

# Bank Efficiency and Productivity: Role of Risk and ESG Disclosure

Desmy Riani<sup>1,\*</sup>, Meutia<sup>2</sup>, Muhamad Taqi<sup>3</sup> and Iis Ismawati<sup>4</sup>

<sup>1</sup>*Ibn Khaldun Bogor University.*

<sup>1,2,3,4</sup>*University of Sultan Ageng Tirtayasa.*

**Abstract:** We examine the impact of environmental, social, governance (ESG), liquidity risk, and credit risk on bank efficiency. Our sample includes 13 banks out of a total of 46 banks listed on the Indonesian stock exchange for the 2019-2021 period. We use Data Envelopment Analysis (DEA) to measure bank efficiency scores, and we find that the average bank efficiency has decreased. The banks that achieved 100 percent technical efficiency during the test were BRI and Bank Mega. The average productivity has experienced a greater increase influenced by technology change, which means that banks are good at utilizing increasingly developing technology. Furthermore, the results of the Tobit regression test, finding ESG has a positive relationship, but the impact is not significant on bank efficiency. Both liquidity risk and market risk were found to have a significant but non-linear relationship to bank efficiency. Based on our findings, banks are expected to be able to leverage technology, optimize the use of third-party funds, and control credit risk to achieve efficiency.

**Keywords:** Efficiency, Malmquist productivity, ESG, Liquidity risk, Credit risk.

**JEL Classification:** M14, M41, M21.

## INTRODUCTION

The banking sector has grown significantly and its financial markets have undergone dramatic changes, including deregulation, corporate governance reforms, releasing non-performing loans, managing risk, and increasing operational efficiency. Efficiency banking is that pay close attention to the value of their resources and choosing the best combination of factors by offering the most profitable combination of services, according to efficiency banking. Assessment of the performance of financial institutions is generally assessed based on their profitability (elTiby, 2011; Sufian, 2012), Risk-based bank rating using the camels method (Rashid & Jabeen, 2016; Wanke et al., 2017), and efficiency using Data Envelopment Analysis (DEA) (Kamarudin et al., 2022; Liu, 2019; Rosman et al., 2014). DEA is a performance measurement that can also use efficiency measurements in the technical field as the ratio between input-output through linear programming (Banker et al., 1984; Charnes et al., 1978). DEA further identifies sources of inefficiency in the process of converting inputs into outputs (Dobrzanski et al., 2021; Svitalkova, 2014).

Besides efficiency, another performance measure is productivity. The Malmquist index has been widely used to measure the productivity index and was introduced by (Caves et al., 1982). The Malmquist Productivity Index (MPI) is a component of the DEA technique that specifically measures the increase or decrease in productivity of each business unit. MPI takes into account changes in total factor productivity (TFP) based on technical efficiency changes and techno-

logical changes (Stanickova & Melecky, 2012). Several studies have found that productivity increases are more influenced by changes in technical efficiency (Arbona et al., 2022; Soltane Bassem, 2014). However, in contrast to the results of other studies, it was found that changes in productivity in commercial banks were more influenced by changes in technology (X. Chen et al., 2023; Cho & Chen, 2021; Dadoukis et al., 2021).

In the financial services business, there is a dearth of research focused on performance and risk. Islamic banks are considered to have achieved efficiency in their performance (Gulzar et al., 2021; Jawadi et al., 2014; Kayed & Hassan, 2011). Several other studies also state that conventional banks experience efficiency in terms of their profitability (Ramadhan et al., 2019; Yahya & Ibrahim, 2021). However, market risk, credit risk, and the size of the financial institution are the primary differences between the two types of banks that trigger financial risk (Chakroun & Gallali, 2021). Efficiency and Productivity of Islamic finance are often associated with credit risk (Abedifar et al., 2013; Čihák & Hesse, 2010; Masood et al., 2012), liquidity risk (Qudah et al., 2021), capital structure (Khokher & Syed Jaafar Alhabshi, 2019).

Environmental, social, and governance (ESG) information is rapidly garnering the attention of scholars and governments in several nations (Broadstock et al., 2021; Krueger et al., 2021; Luo, 2022). ESG disclosures include non-financial information that can help companies and capital market players close the information gap (e.g., stakeholders, governments, and investors). By sharing positive ESG information, businesses may control their public image and reputation (Koh et al., 2022). ESG score has become a new trend

\*Address correspondence to this author at the Ibn Khaldun Bogor University; E-mail: desmyriani@gmail.com

for investors in determining their investment decisions. This ESG investment is gaining importance in the global economy. The increase in sustainable investment has doubled from 2019 to 2020 (Di Luo, 2022). According to (Azmi et al., 2021), the link between ESG performance and bank performance is not linear. Low ESG involvement improves bank performance, whereas excessive ESG involvement is associated with declining performance. (Duque-Grisales & Aguilera-Caracuel, 2021) discovered a similar nonlinear association between ESG and organizational performance in their study of global firms. Investments in ESG activities can incur opportunity costs associated with inefficiently allocated capital. However, some researchers find ESG activity can improve organizational performance (Alam et al., 2022; la Torre et al., 2020; Miralles-Quirós et al., 2019). A proactive environmental strategy is the best business strategy that has been proven to improve company performance (Suttipun & Dechthanabodin, 2022). In addition, they say that ESG engagement reduces the bank's equity cost and improves cash flow and efficiency. This study examines the impact of ESG policies on the credibility of Italian banks as well as potential punishments (Murè et al., 2021). They discover that bank punishments are directly correlated with ESG, but the rise in ESG activities is due to banks' desire to enhance their reputation. The findings from this research can enable banks to mitigate risks and improve their performance. Measurement of governance in Islamic banks also has an important role in evaluating performance (Toumi, 2020). The empirical data relating ESG activity and company performance is ambiguous, or contradictory (Revelli & Viviani, 2015).

## LITERATURE REVIEW

### The Theories

Stakeholding theory, introduced by (Parmar et al., 2010), states that the company is an organ that relates to other interested parties, both inside and outside the company. Stakeholder theory is one of the strategic issues related to how companies manage relationships with stakeholders (Bani-Khalid & Kouhy, 2017). Companies are required to pay attention to and provide benefits to stakeholders because their existence can influence or be influenced by policies taken by companies in their business activities. This definition of stakeholders includes employees, customers, creditors, suppliers, and the surrounding community where the company operates. The stakeholder's model emphasizes business efficiency through the social or environmental context in which the business is located, because of the different interests of stakeholders (Alkhafaji, 1989). This perspective has a view of the corporation as a social entity. Disclosure of company information is important to maintain relationships and improve the company's reputation with stakeholders. The support provided by these stakeholders is expected to be able to have a positive effect on company performance, namely through investment support or capital participation that can improve company operations as well as through support for the use of company products by other stakeholders. Thus the company will be able to achieve profit targets. Achieving a high profit level will certainly have an impact on efficiency. ESG stakeholders argue that corporations have an ethical

obligation to enhance the value of all shareholders (Thottoli, 2022). Some researchers note that a stakeholder management approach leads to more efficient contracts.

