# The nexus of sustainable development, blue financing, digitalization, and financial intermediation


## Abstract

Financial intermediaries are essential for advancing circular and blue economies by providing critical financial support to sustainable ventures. However, sustainability efforts may lack persistence without appropriate incentives. This paper aims to investigate the impact of lending to blue and sustainable firms, as well as increased digitalization, on the performance of the banking sector. Using a comprehensive sample of banks from twenty-seven member states of the European Union over 11 years, our findings reveal a positive association between banking performance and blue lending, sustainable credit, and digitalization. Specifically, we observe that an increase in banks' financing to blue and other sustainable firms, along with higher investments in digitalization, leads to a rise in the net interest margin. Similarly, the solvency risk will be reduced when the exposure to sustainable firms is higher. Likewise, investment in digitalization will lower banking risks. These empirical results manifest significant implications for sustainable development, blue economy firms, and the banking sector at large.



**Keywords:** Blue Economy, Sustainable Development, Digitalization, Banking Performance

## 1. Introduction

Sustainable development is a global priority that requires addressing environmental, social, and economic challenges (Naqvi et al., 2023). Financing sustainable development is a significant challenge due to the need for significant investment in long-term projects that may not yield immediate returns and the inherent risks and uncertainties that these projects may entail (Shan et al., 2022). Financial intermediaries can play a crucial role in supporting sustainable development by providing financing for projects and businesses that contribute to sustainable development goals.

Banks can support sustainable development by providing long-term financing and expertise in risk management to mitigate risks associated with sustainable development projects (Lv et al., 2023). For instance, banks can provide financing for renewable energy projects that are essential for reducing carbon emissions and mitigating climate change (Guo et al., 2022). In doing so, banks can help accelerate the transition to a low-carbon economy. Banks can also promote sustainable agriculture and forestry by financing projects that reduce deforestation, promote biodiversity, and support local communities. Sustainable agriculture practices such as organic farming, crop rotation, and reduced use of pesticides and fertilizers, can be supported by banks (Rizvi et al., 2022). Furthermore, reforestation and forest management projects can be financed by banks. Apart from environmental sustainability, banks can support social and economic sustainability by financing projects that promote access to education, healthcare, and affordable housing. Banks can also provide financing for small and medium-sized enterprises (SMEs) that contribute to job creation and economic development in local communities.

The Blue and the Circular Economy are interrelated concepts that share a common goal of promoting sustainable development. The Blue Economy refers to the sustainable use and management of ocean resources for economic growth, job creation, and improved livelihoods

while ensuring the health of marine ecosystems (Graziano et al., 2022). The Blue Economy encompasses a range of economic sectors that operate in or near the ocean, including fisheries and aquaculture, shipping and transportation, coastal tourism, renewable energy, biotechnology, marine mining, and marine conservation. These sectors have significant economic potential, with the potential to contribute to sustainable development while reducing their environmental impact (Choudhary et al., 2021).

The fisheries and aquaculture sector involves the harvesting of fish and other marine organisms for human consumption or other purposes such as feed or fertilizer. It also includes the cultivation of aquatic plants and animals in controlled environments such as fish farms. The sector provides jobs and livelihoods for millions of people worldwide and is a vital source of food for many coastal communities (Qi, 2022). However, overfishing, illegal fishing and unsustainable fishing practices can lead to the depletion of fish stocks and damage to marine ecosystems.

The shipping and transportation sector involves the movement of goods and people by sea, as well as the infrastructure and services that support maritime transport, such as ports, shipping lanes, and logistics. The sector is a significant contributor to global trade, with more than 90% of international trade being carried by sea. However, shipping also has significant environmental impacts, including air and water pollution, greenhouse gas emissions, and the accidental release of oil and other harmful substances. The coastal tourism sector encompasses activities related to recreation and tourism in coastal areas, such as beach resorts, water sports, and eco-tourism. The sector has significant economic potential, with tourism being a major source of revenue for many coastal communities. However, unregulated tourism can lead to environmental degradation, habitat loss, and the displacement of local communities (Zheng and Tian, 2021).

The renewable energy sector involves the use of ocean resources, such as tidal and wave energy, offshore wind, and ocean thermal energy conversion, to generate electricity and other forms of energy. The sector has the potential to reduce dependence on fossil fuels and contribute to the transition to a low-carbon economy. However, the deployment of renewable energy infrastructure can also have environmental impacts, such as noise pollution, disruption of marine habitats, and the risk of marine mammal entanglement (Li et al., 2022).

The biotechnology sector involves the use of marine organisms and their genetic material for research, medical applications, and the development of new products and materials. The sector has significant potential for developing new drugs, biomaterials, and other products that can contribute to human well-being. However, bioprospecting and the exploitation of marine genetic resources can raise ethical and environmental concerns, including the potential for biodiversity loss and the exploitation of indigenous and local communities (Thompson, 2022).

The marine mining sector involves the extraction of minerals and other resources from the seabed, such as oil, gas, and minerals. The sector has significant economic potential, but the extraction of these resources can have environmental impacts, including the destruction of marine habitats, the release of pollutants, and the disturbance of marine ecosystems. The marine conservation sector involves the protection and management of marine ecosystems and biodiversity, as well as the development of sustainable fishing practices and marine protected areas. This sector is crucial for maintaining the health and productivity of the ocean and preserving its ecological, economic, and social benefits. Marine conservation efforts include measures such as reducing fishing pressure, establishing marine protected areas, and reducing pollution. The gross value added in the EU by coastal tourism, maritime transport, and ocean energy are presented in figures 1 and 2 and we observe an increasing trend that indicates an increasing economic contribution over time.

[Figures 1 and 2 here]

The blue firms have gained significant attention in recent years as a means of promoting sustainable development and economic growth in ocean-based sectors. One of the key challenges facing firms operating in blue economies is limited access to finance, particularly for small and medium-sized enterprises (Wang et al., 2023). Traditional investors are often hesitant to invest in the blue economy due to perceived risks and the lack of collateral. Furthermore, high capital requirements in sectors such as shipping, renewable energy, and marine mining can make it difficult for firms to finance their growth and innovation.

In addition to limited access to finance, blue economy firms also face volatility and uncertainty in the market (Zhu et al., 2023). Many sectors are subject to fluctuations in demand, prices, and environmental conditions, which can create uncertainty and make it difficult for firms to secure financing. Furthermore, the lack of reliable market information in many sectors can make it challenging for firms to identify investment opportunities and assess risks. Regulatory and policy barriers can also limit the growth potential of blue economy firms. Despite these known challenges, the academic literature on the subject is scant and, in this research, we attempt to fill this void by assessing the nexus of blue financing, sustainable development, and digitalization.

The rest of the paper is organized as follows. Section 2 presents data and our research strategy, results are discussed in section 3, and section 4 concludes.

