



Çankaya, S. & Mandisodza, B. (2026). The impact of ESG performance in the banking industry: A comparative study between developed and emerging markets. *Bookarion Journal of Economics & Finance*, 1 (1), 1-24. [doi:10.64734/bjef.1-1-01](https://doi.org/10.64734/bjef.1-1-01)

Original Article

Submission: 02/01/2026


Accepted: 30/05/2026





THE IMPACT OF ESG PERFORMANCE IN THE BANKING INDUSTRY: A COMPARATIVE STUDY BETWEEN DEVELOPED AND EMERGING MARKETS

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ABSTRACT

This study analyzes the influence of ESG factors on the financial performance of banks in developed and emerging markets. Using panel multiple regression analysis on annual data from 2010 to 2021, covering 220 banks (114 from developed markets and 106 from emerging markets), we find that ESG has a significant positive impact on the financial performance of banks in developed markets, with no significant effect in emerging markets. When assessing ESG pillars individually, the environmental and social pillars show a strong positive impact on bank performance in developed markets, while governance has no impact. In emerging markets, only governance has a significant positive effect, with environmental and social factors showing no significant impact. The results also indicate that ESG controversies interestingly have a positive influence on bank performance in both markets. Further regression analysis reveals variations in ESG impact when lagging effects are not accounted for.

Keywords: ESG performance, sustainability, bank performance, developed and developing markets.

1. INTRODUCTION

In today's dynamic economic environment, businesses increasingly recognize that long-term success goes beyond maximizing profits. While the shareholder theory introduced by Friedman in 1970 emphasized shareholder returns, Freeman's stakeholder theory, presented in 1984, argues that businesses should consider the broader impact of their actions on all stakeholders, including local communities. As a result, sustainability issues, particularly those relating to environmental, social, and governance (ESG) concerns, have gained significant importance. What was once viewed primarily as an ethical consideration is now an economic imperative. Investors and creditors are increasingly focused on businesses' sustainability efforts, as these efforts can affect a firm's ability to secure necessary funding and grow.

A 2012 study by Accenture highlights a significant wealth transfer to millennials in America, estimated to be trillions of dollars. Furthermore, research by Morgan Stanley (2021) reveals that 86% of millennials express interest in sustainable investments, compared to 75% of the general investor population. The same study also indicates that 90% of young investors are likely to pursue sustainable investments in the future. This trend underscores the growing economic importance of ESG factors, making it an obligation for companies to integrate ESG issues into their business models. Research by Menicucci & Paolucci (2022) and Kim & Zhichuan (2021) further supports the idea that ESG factors influence financial performance, demonstrating their significance for business success.

In addition to being an economic consideration, ESG reporting is increasingly becoming mandatory. Some nations have made it compulsory for companies to disclose ESG information, either through mandatory reporting or under a "comply or explain" framework, which requires firms to explain any non-compliance with reporting standards. This trend is particularly evident in developed markets. For instance, Malaysian publicly listed companies have been required to disclose ESG matters since 2016, and large companies across sectors in the EU are obligated to report ESG issues under regulations such as the Non-financial Reporting Directive (NFRD) and the forthcoming Corporate Sustainability Reporting Directive (CSRD). The UK has also mandated large companies with at least 500 employees to disclose financial information related to climate issues. These regulatory developments are largely driven by increasing concerns about climate change. Sectors like mining, with direct emissions and land degradation, and banking, which can influence sustainability through financing projects, are under close scrutiny.

The growing awareness of ESG issues among investors, regulators, and societies has brought increased attention to controversies surrounding companies' ESG practices. While other industries have been heavily scrutinized, the banking sector has received relatively less attention regarding ESG studies, indicating a gap in the literature. This study aims to fill that gap by examining the impact of ESG factors on bank performance, particularly in developed and emerging markets. The findings will contribute to existing knowledge, offering valuable insights for decision-makers in banks, which can aid in future projections and risk analysis.

To explore the relationship between ESG factors and bank performance, data from the Refinitiv database, including ESG scores and financial data, was analyzed. The results reveal that in developed markets, ESG factors have a significant positive impact on bank performance, while no such effect is observed in emerging markets. The study finds that the environmental and social pillars have a strong positive effect on bank performance in developed markets, while governance has no significant impact. In contrast, in emerging markets, governance is the only factor with a significant positive impact, with environmental and social factors showing no notable effect. Additionally, the study finds that ESG controversies have a strong positive impact on bank performance in both market types.

2. LITERATURE REVIEW

The desire to see organizations thrive, especially in terms of strong financial performance, is shared by business owners, strategists, investors, and other stakeholders. However, the reality is that businesses do not always meet expectations, and failures are common. This gap between expectations and outcomes has driven numerous studies to explore the drivers of business performance. These studies seek to answer the question: What influences the performance of businesses, particularly in terms of financial outcomes, and to what extent do different factors play a role? While the determinants of business performance have been widely studied, it is clear that financial factors, such as leverage, liquidity, firm size, net profit margin, and debt-to-equity ratio, are often emphasized as shown by Omondi (2013), Estiasih & Putra (2021). However, non-financial factors, including corporate governance, organizational culture, management decisions, and even external factors such as market orientation and the growing significance of Environmental, Social, and Governance (ESG) factors, also play vital roles in business performance.

The aim of this paper is to examine how ESG factors influence the performance of banks in both developed and emerging markets. ESG, representing environmental, social, and governance issues, has garnered significant attention from academics, investors, and corporate managers in recent years. This interest is fueled by the growing awareness of sustainability and its potential impact on financial performance. Many governments have even implemented mandatory ESG reporting laws. For example, New Zealand requires climate-related disclosures from public companies and financial institutions, and Malaysia has led the way in mandating disclosure laws. Other countries, including the USA, China, and the UK, are also pushing for such legislation, acknowledging the importance of ESG factors in the long-term sustainability and profitability of businesses, including banks.

The subject of ESG disclosure and its relationship with financial performance has led to a range of research studies. A systematic review conducted by Janah & Sassi (2021) highlights the growing focus on ESG and sustainability over the past two decades, yet the results from these studies remain mixed. Some studies show a positive relationship between ESG factors and firm performance, while others find no significant connection. For instance, research by Naeem et al. (2022) has investigated the effects of ESG across both developed and developing markets, while other studies have analyzed

ESG scores collectively or individually to examine their impact on various aspects of business performance.