### ESG Activity and Efficiency

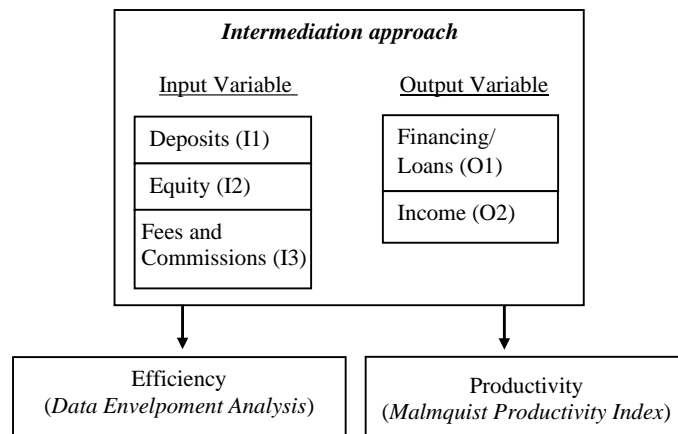
One of the cornerstones of a company's long-term success in terms of development and profitability while competing in the global marketplace is corporate governance (Cheung et al., 2014; Yu Qing et al., 2020). Research conducted by (Hijriah et al., 2021) on banks in Indonesia and Malaysia, the governance of banks takes into account all tasks, resulting in a dual board governance model. The results of this study indicate that the Board of Directors is capable of enhancing bank performance. As a supervisor, the Board of Directors ensures that proper corporate governance is implemented to minimize the risk of agency expenditures and increase the company's earnings. Thus, assessing the performance of financial institutions requires an understanding of governance in banking (Toumi, 2020).

Research on environmental factors of Corporate Social Responsibility (CSR) indicates a good correlation with business success (R. R. Ahmed & Streimikiene, 2021). This means that the existence of corporate social activities is positively perceived by stakeholders. Therefore, it can reduce the company's operational and market risk (Mulia & Joni, 2020). CSR contributes to shareholder value and performance as a tool. Businesses must implement CSR practices to improve their strategic investments and preserve positive relationships with their stakeholders (Tarigan et al., 2019). Organizations with superior disclosure practices will have a positive reputation, eventually increase organizational effectiveness (Adel et al., 2019), and have higher stock returns (Abdelfattah & Aboud, 2020).

The influence of ESG on the productivity and efficiency of businesses is a relatively recent issue in empirical finance. High ESG can increase company value. In addition, it can also reduce company costs and improve company performance in both the short and long term (Barko et al., 2022; Lins et al., 2017; Masulis & Reza, 2015). Companies with significant ESG involvement have greater returns and lower stock price volatility. ESG performance can directly or indirectly save on the cost of equity (Y. Chen et al., 2023; Luo, 2022). Equity cost savings can reduce operational risk and market risk with environmental, social responsibility, and governance as intermediary effects (Y. Chen et al., 2023). Companies that care about ESG levels can maintain higher holdings of liquid assets during a pandemic crisis (Ding et al., 2021). This has more impact on financial companies than non-financial companies (Cardillo et al., 2022). Stocks with higher liquidity have higher ESG than stocks with low liquidity. Thus, companies can use ESG as a tool to reduce the cost of increasing capital in the capital market (Luo, 2022). ESG and sustainable activities are proven to be able to mitigate risks to banking compliance (Kabir Hassan et al., 2021). Previous research provides significant evidence of the influence of ESG on business and bank performance, but the literature on ESG and bank efficiency is quite scarce (Tasnia et al., 2021).

H1: ESG affects bank efficiency.

First stage testing:



Second stage testing:

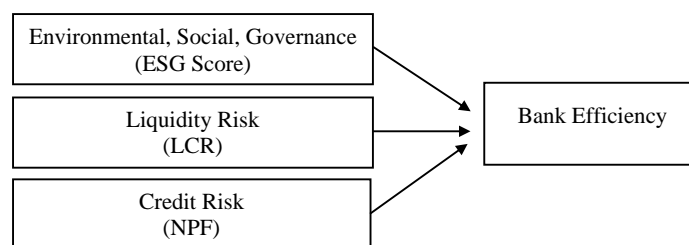


Fig. (1). Research Framework.

**Liquidity Risk and Efficiency**

The empirical research on the relationship between banking capital and bank efficiency has produced contradictory results. (Staub et al., 2010) discovered that when banks maintain more capital, they are more risk-averse, hence enhancing their efficiency. In the contexts of Korea and Taiwan, their conclusions are corroborated by (Banker et al., 2010; Hsiao et al., 2010). A greater capital adequacy ratio can minimize the risk of a bank’s portfolio, leading to safer credit risk practices and improved banking system performance, according to the research. (Pessarossi & Weill, 2015) showed evidence of a positive relationship between capital and efficiency for Chinese banks, implying that shareholders have less motivation to take action against depositors if they control more of the bank. (Vazquez & Federico, 2015) and (Ashraf & Lahsasna, 2017) provide evidence showing that a higher liquidity ratio increases the stability of both conventional and Islamic banks.

However,(Berger & Bonaccorsi di Patti, 2006; Leřanovská & Weill, 2016)offer a different view when examining US banks, suggesting that a low capital ratio reduces agency costs and improves efficiency. A high Liquidity Coverage Ratio (LCR) affects decreasing profitability and reduces the risk of bank default (Giordana & Schumacher, 2017). Meanwhile, (Leřanovská & Weill, 2016)did not find a relationship between capital and efficiency. LCR has no real impact on profitability (Dietrich et al., 2014).

H2: Liquidity risk affects bank efficiency.

**Credit Risk and Efficiency**

Risk in banking faces several challenges in the development of sustainable performance. The stock market has strong causality with risk and financial factors (Ajmi et al., 2014). Risk in banking faces several challenges in the development of sustainable performance. The stock market has strong causality with risk and financial factors. Intrinsic property in financial institutions protects against potential financial risks during a financial crisis (A. Ahmed, 2010). Research (Jawadi et al., 2014; Kayed & Hassan, 2011) found that the impact of the global financial crisis did not have a significant effect on bank performance. Banks are considered capable of controlling risk. However, it is different, credit risk worsened during the oil crisis and the Covid-19 global pandemic (Dibooglu et al., 2022). Credit risk has a negative effect on bank efficiency and productivity growth (Azmi et al., 2021) So that banks that can control credit risk prove to be more efficient during the financial crisis (Taylor, 2022).

H3: Credit risk affects bank efficiency.

**METHODOLOGY**

Purposive sampling was used to collect research data samples, meaning the sample selection method was chosen based on expert judgment. This indicates that the selection of the sample is not random, and that the information obtained is based on a variety of factors. The sample criteria used are (1) banks registered on the Indonesian Stock Exchange during the 2019 to 2021 observation period; and (2) banks that are

**Table 1. Descriptive Data. Source: own research.**

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Income	39	7454	143523	35385.05	36411.818
Loans	39	48594	1042867	324050.46	316864.551
Deposits	39	72790	1138743	379535.38	363197.263
Equity	39	15541	291787	79847.44	80802.873
Commissions	39	1269	38047	7965.44	8771.448
Efficiency	33	0.0000	1.0000	0.4848	0.5075
ESG	33	0.5600	3.0400	1.7912	0.6850
LCR	33	1.4600	4.0000	2.2460	0.6090
NPF	33	0.0080	0.0480	0.0292	0.0090

included in the group of banks based on core capital (KBMI) 3 and 4, which means that they have a core capital of more than 14 trillion. The samples in this study were 13 banks out of a total of 46 bank issuers listed on the Indonesian stock exchange. The samples in this study were Bank Central Asia, BNI, BRI, Bank Mandiri, Bank Danamon, CIMB Niaga, Maybank, Bank Permata, Bank Syariah Indonesia, OCBC, Bank Mega, BTPN, and BTN.