## 2. Data and Methodology

To assess the impact of blue financing and digitalization on the performance of financial intermediation we select our sample from twenty-seven member states of the European Union. The primary focus is on institutions that are engaged in commercial banking and have diversified lending exposures (Lang et al., 2023). We initiate the sample period from January 2012 and include data till September 2022. The information before 2012 is not included to

ascertain that our results are not impacted by the spillovers from the credit crisis (Su et al., 2022). Finally, as the concentration of this research is on blue lending, the selected banks should have some exposure in this space. Based on this criterion, we have an unbalanced panel of sample banks that is presented in Table 1.

[Table 1 here]

We proxy the performance of financial intermediation through two variables. The first one is net interest margin ($NIM_{it}$) which relates to profitability. Prior studies like (Boubaker et al., 2023), (Boubaker et al., 2022), and (Basty and Ghazouani, 2023) advocate that profitability is an important indicator of a bank's performance because it reflects the bank's ability to generate returns for its stakeholders and maintain financial resilience. For every bank *i*, at time *t*, we measure NIM as follows.

$$NIM_{it} = \frac{IR_{it} - IE_{it}}{EA_{it}} \quad \ldots\ldots (1)$$

where $IR_{it}$ is the interest revenue, $IE_{it}$ is the interest expense, and $EA_{it}$ represents earning assets of the bank. Earning assets are those that generate income for a bank. These assets are primarily interest-bearing and include loans, securities, and deposits with other banks (Afzal et al., 2023). Loans are the primary earning asset for most banks and include mortgages, personal loans, and commercial loans. Securities such as bonds, Treasury bills, and other debt securities can also generate income in the form of interest payments (Hasnaoui and Hasnaoui, 2022). Banks can also earn income by placing funds in other banks, typically through interbank deposits or through the purchase of CDs or other money market instruments. Other earning assets may include lease financing receivables, credit card loans, and other specialized assets (Li et al., 2020).

The second variable of performance relates to the riskiness of the banks. The recent events in the global banking sectors have highlighted the relevance of banking risks. The disruptions of the Silicon Valley Bank, Signature, and Credit Suisse, among others, have sent

shock waves across the financial system. Similarly, studies like (Le, 2022; Sidaoui et al., 2022; Yu and Garg, 2022) have extensively documented the relevance of banking risks. We proxy banking risks through the insolvency metrics of the Z score. A banks insolvency (technical) is a function of its capital adequacy ratio (CAR) and return on assets (ROA) and is at risk when $(CAR_{it} + ROA_{it}) \leq 0$. If $ROA_{it}$ is random having a mean of $\mu_{ROA}$ and a standard deviation of $\sigma_{ROA}$, then based on the Chebyshev's inequality, the Z score for the insolvency can be estimated as

$$Z_{it} = \frac{(CAR_{it} + \mu_{ROA_{it}})}{\sigma_{ROA_{it}}} \quad \ldots\ldots (2)$$

Based on these two independent variables, we estimate the following set of fixed-effect panel regressions.

$$NIM_{it} = \alpha_{it} + \beta_1 BL_{it} + \beta_2 SL_{it} + \beta_3 Dig_{it} + \beta_X X_{it} + \epsilon_{it} \quad \ldots\ldots (3)$$

$$Z_{it} = \alpha_{it} + \beta_1 BL_{it} + \beta_2 SL_{it} + \beta_3 Dig_{it} + \beta_X X_{it} + \epsilon_{it} \quad \ldots\ldots (4)$$

In equations 3 and 4 we employ three independent variables to proxy for blue lending, sustainable credit, and digitalization. We measure blue lending ($BL_{it}$) through the proportion of loans given to firms related to the blue economy. The blue economy encompasses a broad range of sectors and industries that are involved in economic activities in or near oceans, seas, coasts, and other water bodies. The firms that are part of the blue economy include those involved in fisheries and aquaculture, shipping and transportation, offshore energy, tourism and recreation, biotechnology, marine conservation and management, and maritime security and defense. The fisheries and aquaculture sector involves fishing, farming, and processing of seafood and other aquatic products.

The shipping and transportation sector includes the transportation of goods and people by sea, as well as the construction, repair, and maintenance of ships and other marine vessels. The offshore energy sector involves the exploration, production, and transportation of oil and gas, as well as the development of renewable energy sources such as wind, wave, and tidal

power. The blue economy also includes firms involved in tourism and recreation, biotechnology, marine conservation and management, and maritime security and defense. Overall, the blue economy represents a diverse range of firms and industries that are connected by their dependence on, or use of, marine resources and ecosystems.

For measuring the sustainable development credit ($SL_{it}$), we use the proportion of sustainable lending to total loans. To differentiate between blue loans and sustainable lending, we exclude the loans given to blue firms to calculate this variable. Sustainable lending by banks can support sustainable development in several ways. Sustainable loans can provide financing for sustainable projects that might not otherwise receive funding. This can include projects related to renewable energy, energy efficiency, sustainable agriculture, and green buildings. By providing access to finance, sustainable loans can help to accelerate the transition to a more sustainable economy. Sustainable loans can help to incentivize companies to adopt more sustainable practices. Finally, sustainable loans can help banks to demonstrate their commitment to sustainability and social responsibility. By offering sustainable loans, banks can align their financing activities with their sustainability goals and values. This can help to enhance their reputation and brand value and attract customers who are looking for socially responsible financial services providers.

The digitalization variable ($Dig_{it}$) is proxied by the proportion of investment allocated for digitalization to the total R&D investment. Digitalization can help banks become more efficient, reduce costs, and improve the customer experience, which can lead to increased revenue and a stronger competitive position in the market. Therefore, we expect that digitalization efforts will result in increasing the net interest margin and reduce the risk of insolvency. To control for the exogenous impacts, we also include a matrix X of control variables. These include the infection ratio (Chen et al., 2022), liquidity (Umar et al., 2021), capital adequacy (Afzal et al., 2020), human capital efficiency (Umar et al., 2022a), market

concentration (Chen et al., 2023), economic growth (Mirza et al., 2023a), and money supply (Mirza et al., 2023b).

To establish the robustness of our results, we will present estimations of equations 3 and 4 after sorting for large and small banks. The sorting is based on the asset size with banks above the median classified as large and those with assets below the median are considered as small banks. Large banks and small banks exhibit significant disparities in terms of size, reach, capital, resources, product offerings, risk management, customer relationships, and decision-making. Large banks, being multinational or national entities, possess substantial capital bases, broader branch networks, and a diverse range of financial products and services (Merzki and Ben Rejeb, 2023). They are equipped with sophisticated risk management systems and advanced digital banking solutions, catering to a vast customer base (Ben Bouheni et al., 2023). Conversely, small banks, typically localized or community-based institutions, focus on personalized customer relationships and basic banking services. While their operations may be simpler, their decision-making process is more nimble and flexible (Poddar et al., 2023).