An early review by Friede et al. (2015) found a wealth of research dating back to 1970, with the majority of studies reporting a positive relationship between ESG and financial performance. This conclusion was further supported by later studies, such as Aydoğmuş et al. (2022), who observed that ESG scores had a positive impact on profitability for publicly listed firms. Furthermore, Naeem & Cankaya (2022) identified a significant positive effect of combined ESG factors on the performance of environmentally sensitive firms in the energy sector. Similarly, Almeyda & Darmansyah (2019) found a positive correlation between ESG scores and the performance of real estate firms, while other research, including studies by Bahaeddin (2020) and Jiaxin Tao (2023), also observed a positive relationship between combined ESG scores and performance metrics across industries.

However, not all studies align with this positive correlation. For example, Aydoğmuş et al. (2020) examined the impact of ESG on the performance of tourism firms in Europe and found a negative correlation between ESG performance and Return on Assets (ROA). This result was attributed to the high costs associated with sustainability investments, suggesting that enhancing ESG performance could, in some instances, negatively impact financial performance. Furthermore, some studies, such as those by Junius et al. (2020) on publicly listed companies in ASEAN countries and Johnson (2020), found no substantial impact of ESG improvements on financial performance, pointing to sector-specific differences in how ESG issues affect businesses.

Further research by Hedström and Dahlsjö (2022) explored the impact of ESG performance in Sweden and China, finding no significant relationship between ESG and performance. Similarly, Pu (2023) investigated the effect of ESG activities on firms in China and observed that while improvements in ESG performance initially enhanced firm performance, continued ESG efforts beyond a certain threshold led to diminishing returns. This suggests that ESG activities may have an inverted U-shaped relationship with firm performance, where excessive focus on ESG could ultimately hinder financial results.

The debate over the impact of individual ESG pillars on business performance has led to studies examining the separate components of ESG: environmental, social, and governance factors. Social factors, often categorized as Corporate Social Responsibility (CSR), have been widely studied, with several studies indicating a positive impact on financial performance. For instance, Coelho (2022) reviewed studies on CSR and found a direct positive impact on firm financial performance. This observation is echoed in studies such as Mentor (2016), which found a strong positive effect of the social pillar on financial performance, particularly in firms listed on the S&P 500. Other studies, including those by Muchiri & Muigai (2019), Mumtaz & Pirzada (2014), and Gautam et al. (2016), have similarly observed positive impacts of CSR on firm performance in various sectors.

The environmental pillar of ESG has also become a focal point, especially due to growing concerns about climate change and global warming. Studies, such as those by Choi et al. (2021), have exam-

ined the role of environmental factors in bank performance, finding that banks with poor reputations for environmental efforts experience a decline in deposits, particularly in regions affected by climate change. Ngan et al. (2022) confirmed a positive impact of environmental factors on firm performance, particularly in the transportation industry, where environmental issues are particularly sensitive due to high emissions. Moreover, Kim & Li (2021) found that ESG factors positively influenced the profitability of firms (measured by ROA), with larger firms benefiting more from strong ESG performance due to higher stakeholder expectations.

Governance factors, which relate to corporate governance practices, have also been found to positively impact firm performance. For example, Aevoae et al. (2023) and Affes & Jarboui (2023) found that firms with strong governance practices had better financial stability and reduced risk. This positive relationship was confirmed in other studies, such as those by Wanyama & Olweny (2013) and Karaye & Büyükkara (2021), which focused on firms in Kenya and South Africa, respectively. Brondello et al. (2018) also noted that better governance practices, particularly in terms of gender representation on boards, had a positive impact on bank performance.

Despite these positive findings, the relationship between individual ESG factors and financial performance remains a subject of debate. Studies such as those by Almeyda & Darmansyah (2019) found a negative impact of social and governance factors on the performance of real estate companies in G7 countries, suggesting that the costs associated with sustainability initiatives can harm financial performance. Similarly, Margaretha & Rachmawati (2016) did not find any significant impact of social factors on firm performance in their study of public firms in Indonesia, and Atan et al. (2016) found no relationship between ESG disclosure and financial performance in Denmark.

The effect of ESG factors on company performance in developed and emerging markets has been a subject of comparative studies. Naeem et al. (2021) found that ESG performance positively impacted firms in developed markets, particularly those in environmentally sensitive industries, but had no significant effect in emerging markets. Janah & Assi (2021) also found positive results for developed countries, while noting an undefined relationship in developing markets. However, a study by Makhdalena (2022) contradicted these findings by observing a strong positive relationship between ESG and financial performance in ASEAN countries, challenging the assumption that ESG factors are more influential in developed markets.

In conclusion, while numerous studies have been conducted to explore the relationship between ESG performance and business outcomes, particularly in the banking sector, the findings remain inconclusive. Some studies show a positive relationship, while others highlight no significant impact or even a negative effect under certain conditions, Menicucci & Paolucci (2022). This paper seeks to address the gap in the literature concerning the banking sector by examining the impact of ESG factors on bank performance. While the results may vary across regions and industries, the growing attention to sustainability and ESG factors suggests that these issues will continue to play a significant role in shaping the future of corporate performance.

2.1. Hypothesis Development

Banks play a crucial role in the functionality of financial systems worldwide, making it essential to explore their connection to emerging economic issues, particularly ESG concerns. ESG factors have gained significant attention, but the impact on business and financial performance remains inconclusive, especially in the banking sector. Existing literature presents mixed findings, and unlike other industries, the banking sector lacks consistent results for both developed and emerging markets. This gap limits decision-making for business strategists and investors regarding the integration of ESG issues in banking. This paper aims to address this gap by providing empirical evidence on the impact of ESG factors on bank performance in both market types. The study will examine ESG factors collectively and individually, assessing their impact in developed and emerging markets, and compare ESG performance between these markets. The following hypothesis is developed based on this objective:

Hypothesis:

- 1a. The combined ESG performance has a significant positive impact on the bank performance in developed markets.
- 1b. The combined ESG performance has a significant positive impact on the bank performance in emerging markets.
- 2a. There is a significant positive relationship between individual ESG factors and bank performance in developed markets.
- 2a. There is a significant positive relationship between individual ESG factors and bank performance in emerging markets.