There are two theoretical techniques for calculating efficiency scores. The parametric approach makes use of econometric methods, whereas the non-parametric approach makes use of the linear programming model. The main difference between the two approaches is how to deal with random errors and assumptions that form efficiency scores (Mokhtar, et al in Bastian (2009: 63). The use of parametric methods is most widely used in Stochastic Frontier Analysis (SFA), Distribution-Free Analysis (DFA), and Thick Frontier Analysis (TFA). In contrast, the use of non-parametric methods generally uses Free Disposal Hull Analysis (FDH) and Data Envelopment Analysis (DEA).

Total Factor Productivity (TFP) measures the connection among both output and input simultaneously. The ratio of the output index to the aggregate input index expresses this connection. An increase in the ratio means that a certain amount of input can produce more output, or that fewer inputs can produce a certain output. TFP is computed to use indices that measure price and volume fluctuations over time. Additionally, TFP evaluates similarities and distinctions across things. TFP is commonly measured using the Malmquist, Laspeyres, Pasche, Fisher, and Trunkvist indices. The Malmquist index is used in this study to calculate productivity (TFP). Malmquist TFP is part of the DEA method developed by Charnes Cooper Rhodes and banker Charnes Cooper Cooper (Banker et al., 1984, 2010; Charnes et al., 1978). Malmquist productivity analysis is beneficial because component-specific analyses may be performed.

In this research, the researcher uses the following analytical steps: (1) determine the measurement based on Output Oriented (Maximum Output); (2) measure the value of efficien-

cy with the variable returns to scale (VRS) approach using the DEA method; (3) measure productivity by analyzing changes in efficiency and changes in technology using the Malmquist Productivity Index; (4) examining the influence of environmental, social and governance on bank efficiency; and (5) examine the indirect effect of environmental, social and governance on efficiency through liquidity risk.

The input variables that are thought to influence the output variables are determined by referring to previous studies and some literature on banking efficiency. This study uses the DEA method with an intermediation approach. The input variables in the intermediation approach (deposits, equity, and fees & commissions) will affect the output variables (financing/loans and income). This approach will produce efficiency values for each bank as measured by the DEA method. The total value of production is based on changes in efficiency and technological changes from each bank using the Malmquist Productivity Index.

Furthermore, testing the effect of ESG, liquidity risk, and credit risk on bank efficiency with Tobit regression. Because Tobit regression is a regression analysis that is used for the dependent variable, some of the data have a discrete measurement scale and some of the others are continuous (Lindenberg & Ross, 1981). Measurement of the technical efficiency score between 0 to 1.

Table 1 shows descriptive data regarding the minimum value, maximum value, and standard deviation of each variable. The data used in calculating the efficiency of banking techniques with the DEA analysis of the intermediation approach. The minimum value of efficiency is 0 and the maximum value is 1, so the hypothesis testing uses Tobit regression.

## RESULT AND DISCUSSION

Based on the calculation results of the DEA method assuming VRS (Variable Returns to Scale) in the intermediation approach using DEAP 2.1 Software, it can be seen that the level of banking efficiency is shown in figure 2. The average technical efficiency of all banks shows a decrease from 98.7 percent in 2019, and 93.3 percent in 2020, and will decrease again to 92.9 percent in 2021. This is due to the condition of

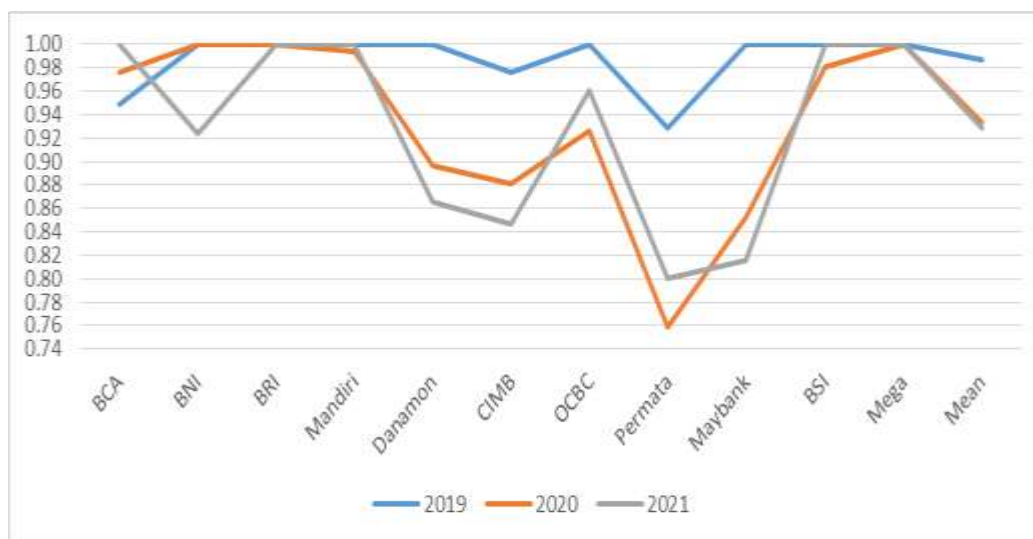


Fig. (1). Efficiency Bank. Source: own research.

the covid 19 pandemic which has reduced the income of financial institutions. The crisis had an impact on reducing people's income, thereby increasing the risk of non-performing loans to financial institutions. The graphic image also shows that banks with large capital values are more likely to survive in an efficient state. Banks that during the observation period achieved 100 percent technical efficiencies were BNI and Bank Mega. BNI achieved technical efficiency in 2019-2020 and decreased in 2021 to 92.4 percent. Bank Mandiri and Bank Syariah Indonesia are consistent in maintaining their technical efficiency achievements, even though they experienced a decline in 2019. Banks that experienced inefficiencies during the observation period were CIMB Bank and Permata Bank. This is due to the lack of achievement of the target of income and distribution of credit funds from the bank.

Based on the results of research on the efficiency level of banks using the intermediation approach, there are several banks that experience the inefficiencies described earlier. The following details the input-output that causes inefficiency in each of these banks, and shows actual values, targets, and potential improvements, which can be seen in the appendix. The actual value is the input-output value used. The target is the achievement expected to achieve a relative efficiency level. Potential improvement is the percentage of increasing efficiency to achieve the expected value. Potential improvements for achieving efficiency are detailed in table 2.

Measurement of technical efficiency is limited to technical and operational relations in the process of converting inputs into outputs. This means that to improve technical efficiency it is only necessary to use internal policies, namely by controlling and allocating resources optimally. Inefficiencies in the intermediation approach occur in the input variables (deposits, equity, and fees & commissions) and the output variables (loans/financing and income). First, the inefficient use of deposit inputs is caused by the variable number of deposit inputs which is still greater than the target. This indicates that its role as input is not maximal to produce output. The effort that can be done is to allocate excess deposit funds to

the total assets section, especially productive assets. Banks can maximize the use of banking products and services to customers so that they can increase income even better than fee-based income. This non-interest income has proven to be more stable and profitable for financial institutions (Kohler, 2015). Income diversification through non-interest income can improve bank performance and reduce risk during the Covid-19 pandemic crisis (Li et al., 2021; Taylor, 2022).