The data is based on the quarterly frequency and is extracted from multiple sources. Most bank-level data is from Bank Focus, while economic data is from trading economics. Some data is from Eikon Datastream and wherever firm-level information is not available in these databases, we have extracted it from the individual disclosures from the respective websites of the banks.

## 3. Results and Discussion

The descriptive statistics of selected variables are presented in Table 2. The sample average for NIM is 0.04, while the exposure to blue lending was about 26%. The average credit to sustainable projects was slightly higher at 28% which is understandable as the focus on water-related sustainable lending is relatively recent. The liquidity ratio stands at 0.13, while the CAR hovers around 0.16. Finally, the asset quality across the sample is adequate with an

infection ratio of 0.15. Across countries' statistics, we observe the maximum NIM in Lithuania (0.079), while the minimum was in Germany (0.022). The differences in NIM can be attributed to inefficiencies in the financial system with higher NIM indicating greater challenges (Trinugroho et al., 2014). The proportion of blue lending is maximum in Slovakia (0.359) while it is lowest in Italy (0.151). In sustainable loans, the banks in Malta dominate (0.380). The liquidity, CAR, and human capital efficiency are minimum for Czech banks. The best asset quality is depicted by the German banks in the sample with an average infection ratio of 0.07.

[Table 2 here]

In Table 3, we present the correlation matrix of our independent and dependent variables. We observe very low correlations across all pairs indicating that multicollinearity is not present. Multicollinearity is a well-known issue in panel regressions that occurs when two or more independent variables are highly correlated with each other. When multicollinearity is present, it can lead to biased and unstable coefficient estimates, making it difficult to interpret the relationship between the independent variables and the dependent variable.

However, if multicollinearity is not present, several benefits can enhance the validity and reliability of the results. A key benefit of the absence of multicollinearity is that the coefficient estimates of the independent variables are more reliable and stable. This means that the estimated effects of the independent variables on the dependent variable are more accurate and trustworthy. The absence of multicollinearity can also increase the precision of the coefficient estimates, resulting in smaller standard errors. This means that the estimates are more precise and can provide more detailed information about the relationship between the independent variables and the dependent variable (Rahat and Nguyen, 2022).

In addition to increased reliability and precision, the absence of multicollinearity can also reduce bias in the coefficient estimates. Multicollinearity can lead to biased coefficient estimates, which can distort the relationship between the independent variables and the

dependent variable. The absence of multicollinearity can reduce the bias in the estimates and provide a more accurate representation of the relationship between the variables (Minviel and Ben Bouheni, 2022).

[Table 3 here]

The results for fixed effect panel regression with NIM as the dependent variable are presented in Table 4. The coefficient of blue lending is positive and significant at 5%. This implies that an increase in exposure toward blue firms results in an increase in NIM for the banks. There are plausible reasons for this relationship. The market for lending to blue firms is less competitive than the market for lending to other types of firms. Furthermore, banks may have established relationships with blue firms that can lead to lower transaction costs. In addition, lending to blue firms may provide banks with the opportunity to cross-sell other financial products and services, such as investment banking or wealth management services. While this may not impact NIM directly, it can support overall banking revenues and profitability.

Our results show that the factor loading for sustainable lending is also positive and significant indicating a positive link between responsible loans and banking performance. While one obvious reason that explains this relationship is the persistent and stable cash flows of the borrowers (Umar et al., 2022b), another plausible factor is the lower regulatory costs. Lending to sustainable businesses may enable banks to meet regulatory requirements related to sustainable finance. Many governments and regulatory bodies are now requiring banks to report on their sustainability activities and provide financing to support sustainable development. Banks that can meet these requirements benefit from lower regulatory costs and higher customer satisfaction.

The findings for the digitalization factor are also encouraging with a significant and positive coefficient. Digitalization has the potential to significantly improve banking

profitability by streamlining operations, reducing costs, and improving customer experiences. By leveraging digital technologies, banks can automate manual processes, such as customer onboarding and loan applications, resulting in faster and more efficient processes and lower operational costs. Additionally, digitalization can lead to increased customer satisfaction by offering more personalized and convenient services, which can result in higher revenues and profitability.

Moreover, digitalization can enable banks to expand their customer base beyond traditional geographic boundaries and reach new customer segments, which can increase market share. It can also improve risk management by enabling banks to better monitor and analyze customer data, assess credit risk, and detect fraud, ultimately leading to lower credit losses and higher profitability. Furthermore, digitalization can create new revenue streams, such as mobile payments, online lending, and robo-advisory services, which can further increase profitability and reduce dependence on traditional sources of revenue. Finally, digitalization can help banks comply with regulatory requirements more efficiently and cost-effectively, resulting in lower regulatory costs and improved profitability.

[Table 4 here]

The results for the Z score are presented in Table 5. Our findings show a negative coefficient for blue lending that is significant at 1%. This indicates that a credit portfolio with more exposure to blue firms will yield a higher Z score and lower chances of insolvency. Lending to blue economy firms can have a lower risk for banks due to several factors. Firstly, blue economy firms typically operate in industries that are more stable and less susceptible to economic downturns. These industries, such as renewable energy, sustainable agriculture, and waste management, are often less volatile than other sectors, which reduces the risk of default.

[Table 5 here]

Secondly, blue economy firms may have lower financing needs and more stable cash flows than other firms. This is because they often focus on sustainable and environmentally friendly practices that require less capital investment and have more predictable revenue streams. This reduces the risk of default and improves the overall stability of the loan portfolio. Thirdly, blue economy firms are often eligible for government subsidies, tax incentives, and other forms of support that can reduce the risk of default. This support can include grants, loan guarantees, and subsidies for research and development, which can provide additional financial security for banks that lend to blue economy firms.

Fourthly, blue economy firms may have a lower environmental and social impact, which can reduce the risk of reputational damage for banks. This is because these firms often operate in a more sustainable and socially responsible manner, which can improve their reputation and reduce the likelihood of negative publicity. Finally, lending to blue economy firms can provide banks with an opportunity to demonstrate their commitment to sustainability and corporate social responsibility. This can help banks attract customers who prioritize sustainability and environmental responsibility, which can improve their long-term profitability and reduce the risk of customer attrition.

Like blue lending, the coefficient of sustainable credit is also significant and positive depicting a lower risk of solvency when banks are engaged in sustainable lending. In addition to the factors mentioned before, sustainable lending can provide banks with a more diversified loan portfolio. By lending to firms and projects in a variety of sustainable industries, banks can reduce their exposure to risks associated with a single sector. This can improve the overall stability of the loan portfolio and reduce the risk of default.