3. DATA AND METHODOLOGY

3.1. Data source and sample

ESG data and company financials were collected from Refinitiv Eikon, which compiles ESG data using verifiable and publicly available information. This data considers various components with different weights across industries, and performance scores are allocated across three main ESG pillars: environmental, social, and governance. In this study, we gathered the data as individual pillar scores and also considered the combined ESG performance score for banks, as defined by Refinitiv Eikon. To analyze the impact of ESG on bank performance, we collected financial data from Refinitiv Eikon and performed necessary calculations as preparation for the analysis.

The study focuses on the impact of ESG factors on bank performance in both emerging and developed markets. The sample includes 114 banks from developed markets and 106 from emerging markets, covering a 10-year period from 2012 to 2021. The data, structured as panel data, consists of 1,140 observations for developed markets and 1,060 for emerging markets. Although data was initially collected from 2007, missing ESG data led to reducing the period to 10 years for banks that met sampling criteria. The selected banks are incorporated and operate in countries classified as developed or emerging markets by the MSCI 2021 classification. Both public and private banks were included.

Table 1. MSCI country classification 2021

Developed Markets		Emerging Markets	
Country n = 22	Number of Banks n = 114	Country n = 23	Number of Banks n = 106
Australia	5	Brazil	4
Austria	1	Chile	3
Belgium	1	China	8
Canada	7	Colombia	2
Denmark	2	Czech Republic	1
Finland	1	Egypt	2
France	3	Greece	4
Germany	2	Hungary	1
Hong Kong	2	India	10
Ireland	3	Indonesia	3
Israel	4	Kuwait	3
Italy	6	Malaysia	7
Japan	20	Mexico	2
Netherlands	1	Philippines	4
Norway	1	Poland	8
Portugal	1	Qatar	5
Singapore	3	Saudi Arabia	5
Spain	5	South Africa	4
Sweden	3	South Korea	6
Switzerland	2	Taiwan	8
United Kingdom	7	Thailand	6
United States	34	Turkey	6
		United Arab Emirates	4

Source: MSCI country classification 2021

3.1.1 Dependent Variable

Several studies, such as Buallay (2019), have explored the impact of ESG factors on firm or bank performance, utilizing indicators like return on equity (ROE) for financial performance, return on assets (ROA) for operational performance, and Tobin's Q for market-based performance. In line with these studies, this paper uses return on equity (ROE) as the dependent variable to assess the financial performance of banks. ROE serves as a proxy to determine whether ESG factors influence bank performance in both developed and emerging markets.

3.1.2. Independent Variables

The primary explanatory variables in this study are ESG factors, analyzed both as combined scores and individual pillars (Environmental, Social, and Governance) to better understand how each dimension of sustainability affects bank performance. The environmental pillar includes issues such as climate change, resource usage, and waste management, highlighting how these concerns influ-

ence banks. The social pillar focuses on human rights, employee welfare, and community well-being, further impacting bank performance. Governance issues, such as management structure, board composition, and corporate practices, are also increasingly relevant to ESG-conscious stakeholders. To measure the impact of these ESG pillars, scores ranging from 0 to 100 are obtained from the Refinitiv Eikon database. Additionally, a combined ESG performance score from Refinitiv Eikon will be used in this study, following the methodology of Pham et al. (2022). ESG controversies, which Refinitiv defines as involvement in environmental, social, or governance scandals, will also be included as an explanatory variable.

As noted by Ersoy (2022) and Refinitiv (2022), ESG factors have a lagging effect on financial performance, with lasting impacts observed in subsequent years. Thus, ESG scores from 2012–2021 will be used, while bank financial data will span 2013–2022. This lag structure provides more accurate results by accounting for the delayed effects of ESG initiatives. Studies like Balatbat (2021) have examined ESG factors both with and without a lag, yielding similar findings on their positive impact on performance. This study contributes to the literature by comparing the effects of ESG factors with and without a lag.

3.1.3 Control Variables

This study also includes five control variables to account for variations in ROE that ESG factors do not explain. These control variables are drawn from the CAMELS framework, which measures bank performance. They include the capital adequacy ratio (CAR), liquidity asset ratio, non-performing loans, logarithm of total assets, and provision for loan losses. A detailed description of these variables is provided in Table 2. The study analyzes two scenarios: one with lagged ESG and control variables, following the methodology of Naeem & Cankaya (2022) and Ersoy et al. (2022), and another without a lag, in line with Kolisch (2015), who studied CSR's impact on financial performance in the USA and Germany.

Table 2. Summary of Variables

Variable	Description and Formulas	References
Dependent Variable: Company financials from Refinitiv Eikon.		
Return of Equity (ROE)	A proxy representing the measure of the banks' performance. Formula: Net Income / Total Equity	Buallay (2019), as cited by Junius et al (2020)
Independent Variables: Refinitiv Eikon ESG Scores.		
ESG Combined (ESG_COM)	Represents the aggregate ESG performance of firms based on the publicly reported data. The score collectively considers the environmental, social and governance issues.	Refinitiv, 2022 Buallay (2019) as cited in Junius (2020)
Environmental (ENV)	The score represents sustainable performance regarding environmental issues, resource use, emission, and innovation. Example, pollution control and prevention.	Refinitiv report 2022 Pham et al (2022)
Social (SOC)	A representative measure of the relationship of companies to communities, workforce. And the consideration of human rights and product responsibility.	Refinitiv report, 2022 Buallay (2019), Almeyda & Darmansyah (2019)

Governance (GOV)	A measure of the disclosure and performance of banks' corporate social responsibility strategies, management, and shareholders.	Refinitiv report, 2022 Almeyda & Darmansyah (2019)
ESG controversy (ESG_CON)	A measure of the impact of scandalous events and or nature of the business on environmental, social and governance issues.	Refinitiv report, 2022 Carmine De Franco (2019)
Control Variables: Company financials from Refinitiv Eikon.		
Capital Adequacy Ratio (CAR)	A broad representation of the quality of capital which at-tests to the level of solvency and adherence to minimum capital benchmarks by regulators. Formula: (Tier 1 capital + Tier 2 capital)/ Total risk-weighted assets.	Gonen & Scholtens (2019) Menicucci & Paolucci (2022) Lin et al (2020)
Liquidity Assets Ratio (LAR)	The ratio represents a measure of liquidity. Formula: (Cash and due from banks + other earnings assets)/ Total Assets	Nizam et al (2019) as cited by Menicucci & Paolucci (2022)
Non-Performing Loan ratio (NPL)	A proportion of the loans default to the total loans of banks. Formula: Non-performing loans are divided by total loans.	Gonenc & Scholtens (2019)
Total Assets (LN_TA)	A measure to capture the effect of the bank size obtained by computing the natural logarithm of total assets. Formula: LN (Total Assets)	Cankaya & Naeem (2022), Lin et al (2020)
Provision for Loan Losses ratio (PLL)	A measure of the reserves by banks to account for potential losses from default loans. Formula: Loan Losses Provision/ Total Loans	Nugroho et al. (2020)