Second, the inefficiency of capital input is due to the lack of maximizing the use of equity as input in producing output (Svitalkova, 2014). The equity function can protect against bank failure or loss and protection of the interests of depositors. So that banks can increase the amount of credit or financing. The impact on obtaining bank revenue is more maximum. Third, inefficiency in fees & commissions input because the amount of labor costs that must be incurred is greater than what is required. The amount of labor costs is caused by a large number of employees used. The increase in the number of employees was not matched by the adequate performance, causing the bank to experience a decrease in productivity. Banks need to improve the performance of their employees by developing corporate values such as cultural control (Ismail, 2016), and innovation management in increasing employee creativity which has a positive impact on company performance (Baird et al., 2019).

Variable output inefficiencies occur in loan/financing and income. first, the amount of loan/financing disbursement is smaller than the predetermined target. This can happen because of the principle of prudence by banks before giving credit. Pandemic conditions have reduced the ability of customers to pay off credit so banks are very selective in providing credit to reduce the risk of non-performing loans. In conditions of economic crisis, credit risk is the main factor affecting the performance of both Islamic and conventional banking (Chakroun & Gallali, 2021). The solution that can be done is not to reduce the predetermined target, but to increase supervision in granting credit. Banks can lower lending rates for productive loans. This is done so that many people, both individuals, and companies, apply for financing, the impact is that the financing target can be achieved and

**Table 2. Potential Improvement of Input-Output. Source: own research.**

Year	Bank	Efficiency	Potential Improvement (In percent)				
			Income	Loans/ Financing	Deposits	Equity	Fees & Commissions
2019	BCA	0,949	5,36	5,36	-	19,86	-
	CIMB	0,976	57,81	2,44	-	-	10,53
	Permata	0,929	15,88	7,6	-	-	-
	<b>Mean</b>	<b>0,951</b>	<b>26,35</b>	<b>5,13</b>	<b>-</b>	<b>6,62</b>	<b>3,51</b>
2020	BCA	0,976	2,48	11,01	-	9,97	-
	Mandiri	0,994	13,47	0,61	-	-	-
	Danamon	0,896	13,69	11,61	-	-	2,68
	CIMB	0,881	58,78	13,5	-	-	-
	OCBC	0,926	12,13	8,04	16,56	3,63	-
	Permata	0,759	31,75	31,75	-	4,31	-
	Maybank	0,853	18,7	17,3	-	-	-
	BSI	0,981	1,96	17,41	9,67	-	-
	<b>Mean</b>	<b>0,908</b>	<b>19,12</b>	<b>13,90</b>	<b>3,28</b>	<b>2,24</b>	<b>0,34</b>
2021	BNI	0,924	18,97	8,26	4,21	-	-
	Danamon	0,866	15,43	15,43	-	0,57	-
	CIMB	0,847	69,48	18,1	-	-	-
	OCBC	0,961	22,32	4,07	19,84	10,06	-
	Permata	0,800	31,82	24,93	-	8,16	-
	Maybank	0,816	43,4	22,51	-	4,56	-
	<b>Mean</b>	<b>0,869</b>	<b>33,57</b>	<b>15,55</b>	<b>4,01</b>	<b>3,89</b>	<b>-</b>

also contributes to economic development. Second, the inefficiency of income has not been as expected. Banks can increase financing by way of product innovation and service fees related to deposit inputs (safe deposit boxes, administration fees, and others). This step will increase fee based income.

Bank productivity performance from 2019 to 2021 related to tfpch (total factor productivity change) is reported in table 3. TFPCH is a combination of two sub-components, namely effch (technical efficiency change) and techch (technological change). Techch is the multiplication of pech (pure technical efficiency change) and sech (scale efficiency change). The results of changes in productivity are shown from the TFP index value (Fare et al., 1994). If the TFP index is below 1, it means that the bank has decreased productivity. The TFP index is above 1, meaning that the bank has not experienced an increase in productivity. The TFP index is equal to 1, meaning that the bank has not experienced a change in productivity either in terms of increase or decrease.

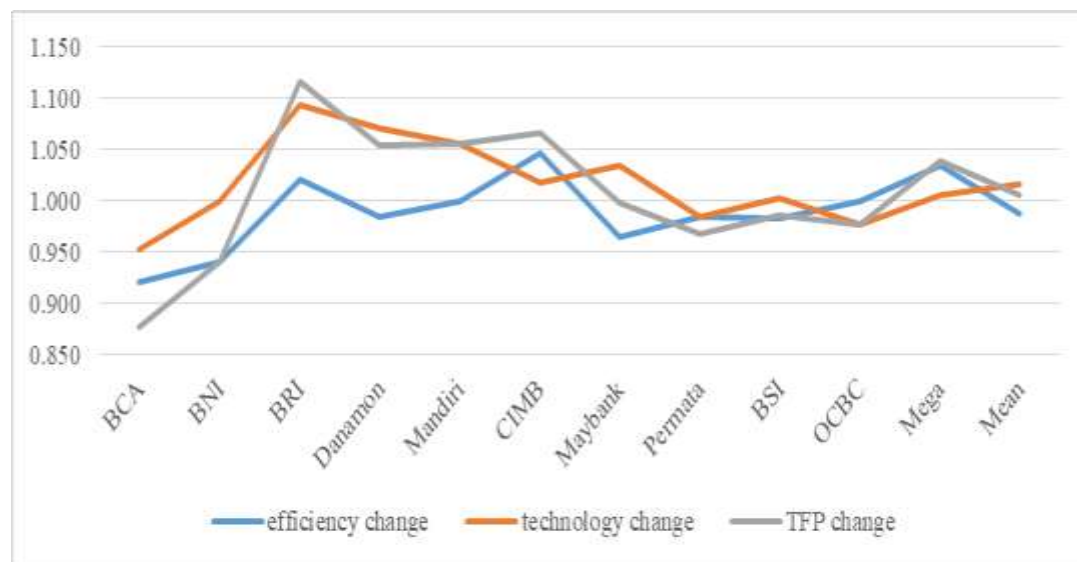
Banks that experienced the highest increase in productivity in 2020 were BNI with a score of 1.108, Permata Bank with a score of 1.074, Bank Mega with a score of 1.024, and CIMB with a score of 1.008. This increase in productivity

was more influenced by technological changes at BNI and Bank Permata. Meanwhile, at bank mega and cimb, the increase in productivity was more influenced by efficiency change. Overall in 2020, technological change has increased by 1.5% and decreased efficiency change by 4.4%. So that the total productivity index has decreased by 3% which is more influenced by the increase in technological change. This research is in line with research results (X. Chen et al., 2023; Cho & Chen, 2021; Dadoukis et al., 2021). This means that banks are good at utilizing increasingly developing technology, but are not yet efficient in managing their inputs and outputs.

