification

A vast theoretical and empirical literature justifies both positive and negative relationships between firms' environmental and financial performance (Gallego-Álvarez et al., 2015; Lee et al., 2015; Li et al., 2017; Sariannidis et al., 2013). Studies that support the negative relationship argue that excessive firm engagement in CSR activities lead to negative financial performance by the firm compared to others (Li et al., 2017). However, the firms can compensate for their environment activities through more disclosure (Ziegler et al., 2011; Busch and Hoffmann, 2011).

The literature on the possible relationship between environmental performance and bank diversification is still limited. In emerging markets, banks are likely to make investment to improve their environmental performance in order to attain the standards in developed countries. Such investment also makes a positive contribution to their financial performance in the medium to long run. Thus, we hypothesize that:

Hypothesis 2. Environmental performance and bank diversification are positively related.

3.3. Social performance and banks diversification

One of the primary motives of firms is profit maximization. However, they have specific social responsibilities. Stakeholder theory argues that corporate social performance (CSP) is a response by firms to the expectations of the stakeholders (Freeman, 1984).

More responsive actions by firms to meet social expectations result in better financial performance (Velte, 2017). A negative perception of the stakeholders about CSP may hurt firm's financial performance (Utz, 2018). Earlier studies, however, find that the relationship between CSP and firms' financial performance is mixed (Orlitzky et al., 2003).

A limited number of studies document the relationship between bank financial performance and CSP. Previous studies in developed countries, such as the US, the EU, Canada, and Japan, reveal a significantly positive association between CSP and bank performance. Our hypothesis about this relationship is:

Hypothesis 3. Social performance and bank diversification have a positive correlation.

3.4. Governance performance and bank diversifications

Corporate governance refers to the compatibility of the actions of the board members and the executives of firms with the interests of the stakeholders (Esteban-Sanchez et al., 2017). In recent years, to win the confidence of their stakeholders, companies establish diverse codes of conduct and disclose more financial and nonfinancial information about firm operations (Kaymak and Bektas, 2017). Earlier studies report a strong relationship between CSR practices and good corporate governance at firms (Aboud and Diab, 2018).

Sound corporate governance practices have a strong influence on banks' financial performance. Studying Italian banks, Soana (2011) finds a positive and significant influence of corporate governance on their financial performance. Sound corporate governance practices by banks reduce their cost of capital (Dincer et al., 2014). Hence, we hypothesize that:

H4. Governance performance and bank diversification have a positive correlation.

4. Data and methodology

4.1. Sample selection

Our sample consists of data on 1385 banks from 89 countries around the world over the period 2009–2020 for which ESG data is available in Bloomberg. We collect country-specific and bank-specific explanatory variables from the Bloomberg database, which comprises 247 different indicators of ESG, measured on a scale from 0.1 to 100. The environmental factors in the Bloomberg dataset relevant to the banking industry are the consumption of paper, total energy consumption, greenhouse gas emissions, and total waste.

In addition, we collect bank-specific variables such as bank diversification (non-interest income/total income), capitalization, bank size, liquidity, asset quality, efficiency, and bank concentration from the Bloomberg dataset. We also collect country-specific data on the inflation rate, GDP growth, and financial development from the World Bank World Development Indicators (WDI).

In Table 1, we present the sample distribution across countries. Approximately 24.12% of banks in our sample have headquarters in the US (334/1385). Banks in high-, upper-middle-, lower-middle-, and low-income countries represent 73.36%, 13.29%, 11.26%, and 2.09% of our sample, respectively.

4.2. Variable definition

4.2.1. Dependent variable: bank diversification

Consistent with prior studies, such as Lee et al. (2014), Edirisuriya et al. (2015), Saghi-Zedek (2016), and Saif-Alyousfi et al. (2020), we analyze income diversification and asset diversification.

Income diversification is defined as the ratio of non-interest income to total income. Bank diversification generates significant income from non-interest-earning sources such as commissions, fees, and income from trading activities. When this ratio is higher, greater diversification is founnd in a bank's income.

Assets diversification is the ratio of non-interest-earning assets to total assets and is defined as the ratio of total assets minus loans divided by total assets. Therefore, a higher percentage of non-interest-earning assets, such as securities and investments, reflects higher diversification in a bank's asset portfolio.

4.2.2. Independent variables

The independent variable in our study is the total ESG score or the partial ESG score (environmental, social, governance). We evaluate the overall ESG score and its components to assess whether and the degree to which bank diversification is affected by various CSR metrics.

By design, ESG scores and then a combination of several indicators need to be weighted. The environmental pillar (E) comprises 13 drivers divided into four groups (climate change, natural capital, pollution and waste, and environmental opportunities). The social pillar (S) consists of 14 critical issues (product liability, stakeholder opposition, human capital, and social opportunities). The governance pillar (G) subsumes 8 indicators that reflect corporate behavior and corporate governance. The score of the three individual ESG pillars ranges from 0 (no disclosure) to 100 (complete disclosure). Using their proprietary method, Bloomberg combines the score in the three individual pillars into a composite ESG score from 0 to 100. Firms that fail to disclose the indicators covered in the ESG metrics are penalized for the non-disclosure of information.

Table 1
Sample: Numbers of banks and development and income levels.