Our observation about digitalization is similar to that of NIM and a significant and positive coefficient indicates that increased digitalization can lower the risk of insolvency. Digitalization can result in lower default risk for banks by enabling more efficient and effective

credit risk management. Digitalization can improve the accuracy and timeliness of credit risk assessments, which can help banks identify and manage credit risk more effectively. Banks can automate credit risk assessment processes, which can improve the accuracy and consistency of credit risk evaluations. By leveraging data analytics and artificial intelligence, banks can quickly and accurately analyze large amounts of data, including financial data, credit scores, and other relevant information. This can provide banks with more comprehensive and accurate information about borrower creditworthiness, which can help them make more informed lending decisions.

Digitalization can improve the speed and efficiency of loan application and approval processes. By using digital platforms, banks can reduce the time and costs associated with loan origination and processing. This can enable banks to process loan applications more quickly and efficiently, which can reduce the risk of default by enabling borrowers to access credit when they need it most. Further, banks can monitor loan portfolios more effectively. By using digital tools to track and analyze loan performance, banks can identify potential credit risks and take action to mitigate those risks before they result in default. Digitalization can improve the efficiency and effectiveness of loan collections and recovery. By using digital tools to automate collections and recovery processes, banks can reduce the time and costs associated with managing delinquent loans. This can help banks recover more of their outstanding loans, reducing the risk of default and improving the overall quality of their loan portfolio. The results of size-sorted samples are presented in Tables 6 and 7 and the findings are in line with our main observations.

[Tables 6 and 7 here]

## 4. Conclusion

Financing sustainable development is a challenge for many reasons. Sustainable development projects often require significant upfront investments and long-term funding,

which can be difficult to secure. These projects may have a longer payback period, which can be less attractive to traditional investors looking for short-term returns. These projects often require specialized knowledge and expertise, which can be challenging for investors who are not familiar with the specific industries and technologies involved. This can increase the perceived risk of investing in these projects, making it more difficult to secure financing.

Furthermore, sustainable development projects may not generate the same level of profits as traditional investments, which can make them less attractive to investors. This is particularly true for projects that have a strong environmental or social impact but do not generate significant financial returns. There may be regulatory and policy barriers that can make it difficult to secure financing. Finally, sustainable development projects may face challenges related to market demand and access to customers. Some sustainable products and services may have a limited market, making it difficult for investors to see a clear path to profitability.

These factors make it challenging for financial intermediaries to participate and support blue and circular economy firms. For their fiduciary responsibilities, these intermediaries should have incentives to finance sustainable businesses, and, in this research, we explore if there are such incentives. Our results demonstrate that lending to blue and sustainable firms improves the performance of the banks which is further supported by their investment in digitalization.

There are important implications of our findings. Promoting lending to blue and sustainable firms is incentivizing for banks and the wider economy. Governments and financial regulators could further support banks to increase their lending to blue and sustainable firms by providing preferential treatment or lower capital requirements for these types of loans. They could also develop policies and guidelines that encourage banks to incorporate environmental and social risk factors into their lending decisions. Additionally, promoting the development of

blue bonds and other sustainable finance products, supporting the growth of sustainable industries, strengthening disclosure requirements, and promoting international cooperation could all have positive policy implications for sustainable finance. Overall, taking a proactive approach to promoting sustainable finance could help to address environmental and social challenges while also creating new opportunities for economic growth and development.

In terms of digitalization, the adoption of digital technologies such as mobile banking, online platforms, and digital payment systems has the potential to improve banking performance by increasing efficiency, enhancing customer service, and reducing costs. As a result, governments and financial regulators should prioritize policies and initiatives that promote digitalization in the banking sector. A plausible approach could be to provide financial incentives or regulatory relief to encourage investment in digital infrastructure, such as cybersecurity systems, online banking platforms, and mobile payment systems. Additionally, promoting the development of digital skills among bank employees could help to ensure that the full benefits of digitalization are realized. Finally, digitalization can also help to enhance financial inclusion by expanding access to financial services, particularly in underserved or remote areas. To this end, governments and financial regulators could support the development of low-cost digital banking services and mobile payment systems.

There are very few studies that explore the nexus of financial intermediation and blue lending. Therefore, this early evidence has limitations of its own that should be considered while interpreting the results. The sample is based on banks that have blue exposure and hence the selection may not be representative of the entire banking sector, limiting the generalizability of the findings to other regions or countries. The research relies on available data on blue lending, sustainable credit, digitalization, and banking performance mostly from the voluntary disclosure of the banks. We are conscious of the fact that our results are sensitive to these disclosures. Finally, we focus on the relatively short-term impact of blue lending (11 years),

sustainable credit, and digitalization on banking performance. The long-term sustainability and durability of these effects need to be further investigated to determine if the observed positive associations persist over time. Once the sector matures, addressing some of these limitations will be a relevant course of future research.

**References**


Afzal, A., Mirza, N., Arshad, F., 2020. Market discipline in South Asia: Evidence from commercial banking sector. Int. J. Finance Econ. ijfe.1904. https://doi.org/10.1002/ijfe.1904

Afzal, A., Mirza, N., Firdousi, S., 2023. Do depositors discipline the banking sector? Evidence from an emerging economy. Rev. Account. Finance ahead-of-print. https://doi.org/10.1108/RAF-09-2022-0271/FULL/PDF

Basty, N., Ghazouani, I., 2023. Competition–banking stability: the moderating role of government intervention quality in North African countries. J. Risk Finance 24, 244–268. https://doi.org/10.1108/JRF-06-2022-0166/FULL/PDF

Ben Bouheni, F., Tewari, M., Sidaoui, M., Hasnaoui, A., 2023. An econometric understanding of Fintech and operating performance. Rev. Account. Finance 22, 329–352. https://doi.org/10.1108/RAF-10-2022-0290/FULL/PDF

Boubaker, S., Nguyen, N., Trinh, V.Q., Vu, T., 2023. Market reaction to the Russian Ukrainian war: a global analysis of the banking industry. Rev. Account. Finance 22, 123–153. https://doi.org/10.1108/RAF-10-2022-0294/FULL/PDF

Boubaker, S., Uddin, M.H., Kabir, S.H., Mollah, S., 2022. Does cost-inefficiency in Islamic banking matter for earnings uncertainty? Rev. Account. Finance 22, 1–36. https://doi.org/10.1108/RAF-07-2022-0193/FULL/PDF

Chen, Z., Mirza, N., Huang, L., Umar, M., 2022. Green Banking—Can Financial Institutions support green recovery? Econ. Anal. Policy 75, 389–395. https://doi.org/10.1016/J.EAP.2022.05.017

Chen, Z., Umar, M., Su, C.-W., Mirza, N., 2023. Renewable energy, credit portfolios and intermediation spread: Evidence from the banking sector in BRICS. Renew. Energy. https://doi.org/10.1016/J.RENENE.2023.03.003

Choudhary, P., G, V.S., Khade, M., Savant, S., Musale, A., G, R.K.K., Chelliah, M.S., Dasgupta, S., 2021. Empowering blue economy: From underrated ecosystem to sustainable industry. J. Environ. Manage. 291, 112697. https://doi.org/10.1016/J.JENVMAN.2021.112697