BCA, BNI, and Bank Permata will experience a decline in productivity in 2021. This decline is caused by a greater reduction in efficiency change than technological change. This shows that the bank has not been efficient in managing its inputs and outputs. Meanwhile, eight other banks experienced an increase in productivity based on technological change and efficiency change. Overall, the bank experienced a better increase in productivity in 2021 compared to 2020. The increase in the total productivity index was 4.1% due to an increase in technology change of 1.9% and an increase in efficiency change of 2.2%. This shows the bank is good at

**Table 3. Productivity Bank. Source: own research.**

Bank	2019-2020					2020-2021				
	Efficiency Change	Tech-change	Pure effch	Slaceeffch	TFP change	Efficiency Change	Tech-Change	Pure effch	Slaceeffch	TFP Change
BCA	0,982	0,990	0,988	0,994	0,972	0,862	0,919	0,918	0,940	0,792
BNI	1,042	1,064	1,025	1,016	1,108	0,851	0,939	0,911	0,934	0,799
BRI	0,974	1,018	1,000	0,974	0,991	1,071	1,176	1,000	1,071	1,260
Danamon	0,939	0,979	1,000	0,939	0,919	1,032	1,171	1,000	1,032	1,209
Mandiri	0,977	0,948	1,000	0,977	0,926	1,024	1,177	1,000	1,024	1,205
CIMB	1,016	0,993	1,026	0,990	1,008	1,079	1,044	1,055	1,023	1,127
Maybank	0,911	0,999	0,935	0,975	0,910	1,022	1,070	1,017	1,005	1,093
Permata	1,000	1,074	1,074	1,074	1,074	0,968	0,902	0,994	0,974	0,873
BSI	0,864	1,118	1,074	0,864	0,966	1,118	0,900	1,000	1,118	1,006
OCBC	0,810	1,001	0,828	0,977	0,810	1,235	0,953	1,207	1,023	1,177
Mega	1,029	0,995	1,074	1,029	1,024	1,040	1,015	1,000	1,040	1,055
<b>Mean</b>	<b>0,956</b>	<b>1,015</b>	<b>0,980</b>	<b>0,975</b>	<b>0,970</b>	<b>1,022</b>	<b>1,019</b>	<b>1,007</b>	<b>1,015</b>	<b>1,041</b>



**Fig. (2).** Average productivity change. Source: own research.

managing its input and output, as well as at utilizing technology. The increase in productivity this year was more influenced by an increase in efficiency change, which means that the bank is already good at management practices (Arbona et al., 2022; Soltane Bassem, 2014).

Fig. (3) shows the average productivity of each bank during the observation period. It can be seen that BRI experienced the highest increase in total factor productivity at 11.7%. The increase in productivity was influenced by an increase in efficiency change of 2.1% and technology change of 9.4%. BCA experienced the lowest decrease in total factor productivity at 12.3%. The decline in productivity was affected by

an 8% reduction in efficiency change and a 4.7% reduction

in technology change. This decrease was due to banks being very careful in using their input funds or assets and limiting credit distribution. The conditions of the covid crisis resulted in deteriorating asset quality which resulted in economic and financial difficulties (Taylor, 2022). The average of all banks during the observation period experienced an increase in the total productivity index of 5%, which was influenced by an average increase in technology change of 1.7%, and an average decrease in efficiency change of 1.2%. The increase in bank productivity is more influenced by technological

change. Thus, technology can increase financial stability and bank resilience during pandemic crisis conditions. These results are by research (Dadoukis et al., 2021).

**Table 4. Results of hypothesis testing. Source: own research.**

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	3.435	1.782	1.927	0.0539
ESG	0.170	0.356	0.476	0.6336
LCR	-0.913	0.432	-2.113	0.0346*
NPF	-5.792	3.206	-1.806	0.0708**

\*significant 5%

\*\*significant 10%

Analysis of the effect of ESG, liquidity risk as measured by LCR, and credit risk as measured by NPF on bank efficiency is described in Table 4. This study found a significant effect of LCR and NPF on bank efficiency. However, there is no significant effect of ESG on bank efficiency, our findings support the results of this study (Alam et al., 2022; la Torre et al., 2020). However, there is a positive relationship between ESG and efficiency, although the effect is not significant. This result can occur because the research was carried out during a pandemic, so the benefits of ESG had less impact. Liquidity risk was found to have a significant but non-linear relationship to bank efficiency. These results are consistent with (Berger & Bonaccorsi di Patti, 2006; Lešanovská & Weill, 2016) which show that low capital ratios can reduce agency costs and increase efficiency. High LCR affects decreasing profitability due to less optimal bank management of third-party funds, thereby reducing bank efficiency. Credit risk as measured by NPF was found to have a significant negative effect on bank efficiency. The results of these findings are consistent with the research (Azmi et al., 2021; Taylor, 2022), proving that banks that can control credit risk are proven to be more efficient during the financial crisis. In this pandemic condition, banks are more careful in extending credit to reduce the risk of non-performing financing.

## CONCLUSIONS

In this paper, we measure the technical efficiency and productivity of banks. The average bank efficiency has decreased from 2019, 2020, 2021 respectively by 98.7%, 93.3%, and 92.9%. This was caused by the condition of the Covid 19 pandemic which had an impact on a decrease in bank income. Pandemic conditions reduce the ability of customers to pay credit, thereby increasing the risk of problem loans. Credit risk is the main factor affecting the performance of both sharia and conventional banking (Chakroun & Gallali, 2021). Bank Mega and BRI are banks that during the observation period achieved 100% technical efficiency.

During the observation period, the average productivity experienced an increase in the total productivity index by 5%. This increase was influenced by an average increase in technology change of 1.7%, and an average decrease in efficiency change of 1.2%. The increase in bank productivity is more influenced by technological change. This means that

banks are good at utilizing increasingly developing technology, but are not yet efficient in managing their inputs and outputs. Technology can increase financial stability and bank resilience during pandemic crisis conditions. These findings support (X. Chen et al., 2023; Cho & Chen, 2021; Dadoukis et al., 2021).

In this study, ESG found no effect on bank efficiency, these results support research (Alam et al., 2022; la Torre et al., 2020). Liquidity risk was found to have a significant but non-linear relationship to bank efficiency. These results support the research (Berger & Bonaccorsi di Patti, 2006; Lešanovská & Weill, 2016). Credit risk as measured by NPF was found to have a significant negative effect on bank efficiency. The results of this finding are in line with research (Azmi et al., 2021; Taylor, 2022) that banks that can control credit risk are proven to be more efficient during financial crises.

## IMPLICATIONS AND LIMITATIONS

The results of this study contribute to the bank's internal policies in managing its inputs and outputs to achieve efficiency targets. The policy concerns controlling and allocating bank resources optimally. Our findings prove that technological change can increase bank productivity. Thus, utilizing technology can increase the stability and resilience of banks during crisis conditions. Furthermore, our findings contribute to the gap in the literature regarding the effect of liquidity risk, credit risk, and ESG on bank efficiency. This study strengthens the results of the research (Alam et al., 2022; Azmi et al., 2021; Lešanovská & Weill, 2016). This is useful for policymakers in paying attention to risk management, environment, social, and governance in improving bank performance.