Source: Compiled by authors

3.2. Methodology

This study uses a panel regression analysis model to assess whether ESG factors significantly impact the performance of banks in developed and emerging markets. This approach has been employed in prior studies, such as Menicucci and Paolucci (2022), to explore the relationship between these variables. As previously mentioned, ESG factors are believed to have a lagging effect on performance, so the study incorporates a model with 1-year lagged ESG factors and control variables. Additionally, a second model will analyze the ESG and control variables without a lag, based on the premise that investments or costs incurred in a given year to enhance ESG performance might negatively impact financial performance in the same period, particularly if significant events occur early in the year. The model without the lag effect will be presented in the appendix and compared with the findings from the lagged model. The primary model of this study focuses on the lagging effect of ESG in both developed and emerging markets, and the results will inform the hypothesis testing. Thus, this study applies these models consistently across both market categories.

Model with 1-year lag ($t - 1$)

$$ROE_{it} = \beta_0 + \beta_1 ESG_COM_{it-1} + \beta_2 CAR_{it-1} + \beta_3 LAR_{it-1} + \beta_4 NPL_{it-1} + \beta_5 LN_TA_{it-1} + \beta_6 PLL_{it-1} + \epsilon_{it-1} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 ENV_{it-1} + \beta_2 SOC_{it-1} + \beta_3 GOV_{it-1} + \beta_4 ESG_CON_{it-1} + \beta_5 CAR_{it-1} + \beta_6 LAR_{it-1} + \beta_7 NPL_{it-1} + \beta_8 LN_TA_{it-1} + \beta_9 PLL_{it-1} + \epsilon_{it-1} \quad (2)$$

Model with no lag (t)

$$ROE_{it} = \beta_0 + \beta_1 ESG_COM_{it} + \beta_2 CAR_{it} + \beta_3 LAR_{it} + \beta_4 NPL_{it} + \beta_5 LN_TA_{it} + \beta_6 PLL_{it} + \epsilon_{it} \quad (3)$$

$$ROE_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_4 ESG_CON_{it} + \beta_5 CAR_{it} + \beta_6 LAR_{it} + \beta_7 NPL_{it} + \beta_8 LN_TA_{it} + \beta_9 PLL_{it} + \epsilon_{it} \quad (4)$$

As indicated in Table 2, with a summary of variables, ROE_{it} represents the bank performance at period t which is the dependent variable. The ESG_COM_{it-1} , ENV_{it-1} , SOC_{it-1} , GOV_{it-1} , ESG_CON_{it-1} represents the ESG scores at period $t - 1$, which are the explanatory variables in this study. Moreso, CAR_{it-1} , LAR_{it-1} , NPL_{it-1} , LN_TA_{it-1} , PLL_{it-1} represents the control variables. Finally, ϵ_{t-1} denotes the error at period t . The same description also applies for variables in model 2, where the period t is considered for each firm.

4. Empirical Findings and Discussions

4.1. Descriptive statistics

Tables 3. and 4. present the descriptive statistics for all variables used in this study, for developed and emerging markets, respectively. Table 3.1 shows that the combined ESG scores in developed countries range from 4.1 to 89.98, with a mean of 48.82 and a median of 49.45, indicating significant variation in ESG performance. The individual ESG pillars also show wide variation, especially in the social, governance, and ESG controversy categories. The Environmental pillar has a higher minimum score of 15.26, suggesting more emphasis on environmental sustainability.

Table 3.2 shows that the combined ESG scores for emerging markets have a slightly higher mean of 51.75 and median of 52.35. Despite the advanced economies of developed countries, both regions show similar variation in pillar scores, indicating comparable attention to sustainability.

Both tables reveal that capital adequacy ratios are similar for both developed (0.152) and emerging markets (0.157). However, both markets have minimum ratios below the 8% Basel II benchmark, suggesting some banks do not meet international capital requirements. Liquidity ratios, provisions for loan losses (PLL), and non-performing loans (NPL) show similar patterns, with emerging markets exhibiting a higher maximum value for NPL, supporting the assumption of increased default risk

Table 3. Descriptive Statistics: Developed Markets

Variable	Number of observations	Min	Max	Mean	Median	Standard Deviation
ROE	1040	-0.8827	0.4825	0.07772106	0.0805	0.07990735
ESG Combined	1040	4.1	89.98	48.81577	49.45	19.06606
Environmental	1040	15.26	94.3	53.34288	58.025	29.8526
Social	1040	0.93	97.64	54.3723	56.885	25.03352
Governance	1040	5.8	97	57.23276	58.91	22.93708
ESG Controversy	1040	0.49	100	79.97978	100	32.2098

Capital Adequacy Ratio	1040	0.076	0.541	0.1628285	0.152	0.04884232
Liquidity Asset Ratio	1040	0.7127	1.05257	0.9427646	0.9562031	0.04509528
NPL	1040	0	0.4646	0.03241923	0.0173	0.04840441
Total Assets	1040	15.66	26.5417	19.899919	19.83165	2.302351
PLL	1040	0.0132	0.0548	0.03815673	0.0019	0.006384904

Calculations by authors.

Table 4. Descriptive Statistics: Emerging Markets

Variable	Number of observations	Min	Max	Mean	Median	Standard Deviation
ROE	1010	-2.257	0.9814	11.60323	0.1209	0.1285982
ESG Combined	1010	6.72	91.78	51.75414	52.35	19.01634
Environmental	1010	0	97.66	47.86031	52.075	25.58908
Social	1010	2.46	98.61	54.15709	56.055	23.93347
Governance	1010	0.47	95.77	55.07896	59.105	22.37514
ESG Controversy	1010	8.48	100	93.67819	100	17.38397
Capital Adequacy Ratio	1010	0.061	0.4277	0.1596801	0.1576	0.03174095
Liquidity Asset Ratio	1010	0.6867035	0.9903586	0.9506039	0.9580407	0.03141434
NPL	1010	0.0006	0.6407	0.04822531	0.0265	0.07753295
Total Assets	1010	0.1403825	0.2803881	0.2094684	0.2072863	0.02709706
PLL	1010	0.0218	0.2039	0.01297099	0.00855	0.01539431

Source: Compiled by authors

4.2. Correlations

As shown in Table 5. for developed countries, all three individual ESG pillars are strongly and positively correlated with the combined ESG score, as expected. However, ESG controversy is negatively correlated with the individual ESG scores (Environmental, Social, and Governance), indicating that higher ESG controversies lead to lower ESG performance. Similar results are observed for ESG factors in emerging markets, as shown in Table 6.