Country	Number of banks	Development level	Income level
Argentina	3	Developing	Upper middle income
Australia	14	Developed	High income
Austria	7	Developed	High income
Bahrain	4	Developing	High income
Bangladesh	15	Developing	Lower middle income
Belgium	6	Developed	High income
Bolivia	17	Developing	Lower middle income
Bosnia and Herzegovina	13	Developing	Upper middle income
Botswana	2	Developing	Upper middle income
Brazil	8	Developing	Upper middle income
Bulgaria	5	Developing	Upper middle income
Canada	21	Developed	High income
Chile	5	Developed	High income
China	17	Developing	Upper middle income
Colombia	6	Developing	Upper middle income
Costa Rica	20	Developing	Upper middle income
Croatia	12	Developing	High income
Cyprus	2	Developed	High income
Czech Republic	3	Developed	High income
Denmark	13	Developed	High income
Ecuador	15	Developing	Upper middle income
Egypt	2	Developing	Lower middle income
Estonia	9	Developing	High income
Finland	3	Developed	High income
France	17	Developed	High income
Germany	8	Developed	High income
Ghana	11	Developing	Lower middle income
Greece	10	Developed	High income
Hong Kong	15	Developed	High income
Hungary	1	Developing	High income
India	39	Developing	Lower middle income
Indonesia	9	Developing	Lower middle income
Ireland	11	Developed	High income
Israel	20	Developed	High income
Italy	19	Developed	High income
Japan	122	Developed	High income
Jordan	3	Developing	Lower middle income
Kazakhstan	2	Developing	Upper middle income
Korea	25	Developing	High income
Kuwait	5	Developing	High income
Kenya	5	Developing	Lower middle income
Lebanon	2	Developing	Upper middle income
Lithuania	6	Developing	High income
Luxembourg	20	Developed	High income
Macedonia	10	Developing	Upper middle income
Malaysia	9	Developing	Upper middle income
Malta	11	Developing	High income
Mauritius	1	Developing	Upper middle income
Mexico	4	Developing	Upper middle income
Montenegro	5	Developing	Upper middle income
Morocco	1	Developing	Lower middle income
Namibia	2	Developing	Upper middle income
Netherlands	4	Developed	High income
Nigeria	9	Developing	Lower middle income
Norway	30	Developed	High income
Oman	4	Developing	High income
Pakistan	6	Developing	Lower middle income
Panama	1	Developing	Upper middle income
Peru	3	Developing	Upper middle income
Philippines	9	Developing	Lower middle income
Poland	14	Developing	High income
Portugal	2	Developed	High income
Qatar	7	Developing	High income
Romania	3	Developing	Upper middle income
Russia	6	Developing	Upper middle income
Rwanda	6	Developing	Low income
Saudi Arabia	11	Developing	High income
Serbia	5	Developing	Upper middle income

(*continued on next page*)

Table 1 (*continued*)

Country	Number of banks	Development level	Income level
Singapore	11	Developed	High income
Slovakia	6	Developing	High income
South Africa	6	Developing	Upper middle income
Spain	9	Developed	High income
Sri Lanka	2	Developing	Lower middle income
Sweden	7	Developed	High income
Switzerland	47	Developed	High income
Taiwan	11	Developing	High income
Tanzania	12	Developing	Low income
Thailand	9	Developing	Upper middle income
Tunisia	20	Developing	Lower middle income
Turkey	12	Developing	Upper middle income
Uganda	2	Developing	Low income
Ukraine	2	Developing	Lower middle income
United Arab Emirates	10	Developing	High income
United Kingdom	120	Developed	High income
United State	334	Developed	High income
Venezuela	15	Developing	Upper middle income
Vietnam	3	Developing	Lower middle income
Zambia	3	Developing	Lower middle income
Zimbabwe	9	Developing	Low income
	1385		

Yip and Bocken (2018) argue that banking operations have a significant and indirect impact on the environment, even though the direct effect is low. Sanfilippo-Azofra et al. (2018) argue that the banking sector plays a major role as a purveyor of credit. Hence, by extending credit facilities to firms whose activities have negative environmental effects, such as air and water pollution, loss of biodiversity, and greenhouse gas emissions, banks indirectly damage the environment. However, banks also finance projects that foster environmental sustainability, such as financing renewable energy projects, and projects for recycling waste. Therefore, evaluating bank performance in terms of environmental sustainability is a critical challenge that confronts policy planners and regulators around the world.

4.2.3. Control variables

In this analysis, we control for country- and bank-specific characteristics. In the selection of the control variables, we follow prior studies on ESG and bank performance literature, such as Nizam et al. (2019), Paltrinieri et al. (2020), Azmi et al. (2021), Fuente and Velasco (2022), and Moufty et al. (2021), and the diversification literature, such as Yang et al. (2020), Toh (2019), Francis et al. (2018), and Meslier et al. (2014). We add bank capital, size, efficiency, liquidity, and asset quality to control for bank-specific factors.

Capital determines banks' ability to withstand possible shocks to the balance sheet. The ratio of equity to total assets assesses banks' capital strength. Better capitalized banks are considered safer. They are also viewed as conservative and less risky than banks with a lower level of capitalization (Saif-Alyousfi et al., 2020). Conservative banks tend to avoid risk (including ESG risks) more than aggressive banks.

The exposure of banks to credit risk is measured by asset quality. It is reflected in the size of nonperforming loans (NPLs) on the bank's balance sheet, which reflects the health of clients with loans, particularly in the corporate segment. Following García-Herrero et al. (2009), we use the ratio of NPLs to total loans in our analysis to reflect asset quality. Banks try to strengthen the robustness of their credit assessment process to ensure their loan quality. Hence, to ensure better-quality loans, banks may include clients' environmental and social risks in their credit assessment.

We use the ratio of cost to income in our analysis to measure efficiency. When the ratio is higher, the bank management is more inefficient. Through more effective use of its resources, a bank can improve its efficiency and, hence, its financial (Saif-Alyousfi et al., 2020) and ESG performance.

The ratio of deposits to total assets measures liquidity risk arising from possible unwarranted deposit withdrawals. Djalilov and Piesse (2016) use liquidity risk to measure bank performance, and it also reflects the strength of banks' risk management. When this ratio is lower, indicates bank management is more aggressive. Aggressive bank management may be willing to take additional risks, including those arising out of ESG challenges.

We add bank size (measured in terms of the log of total assets) as a control variable. We argue that bigger banks are more diversified across sectors, hence, they are exposed less to liquidity risks. They can attain economies of scale and, thereby, reduce their cost of operation, resulting in better financial performance (García-Herrero et al., 2009; Saif-Alyousfi et al., 2020). But, given their size, large banks are subject to more media scrutiny. Designing ESG policies and procedures, engaging in periodic revision, building capacity for staff to implement these policies, and ESG disclosure are costly initiatives for banks. Bigger banks can reduce the adoption cost of ESG and its disclosure through economies of scale. Cornett et al. (2014) find that, in general, bigger banks are more proactive in their disclosure of ESG scores.

We include GDP growth, the inflation rate, bank concentration, and the level of financial development to control for country-specific factors in our analysis. As banks' financial performance is closely linked to GDP growth in a country, we include that as a

Table 2
Definition of variables.

