

Exploring the Relationship Between Diversification, Risk Bank, Size Bank, And Liquidity; Evidence From Conventional Banking in Indonesia

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Abstract: Exploring the Relationship Between Diversification, Risk Bank, Size Bank, And Liquidity; Evidence From Conventional Banking in Indonesia

Banking plays an important role in the economy both micro and macro. In addition, it is crucial for a country to have a strong and robust banking system. To realize a strong and robust banking banks need to maintain their efficiency. Therefore, it is necessary to identify the factors that affect efficiency, including asset diversification, risk, bank size and bank liquidity. The novelty of this research is that there is an asset diversification variable. Asset diversification can protect investors from recurring investment cycles and can save from asset failure. The sample of this research are conventional banks with a total of 10 banks that have the largest share of assets in Indonesia. In this study to identify the effect of asset diversification, bank risk, bank size, and bank liquidity on bank efficiency used multiple linear regression analysis methods were used. This study concludes that asset diversification actually reduces bank efficiency. The increased bank risk, the better efficiency. Then, the size of the bank and liquidity have no effect on efficiency. Therefore, banks need to review the diversification strategy, ensure that the risks associated with each asset and portfolio as a whole are well-identified and look for opportunities to automate repetitive processes and reduce overall operational costs. Through this research, we suggest, (i) Banks need to review the diversification strategy that has been implemented. There may be some areas or types of assets that do not fit the risk profile and objectives of the bank, (ii) Banks need to ensure that the risks associated with each asset and portfolio as a whole are well-identified, measured and managed, (iii) Banks need to look for opportunities to automate repetitive processes and reduce overall operational costs.

Keywords: Efficiency; Asset Diversification; Bank Risk; Size of Bank; Banking

INTRODUCTION

Banking plays an important role in the economy both micro and macro. In addition, it is crucial for a country to have a strong and robust banking system, especially developing countries such as Indonesia to achieve economic growth. To realize a strong and robust banking system, banks need to maintain their efficiency. An efficient banking system can be used as a tool for mobilization and allocation of funds to encourage investment and savings to be more effective and provide low-cost monetary payments (Pham & Nguyen, 2023).

Banking is also inseparable from intense competition so that business is required to be efficient in order to survive and develop in the midst of competition. With a higher level of efficiency, banks can increase their investment and contribute to the advancement of the economy. Conversely, if banking efficiency is low, the bank will cause the economy to grow slowly which ultimately reduces social welfare (Muarief & Miranti, 2022).

One of the factors affecting banking efficiency is asset diversification. This statement is supported by research (Du et al., 2017) that regressions reveal that increasing the asset share of other earning assets is positively associated with bank efficiency. Asset diversification is the diversity of financial services offered by banks. As banks offer more and more financial services, the more they need to run their operations efficiently. Research on diversification has been widely conducted, but there is still much debate about the effect of diversification on efficiency which is one measure of banking performance. Some researchers argue that diversification has a positive impact on performance (Salami & Clinton, 2021).

Risk also affects efficiency. Banking one of its main activities is lending. This causes banks to be inseparable from credit risk. The greater the credit allocated to the community, the greater the risk that will be borne by the bank and have an impact on decreasing profits. It can be said that credit risk is one of the determinants of bank performance (Guloglu & Ekinici, 2022). Banks have risks due to the inability of customers to pay credit interest and increase the principal and ultimately result in a decrease in the level of bank efficiency. The Basel Committee on Banking Supervision suggests that credit risk is likely to lose outstanding loans partially or completely, due to failure to manage credit. Research on credit risk on efficiency was examined by Utama et al. (2022) and Boamah et al. (2022) which suggests that the higher the level of bank risk, the lower the level of bank efficiency.

Efficiency is also affected by the size of the bank. The greater the assets owned, the more capable the bank is in meeting its operational needs such as for credit, guarantees, currency trading, product services and services. In addition, the larger the size of the bank, the

more complex bank services will encourage banks to make efficiency in their operational activities (Kolia & Papadopoulos, 2022). However, the size of the bank can also have a negative impact, namely increasing operational costs so that it affects the amount of costs that must be paid by the bank and in turn can reduce the level of bank efficiency. Several studies on the effect of bank size on bank efficiency have been conducted, including research by (Blatter & Fuster, 2022) and Linawati et al. (2022). In contrast, research conducted by (Alfadhli & Alali, 2021) proves that the size of the bank does not affect efficiency.

The last factor in this study that can affect efficiency is bank liquidity. Liquidity relates to the extent to which banks can provide credit and withdraw customer funds. (Ajmadayana et al., 2022) suggest that banks are required to be able to maintain their health, especially in maintaining liquidity. Liquidity risk can occur if the amount of funds disbursed in the form of financing is greater than deposits or public deposits collected by banks. Several researchers have conducted research on the relationship between liquidity and bank efficiency, including (Candra & Yulianto, 2015), Fadilah (2022) and (Azizah, 2018) results of the research prove that liquidity has a positive effect on bank efficiency. Based on this exposure, the researcher analyzed the effect of asset diversification, risk, bank size and bank liquidity on banking efficiency.