ROE shows a strong positive correlation with both the combined ESG score (0.1335***, $p < 0.01$) and the Governance factor (0.1720***, $p < 0.01$) in developed countries, suggesting that banks with higher ESG performance, particularly in governance, tend to perform better financially. However, the matrix also reveals that high performance in environmental issues correlates with decreased bank performance (-0.0871***, $p < 0.01$). Unexpectedly, ESG controversy correlates positively with ROE, meaning banks with high ESG controversies perform better, likely due to a profit-focused approach, as supported by shareholder theory.

In contrast, for emerging markets (Table 7.), ROE shows a strong negative correlation with the social pillar, unlike developed markets where no correlation is found. This inverse relationship suggests that focusing on social issues may negatively impact ROE. ESG controversy also correlates positively with ROE in emerging markets.

Table 5. Correlation between ESG scores and bank factors: Developing Markets

	ESG Combined	Environmental	Social	Governance	ESG Controversy
ESG Combined	1				
Environmental	0.6043***	1			
Social	0.788***	0.7191***	1		
Governance	0.6855***	0.4891***	0.5501***	1	
ESG Controversy	0.0025	- 0.4568***	- 0.4695***	- 0.3301***	1
ROE	0.1335***	- 0.0871***	0.0432	0.1720***	0.0858***
Capital Adequacy Ratio	0.0547	0.0913***	0.0807***	0.0858***	- 0.0789
Liquidity Asset Ratio	- 0.1396***	- 0.1096***	- 0.1285***	- 0.1994***	0.1122***
NPL	0.1930	0.1529***	0.0707	- 0.1561***	- 0.0007
Total Assets	0.0026	0.3312***	0.0177	0.1519***	- 0.2111***
PLL	0.1154***	0.1423***	0.1485***	0.0322	- 0.0780

Source: Calculations by authors. Significance level *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6. Correlation between bank factors: Developing Markets

	ROE	Capital Adequacy Ratio	Liquidity Asset Ratio	NPL	Total Assets	PLL
ROE	1					
Capital Adequacy Ratio	0.0341	1				
Liquidity Asset Ratio	- 0.1061***	- 0.2230***	1			
NPL	- 0.5310***	- 0.0830***	0.0245	1		
Total Assets	- 0.0363	0.0168	0.0495	- 0.1271***	1	
PLL	- 0.4526	- 0.0903	- 0.0633	0.5755***	- 0.1415***	1

Source: Calculations by authors. Significance level *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7. Correlation between ESG scores and bank factors: Emerging Markets

	ESG Combined	Environmental	Social	Governance	ESG Controversy
ESG Combined	1				
Environmental	0.6760***	1			
Social	0.8798***	0.6871***	1		
Governance	0.6630***	0.2129***	0.3427***	1	
ESG Controversy	0.0951***	- 0.0997***	- 0.1189***	0.1324***	1
ROE	- 0.0577	- 0.0279	- 0.0708**	- 0.0537	0.0635**
Capital Adequacy Ratio	0.1525***	- 0.0774**	0.0959***	0.1925***	0.1056***
Liquidity Asset Ratio	- 0.1533***	- 0.15908***	- 0.1428***	- 0.1320***	0.0623**
NPL	0.0831***	0.1342***	0.0704**	0.0525*	- 0.0608*
Total Assets	0.2217***	0.0650**	0.2090***	0.1933***	0.0223
PLL	0.1691***	0.2325***	0.2168***	0.0285	- 0.1808***

Source: Calculations by authors. Significance level *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8. Correlation between bank factors: Emerging Markets

	ROE	Capital Adequacy Ratio	Liquidity Asset Ratio	NPL	Total Assets	PLL
ROE	1					
Capital Adequacy Ratio	0.0203	1				
Liquidity Asset Ratio	0.1589***	0.1267***	1			
NPL	- 0.1298***	- 0.0176	- 0.3010***	1		
Total Assets	0.0466	0.1789***	- 0.0136	- 0.0875***	1	
PLL	- 0.2236***	- 0.0134	- 0.3085***	0.3245***	- 0.0165	1

Source: Compiled by authors. Significance level *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$,

4.3. Multicollinearity Test

As shown in the tables above, correlations between explanatory variables suggest potential multicollinearity, which could affect the regression results. To assess its impact, we computed Variance Inflation Factors (VIF), as shown in Table 5. Desirable VIF values range between 1 and 10, indicating reliable results without multicollinearity distortion. Table 9 reveals that VIF values fall within this range, suggesting that the observed correlations will not impact the models for both developed and emerging markets.

Table 9. Multicollinearity Test: Variance Inflation Factor (VIF).

Variables	Developed Markets		Emerging Markets	
	VIF	VIF	VIF	VIF
ESG Combined	1.55	-	1.21	-
Environmental	-	2.88	-	2.02
Social	-	2.81	-	2.22
Governance	-	1.64	-	1.24
ESG Controversy	-	1.38	-	1.08
Capital Adequacy Ratio	1.07	1.07	1.13	1.13
Liquidity Assets Ratio	1.08	1.11	1.20	1.22
NPL	1.51	1.68	1.31	1.20
Total Assets	1.03	1.39	1.29	1.11
PLL	1.55	1.57	1.20	1.26
Mean VIF	1.21	1.73	1.23	1.39

Source: Calculations by authors.

4.4. Causality

Table 10 presents the panel causality test to determine the direction of the panel regression model. The hypothesis tests whether ESG factors cause a change in ROE. We used the Pairwise Dumitrescu Hurlin Panel Causality Test, as proposed by Dumitrescu (2012), considering heteroskedasticity and multicollinearity. The p-values are less than 0.05 ($p < 0.05$) for both developed and emerging markets, leading to the rejection of the null hypothesis. This implies that ESG factors influence ROE, making ROE the dependent variable and ESG pillars the independent variable in this study.