Variables	Description	Source
Dependent variables:		
Bank diversification		
Income diversity	Non-interest income/total income	Bloomberg
Assets diversity	Total assets minus loans divided by total asset	
Independent variables:		
ESG	ESG index: Overall sustainability score, as the average of the scores of the three pillars (environmental, social, and governance).	Bloomberg
E	First component of the ESG Index: Sustainability score of the environmental pillar.	Bloomberg
S	Second component of the ESG Index: Sustainability score of the social pillar.	Bloomberg
G	Third component of the ESG Index: Sustainability score of the governance pillar.	Bloomberg
Control variables:		
Bank-specific factors:		
Capitalization	Total equity/total assets	Bloomberg
Asset quality	Non-performing loans/total loans	Bloomberg
Management efficiency	Cost/total income	Bloomberg
Liquidity	Total deposit/total assets	Bloomberg
Bank size	The natural logarithm of the total assets	Bloomberg
Macroeconomic Factors		
Bank concentration	Calculated by dividing the assets of the five largest banks by the assets of all banks operating in the market	Bloomberg
GDP growth	Real GDP growth rate	WDI
Inflation rate	Current period inflation rate (consumer prices)	WDI
Financial development	Domestic credit to private sector (% of GDP)	

control variable. Moreover, GDP affects both interest income (via lending activity) and loan-loss provision (via credit portfolio quality) (Mirzaei et al., 2013; Saif-Alyousfi et al., 2020). So, we argue that bank profits are procyclical.

We also include inflation as a control variable because the inflation impact on bank profitability depends on the ability of banks to predict future inflation correctly. If the bank managers can correctly predict the future level of inflation, they can maintain the margin by keeping their loan pricing higher than deposit rates. In the process, they can maintain their real (inflation-adjusted) profits.

In our analysis, the measure of "bank-market concentration" is the percentage of assets held by the five biggest banks in a country. The relative market power hypothesis posits that banks can increase their market share by having a diverse portfolio. By exercising their market power in the pricing of products, bigger banks can generate supernormal profits (Mirzaei et al., 2013; Saif-Alyousfi et al., 2020). The ratio of domestic credit to the private sector as a percentage of GDP is used measure financial development in a country. Table 2 describes all the variables used in this study.

4.3. Model specification

Eq. (1) represents our bank diversification and ESG activity model. The individual dimensions of ESG (environmental, social, and governance characteristics) are represented separately.

$$BankDiversification_{i,t} = \alpha + \beta_1 BankDiversification_{i,t-1} + \beta_2 ESG_{i,t} + \beta_3 ControlVariables_{i,t} + \beta_3 \varepsilon_{i,t} \quad (1)$$

where i is the bank, t is the year, and *BankDiversification* captures the bank diversification of income and assets. *ESG* represents the environmental, social, and governance indicators, *ControlVariables* are the bank-specific factors and macroeconomic variables used as control variables. ε_{it} is the error term.

We use control variables and interaction terms in the analysis, with bank-specific factors and macroeconomic variables as control variables. To capture cross-country variation in economic and industrial development, we use macroeconomic variables. Country, bank, and year fixed effects are also included as control variables. The interaction terms in our analysis are capitalization, asset quality, management efficiency, and liquidity, used terms to identify the channels through which the ESG total and partial scores (environmental, social, and governance) affect bank diversification, as shown in Eq. (2):

$$BankDiversification_{i,t} = \alpha + \beta_1 BankDiversification_{i,t-1} + \beta_2 ESG_{i,t} + \beta_3 InteractionTerm_{i,t}(ESG, CAML) + \beta_4 ControlVariables_{i,t} + \mu \quad (2)$$

where *InteractionTerm* refers to the interaction term; and μ is the error term. The interaction terms include bank capitalization, asset quality, management quality, and liquidity.

We use GMM estimation to examine the relationship between ESG and bank diversification. Lee et al. (2014) and Saif-Alyousfi et al. (2020) argue that the GMM technique addresses potential endogeneity, unobserved heterogeneity, and the persistence of the dependent variable. GMM uses lagged values of dependent and independent variables in instrumental variables. We use sys-GMM instead of two-stage least squares (2SLS) to avoid bias due to the use of inappropriate instruments. In addition, Lee et al. (2015) argue that GMM is more efficient than 2SLS as it accounts for heteroskedasticity. To estimate dynamic panels, we use two types of

Table 3
Descriptive statistics.

Variable	Mean	SD	Min	Max	p25	p50	p75	Skewness	Kurtosis	VIF
Income diversity	39.29	15.10	0.04	76.17	28.87	36.96	47.74	0.69	3.72	
Assets diversity	52.15	16.11	0.13	87.18	37.87	45.18	61.44	0.73	3.51	
ESG	28.57	4.71	2.14	71.16	3.37	3.90	5.45	1.36	4.33	19.8
E	21.16	12.16	1.10	33.90	3.47	4.06	4.96	-0.54	4.96	1.89
S	17.69	14.18	3.21	29.98	3.59	3.71	3.81	-0.82	3.54	1.6
G	37.31	6.46	18.27	75.26	2.48	3.37	5.92	0.99	3.18	18.56
Capitalization	10.00	3.99	3.50	22.90	7.10	9.40	12.24	0.90	3.75	1.48
Asset quality	6.89	6.57	0.40	28.50	2.30	4.30	9.50	1.53	4.82	1.33
Management efficiency	56.44	14.82	22.68	100.00	47.22	56.59	65.39	0.23	3.37	1.23
Liquidity	37.14	20.08	7.86	99.72	22.15	31.75	48.32	1.00	3.53	1.13
Size	11.67	6.40	14.29	18.57	14.43	16.86	17.58	0.68	2.97	1.46
Bank concentration	69.99	19.62	28.37	100.00	54.92	70.00	86.79	-0.13	2.01	1.22
GDP growth	3.39	4.33	-11.23	15.38	1.41	3.60	5.90	-0.48	4.71	1.2
Inflation	4.86	4.75	-0.69	18.55	1.53	3.37	6.81	1.36	4.33	1.37
Financial development	49.28	42.54	2.15	191.46	16.99	36.27	66.70	1.35	4.38	2.2

GMM estimators. The first is the difference-GMM estimator developed by Arellano and Bond (1991). The second is the system-GMM estimator developed by Arellano and Bover (1995). To eliminate fixed effects, the data is first differenced in the diff-GMM estimator. In sys-GMM, however, data is estimated simultaneously in differences and levels. Blundell and Bond (1998) argue that sys-GMM is more robust in capturing efficiency gains and reduces bias in finite samples. Sarafidis et al. (2009) argue that, in unbalanced panel data, this method can deal with serial correlation better than diff-GMM. We use sys-GMM because the GMM estimator can address unit roots and has more robust findings (Bond, 2002).