Graziano, M., Alexander, K.A., McGrane, S.J., Allan, G.J., Lema, E., 2022. The many sizes and characters of the Blue Economy. Ecol. Econ. 196, 107419. https://doi.org/10.1016/J.ECOLECON.2022.107419

Guo, X., Liang, C., Umar, M., Mirza, N., 2022. The impact of fossil fuel divestments and energy transitions on mutual funds performance. Technol. Forecast. Soc. Change 176, 121429. https://doi.org/10.1016/J.TECHFORE.2021.121429

Hasnaoui, J.A., Hasnaoui, A., 2022. How does human capital efficiency impact credit risk?: the case of commercial banks in the GCC. J. Risk Finance 23, 639–651. https://doi.org/10.1108/JRF-04-2022-0083/FULL/XML

Lang, Q., Ma, F., Mirza, N., Umar, M., 2023. The interaction of climate risk and bank liquidity: An emerging market perspective for transitions to low carbon energy. Technol. Forecast. Soc. Change 191, 122480. https://doi.org/10.1016/J.TECHFORE.2023.122480

Le, A.N.Q., 2022. Market discipline and bank risk through new regulations: evidence from Asia–Pacific. J. Risk Finance 23, 498–515. https://doi.org/10.1108/JRF-02-2022-0034/FULL/PDF

Li, J.P., Mirza, N., Rahat, B., Xiong, D., 2020. Machine learning and credit ratings prediction in the age of fourth industrial revolution. Technol. Forecast. Soc. Change 161, 120309. https://doi.org/10.1016/j.techfore.2020.120309

Li, M., Luo, H., Zhou, S., Senthil Kumar, G.M., Guo, X., Law, T.C., Cao, S., 2022. State-of-the-art review of the flexibility and feasibility of emerging offshore and coastal ocean

energy technologies in East and Southeast Asia. Renew. Sustain. Energy Rev. 162, 112404. https://doi.org/10.1016/J.RSER.2022.112404

Lv, W., Mirza, N., Umar, M., Chen, W., 2023. The Nexus of climate crisis and asset liability management in frontier economies. Technol. Forecast. Soc. Change 192, 122586. https://doi.org/10.1016/J.TECHFORE.2023.122586

Merzki, N., Ben Rejeb, M., 2023. Bank diversification and earnings management: the moderating effect of female directors. Rev. Account. Finance ahead-of-print. https://doi.org/10.1108/RAF-08-2022-0223/FULL/PDF

Minviel, J.J., Ben Bouheni, F., 2022. The impact of research and development (R&D) on economic growth: new evidence from kernel-based regularized least squares. J. Risk Finance 23, 583–604. https://doi.org/10.1108/JRF-11-2021-0177/FULL/PDF

Mirza, N., Afzal, A., Umar, M., Skare, M., 2023a. The impact of green lending on banking performance: Evidence from SME credit portfolios in the BRIC. Econ. Anal. Policy 77, 843–850. https://doi.org/10.1016/J.EAP.2022.12.024

Mirza, N., Umar, M., Afzal, A., Firdousi, S.F., 2023b. The role of fintech in promoting green finance, and profitability: Evidence from the banking sector in the euro zone. Econ. Anal. Policy 78, 33–40. https://doi.org/10.1016/J.EAP.2023.02.001

Naqvi, B., Rizvi, S.K.A., Mirza, N., Umar, M., 2023. Financial market development: A potentiating policy choice for the green transition in G7 economies. Int. Rev. Financ. Anal. 87, 102577. https://doi.org/10.1016/J.IRFA.2023.102577

Poddar, A., Choudhary, S., Tiwari, A.K., Misra, A.K., 2023. Interlinkages of market power, price and liquidity network in banks: evidence from an emerging economy. J. Risk Finance 24, 285–315. https://doi.org/10.1108/JRF-01-2023-0006/FULL/PDF

Qi, X., 2022. Building a bridge between economic complexity and the blue economy. Ocean Coast. Manag. 216, 105987. https://doi.org/10.1016/J.OCECOAMAN.2021.105987

Rahat, B., Nguyen, P., 2022. Risk-adjusted investment performance of green and black portfolios and impact of toxic divestments in emerging markets. Energy Econ. 116, 106423. https://doi.org/10.1016/J.ENECO.2022.106423

Rizvi, S.K.A., Naqvi, B., Mirza, N., 2022. Is green investment different from grey? Return and volatility spillovers between green and grey energy ETFs. Ann. Oper. Res. 313, 495–524.

Shan, S., Umar, M., Mirza, N., 2022. Can robo advisors expedite carbon transitions? Evidence from automated funds. Technol. Forecast. Soc. Change 180, 121694. https://doi.org/10.1016/J.TECHFORE.2022.121694

Sidaoui, M., Ben Bouheni, F., Arslankhuyag, Z., Mian, S., 2022. Fintech and Islamic banking growth: new evidence. J. Risk Finance 23, 535–557. https://doi.org/10.1108/JRF-03-2022-0049/FULL/PDF

Su, C.W., Mirza, N., Umar, M., Chang, T., Albu, L.L., 2022. Resource extraction, greenhouse emissions, and banking performance. Resour. Policy 79, 103122. https://doi.org/10.1016/J.RESOURPOL.2022.103122

Thompson, B.S., 2022. Blue bonds for marine conservation and a sustainable ocean economy: Status, trends, and insights from green bonds. Mar. Policy 144, 105219. https://doi.org/10.1016/J.MARPOL.2022.105219

Trinugroho, I., Agusman, A., Tarazi, A., 2014. Why have bank interest margins been so high in Indonesia since the 1997/1998 financial crisis? Res. Int. Bus. Finance 32, 139–158. https://doi.org/10.1016/J.RIBAF.2014.04.001

Umar, M., Ji, X., Mirza, N., Naqvi, B., 2021. Carbon neutrality, bank lending, and credit risk: Evidence from the Eurozone. J. Environ. Manage. 296, 113156. https://doi.org/10.1016/J.JENVMAN.2021.113156

Umar, M., Mirza, N., Hasnaoui, J.A., Rochoń, M.P., 2022a. The nexus of carbon emissions, oil price volatility, and human capital efficiency. Resour. Policy 78, 102876. https://doi.org/10.1016/J.RESOURPOL.2022.102876

Umar, M., Mirza, N., Rizvi, S.K.A., Naqvi, B., 2022b. ESG scores and target price accuracy: Evidence from sell-side recommendations in BRICS. Int. Rev. Financ. Anal. 84, 102389. https://doi.org/10.1016/J.IRFA.2022.102389

Wang, H., Mirza, N., Umar, M., Xie, X., 2023. Climate change and blue returns: Evidence from Niche firms in China. Finance Res. Lett. 56, 104119. https://doi.org/10.1016/J.FRL.2023.104119