Table 10. Direction of Causality: Pairwise Dumitrescu Hurlin Panel Causality Test

Null Hypothesis		W-stats	p-value
Developed Markets	ESG factors does not homogeneously cause ROE	2.90394	0.00002 ***
Emerging Markets	ESG factors does not homogeneously cause ROE	3.10162	0.00001 ***

Source: Calculations by authors.

4.5. Hausman

We conducted a Hausman Test to determine the appropriate model for our study, as shown in Table 11. The test helps decide between a random effect model, which assumes zero covariance between independent variables and uncaptured variables, and a fixed effect model, which assumes nonzero covariance. The null hypothesis suggests the random effect model is appropriate. However, as all p-values were less than 0.05 ($p < 0.05$) for both developed and emerging markets, we reject the null hypothesis. Therefore, the fixed effect model is deemed appropriate, and we proceeded with a panel multiple regression using the fixed effect model.

Table 11. Hausman Test

	Model	Chi-square value	p-value	Model
Developing Markets	ESG Combined	111.6	0.0000	Fixed effect
	Individual ESG Pillars	123.03	0.0000	Fixed effect
Emerging Markets	ESG combined	62.97	0.0000	Fixed effect
	Individual ESG Pillars	51.37	0.0000	Fixed effect

Source: Calculations by authors.

4.6. Regression results

Table 12 presents the results of a multiple panel regression model utilizing the Driscoll and Kraay standard error approach, addressing diagnostic issues identified in the fixed effect model, such as heteroskedasticity, serial correlation, and cross-sectional dependence (Özdemir, 2019). The results of Model 1.1 DM in Table 12 show that the combined ESG factors have a significant positive impact on ROE for banks in developed markets, with a coefficient of 0.0411 and $p < 0.01$. This finding suggests that improvements in ESG performance can be strategically leveraged by banks to enhance their performance, supporting previous findings by Buallay (2019), who also reported a positive impact of ESG on bank performance. In contrast, the ESG combined factor does not significantly affect bank performance in emerging markets, as shown by Model 1.1 EM. These mixed results align with Janah & Sassi (2021), who noted limited studies on ESG's impact in emerging markets, with most studies reporting a positive effect, contrary to the findings of this study. Interestingly, the effects of ESG combined factors on bank performance in both developed and emerging markets remain consistent whether the lagging effect is considered or not, as shown in Table 13. This supports the notion that current ESG scores (t) influence current performance (t).

Moreover, individual ESG pillars exhibit varying impacts on bank performance in both developed and emerging markets. Model 1.2 DM shows that the Environmental and Social pillars have a significant positive impact on ROE for banks in developed markets, with coefficients of 2.0873, $p < 0.01$, and 0.0410, $p < 0.1$, respectively. This suggests that banks can enhance performance by improving their environmental and social reputations, either through direct actions or by financing ESG-related projects. However, the Governance pillar does not show a significant impact, while the ESG controversy has a positive effect on ROE in developed markets, with a coefficient of 0.0214, $p < 0.01$. This indicates that banks with higher ESG controversy scores may achieve higher returns by focusing primarily on maximizing shareholder value, consistent with Friedman's (1970) shareholder theory. The same results were observed in emerging markets, suggesting a universal trend where banks with ESG controversies can benefit from prioritizing shareholders' value, even at the expense of other stakeholders.

In Model 1.2 EM, it is shown that the Governance pillar has a significant negative impact on ROE for banks in emerging markets, with a coefficient of -0.0197292, $p < 0.1$, while no significant impact is found in developed markets. The inverse relationship indicates that banks in emerging markets may experience a negative effect on performance when trying to improve their governance scores. Additionally, Environmental and Social factors do not have a significant impact on performance in emerging markets. These findings partially align with Buallay (2019), who reported that Environmental and Social factors positively affected bank performance in European markets, while the Governance pillar had a negative impact, contrary to the finding in this study where Governance showed no impact in developed markets. In contrast, other studies like Miralles-Quirós et al. (2019) found that only the Governance pillar impacted bank performance in developed markets, differing from the results of this study. In emerging markets, Miralles-Quirós et al. found significant positive impacts of Environmental and Governance factors, while Social issues negatively impacted performance, whereas this study found no significance for the Environmental and Social pillars.

Furthermore, the results for individual ESG factors in developed markets with a lagging effect, as shown in Table 8.1, align with the models without a lagging effect presented in Table 8.2. This consistency suggests that the impact of ESG factors is not confined to subsequent years, as would be expected with the lagging effect theory. Additionally, for emerging markets, the Governance pillar shows a similar negative significant impact, with coefficients of -0.0197292, $p < 0.1$ for the lagging effect and -0.07414, $p < 0.05$ without the lagging effect. This indicates that initiatives towards governance issues can affect performance both in the current period and in subsequent years. Table 8.2 also reveals that Social factors in emerging markets only show a significant negative impact if the lagging effect is not considered, implying that efforts to improve social reputations instantly harm bank performance.

These findings provide new insights into the complex relationship between ESG factors and bank performance in both developed and emerging markets, indicating the importance of considering the type of ESG factor and the time lag in assessing their effects on ROE. The observed contradictions

with previous studies highlight the need for further research into the impact of ESG on bank performance across different regions and time periods.

Table 12. Panel regression analysis: ESG and bank factors (t - 1)