Lack of observation time regarding the evidence of the effect of ESG on bank efficiency. This is important because the impact of ESG on efficiency is less apparent due to the observation period during a pandemic. However, there is a positive relationship between ESG and bank efficiency, even though it is not significant. Future research can examine the effect of technology on bank value, and in testing ESG can extend the research time.

## REFERENCES

- Abdelfattah, T., & Aboud, A. (2020). Tax avoidance, corporate governance, and corporate social responsibility: The case of the Egyptian capital market. *Journal of International Accounting, Auditing and Taxation*, 38, 100304. <https://doi.org/10.1016/j.intaccudtax.2020.100304>
- Abedifar, P., Molyneux, P., & Tarazi, A. (2013). Risk in Islamic Banking. *Review of Finance*, 17(6), 2035–2096. <https://doi.org/10.1093/ROF/RFS041>
- Adel, C., Hussain, M. M., Mohamed, E. K. A., & Basuony, M. A. K. (2019). Is corporate governance relevant to the quality of corporate social responsibility disclosure in large European companies? *International Journal of Accounting & Information Management*, 27(2), 301–332. <https://doi.org/10.1108/IJAIM-10-2017-0118>
- Ahmed, A. (2010). Global financial crisis: an Islamic finance perspective. *International Journal of Islamic and Middle Eastern Finance and Management*, 3(4), 306–320. <https://doi.org/10.1108/17538391011093252>



- Ahmed, R. R., & Streimikiene, D. (2021). Environmental Issues and Strategic Corporate Social Responsibility for Organizational Competitiveness. *Journal of Competitiveness*, 13(2), 5–22. <https://doi.org/10.7441/joc.2021.02.01>
- Ajmi, A. N., Hammoudeh, S., Nguyen, D. K., & Sarafrazi, S. (2014). How strong are the causal relationships between Islamic stock markets and conventional financial systems? Evidence from linear and non-linear tests. *Journal of International Financial Markets, Institutions and Money*, 28(1), 213–227. <https://doi.org/10.1016/J.INTFIN.2013.11.004>
- Alam, A. W., Banna, H., & Hassan, M. K. (2022). ESG ACTIVITIES AND BANK EFFICIENCY: ARE ISLAMIC BANKS BETTER? *Journal of Islamic Monetary Economics and Finance*, 8(1), 65–88. <https://doi.org/10.21098/jimf.v8i1.1428>
- Alkhafaji, A. F. (1989). *A stakeholder approach to corporate governance: Managing in a dynamic environment*. Praeger.
- Arbona, A., Giménez, V., López-Estrada, S., & Prior, D. (2022). Efficiency and quality in Colombian education: An application of the meta-frontier Malmquist-Luenberger productivity index. *Socio-Economic Planning Sciences*, 79. <https://doi.org/10.1016/j.seps.2021.101122>
- Ashraf, M. A., & Lahsasna, A. (2017). Measuring Sharī'ah risk proposal for a new Sharī'ah risk rating model for Islamic banks and allocation of capital for Sharī'ah risk under Basel III. *Journal of King Abdulaziz University, Islamic Economics*, 30(Specialissue), 73–87. <https://doi.org/10.4197/Islec.30-SI.5>
- Azmi, W., Hassan, M. K., Houston, R., & Karim, M. S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International Financial Markets, Institutions and Money*, 70. <https://doi.org/10.1016/j.intfin.2020.101277>
- Baird, K., Su, S., & Munir, R. (2019). Levers of control, management innovation and organisational performance. *Pacific Accounting Review*, 31(3), 358–375. <https://doi.org/10.1108/PAR-03-2018-0027>
- Banker, R. D., Chang, H., & Lee, S.-Y. (2010). Differential impact of Korean banking system reforms on bank productivity. *Journal of Banking & Finance*, 34(7), 1450–1460. <https://doi.org/10.1016/j.jbankfin.2010.02.023>
- Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficient in Data Envelopment Analysis. *Management Science*. <https://doi.org/10.1287/mnsc.30.9.1078>
- Barko, T., Cremers, M., & Renneboog, L. (2022). Shareholder Engagement on Environmental, Social, and Governance Performance. *Journal of Business Ethics*, 180(2), 777–812. <https://doi.org/10.1007/s10551-021-04850-z>
- Berger, A. N., & Bonaccorsi di Patti, E. (2006). Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. *Journal of Banking & Finance*, 30(4), 1065–1102. <https://doi.org/10.1016/j.jbankfin.2005.05.015>
- Broadstock, D. C., Chan, K., Cheng, L. T. W., & Wang, X. (2021). The role of ESG performance during times of financial crisis: Evidence from COVID-19 in China. *Finance Research Letters*, 38, 101716. <https://doi.org/10.1016/J.FRL.2020.101716>
- Cardillo, G., Bendinelli, E., & Torlucchio, G. (2022). COVID-19, ESG investing, and the resilience of more sustainable stocks: Evidence from European firms. *Business Strategy and the Environment*. <https://doi.org/10.1002/bse.3163>
- Caves, D. W., Christensen, L. R., & Diewert, W. E. (1982). The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity. *Econometrica*, 50(6), 1393. <https://doi.org/10.2307/1913388>
- Chakroun, M. A., & Gallali, M. I. (2021). Dependence between Islamic banks and conventional banks and risk factors. *International Journal of Banking, Accounting and Finance*, 12(3), 201–239. <https://doi.org/10.1504/IJBAF.2021.116189>
- Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*. [https://doi.org/10.1016/0377-2217\(78\)90138-8](https://doi.org/10.1016/0377-2217(78)90138-8)
- Chen, X., Chen, Y., Huang, W., & Zhang, X. (2023). A new Malmquist-type green total factor productivity measure: An application to China. *Energy Economics*, 117, 106408. <https://doi.org/10.1016/j.eneco.2022.106408>
- Chen, Y., Li, T., Zeng, Q., & Zhu, B. (2023). Effect of ESG performance on the cost of equity capital: Evidence from China. *International Review of Economics and Finance*, 83, 348–364. <https://doi.org/10.1016/j.iref.2022.09.001>
- Cheung, Y.-L., Connelly, J. T., Estanislao, J. P., Limpaphayom, P., Lu, T., & Utama, S. (2014). Corporate Governance and Firm Valuation in Asian Emerging Markets. *Springer, Berlin, Heidelberg*, 27–53. [https://doi.org/10.1007/978-3-642-44955-0\\_2](https://doi.org/10.1007/978-3-642-44955-0_2)
- Cho, T. Y., & Chen, Y. S. (2021). The impact of financial technology on China's banking industry: An application of the metafrontier cost Malmquist productivity index. *North American Journal of Economics and Finance*, 57. <https://doi.org/10.1016/j.najef.2021.101414>
- Čihák, M., & Hesse, H. (2010). Islamic Banks and Financial Stability: An Empirical Analysis. *Journal of Financial Services Research*, 38(2), 95–113. <https://doi.org/10.1007/s10693-010-0089-0>
- Dadoukis, A., Fiaschetti, M., & Fusi, G. (2021). IT adoption and bank performance during the Covid-19 pandemic. *Economics Letters*, 204, 109904. <https://doi.org/10.1016/j.econlet.2021.109904>
- Dibooglu, S., Cevik, E. I., & Tamimi, H. A. H. A. (2022). Credit default risk in Islamic and conventional banks: Evidence from a GARCH option pricing model. *Economic Analysis and Policy*, 75, 396–411. <https://doi.org/10.1016/j.eap.2022.06.006>
- Dietrich, A., Hess, K., & Wanzenried, G. (2014). The good and bad news about the new liquidity rules of Basel III in Western European countries. *Journal of Banking & Finance*, 44, 13–25. <https://doi.org/10.1016/j.jbankfin.2014.03.041>
- Ding, W., Levine, R., Lin, C., & Xie, W. (2021). Corporate immunity to the COVID-19 pandemic. *Journal of Financial Economics*, 141(2), 802–830. <https://doi.org/10.1016/J.JFINECO.2021.03.005>
- Dobrzanski, P., Bobowski, S., Chrysostome, E., Velinov, E., & Strouhal, J. (2021). Toward Innovation-Driven Competitiveness Across African Countries: An Analysis of Efficiency, R&D Expenditures. *Journal of Competitiveness*, 13(1), 5–22. <https://doi.org/10.7441/joc.2021.01.01>
- Duque-Grisales, E., & Aguilera-Caracuel, J. (2021). Environmental, Social and Governance (ESG) Scores and Financial Performance of Multinationals: Moderating Effects of Geographic International Diversification and Financial Slack. *Journal of Business Ethics*, 168(2), 315–334. <https://doi.org/10.1007/s10551-019-04177-w>
- eITiby, A. M. (2011). Islamic Banking: How to Manage Risk and Improve Profitability. In *Islamic Banking: How to Manage Risk and Improve Profitability*. John Wiley and Sons. <https://doi.org/10.1002/9781118266922>
- Fare, R., Grosskopf, S., Norris, M., & Zhang, Z. (1994). Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries. *The American Economic Review*, 84(1), 66–83. <http://www.jstor.org/stable/2117971>
- Giordana, G. A., & Schumacher, I. (2017). An Empirical Study on the Impact of Basel III Standards on Banks' Default Risk: The Case of Luxembourg. *Journal of Risk and Financial Management*, 10(2), 8. <https://doi.org/10.3390/jrfm10020008>
- Gulzar, R., Ibrahim, M. H., & Ariff, M. (2021). Islamic Banks: History, Stability and Lessons from Cooperative Banking. *Jurnal Institutions and Economics*, 13(3), 1–26. <https://doi.org/10.22452/IJIE.vol13no3.1>
- Hijriah, H. Y., Kholidah, H., & Alkausar, B. (2021). Dual Board Governance Structure and Performance Evaluation of Islamic Banking: A Comparative Study among Islamic Banks in Indonesia and Malaysia. *Review of International Geographical Education Online*, 11(8), 1047–1057. <https://doi.org/10.48047/rigeo.11.08.91>
- Hsiao, H.-C., Chang, H., Cianci, A. M., & Huang, L.-H. (2010). First Financial Restructuring and operating efficiency: Evidence from Taiwanese commercial banks. *Journal of Banking & Finance*, 34(7), 1461–1471. <https://doi.org/10.1016/j.jbankfin.2010.01.013>
- Ismail, T. (2016). Culture control, capability and performance: evidence from creative industries in Indonesia. *Asian Review of Accounting*, 24(2). <https://doi.org/10.1108/ARA-01-2014-0014>
- Jawadi, F., Jawadi, N., & Louhichi, W. (2014). Conventional and Islamic stock price performance: An empirical investigation. *International Economics*, 137, 73–87. <https://doi.org/10.1016/j.inteco.2013.11.002>
- Kabir Hassan, M., Chiaramonte, L., Dreassi, A., Paltrinieri, A., & Piserà, S. (2021). The crossroads of ESG and religious screening on firm risk. *Research in International Business and Finance*, 58. <https://doi.org/10.1016/j.ribaf.2021.101500>