Yu, K., Garg, P., 2022. Corporate social responsibility report readability, credit ratings and cost of borrowing. Rev. Account. Finance 21, 423–448. https://doi.org/10.1108/RAF-11-2021-0322/FULL/PDF

Zheng, L., Tian, K., 2021. The contribution of ocean trade to national economic growth: A non-competitive input-output analysis in China. Mar. Policy 130, 104559. https://doi.org/10.1016/J.MARPOL.2021.104559

Zhu, B., Liang, C., Mirza, N., Umar, M., 2023. What drives gearing in early-stage firms? Evidence from blue economy startups. J. Bus. Res. 161, 113840. https://doi.org/10.1016/J.JBUSRES.2023.113840

## Figures and Tables

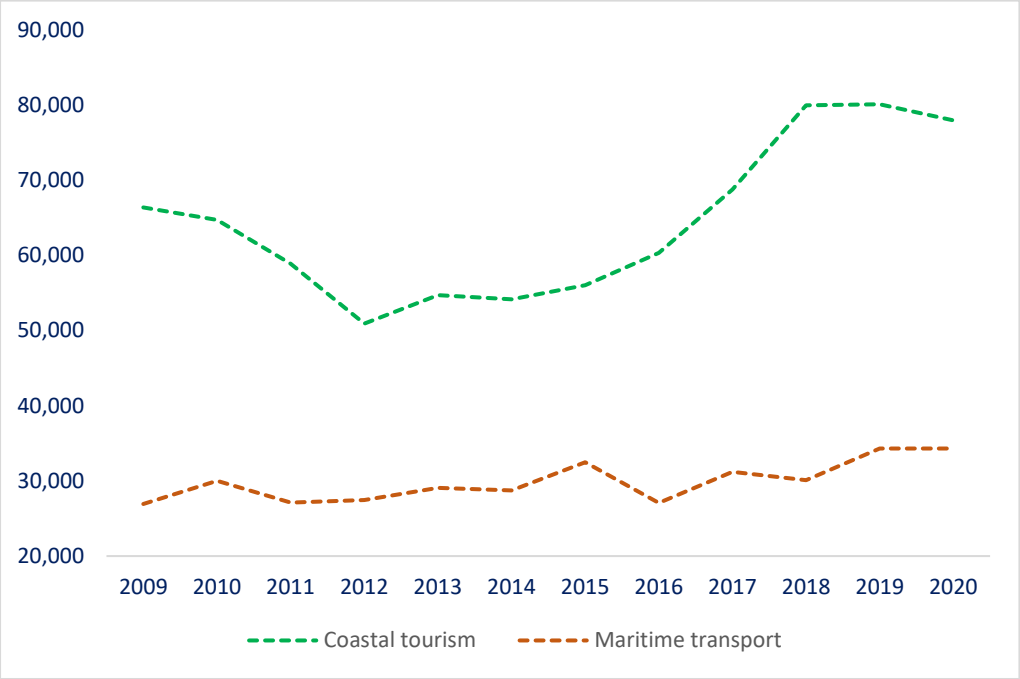


**Figure 1: Year wise Gross Value Added (Euro Mlns)**

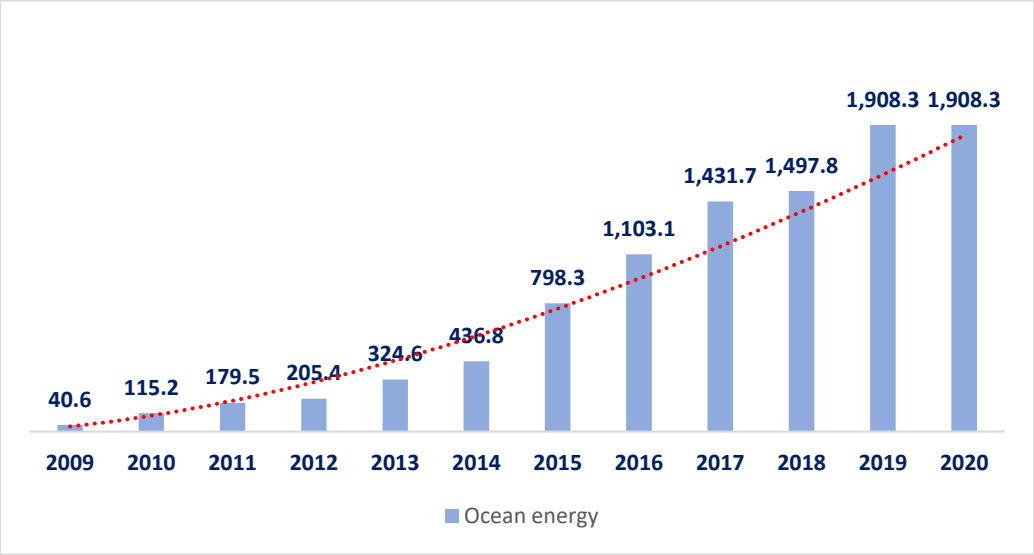


**Figure 2: Year wise Gross Value Added (Euro Mlns)**

**Table 1: Country and Year-wise Sample Banks**

| Country | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 12 | 12 | 13 | 13 | 14 | 15 | 18 | 18 | 20 | 20 |
| Belgium | 11 | 11 | 11 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Bulgaria | 7 | 7 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 |
| Croatia | 8 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 10 | 10 |
| Cyprus | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 |
| Czech Republic | 7 | 7 | 7 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Denmark | 11 | 13 | 13 | 15 | 15 | 15 | 17 | 17 | 17 | 17 |
| Estonia | 6 | 6 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 |
| Finland | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 12 | 12 | 12 |
| France | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 17 | 17 | 19 |
| Germany | 18 | 19 | 19 | 19 | 20 | 20 | 21 | 21 | 21 | 21 |
| Greece | 10 | 10 | 9 | 9 | 9 | 9 | 8 | 9 | 9 | 9 |
| Hungary | 5 | 5 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 8 |
| Ireland | 9 | 9 | 9 | 9 | 11 | 11 | 11 | 11 | 13 | 13 |
| Italy | 12 | 12 | 12 | 14 | 14 | 14 | 13 | 13 | 14 | 15 |
| Latvia | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Lithuania | 5 | 5 | 5 | 5 | 7 | 7 | 6 | 6 | 6 | 7 |
| Luxembourg | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 |
| Malta | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 5 |
| Netherlands | 13 | 13 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 |
| Poland | 5 | 5 | 5 | 7 | 7 | 7 | 6 | 6 | 6 | 6 |
| Portugal | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 9 |
| Romania | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 |
| Slovakia | 5 | 6 | 6 | 6 | 8 | 8 | 8 | 8 | 8 | 8 |
| Slovenia | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 9 |
| Spain | 10 | 10 | 10 | 11 | 11 | 11 | 12 | 13 | 13 | 13 |
| Sweden | 9 | 11 | 11 | 12 | 12 | 11 | 11 | 13 | 13 | 13 |
| **Total** | **232** | **239** | **244** | **258** | **270** | **273** | **282** | **287** | **292** | **299** |