Earlier banking studies on emerging markets have also used sys-GMM to control for endogeneity due to omitted variables (Azmi et al., 2021; Bilgin et al., 2021; Saif-Alyousfi et al., 2020). Saif-Alyousfi et al. (2020) argue that sys-GMM can handle dynamic modeling; hence, it is superior to traditional fixed and random effects models, which are susceptible to bias due to omitted variables.

We conduct a Sargan/Hansen test to assess overidentifying restrictions and first- and second-order autocorrelation tests. To confirm the validity of the instruments, we carry out a Sargan/Hansen test and AR (2). These diagnostic tests confirm that the lagged values are appropriate instruments. We control for persistence using dynamic GMM.

4.4. Descriptive statistics

We present the descriptive statistics of our data in Table 3. The average income diversification and asset diversification of banks in our sample is 39.29% and 52.15%, respectively. The income diversification variable reveals that banks in high-income countries generate nearly 50% from non-interest sources and thus are more diversified in terms of sources of income. In contrast, only about one-third of the income of banks in middle- and low-income countries comes from nontraditional sources. Except in low-income countries, the asset diversification variable reveals that at the global level banks have a high proportion (about two-thirds) of non-loan assets in their portfolios. The mean ESG at banks in our sample is 28.57%. Our sample banks in developing countries have low ESG scores and are riskier than banks in developed countries. Our sample banks present a very mixed picture in terms of asset quality: the sample average ratio of NPLs to total loans is 6.89%, with a minimum of 0.40% and a maximum of 28.00%.

5. Results

5.1. ESG and bank diversification

In Table 4, we present our main results. Model 1 shows the ESG overall results, Model 2 includes bank-specific control factors, and Model 3 controls for macroeconomic indicators. As shown in Table 4, in Model 1, the estimated ESG coefficient is 0.048, and it is positive and statistically significant at 5%. Our result indicates that banks with higher ESG disclosure have higher diversification in income and assets, consistent with our prediction. Summary data on ESG, reported in Table 3, reflect that a one-standard-deviation increase in ESG disclosure leads to an increase in the bank diversification of income and assets, respectively, of 22.608% (= 0.048 *4.71) and 29.202% (= 0.062 *4.71). The results for Models 2 and 3 indicate that, even after controlling for bank-specific internal factors, bank concentration, and external macroeconomic factors, ESG significantly influences bank diversification at the of 5% level. This result reflects that, irrespective of the intensification of bank competition, ESG has a significant impact on bank diversification. Our results are in line with those of Azmi et al. (2021), who find that the relationship between ESG activities and Tobin's Q is nonlinear. This implies that the marginal effect is positive but then declines and, after a certain threshold, becomes inconsequential. Wang et al. (2008) find that as the stakeholders bear partial ESG expenses, the net positive effect of ESG spending could be reduced substantially beyond a specific limit.

Table 4
Full sample: The effect of ESG on bank diversification using two-step system GMM.

	(1)	(2)	(3)
Variables			
L. Bank diversification $_{t-1}$	0.642 * **	0.370 * **	0.417 * **
	(0.069)	(0.021)	(0.017)
ESG	0.048 * *	0.018 * *	0.014 * *
	(0.016)	(0.008)	(0.005)
Capitalization		-0.421 * **	-0.242 * *
		(0.102)	(0.100)
Asset quality		0.050	0.032
		(0.035)	(0.032)
Management efficiency		0.136 * **	0.230 * **
		(0.026)	(0.021)
Liquidity		0.089 * **	0.036 *
		(0.018)	(0.018)
Size		-0.076 * **	-0.082 * **
		(0.001)	(0.003)
Bank concentration			0.011
			(0.031)
GDP growth			0.016
			(0.040)
Inflation			-0.459 * **
			(0.041)
Financial development			0.005
			(0.009)
Constant	13.74 * **	16.03 * **	8.825 * **
	(2.764)	(2.296)	(2.417)
Bank fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
No. of observations	**13,970**	**13,970**	**13,970**
AR(1) (p-value)	0.000	0.001	0.001
AR(2) (p-value)	0.599	0.369	0.318
Hansen test (p-value)	0.132	0.570	0.377

Notes: This table shows the impact of overall ESG on bank diversification around the globe using two-step system GMM. The null hypothesis of the Hansen test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. The values in parentheses are standard errors. * , * * and * ** denote significance at 10%, 5% and 1% levels, respectively.

For a further robustness test, we examine the effect of the squared term of ESG on bank diversification and find that its effect is negative and significant at the 1% level (results are available upon request). This indicates an inverted U-shaped relationship between ESG and bank diversification, which supports H1. Although the interpretation of the coefficient indicates the presence of a nonlinear relationship, it might be incorrect to interpret the marginal effects of the interaction of continuous random variables as unconditional (Brambor et al., 2006).

5.2. Individual ESG dimensions and ESG and bank diversification

In Table 5, we report the results of testing our hypothesis on the individual dimensions of ESG (environmental, social, and governance). The motivation for our assessment of the individual dimensions of ESG is that each industry has unique ESG challenges. Moreover, firms in each industry also face unique pressures from various stakeholders, which implies that each industry might wish to focus on one or more dimensions of ESG to gain benefits from doing so. For instance, stakeholders in banking might be more interested in the nonlending activities of banks than their charitable contributions.

Although ESG has a significantly positive impact on bank performance, analyzing the impact of the ESG dimensions demonstrates separate aspects of that relationship. Our results in Table 5 indicate that environmental and social factors have a negative and statistically significant impact on bank diversification at the 1% level, but governance factors have a significantly positive impact at the 5% level.