One of the main variable in this research is asset diversification. The contribute this research to future changes is (i) asset diversification can help reduce risk in an investment portfolio (ii) A diversified portfolio can provide the potential for higher returns because it involves a variety of investments. (iii) One of the main goals of diversification is to preserve your capital. (iv) With diversification, we can achieve a balance between risk and return. This means we can achieve your expected level of return by taking lower risk, or we can increase your return for a given level of risk.

LITERATURE REVIEW

Bank efficiency can play an important role in shaping the real economy and helping an inadequate economy progress. Bhatia (2018) explains banking efficiency relates to measuring the bank's ability to use its resources to produce maximum output with minimum input. It involves evaluating a bank's performance in terms of its ability to allocate resources efficiently, manage risk, and generate profits. Banking efficiency is based on the assumption that banks operate in a competitive environment and seek to maximize their profits by minimizing their costs and maximizing their revenues. Banking efficiency is very important as it can help

policymakers and regulators in evaluating bank performance and identifying areas where improvements can be made to increase the efficiency of the banking system.

A country's entire economy can be threatened due to a weak and incompetent banking system (Mollah, M.A.S. and Rouf, 2022). Efficiency is defined as "maximum use of existing resources in an improved and more productive way." The idea of measuring efficiency determines how a firm can maximize output and profits while minimizing costs (Shakeb Akhtar; et al, 2021). Efficiency measurement allows managers to compare bank performance and explore areas of inefficiencies for future improvement (Shakeb Akhtar; et al, 2021). Commercial banks' internal rating system using critical financial performance to support competitiveness and profitability in the long run (Saif Ullah, 2023). However, Saif Ullah (2023) found that the factors affecting bank customer satisfaction are almost the same in different countries.

Research on bank efficiency in developing countries has grown rapidly, but there has been little research on the case of Indonesia. Studies on Indonesian banking that have been published scientifically and made significant contributions include Shahriar et al. (2023), Khalifaturofi'ah (2023) dan Gržeta et al. (2023). Larger banks can be more efficient than smaller banks, confirming other studies such as Gržeta et al. (2023), and Chiang (2022), but contradicting Zhao et al. (2022).

The liquidity ratio is also known as a ratio that can be used to measure the extent of the company's capability to pay off its short-term obligations that will mature. A good company has a sufficient level of liquidity to run the company (Pratiwi & Riduwan, 2021). The theory of liquidity banking implies that the level of liquidity in the banking system significantly influences the availability of credit and the overall functioning of the economy (Wulan & Buana, 2023). Furthermore, the theory suggests that changes in the overall liquidity preference of banks can have a direct impact on the effectiveness of monetary policy (Arthasari, 2021).

For instance, if banks increase their liquidity preference and hold onto more cash reserves, it could potentially limit the effectiveness of monetary policy measures aimed at stimulating economic activity, as the increased demand for money reduces the effectiveness of interest rate adjustments. On the other hand, a decrease in liquidity preference could amplify the impact of monetary policy measures (Lavoie & Reissl, 2019). Some researchers have concluded that liquidity exerts a significant effect on bank profitability (Doan & Bui, 2021).

Bank size serves as a fundamental gauge of a bank's total assets, encompassing loans, investments, and other holdings, and plays a crucial role in evaluating the bank's operational scale and significance within the financial sector. The implications of bank size are far-reaching and can significantly affect the operations, risk exposure, and market influence of a bank (Arifian

& Noor, 2022). Moreover, their substantial lending capacity and market presence empower them to exert a considerable influence on financial markets, influencing interest rates, credit accessibility, and overall economic stability (Panagiotis Avramidis, 2021).

Consequently, regulatory authorities meticulously monitor larger banks, imposing stringent compliance requirements to ensure financial stability and prevent excessive risk-taking. While larger banks often possess a higher capacity to withstand financial downturns through diversified portfolios, their interconnectedness may expose them to contagion risks during systemic crises (Goldberg, 2022). Recognizing the implications of bank size is pivotal for regulators, policymakers, and market participants, as it aids in assessing the overall stability and health of the financial system and in formulating effective measures to manage systemic risks and foster sustainable growth. Most studies on the impact of size on the financial performance of banks that the proxies of bank size (total assets, number of employees and customers' deposit) had a cumulative effect on return on asset for financial performance (Akinola, 2022). Also, internal control adequacy as a moderating variable enhanced the effect of bank size on financial performance. Also, (Alfadhli & Alali, 2021) examined the influence of bank size on the financial performance of banks in Kuwait.