**Table 2: Descriptive Stats of Selected Variables**

| Country | NIM | BL/TL | SL/TL | Liq | CAR | HCE | AQ |
|---|---|---|---|---|---|---|---|
| *Overall* | *0.04345* | *0.26013* | *0.28278* | *0.13092* | *0.15624* | *0.63022* | *0.15186* |
| Austria | 0.03780 | 0.23231 | 0.21569 | 0.14569 | 0.12585 | 0.58453 | 0.17177 |
| Belgium | 0.04327 | 0.35162 | 0.37866 | 0.14866 | 0.15811 | 0.81083 | 0.08789 |
| Bulgaria | 0.04393 | 0.20193 | 0.25124 | 0.12124 | 0.14252 | 0.25211 | 0.09849 |
| Croatia | 0.05006 | 0.33315 | 0.27341 | 0.13341 | 0.14784 | 0.78433 | 0.18859 |
| Cyprus | 0.05236 | 0.24951 | 0.34861 | 0.12861 | 0.16510 | 0.51022 | 0.19292 |
| Czech Republic | 0.06141 | 0.17669 | 0.35852 | 0.08852 | 0.12107 | 0.10702 | 0.19868 |
| Denmark | 0.04736 | 0.16994 | 0.26907 | 0.14907 | 0.15823 | 0.82274 | 0.08701 |
| Estonia | 0.04274 | 0.31376 | 0.22033 | 0.13033 | 0.17873 | 0.87349 | 0.18885 |
| Finland | 0.04983 | 0.30237 | 0.20678 | 0.15678 | 0.14952 | 0.95245 | 0.19025 |
| France | 0.02270 | 0.35756 | 0.25380 | 0.12380 | 0.12728 | 0.72813 | 0.19854 |
| Germany | 0.02254 | 0.30863 | 0.35132 | 0.11132 | 0.17705 | 0.70517 | 0.07349 |
| Greece | 0.03247 | 0.24240 | 0.23993 | 0.08993 | 0.17919 | 0.91892 | 0.15897 |
| Hungary | 0.04872 | 0.22859 | 0.29339 | 0.13339 | 0.18456 | 0.45641 | 0.20254 |
| Ireland | 0.03682 | 0.18750 | 0.36260 | 0.14260 | 0.12793 | 0.79332 | 0.10643 |
| Italy | 0.02757 | 0.15158 | 0.22877 | 0.14877 | 0.17723 | 0.72335 | 0.07509 |
| Latvia | 0.06321 | 0.22227 | 0.31054 | 0.12054 | 0.12685 | 0.68514 | 0.07987 |
| Lithuania | 0.07941 | 0.35490 | 0.30321 | 0.13321 | 0.17668 | 0.66823 | 0.18888 |
| Luxembourg | 0.03268 | 0.23998 | 0.23664 | 0.14664 | 0.16829 | 0.82889 | 0.11129 |
| Matla | 0.05719 | 0.26558 | 0.38041 | 0.10041 | 0.17628 | 0.62751 | 0.12843 |
| Netherlands | 0.03395 | 0.19187 | 0.18739 | 0.13739 | 0.15464 | 0.46374 | 0.21568 |
| Poland | 0.06580 | 0.32286 | 0.35967 | 0.11967 | 0.16019 | 0.18516 | 0.19187 |
| Portugal | 0.03210 | 0.17139 | 0.20242 | 0.10242 | 0.18933 | 0.93262 | 0.17216 |
| Romania | 0.03421 | 0.20153 | 0.28021 | 0.15021 | 0.13330 | 0.33045 | 0.18925 |
| Slovakia | 0.02944 | 0.35904 | 0.19761 | 0.14761 | 0.16825 | 0.82494 | 0.08402 |
| Slovenia | 0.05143 | 0.32762 | 0.27000 | 0.15171 | 0.18471 | 0.47095 | 0.19419 |
| Spain | 0.04581 | 0.27142 | 0.35478 | 0.11478 | 0.13341 | 0.34055 | 0.14603 |
| Sweden | 0.02830 | 0.28738 | 0.30000 | 0.15801 | 0.12635 | 0.63470 | 0.17916 |

**Table 3: Correlation Matrix**

| | BL/TL | SL/TL | Dig | Liq | CAR | HCE | AQ | HHI | gGDP |
|---|---|---|---|---|---|---|---|---|---|
| **SL/TL** | 0.00273 | | | | | | | | |
| **Dig** | -0.02273 | -0.04084 | | | | | | | |
| **Liq** | 0.01014 | -0.02085 | 0.05417 | | | | | | |
| **CAR** | 0.06305 | -0.01431 | -0.07475 | 0.10185 | | | | | |
| **HCE** | -0.03884 | 0.08500 | -0.07475 | 0.07398 | 0.04152 | -0.03438 | | | |
| **AQ** | 0.00286 | 0.02301 | -0.09371 | -0.01254 | 0.00953 | 0.04595 | | | |
| **HHI** | 0.09470 | 0.00012 | 0.07741 | 0.07741 | 0.07814 | 0.10674 | 0.04921 | | |
| **gGDP** | -0.05435 | 0.08812 | 0.02364 | -0.00526 | -0.03422 | -0.05939 | -0.00411 | -0.03532 | |
| **M2/GDP** | 0.02039 | 0.00569 | 0.07034 | -0.07750 | -0.05218 | 0.02699 | -0.03784 | -0.04352 | -0.04714 |

**Table 4: Fixed Effect Panel Regression - NIM**

| | Variables | Coefficient | t stats | std error | |
|---|---|---|---|---|---|
| | Constant | 0.16483 | 0.97311 | 0.20153 | |
| **Blue Lending** | BL/TL | 0.08865 | 2.06593 | 0.07505 | ** |
| **Sustainable Development** | SL/TL | 0.03412 | 1.99401 | 0.04926 | ** |
| **Digitalization** | Dig | 0.09188 | 2.19743 | 0.07396 | ** |
| | Liq | -0.24266 | -2.17595 | 0.14367 | ** |
| **Micro Control** | CAR | -0.16747 | -0.96977 | 0.20483 | |
| | HCE | 0.33703 | 2.18315 | 0.18653 | ** |
| | AQ | -0.12508 | -2.00927 | 0.09440 | ** |
| | HHI | 0.85290 | 0.95749 | 0.92290 | |
| **Macro Control** | gGDP | 0.06579 | 2.03627 | 0.06446 | ** |
| | M2/GDP | 0.06513 | 0.30257 | 0.24740 | |
| | Country FE | | YES | | |
| | Year FE | | YES | | |
| | Hausman Stats | | 0.00002 | | |
| | Adjusted R2 | | 0.63265 | | |