5.3. ESG channels and bank diversification (interaction terms between ESG and bank CAMEL)

Next, we test the interaction terms between ESG as a whole and the individual ESG dimensions (Table 6). The interaction terms involve capitalization, asset quality, management efficiency, and liquidity (CAMEL) to identify the channels through which the performance of ESG as a whole or its components (environmental, social, and governance) affects bank diversification.

As reported in Table 6, in Model 1, the capitalization interaction term assesses whether ESG influences bank diversification through this channel. Its coefficient is significant with ESG overall and its dimensions (E, S, and G), suggesting that better ESG affects

Table 5
Full sample: The effect of individual ESG dimensions on bank diversification using two-step system GMM.

	(1)	(2)	(3)
Variables			
L. Bank diversification $_{t-1}$	0.346 * **	0.452 * **	0.417 * **
	(0.022)	(0.021)	(0.017)
E	-0.016 * **		
	(0.002)		
S		-0.496 * **	
		(0.066)	
G			0.052 * *
			(0.022)
Capitalization	-0.319 * **	-0.444 * **	-0.248 * *
	(0.091)	(0.114)	(0.104)
Asset quality	0.038	0.061	0.032
	(0.033)	(0.041)	(0.032)
Management efficiency	0.237 * **	0.230 * **	0.230 * **
	(0.019)	(0.023)	(0.021)
Liquidity	0.035 * *	0.061 * **	0.035 *
	(0.017)	(0.018)	(0.018)
Size	-0.086 * **	-0.062 * **	-0.091 * **
	(0.002)	(0.001)	(0.001)
Bank concentration	0.033	-0.074 * *	0.011
	(0.034)	(0.030)	(0.031)
GDP growth	0.107 * **	-0.067	0.016
	(0.036)	(0.039)	(0.040)
Inflation	-0.389 * **	-0.442 * **	-0.459 * **
	(0.041)	(0.049)	(0.041)
Financial development	0.016 *	-0.004	0.005
	(0.008)	(0.011)	(0.009)
Constant	12.86 * **	36.80 * **	8.843 * **
	(2.110)	(4.417)	(2.414)
Bank fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
No. of observations	**13,970**	**13,970**	**13,970**
AR(1) (p-value)	0.001	0.000	0.001
AR(2) (p-value)	0.266	0.359	0.316
Hansen test (p-value)	0.510	0.333	0.377

Notes: This table shows the impact of individual ESG dimensions on bank diversification around the globe using two-step system GMM. The null hypothesis of the Hansen test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. The values in parentheses are standard errors. * , * * and * ** denote significance at 10%, 5% and 1% levels, respectively.

bank (income and assets) diversifications via changes in capitalization. The significance of the interaction term is negative, indicating that for every 1% increase in ESG, through direct and interactive effects with capitalization, the income diversification of banks decreases by 0.898% (−0.078 + (−0.082) (10) = −0.898; see Table 6, Model 1), holding capitalization at the mean value.[1] However, in Model 2, the coefficient of the interaction term with asset quality is not significant, implying that better ESG does not affect bank (income and assets) diversification and changes in asset quality (credit risk).

We test the effect of management quality or efficiency on bank diversification in Model 3. Our results reflect that management quality plays a significant role in determining the relationship between ESG overall as well as its three dimensions (E, S, and G) and bank diversification. The coefficient of this interaction term is positive, which implies that, for every 1% improvement in ESG, through the direct and interactive effect with management quality, income diversification by banks increases by 2.289% (−0.025 + (0.041) (56.44) = 2.289; see Table 6, Model 3), holding management quality at the mean. Managing microfinance loans and loans to small and medium-size enterprises (SMEs) is costly. Hence, attaining cost efficiency through better cost management is key for achieving a larger ESG impact, which is consistent with Honohan (2004), who argues that cost efficiency is the hallmark of a sustainable banking venture. Our findings support the results by Cochran and Wood (1984), who find that the quality and efficiency of a firm's management are reflected in returns.

Model 4 results reflect that the interaction term for deposits to total assets (liquidity) is positive and significant at the level of 5%, which indicates that for every 1% increase in ESG, through the direct and interactive effect with liquidity, income diversification of

[1] Given the interactive variable for ESG and capitalization (CAP), i.e., Y = Bo + B1(ESG) + B2(CAP) + B3(ESG*CAP) + …, the marginal effect of ESG is: d(Y)/d(ESG) = B1 + B3(CAP), where the value of the marginal effect depends on the value of CAP. Thus, the marginal effect can be calculated by holding the CAP at its mean (10; see Table 3). Similar mean value calculations are applied to the other interactive variables (management quality and liquidity).

Table 6
Full sample: The interaction effect of ESG and individual ESG dimensions with CAML on bank diversification using two-step system GMM.

	(1)	(2)	(3)	(4)
Variables				
Panel A: Interaction effect between ESG and bank CAML				
L.Bank diversification $_{t-1}$	0.366 * **	0.360 * **	0.247 * **	0.361 * **
ESG	-0.078 * *	-0.035 * *	-0.025 * *	-0.026 * *
ESG × Capitalization	-0.082 * *			
ESG ×Asset quality		0.060		
ESG × Management efficiency			0.041 * **	
ESG × Liquidity				0.011 * *
Panel B: Interaction effect between environment (E) and bank CAML				
L.Bank diversification $_{t-1}$	0.334 * **	0.337 * **	0.192 * **	0.372 * **
E	0.013 * *	0.081 * *	0.067 * *	0.049 * **
E × Capitalization	-0.014 * *			
E × Asset quality		0.023		
E × Management efficiency			0.013 * **	
E × Liquidity				0.018 * *
Panel C: Interaction effect between social (S) and bank CAML				
L.Bank diversification $_{t-1}$	0.390 * **	0.400 * **	0.267 * **	0.375 * **
S	1.731 * **	0.120 * *	3.810 * **	0.938 * **
S × Capitalization	-0.118 * *			
S ×Asset quality		0.056		
S × Management efficiency			0.075 * **	
S × Liquidity				0.014 * *
Panel D: Interaction effect between governance (G) and bank CAML				
L.Bank diversification $_{t-1}$	0.368 * **	0.361 * **	0.243 * **	0.360 * **
G	-0.025	0.088	-0.071 * *	-0.018 * *
G × Capitalization	-0.029 * *			
G ×Asset quality		0.019		
G × Management efficiency			0.011 * **	
G × Liquidity				0.020 *
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Notes: This table shows the interaction effect of ESG and individual ESG dimensions with CAML on bank diversification using two-step system GMM. The null hypothesis of the Hansen test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. The values in parentheses are standard errors. * , * * and * ** denote significance at 10%, 5% and 1% levels, respectively. The coefficient of constant, values of standard errors, and p-values of AR(1), AR(2), and the Hansen test are removed to save the space.