Dependent Variable	Developed Markets.				Emerging Markets			
	ROE		ROE		ROE		ROE	
	Model 1.1 DM		Model 1.2 MD		Model 1.1 EM		Model 1.2 EM	
	Coefficient (p-value)	Standard Error	Coefficient (p-value)	Standard error	Coefficient (p-value)	Standard Error	Coefficient (p-value)	Standard Error
ESG Combined	0.0411283 (0.016) ***	0.0134766	-	-	0.002569 (0.948)	0.0383206	-	-
Environmental	-	-	2.087375 (0.000) ***	0.2800968	-	-	-0.005479 (0.360)	0.0087997
Social	-	-	0.0410269 (0.096) *	0.02177	-	-	0.0067674 (0.824)	0.029407
Governance	-	-	0.0063793 (0.644)	0.0132907	-	-	-0.0197292 (0.082) *	0.0099126
ESG Controversy	-	-	0.0214317 (0.007) ***	0.005925	-	-	0.0211454 (0.091) *	0.011011
Capital Adequacy Ratio	-0.21733154 (0.003) ***	0.0536527	-0.2184661 (0.009) ***	0.0630687	-0.3191073 (0.177)	0.2154496	0.3209351 (0.182)	0.2193889
Liquidity Asset Ratio	-0.1729894 (0.003) ***	0.042308	-0.1794212 (0.006) ***	0.0483549	0.2280537 (0.185)	0.1573289	0.2161716 (0.209)	0.1582659
NPL	0.083856 (0.460)	0.1079648	0.0899132 (0.465)	0.117258	-0.6504584 (0.361)	0.6717799	-0.6499439 (0.361)	0.671008
Total Assets	-3.927231 (0.000) ***	0.4846618	-4.263259 (0.001) ***	0.8448698	-4.989936 (0.001) ***	0.9791662	-4.737943 (0.001) ***	0.9092565
PLL	-8.038098 (0.000) ***	0.7854447	-8.0079 (0.000) ***	0.7459876	-2.976107 (0.022) **	1.051982	-2.953522 (0.022) **	1.036844
Constant	106.3752 (0.000) ***	8.765675	-	-	105.763 (0.004) ***	26.80678	100.877 (0.003) ***	24.68099
F-statistic	55.67 (0.000) ***		115.25 (0.000) ***		122.04 (0.000) ***		141.61 (0.000) ***	
R-Squared	0.4772		0.4832		0.1836		0.1848	

Source: Calculations by authors.

Table 12 illustrates the relationship between control variables and bank performance. In Model 1.1 DM, the capital adequacy ratio (CAR) has a significant negative impact on ROE for banks in developed markets, with a coefficient of -0.21733 ($p < 0.01$). However, no significant impact of CAR is observed for banks in emerging markets. This inverse relationship in developed markets contradicts studies like Shabani et al. (2019), which found CAR to positively affect bank performance. The study suggests that banks should aim to meet regulatory benchmarks without exceeding them, as excess capital may harm performance. Table 13 reveals that without considering the lagging effect, CAR does not significantly impact ROE in either developed or emerging markets, aligning with Menicucci & Paolucci (2022) who reported similar findings for Italian banks.

Further analysis in Model 1.1 MD shows that a 1-year lag in liquidity ratio significantly negatively affects ROE in developed markets (coefficient: -0.17299, $p < 0.01$), but no impact is observed in emerging markets. This supports Ongore & Kusa (2013), who found liquidity to have no impact on bank performance in Kenya. The negative impact of liquidity in developed markets is also consistent with Menicucci & Paolucci (2022). Without the lagging effect, liquidity has no significant impact on ROE for banks in either market, and in developed countries, high liquidity in the previous year adversely affects performance in the subsequent year, indicating that excessive liquidity can hurt bank performance.

The results also indicate that the size of banks, measured by the logarithm of total assets, has a significant negative impact on ROE in both developed and emerging markets. This contradicts the common belief that larger banks perform better due to better access to resources. Similar negative results are observed when the lagging effect is not considered, aligning with Buallay (2019), who found a positive impact of bank size on performance in the European region.

In terms of provisions for loan losses (PLL), Table 12 shows a strong negative impact on ROE for banks in both developed markets (-8.0381, $p < 0.01$) and emerging markets (-2.953522, $p < 0.05$). This suggests that banks with lower provisions for loan losses tend to perform better, indicating confidence in asset quality. The negative impact of PLL remains consistent even without considering the lagging effect, reinforcing its universal influence on ROE across time periods.

Finally, the non-performing loans (NPL) variable has no significant impact on bank performance in either developed or emerging markets. This suggests that bank performance is not significantly tied to loan performance, highlighting that other factors play a role in shaping a bank's financial outcomes. These results indicate the complexity of factors influencing bank performance, with varying impacts across different market types.

4.7. Robustness Test

To ascertain the findings of this research, a robustness test was conducted to address potential deviations in model assumptions. This involved performing separate regressions for each ESG pillar, unlike the model in Table 12 where all three pillars were combined. The results of this test are shown in Tables 14 and 15 in the appendix. The test was motivated by concerns that including all pillars in one model might lead to confounding effects, distorting the impact of each individual factor. Additionally, the control variables NPL and PLL were considered separately to avoid absorption effects. Following the CAMELS framework, PLL is determined based on asset quality, particularly non-performing loans. To account for possible misspecification, a 1-year lag of ROE was added. The robustness test showed similar results for all individual ESG pillars in both developed and emerging markets, confirming the robustness of the study's conclusions under varying assumptions.

5. CONCLUSIONS

The growing interest in Environmental, Social, and Governance (ESG) factors among investors, academics, and stakeholders has led to numerous studies exploring their influence on business performance across industries. However, evidence regarding ESG's impact in the banking sector remains limited and mixed, motivating this research. This study investigates the effect of ESG pillars on Return on Equity (ROE), a key performance measure, in developed and emerging markets to examine how ESG factors interact with bank performance in distinct contexts. ESG scores and financial data were sourced from the Refinitiv database, and panel regression was applied for analysis.

The results reveal that ESG combined has a significant positive effect on bank performance in developed markets but not in emerging markets, both with and without lagging effects. This indicates that as an aggregate sustainability measure, ESG's benefits are more pronounced in developed markets, likely due to heightened stakeholder awareness of sustainability issues, prompting banks to adopt reputation-enhancing initiatives. Analyzing individual ESG pillars, environmental and social factors positively influence ROE for banks in developed markets. Conversely, in emerging markets, only the governance pillar significantly affects ROE, but the impact is negative. This supports stakeholder theory, which suggests businesses that prioritize diverse stakeholder needs perform better long-term. In developed markets, banks addressing environmental concerns like climate change and resource use through ESG-oriented financing tend to show stronger financial performance.

In contrast, the negative governance impact in emerging markets aligns with shareholder theory, emphasizing profit maximization at the expense of broader considerations. Furthermore, ESG controversies positively impact ROE in both markets, suggesting banks embroiled in controversies may focus on profit maximization, enhancing performance. With lagging effects, results in developed markets remain consistent. However, in emerging markets, social issues negatively affect ROE without lagging effects, implying short-term harm from current social initiatives, which again aligns with shareholder theory prioritizing immediate profit.