**** represents significance at 1%, ** at 5%, and * at 10%*

**Table 5: Fixed Effect Panel Regression - Z Score**

| | Variable | Coefficient | t stats | Std error | |
|---|---|---|---|---|---|
| | Constant | 0.40819 | 0.76653 | 0.53426 | |
| **Blue Lending** | BL/TL | 0.09309 | 2.43638 | 0.03996 | *** |
| **Sustainable Development** | SL/TL | 0.04521 | 3.32899 | 0.01533 | *** |
| **Digitalization** | Dig | 0.03523 | 2.15501 | 0.01810 | ** |
| | Liq | 0.13796 | 2.18941 | 0.06476 | ** |
| **Micro Control** | CAR | 0.10227 | 0.46042 | 0.22386 | |
| | HCE | 0.52763 | 1.99618 | 0.26607 | ** |
| | AQ | -0.08112 | -2.14885 | 0.03950 | ** |
| | HHI | 0.27036 | 0.93888 | 0.28971 | |
| **Macro Control** | gGDP | 0.04935 | 2.62160 | 0.02057 | *** |
| | M2/GDP | 0.11110 | 0.98690 | 0.11432 | |
| | Country FE | | YES | | |
| | Year FE | | YES | | |
| | Hausman Stats | | 0.000008 | | |
| | Adjusted R2 | | 0.65888 | | |

**** represents significance at 1%, ** at 5%, and * at 10%*

**Table 6: Fixed Effect Panel Regression using Size Sorts - NIM**

| | **Large Banks** | | | | |
|---|---|---|---|---|---|
| | **Variables** | **Coefficient** | **t stats** | **std error** | |
| | Constant | 0.19412 | 1.28951 | 0.15053 | |
| **Blue Lending** | BL/TL | 0.05395 | 3.29010 | 0.01640 | *** |
| **Sustainable Development** | SL/TL | 0.04363 | 1.98193 | 0.02201 | ** |
| **Digitalization** | Dig | 0.13686 | 2.17146 | 0.06303 | ** |
| | Liq | 0.17145 | 0.80336 | 0.21342 | |
| **Micro Control** | CAR | 0.94631 | 0.93734 | 1.00957 | |
| | HCE | 0.90441 | 2.03082 | 0.44534 | ** |
| | AQ | -0.15953 | -1.98886 | 0.08021 | ** |
| | HHI | 0.74080 | 2.06509 | 0.35872 | ** |
| **Macro Control** | gGDP | 0.07098 | 1.99406 | 0.03559 | ** |
| | M2/GDP | 0.05780 | 1.09397 | 0.05284 | |
| | Country FE | | YES | | |
| | Year FE | | YES | | |
| | Hausman Stats | 0.00004 | | | |
| | Adjusted R2 | 0.65102 | | | |
| | **Small Banks** | | | | |
| | **Variables** | **Coefficient** | **t stats** | **std error** | |
| | Constant | 0.20508 | 0.44456 | 0.46130 | |
| **Blue Lending** | BL/TL | 0.04096 | 2.07591 | 0.01973 | ** |
| **Sustainable Development** | SL/TL | 0.06017 | 1.96875 | 0.03056 | ** |
| **Digitalization** | Dig | 0.11754 | 2.84564 | 0.04131 | *** |
| | Liq | 0.10621 | 0.98518 | 0.10781 | |
| **Micro Control** | CAR | 0.82660 | 1.02409 | 0.80716 | |
| | HCE | 0.66952 | 3.42672 | 0.19538 | *** |
| | AQ | -0.18265 | -2.00773 | 0.09097 | ** |
| | HHI | 0.70726 | 0.54270 | 1.30321 | |
| **Macro Control** | gGDP | 0.04676 | 1.98842 | 0.02351 | ** |
| | M2/GDP | 0.03270 | 0.18219 | 0.17950 | |
| | Country FE | | YES | | |
| | Year FE | | YES | | |
| | Hausman Stats | 0.00005 | | | |
| | Adjusted R2 | 0.62318 | | | |

**** represents significance at 1%, ** at 5%, and * at 10%*

**Table 7: Fixed Effect Panel Regression with Size sorts - Z Score**

| | **Large Banks** | | | | |
|---|---|---|---|---|---|
| | **Variable** | **Coefficient** | **t stats** | **Std error** | |
| | Constant | 0.7958765 | 0.804567 | 0.989199 | |
| **Blue Lending** | BL/TL | 0.0678308 | 2.127361 | 0.031885 | ** |
| **Sustainable Development** | SL/TL | 0.0200727 | 2.008289 | 0.009995 | ** |
| **Digitalization** | Dig | 0.0557437 | 1.997978 | 0.0279 | ** |
| | Liq | 0.1583912 | 1.985287 | 0.079783 | ** |
| **Micro Control** | CAR | 0.14774 | 1.017766 | 0.145161 | |
| | HCE | 0.7677338 | 0.663285 | 1.157471 | |
| | AQ | -0.1248894 | -0.82577 | 0.15124 | |
| | HHI | 0.2336561 | 1.172832 | 0.199224 | |
| **Macro Control** | gGDP | 0.067208 | 2.052431 | 0.032746 | ** |
| | M2/GDP | 0.1220228 | 0.713539 | 0.171011 | |
| | Country FE | | YES | | |
| | Year FE | | YES | | |
| | Hausman Stats | | 0.000007 | | |
| | Adjusted R2 | | 0.601510612 | | |
| | **Small Banks** | | | | |
| | **Variable** | **Coefficient** | **t stats** | **Std error** | |
| | Constant | 0.7958765 | 0.874543 | 0.910048 | |
| **Blue Lending** | BL/TL | 0.1057573 | 1.968847 | 0.053715 | ** |
| **Sustainable Development** | SL/TL | 0.038616 | 1.992247 | 0.019383 | ** |
| **Digitalization** | Dig | 0.0246553 | 2.130864 | 0.011571 | ** |
| | Liq | 0.1233541 | 2.00544 | 0.06151 | ** |
| **Micro Control** | CAR | 0.0898133 | 1.167987 | 0.076896 | |
| | HCE | 0.3561674 | 1.275059 | 0.279334 | |
| | AQ | -0.1849375 | -1.99734 | 0.092592 | ** |
| | HHI | 0.1362031 | 0.259358 | 0.525155 | |
| **Macro Control** | gGDP | 0.0416572 | 2.176724 | 0.019138 | ** |
| | M2/GDP | 0.1042717 | 0.707642 | 0.147351 | |
| | Country FE | | YES | | |
| | Year FE | | YES | | |
| | Hausman Stats | | 0.000003 | | |
| | Adjusted R2 | | 0.68395 | | |

**** represents significance at 1%, ** at 5%, and * at 10%*