banks increases by 0.883% ($-0.026 + (0.011)\,(37.14) = 0.383$; see Table 6, Model 4), holding liquidity at the mean. This implies that ESG affects bank diversification via deposits. In other words, better implementation of ESG activities by banks leads to better public perception and higher confidence, which translates into a larger flow of deposits. As deposits increase, banks can expand their off-balance-sheet activities, which translates into a larger asset base and, hence, better returns for banks. So, banks that intend to increase their income and asset diversification should consider deeper market participation by offering various services and incentives and, in the process, attracting as many deposits as possible. De la Torre et al. (2010) obtain a similar finding, reporting that banks with a wider range of products and services, such as catering to the financing needs of SMEs, will have a comparative advantage.

5.4. ESG and bank diversification across countries at different levels of development and income

To determine whether sampling bias exists in our results, we test the hypothesis on ESG overall and individual ESG dimensions based on the level of development and income in individual countries. We report the results in Tables 7 and 8, however, do not report the results of control variables here due to space limitations.

Our results for the sample of developed countries, reported in Table 7, show that ESG overall is positively related to bank diversification measures regarding income and assets. However, the environmental and social factors have a negative and statistically significant impact (at the 1% level) on bank diversification. Because of large-scale adoption of the ESG criteria by regulators, rating agencies, and institutional investors, banks have become aware that their performance is increasingly tested in terms of their ability to withstand ESG risks. By financing projects that foster environmental sustainability, such as financing renewable energy projects and projects for recycling waste, banks can foster environmental sustainability and raise their ESG scores. But, as argued by Acharya et al. (2006), industrial and sectoral diversification of loans reduces bank returns by endogenously leading to riskier loans. Yang et al. (2020) also argue that diversification might increase systemic risk. The social activities by the executive management and the board of directors in high-income countries are intended more to satisfy their own needs than those of their banks and thus are viewed negatively by shareholders. In effect, diversification may be negatively related to the environmental and social activities of banks. By comparison, governance has a positive and significant impact at the level of 1%. We find similar results when we regress

Table 7
Different development levels: The effect of ESG and individual ESG dimensions on bank diversification using two-step system GMM.

	(1)	(2)	(3)	(4)
Variables	ESG	E	S	G
Panel A: Developed countries				
L.Bank diversification $_{t-1}$	0.483 * **	0.309 * **	0.488 * **	0.484 * **
ESG	0.088 * **			
E		-0.027 * **		
S			-0.225 * **	
G				0.025 * **
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	**8580**	**8580**	**8580**	**8580**
AR(1) (p-value)	0.004	0.006	0.005	0.004
AR(2) (p-value)	0.437	0.434	0.473	0.443
Hansen test (p-value)	0.537	0.507	0.524	0.540
Panel B: Developing countries				
L.Bank diversification $_{t-1}$	0.374 * **	0.383 * **	0.427 * **	0.374 * **
ESG	0.011 * *			
E		-0.059 *		
S			-0.512 * *	
G				0.037 * *
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	**5390**	**5390**	**5390**	**5390**
AR(1) (p-value)	0.000	0.000	0.000	0.000
AR(2) (p-value)	0.225	0.225	0.267	0.226
Hansen test (p-value)	0.751	0.744	0.669	0.752

Notes: This table shows the effect of ESG and individual ESG dimensions on bank diversification using two-step system GMM. The null hypothesis of the Hansen test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. The values in parentheses are standard errors. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively. The coefficients of control variables and constant are removed to save the space.

the model with the sample of developing countries. The significance level is at either the 5% or 10% level. These results are generally in line with those for the full sample model reported in Tables 4 and 5.

We stress that, in developed countries, the governance mechanism at banks has become increasingly robust over time with the implementation of the Basel accords but is less robust in developing countries hence, the significance level. We find that bank diversification is affected more by ESG overall and individual ESG dimensions in developed countries than in developing countries.

As reported in Table 8, we find that ESG overall and income diversification by banks in high- and low-income countries are positively related, and the relationship is significant at 1%. In countries in at upper-middle- and lower-middle-income levels, however, the relationship is negative and significant at 10%. Differences in the findings can be explained by variations in the adoption of ESG practices across countries. A similar profile is reflected in the relationship of ESG overall with asset diversification. In terms of individual dimensions of ESG (E, S, G), we find that at banks in high-income countries, environmental disclosure (E) has a positive and significant impact on income and asset diversification at the level of 1%. In contrast, the relationship is negative and significant (at the 5% level) in upper-middle-, lower-middle-, and low-income countries. The findings suggest that environmental disclosures enable banks in high-income countries to generate greater scope for diversification and, hence, more income and better asset efficiency. This also implies that, in their investment decision-making process, investors consider banks' environmental practices and disclosure. In effect, ESG activities by banks create a virtuous circle of bank asset and income diversification through higher environmentally friendly investment in physical assets by firms that ensure sustainable growth. Also, these results indicate that disclosure of environmental practices contributes significantly to physical diversification of assets and income. Therefore, we argue that environmental disclosure has relevance and significance in high-income countries as the nexus between financial markets and markets for goods and services.

We find that the social score (S) has a negative and significant (at the level of 1%) impact on income and asset diversification by banks in high-income countries, similar to the main results in Table 5. In contrast, in upper-middle-, lower-middle-, and low-income countries, the relationship is negative but insignificant. In high-income countries, the CSR activities by the executive management and the board of directors are intended mainly to satisfy their own needs, rather than those of their banks. As a result, stakeholders view CSR-related costs as unproductive, resulting in lower income for stakeholders, less income diversification, and less asset efficiency by banks.