The study highlights the importance of banks balancing ESG initiatives to benefit stakeholders while maintaining financial performance, especially in developed markets where ESG significantly influences outcomes. However, the research has limitations, including a small sample size that may not fully represent banks in developed and emerging markets, and the lack of exploration of regional ESG performance variations. Future studies could examine integrating ESG into emerging market banking and the role of cultural differences in shaping ESG performance across regions. These findings underscore the nuanced relationship between ESG and bank performance, emphasizing that context and stakeholder awareness play critical roles in determining the impact of sustainability efforts.

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6. APPENDIX

Table 13. Panel regression analysis: ESG and bank factors (t)

Dependent Variable	Developed Markets.				Emerging Markets			
	ROE		ROE		ROE		ROE	
	Model 2. DM		Model 2. MD		Model 2. EM		Model 2. EM	
	Coefficient (p-value)	Standard Error	Coefficient (p-value)	Standard error	Coefficient (p-value)	Standard Error	Coefficient (p-value)	Standard Error
ESG Combined	0.030592 (0.008) ***	0.008927	-	-	-0.0665812 (0.000) ***	0.0117149	-	-
Environmental	-	-	1.874891 (0.018) **	0.6482953	-	-	0.0178024 (0.424)	0.02127
Social	-	-	0.0503231 (0.040) **	0.0209411	-	-	-0.0347559 (0.040) **	0.0145073
Governance	-	-	-0.0158816 (0.276)	0.0136966	-	-	-0.0741353 (0.038) **	0.0305096
ESG Controversy	-	-	0.0175349 (0.007) ***	0.0050242	-	-	-0.002169 (0.942)	0.0288162
Capital Adequacy Ratio	0.0043698 (0.963)	0.0927607	-0.0033522 (0.969)	0.0840248	0.4397543 (0.183)	0.3050144	-0.4236904 (0.212)	0.3154791
Liquidity Asset Ratio	-0.0062488 (0.931)	0.0704493	-0.0086768 (0.895)	0.0640386	0.5823041 (0.035) **	0.2353538	0.5571856 (0.035) **	0.2242986
NPL	-0.0563122 (0.566)	0.0945635	-0.0638186 (0.475)	0.0856194	0.047106 (0.912)	0.4146646	0.0529923 (0.901)	0.4130244
Total Assets	-4.179023 (0.012) **	1.332866	-4.598731 (0.025) **	1.711964	-2.150422 (0.019) **	0.7498211	-2.035848 (0.064) *	0.9635732
PLL	-7.602368 (0.000) ***	0.7259272	-7.545563 (0.000) ***	0.7109205	-2.899055 (0.029) **	1.113662	-2.900122 (0.026) **	1.086306
Constant	93.03924 (0.009) ***	27.96814			15.29477 (0.283)	13.40616	16.86994 (0.192)	11.9711
F-statistic		134.72 (0.000) ***		80439.64 (0.000) ***		260.44 (0.000) ***		949.689 (0.000) ***
R-Squared		0.4361		0.4424		0.1301		0.1350

Sources: Calculations by authors.

Table14. Robustness Test - Panel regression analysis: ESG and bank factors

Developed Markets						
ROE						
	RM1		RM2		RM3	
<i>Dependent Variable</i>	<i>Coefficient (p-value)</i>	<i>Standard Error</i>	<i>Coefficient (p-value)</i>	<i>Standard error</i>	<i>Coefficient (p-value)</i>	<i>Standard Error</i>
Environmental	1.514168 (0.001) ***	.2916203	-	-	-	-
Social	-	-	0.0406464 (0.069) *	0.0193571	-	-
Governance	-	-	-	-	0.008222 (0.598)	.0149584
ROE (t – 1)	- 0.0604098 (0.479)	.0812989	- 0.0708462 (0.411)	0.0816918	- 0.0609441 (0.471)	.08061
Capital Adequacy Ratio	- 0.0666833 (0.387)	.0729131	- 0.1031714 (0.207)	0.075101	- 0.0697512 (0.372)	.0737327
Liquidity Asset Ratio	0.038914 (0.521)	.0580365	.04288 (0.490)	0.0592115	0.0383809 (0.539)	.0598032
Total Assets	-3.631313 (0.001) ***	.6717946	-4.799684 (0.003) ***	1.10884	-3.768001 (0.000) ***	.5636363
PLL	-7.904585 (0.000) ***	.8085656	-7.850683 (0.000) ***	0.7635694	-7.897457 (0.000) ***	.8100413
Constant	0	0	102.0991 (0.002) ***	23.40616	83.12454 (0.001) ***	14.89602
F-statistic	2727.59 (0.000) ***		77.43 (0.000) ***		161.53 (0.000) ***	
R-Squared	0.4666		0.4699		0.4669	

Sources: Calculations by authors.

Table 15. Robustness Test - Panel regression analysis: ESG and bank factors

Emerging Markets ROE						
	RM1		RM2		RM3	
<i>Dependent Variable</i>	<i>Coefficient (p-value)</i>	<i>Standard Error</i>	<i>Coefficient (p-value)</i>	<i>Standard Error</i>	<i>Coefficient (p-value)</i>	<i>Standard Error</i>
Environmental	- 0.0092519 (0.204)	0.0066958	-	-	-	-
Social	-	-	-0.0134169 (0.471)	0.0177462	-	-
Governance	-	-	-	-	- 0.0203076 (0.034) **	0.0079348
ROE (t – 1)	0.2530402 (0.050) *	0.1098667	0.2524468 (0.051) *	0.1098983	0.2508749 (0.053) **	0.1103282
Capital Adequacy Ratio	0.1944578 (0.492)	0.2698121	0.2101499 (0.448)	0.263617	0.2018728 (0.474)	0.2687057
Liquidity Asset Ratio	0.3848271 (0.061) *	0.1765439	0.3869427 (0.058) *	0.1748051	0.3863315 (0.060) *	0.1761352
Total Assets	-5.015571 (0.004) ***	1.272679	- 4.820328 (0.007) ***	1.339211	-4.938134 (0.004) ***	1.213594
PLL	-2.771952 (0.022) **	0.97848	-2.780237 (0.022) **	0.9779761	-2.777699 (0.022) **	.977235
Constant	77.29206 (0.013) **	24.33519	73.04469 (0.018) **	24.52295	76.11288 (0.010) **	22.57684
F-statistic		26.61 (0.000) ***		25.72 (0.000) ***		153.77 (0.000) **
R-Squared		0.2130		0.2131		0.2134

Sources: Calculations by authors.