- Kamarudin, F., Mohamad Anwar, N. A., Md. Nassir, A., Sufian, F., Tan, K. M., & Iqbal Hussain, H. (2022). Does country governance and bank productivity Nexus matters? *Journal of Islamic Marketing*, 13(2), 329–380. <https://doi.org/10.1108/JIMA-05-2019-0109/FULL/XML>
- Kayed, R. N., & Hassan, M. K. (2011). The global financial crisis and Islamic finance. *Thunderbird International Business Review*, 53(5), 551–564. <https://doi.org/10.1002/tie.20434>
- Khokher, Z. U. R., & Syed Jaafar Alhabshi, S. M. B. (2019). Determinants of capital structure decisions among publicly listed Islamic banks. *Management Science Letters*, 9(10), 1577–1598. <https://doi.org/10.5267/j.msl.2019.5.028>
- Koh, H.-K., Burnasheva, R., & Suh, Y. G. (2022). Perceived ESG (Environmental, Social, Governance) and Consumers' Responses: The Mediating Role of Brand Credibility, Brand Image, and Perceived Quality. *Sustainability*, 14(8), 4515. <https://doi.org/10.3390/su14084515>
- Kohler, M. (2015). Which banks are more risky? The impact of business models on bank stability. *Journal of Financial Stability*, 16, 195–212. <https://doi.org/10.1016/j.jfs.2014.02.005>
- Krueger, P., Sautner, Z., Tang, D. Y., & Zhong, R. (2021). The Effects of Mandatory ESG Disclosure around the World. *SSRN Electronic Journal*, 754, 21–44. <https://doi.org/10.2139/ssrn.3832745>
- la Torre, M., Mango, F., Cafaro, A., & Leo, S. (2020). Does the ESG Index Affect Stock Return? Evidence from the Eurostoxx50. *Sustainability*, 12(16), 6387. <https://doi.org/10.3390/su12166387>
- Lešanovská, J., & Weill, L. (2016). Does greater capital hamper the cost efficiency of banks? A Bi-causal analysis. *Comparative Economic Studies*, 58(3), 409–429. <https://doi.org/10.1057/S41294-016-0002-4>
- Li, X., Feng, H., Zhao, S., & Carter, D. A. (2021). The effect of revenue diversification on bank profitability and risk during the COVID-19 pandemic. *Finance Research Letters*, 43, 101957. <https://doi.org/10.1016/j.frl.2021.101957>
- Lindenberg, E. B., & Ross, S. A. (1981). Tobin's q Ratio and Industrial Organization. *The Journal of Business*, 54(1), 1–32. <http://www.jstor.org/stable/2352631>
- Lins, K. v., Servaes, H., & Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *The Journal of Finance*, 72(4), 1785–1824. <https://doi.org/10.1111/jofi.12505>
- Liu, R. (2019). Comparison of Bank Efficiencies between the US and Canada: Evidence Based on SFA and DEA. *Journal of Competitiveness*, 11(2), 113–129. <https://doi.org/10.7441/joc.2019.02.08>
- Luo, D. (2022). ESG, liquidity, and stock returns. *Journal of International Financial Markets, Institutions and Money*, 78. <https://doi.org/10.1016/j.intfin.2022.101526>
- Masood, O., al Suwaidi, H., & Darshini Pun Thapa, P. (2012). Credit risk management: a case differentiating Islamic and non-Islamic banks in UAE. *Qualitative Research in Financial Markets*, 4(2–3), 197–205. <https://doi.org/10.1108/17554171211252529>
- Masulis, R. W., & Reza, S. W. (2015). Agency Problems of Corporate Philanthropy. *Review of Financial Studies*, 28(2), 592–636. <https://doi.org/10.1093/rfs/hhu082>
- Miralles-Quirós, M., Miralles-Quirós, J., & Redondo Hernández, J. (2019). ESG Performance and Shareholder Value Creation in the Banking Industry: International Differences. *Sustainability*, 11(5), 1404. <https://doi.org/10.3390/su11051404>
- Mulia, R. A., & Joni, J. (2020). Corporate social responsibility (CSR) and risk taking: Evidence from Indonesia. *ACRN Journal of Finance and Risk Perspectives*, 8(1), 152–162. <https://doi.org/10.35944/jofrp.2019.8.1.010>
- Murè, P., Spallone, M., Mango, F., Marzioni, S., & Bittucci, L. (2021). ESG and reputation: The case of sanctioned Italian banks. *Corporate Social Responsibility and Environmental Management*, 28(1), 265–277. <https://doi.org/10.1002/csr.2047>
- Parmar, B. L., Freeman, R. E., Harrison, J. S., Wicks, A. C., Purnell, L., & de Colle, S. (2010). Stakeholder theory: The state of the art. *Academy of Management Annals*, 4(1), 403–445. <https://doi.org/10.1080/19416520.2010.495581>
- Pessarossi, P., & Weill, L. (2015). Do capital requirements affect cost efficiency? Evidence from China. *Journal of Financial Stability*, 19, 119–127. <https://doi.org/10.1016/j.jfs.2014.11.002>
- Qudah, H. A., Abdo, K. K., Al-Qudah, L. A., Kilani, O., al Manaseh, M., & Alqudah, M. Z. (2021). Liquidity risk measurement study case (Jordan Islamic banks). *International Journal of Entrepreneurship*, 25(8), 1–9. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85114298336&partnerID=40&md5=154b07b4b87830fda27a5db538fd019>
- Ramadhan, S., Selim, M., & Sahwan, A. (2019). Financial performance of conventional and Islamic banks in Bahrain: A comparative study. *Banks and Bank Systems*, 14(4), 192–205. [https://doi.org/10.21511/bbs.14\(4\).2019.18](https://doi.org/10.21511/bbs.14(4).2019.18)
- Rashid, A., & Jabeen, S. (2016). Analyzing performance determinants: Conventional versus Islamic Banks in Pakistan. *Borsa Istanbul Review*, 16(2), 92–107. <https://doi.org/10.1016/J.BIR.2016.03.002>
- Revelli, C., & Viviani, J.-L. (2015). Financial performance of socially responsible investing (SRI): what have we learned? A meta-analysis. *Business Ethics: A European Review*, 24(2), 158–185. <https://doi.org/10.1111/beer.12076>
- Rosman, R., Wahab, N. A., & Zainol, Z. (2014). Efficiency of Islamic banks during the financial crisis: An analysis of Middle Eastern and Asian countries. *Pacific Basin Finance Journal*, 28, 76–90. <https://doi.org/10.1016/j.pacfin.2013.11.001>
- Soltane Bassem, B. (2014). Total factor productivity change of MENA microfinance institutions: A Malmquist productivity index approach. *Economic Modelling*, 39, 182–189. <https://doi.org/10.1016/j.econmod.2014.02.035>
- Stanickova, M., & Melecky, L. (2012). Multidimensional Approach to Evaluation of Visegrad Countries' competitiveness in Comparison with Austria and Germany. *Journal of Competitiveness*, 4(3), 58–76. <https://doi.org/10.7441/joc.2012.03.05>
- Staub, R. B., da Silva e Souza, G., & Tabak, B. M. (2010). Evolution of bank efficiency in Brazil: A DEA approach. *European Journal of Operational Research*, 202(1), 204–213. <https://doi.org/10.1016/j.ejor.2009.04.025>
- Sufian, F. (2012). Determinants of bank profitability in developing economies: empirical evidence from the South Asian banking sectors. <http://Dx.Doi.Org/10.1080/09584935.2012.696089>, 20(3), 375–399. <https://doi.org/10.1080/09584935.2012.696089>
- Suttipun, M., & Dechthanabodin, P. (2022). Environmental, Social and Governance (ESG) Committees and Performance in Thailand. *Asian Journal of Business and Accounting*, 15(2), 205–220. <https://doi.org/10.22452/ajba.vol15no2.7>
- Svitalkova, Z. (2014). Comparison and Evaluation of Bank Efficiency in Austria and the Czech Republic. *Journal of Competitiveness*, 6(2), 15–29. <https://doi.org/10.7441/joc.2014.02.02>
- Tarigan, J., Hatane, S. E., Stacia, L., & Widjaja, D. C. (2019). Corporate social responsibility policies and value creation: Does corporate governance and profitability mediate that relationship? *Investment Management and Financial Innovations*, 16(2), 270–280. [https://doi.org/10.21511/imfi.16\(2\).2019.23](https://doi.org/10.21511/imfi.16(2).2019.23)
- Tasnia, M., Syed JafaarAlhabshi, S. M., & Rosman, R. (2021). Corporate social responsibility and Islamic and conventional banks performance: a systematic review and future research agenda. *Journal of Sustainable Finance and Investment*. <https://doi.org/10.1080/20430795.2021.1922063>
- Taylor, D. (2022). Did diversified and less risky banks perform better amid the pandemic? *Economics Letters*, 211, 110251. <https://doi.org/10.1016/j.econlet.2021.110251>
- Thottoli, J. M. (2022). Two Decades of Environmental Accounting: A Bibliometric Analysis. *Jurnal Institutions and Economies*, 14(4), 83–113. <https://doi.org/10.22452/IJIE.vol14no4.4>
- Toumi, K. (2020). Islamic ethics, capital structure and profitability of banks; what makes Islamic banks different? *International Journal of Islamic and Middle Eastern Finance and Management*, 13(1), 116–134. <https://doi.org/10.1108/IMEFM-05-2016-0061>
- Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking & Finance*, 61, 1–14. <https://doi.org/10.1016/j.jbankfin.2015.08.023>
- Wanke, P., Kabir Hassan, M., & Octávio Gavião, L. (2017). Islamic banking and performance in the asean banking industry: a topsis approach with probabilistic weights. *International Journal of Business and Society*, 18, 129–150. <http://iresearch.worldbank.org/servicetrade>
- Yahya, S., & Ibrahim, Y. (2021). Determinants of Islamic and Conventional Banks Profitability A Contingency Approach. *Asian Journal of Business and Accounting*, 14(2), 279–319.

<https://doi.org/10.22452/ajba.vol14no2.10>

Yu Qing, S., Chee Wooi, H., & Zulkafli, A. H. (2020). The Role of Country Governance on the Relationship between Firm Governance and

Firm Performance: Evidence from Emerging Countries. *Jurnal Institutions and Economics*, 13(1), 35–68.

<https://doi.org/10.22452/IJIE.vol13no1.2>

---

Received: September 20, 2023

Revised: September 22, 2023

Accepted: September 27, 2023

Copyright © 2023– All Rights Reserved

This is an open-access article.