Our results reflect that the governance (G) score has a positive (negative) and significant impact on bank diversification at the 1% level in high- and upper-middle-income countries, but 5% in lower-middle- and low-income countries. This implies that governance disclosure increases (decreases) bank income and asset diversification in high- and upper-middle-income countries (lower-middle- and low-income countries), which in line with the findings by Buallay (2018), Core et al. (2006), and Gompers et al. (2003).

Table 8
Different income levels: The effect of ESG and individual ESG dimensions on bank diversification using two-step system GMM.

	(1)	(2)	(3)	(4)
Variables	ESG	E	S	G
Panel A: High income countries				
L.Bank diversification $_{t-1}$	0.347 * **	0.279 * **	0.381 * **	0.342 * **
ESG	0.014 * **			
E		0.021 * **		
S			-0.010 * **	
G				0.038 * **
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	**10,241**	**10,241**	**10,241**	**10,241**
AR(1) (p-value)	0.005	0.009	0.005	0.006
AR(2) (p-value)	0.177	0.264	0.263	0.195
Hansen test (p-value)	0.526	0.578	0.571	0.536
Panel B: Upper middle-income countries				
L.Bank diversification $_{t-1}$	0.176 * **	0.204 * **	0.196 * **	0.176 * **
ESG	-0.085 *			
E		-0.019 * *		
S			-0.151	
G				0.027 * **
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	**1859**	**1859**	**1859**	**1859**
AR(1) (p-value)	0.017	0.025	0.021	0.017
AR(2) (p-value)	0.248	0.240	0.216	0.248
Hansen test (p-value)	0.836	0.634	0.774	0.837
Panel C: Lower middle-income countries				
L.Bank diversification $_{t-1}$	0.612 * **	0.700 * **	0.634 * **	0.613 * **
ESG	-0.037 *			
E		-0.043 * *		
S			-0.016	
G				-0.019 * *
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	**1573**	**1573**	**1573**	**1573**
AR(1) (p-value)	0.015	0.020	0.012	0.015
AR(2) (p-value)	0.898	0.677	0.903	0.899
Hansen test (p-value)	0.729	0.840	0.722	0.728
Panel D: Low income countries				
L.Bank diversification $_{t-1}$	0.433	-0.788 * *	1.933	0.426
ESG	0.018 * **			
E		-7.271 * *		
S			-2.427	
G				-0.059 * **
Controls variables	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
No. of observations	**297**	**297**	**297**	**297**
Year fixed effects	Yes	Yes	Yes	Yes
AR(1) (p-value)	0.012	0.016	0.058	0.046
AR(2) (p-value)	0.533	0.596	0.469	0.766
Hansen test (p-value)	0.342	0.344	0.323	0.473

Notes: This table shows the effect of ESG and individual ESG dimensions on bank diversification using two-step system GMM. The null hypothesis of the Hansen test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. The values in parentheses are standard errors. *, * * and * ** denote significance at 10%, 5% and 1% levels, respectively. The coefficients of control variables and constant are removed to save the space.

5.5. ESG and bank diversification across countries without the US sample

As US banks account for 24.12% of our sample, to confirm whether our results suffer from any sampling bias, we present the empirical results for all banks excluding those in the US, and the results are in Table 9. Although the absolute values of the estimated

Table 9
Full sample: The effect of ESG on bank diversification using two-step system GMM: Excluding sample from USA.

	(1)	(2)	(3)	(4)
	ESG	E	S	G
Variables				
L. Bank diversification $_{t-1}$	0.287 * **	0.268 * **	0.283 * **	0.291 * **
	(0.090)	(0.084)	(0.091)	(0.089)
ESG	0.038 * **			
	(0.004)			
E		-0.219 * **		
		(0.017)		
S			-0.199 * **	
			(0.023)	
G				0.011 * *
				(0.004)
Capitalization	-0.904 * *	-0.993 * *	-0.823 * *	-0.924 * *
	(0.345)	(0.342)	(0.325)	(0.438)
Asset quality	-0.389	-0.074	-0.049	-0.329
	(0.327)	(0.290)	(0.321)	(0.327)
Management efficiency	0.899 * **	0.654 * **	0.501 * **	0.775 * **
	(0.180)	(0.168)	(0.172)	(0.181)
Liquidity	0.053 * **	0.065 * *	0.055 * *	0.097 * **
	(0.016)	(0.024)	(0.025)	(0.032)
Size	-0.0421 * **	-0.081 * *	-0.091 * **	-0.045 * *
	(0.062)	(0.035)	(0.026)	(0.021)
Bank concentration	0.055	0.051	-0.3117 *	0.54
	(0.132)	(0.138)	(0.172)	(0.131)
GDP growth	0.163	0.219	0.018	0.147
	(0.144)	(0.144)	(0.180)	(0.140)
Inflation	-0.690 * **	-0.483 * *	-0.386 *	-0.652 * **
	(0.242)	(0.207)	(0.214)	(0.240)
Financial development	0.021	0.041	0.005	0.022
	(0.062)	(0.057)	(0.064)	(0.061)
Constant	10.600 * **	8.271 * **	17.671 * **	12.126 * **
	(1.451)	(1.461)	(2.504)	(1.345)
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	**10,296**	**10,296**	**10,296**	**10,296**
AR(1) (p-value)	0.000	0.004	0.000	0.000
AR(2) (p-value)	0.170	0.132	0.131	0.176
Hansen test (p-value)	0.355	0.308	0.316	0.390

Notes: This table shows the effect of ESG and individual ESG dimensions on bank diversification using two-step system GMM after excluding sample from USA. The null hypothesis of the Hansen test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. The values in parentheses are standard errors. * , * * and * ** denote significance at 10%, 5% and 1% levels, respectively.

coefficients are lower, our main results remain robust. Moreover, the estimated coefficients and the statistical significance of the control variables are similar to those in prior tables.

5.6. Instrumental variable approach

As stated above, endogeneity is a potential limitation in archival research (Saif-Alyousfi et al., 2020). In our analysis, we address this issue by using a lagged term as an instrumental variable (IV) in our GMM estimation. Using Sargan and Hansen tests, we confirm the validity of the IVs. To address endogeneity concerns further, we use the two-stage least squares (2SLS) approach and instrument the ESG activities, and the results are in Table 10. Our findings remain consistent with the earlier findings and thus support our hypotheses.

6. Conclusions and policy implications

6.1. Summary of our findings

In this paper, we assess whether banks' ESG activities around the world have any effect on bank diversification. Using the GMM technique, we analyze data on 1385 banks in 89 countries globally from 2009 to 2020. Our results show that the relationship between ESG activity and bank diversification is nonlinear.

We also find that higher ESG disclosure results in higher bank diversification in income and assets. The results also indicate that environmental and social factors have a negative and statistically significant impact on bank diversification, while governance has a

Table 10
Full sample: 2SLS tests of the relationship between ESG and bank diversification.

	(1)	(2)	(3)	(4)
	ESG	E	S	G
Variables				
ESG	0.077 * *			
	(0.026)			
E		-0.124 * **		
		(0.003)		
S			-0.220 * **	
			(0.077)	
G				0.069 * *
				(0.029)
Capitalization	0.286 * *	0.303 * *	0.280 * *	0.285 * *
	(0.113)	(0.112)	(0.113)	(0.113)
Asset quality	0.027	0.031	0.029	0.027
	(0.057)	(0.056)	(0.056)	(0.057)
Management efficiency	0.376 * **	0.392 * **	0.372 * **	0.376 * **
	(0.026)	(0.028)	(0.025)	(0.027)
Liquidity	0.229 * **	0.217 * **	0.224 * **	0.229 * **
	(0.020)	(0.028)	(0.027)	(0.021)
Size	-0.065 * **	-0.059 * **	-0.061 * **	-0.066 * **
	(0.007)	(0.008)	(0.008)	(0.007)
Bank concentration	-0.026	-0.016	-0.0343 *	-0.027
	(0.018)	(0.017)	(0.018)	(0.018)
GDP growth	0.052	0.105	0.099	0.053
	(0.101)	(0.101)	(0.102)	(0.101)
Inflation	0.321 * **	0.596 * **	0.853 * **	0.320 * **
	(0.092)	(0.092)	(0.094)	(0.099)
Financial development	0.015	0.091	0.011	0.015
	(0.010)	(0.096)	(0.009)	(0.010)
Constant	10.841 * **	9.17 * **	6.816 * **	9.837 * **
	(2.612)	(2.653)	(2.023)	(2.612)
Bank fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	15,240	15,240	15,240	15,240
R^2	0.53	0.54	0.53	0.53

Notes: This table shows the effect of ESG and individual ESG dimensions on bank diversification using 3SLS. The values in parentheses are standard errors. * , * * and * ** denote significance at 10%, 5% and 1% levels, respectively.

positive and significant impact. Similar results are found when we regress the model with the sample of developed and developing countries separately. However, we find that bank diversification is affected by the ESG overall and the individual ESG dimension more in developed countries than in developing countries.

In terms of the income level of countries, we find that environmental disclosure has a positive (negative) and significant impact on income and asset diversification at banks in high-income countries (upper-middle-, lower-middle-, and low-income countries). The findings suggest that banks in high-income countries generate more scope for diversification through environmental disclosure. Hence, banks in high-income countries have generated more income by concentrating on environmental disclosure. We find that the social score has a negative and significant (insignificant) impact on income and asset diversification by banks in high-income countries (upper-middle-, lower-middle-, low-income countries). This result indicates that social activities by the executive management and the board of directors in high-income countries are intended mainly to satisfy their own needs rather than those of their banks. We find that governance disclosure increases (decreases) income and asset diversification by banks in high- and upper-middle-income countries (lower-middle- and low-income countries).

In short, our findings indicate that the relationship between ESG activity and bank diversification can be explained well by the stakeholder theory and the trade-off theory. Consistent with the stakeholder theory, we find that governance activities by banks add value. However, stakeholders become indifferent to environmental and social activity, and each additional factor has a smaller marginal value. This indicates that stockholders and bondholders are more interested in banks' commitment to environmental and social activities and transparency in corporate governance.

Next, we examine the channels through which ESG affects bank diversification. We find that capitalization, management quality, and liquidity are the channels through which ESG affects bank diversification. However, better ESG does not affect bank (income and assets) diversification via changes in credit risk (asset quality).

6.2. Policy implications

Because of ever-increasing global concern about climate change and the need to limit the rise in global temperatures to 1.5 °C, the ESG disclosure requirements will shape future investment by companies and thus activities related to sustainable financing and

diversification by banks. The International Sustainability Standards Board, created by the International Financial Reporting Standard Foundation, issued two proposals for creating an accounting and reporting system. The goal is to foster greater understanding of the true value of companies for investors by incorporating social and environmental considerations into disclosures. The first proposal charts sustainability-related disclosure, and the second specifies the disclosure requirements related to the climate. The proposals are expected to become standards by the end of 2022. Similarly, the European Commission, which is committed to the European Green Deal, has set up a permanent expert group, the Platform on Sustainable Finance, to assist the commission in developing sustainable finance policies. The European Union's taxonomy, an EU-wide classification system, was established to steer green investment in order to attain the European Green Deal objectives. The imposition of capital add-ons on banks that fail to manage climate risk is also under active consideration by the European Central Bank. If the adoption of the Climate-Aligned Finance Act in the Canadian parliament which proposes banks to meet capital requirements in proportion to the climate risks generated is an indicator, ESG will become the touchstone and shape the strategic focus of bank diversification activities across the globe.

Given this perspective, policy designers and financial regulators in each country need to implement a tailor-made framework for sustainable finance and incentivize banks to embrace the practices in that framework. These steps should undoubtedly become one of the key policy priorities of the government and the regulators. Increased adoption of ESG best practices and the transparency in ESG disclosures by banks, especially in emerging markets, would undoubtedly add to banks' value. Adopting the best practices of environmental sustainability and financing socially responsible projects would also foster the interest of various stakeholders. It would also attract investors' increased attention, resulting in a higher valuation of banks. Banks, however, should also take into cognizance the non-linearity in the specific ESG activities while charting their path in the future.

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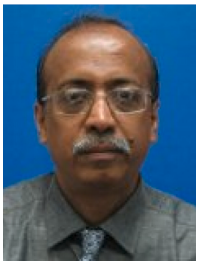

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