Bank risk encompasses potential financial losses or detrimental impacts resulting from diverse factors such as economic conditions, market fluctuations, regulatory changes, and operational failures. Market risk emerges from adverse movements in market prices, affecting a bank's trading portfolio and overall financial position (Torluccio, 2021). Reputational risk arises from negative public perception, impacting a bank's customer retention and funding access (Theunissen, 2015). Interest rate risk is linked to fluctuations in interest rates, affecting a bank's net interest income and overall profitability, especially for those with significant mismatches between assets and liabilities (Matthieu Gomez; et al, 2021). To mitigate these risks, banks utilize various risk management techniques, including identification, measurement, monitoring, and mitigation strategies. Risk taking by banks enhances firm investment as banks become more willing to perform their key function in the economy and there are positive relation is stronger for financially-constrained firms and when banks are more efficient (Anastasiya Shamshur & Laurent Weill, 2022).

Diversification is a strategy carried out with the aim of improving banking performance. One way that can be done is by expanding the business, opening several new business units or subsidiaries both within the scope of the company and different from the company's core business. Asset diversification is the diversity of financial services offered by banks (Ji Wu; et al,

2020). Some researchers have concluded that diversification has a positive impact on performance Pham (2021). In Indonesia itself, there have also been many studies that measure efficiency, but studies on diversification and efficiency in banking are still not widely conducted.

Pham & Nguyen (2023), explained asset diversification as a strategy to reduce risk and as an effort to increase efficiency. (Elsas, Hackethal, & Holzhäuser., 2010) also mention that diversified banks will acquire the skills to make efficient business decisions. This is supported by Pham (2021) which measures Efficiency with three dimensions of bank diversification, namely, asset diversification, funding, and income. They found that asset diversification can improve bank efficiency, while income and funding diversification negatively affect efficiency. The results of research from Ayusaleha (2022) showed that asset diversification, bank risk, and bank liquidity had a negative effect on efficiency caused by the inability of banks to carry out asset strategies appropriately. Accuracy in carrying out strategies will actually have an impact on decreasing the level of efficiency of Islamic banks. This finding is consistent with Pham (2021) that for the four largest banks, asset and funding diversification impair cost efficiency.

Pham & Nguyen (2023) suggests that diversified funding banks with majority ownership of the government show higher cost efficiency but lower profit efficiency than other banks. Based on these previous studies, asset diversification affects bank efficiency. However, research by Pham (2021) found that asset diversification improved bank efficiency only during the consolidation period, whereas during the global financial crisis of 2007–2008, income and funding diversification had greater negative impacts on bank efficiency.

H1 : asset diversification has negative effects on bank efficiency.

According to Lin et al. (2022) credit risk is the degree of value fluctuations in debt instruments and derivatives due to changes in the credit quality underlying the loan and counterparties. Credit risk is often referred to as default risk which is defined as the risk faced due to the inability of customers to pay credit interest and repay the principal. In the end, it will have an impact on reducing the level of bank efficiency. Robin Greenwood, et al (2022) show the results that if managers can lower costs during normal times, the consequences of high bank efficiency during financial crises can help reduce bank risk and lower the likelihood of bank failure. Meanwhile, has research results that the higher the level of bank risk, the lower the level of bank efficiency. Boamah, et al (2022) which explains the relationship of credit risk negatively affects bank efficiency.

Boamah, et al (2022) also state that the relationship between credit risk and bank efficiency can be explained by The "Bad Luck" Hypothesis. The relationship between non-performing loans and bank efficiency can be explained by the bad luck hypothesis put forward

by Berger and DeYoung in 1997 (Pung, Vu, & Tran, 2021). Berger and DeYoung in 1997 (Pung, Vu, & Tran, 2021) suggest that the unexpected outcome of a "bad luck" could cause banks to face troubled loans. Banks may face more operational costs, and this can disrupt the bank's efficiency. Costs arise from monitoring borrowers, collateral value, or disposal costs associated with defaulted loans. Therefore, the bad luck hypothesis postulates that the higher the increase in non-performing loans, the more likely it is that bank efficiency will decrease.

However, several research show that banks must choose to take large risks but having the ability to manage risk through portfolio diversification can increase bank efficiency. Previous research that also supports the results of this study that the threat of risk, and monitoring and review of risk has a statistically significant positive effect on organizational efficiency at a 5% level of significance (Egiyi & Regina, 2022), (Saif Ullah, 2023).

H2: Bank risk has positive effects on bank efficiency. The size of the bank can have an impact on increasing operational costs so that it affects the amount of costs that must be paid by the bank. In the end, the amount of operational costs can reduce the level of bank efficiency (Ayusaleha, 2022). Several studies that support this research with the results that bank size does not affect cost efficiency within the study period (Titus & Akinlo, 2021) , (Sapci & Miles, 2019);(Mutarindwa et al., 2021).

But, several studies showed that firm size has a negative relationship with knowledge production efficiency and mature stage clusters have a negative relationship with knowledge commercialization efficiency and overall efficiency with the DEA Model (Titus & Akinlo, 2021). Based on these studies, the size of the bank affects the efficiency of the bank.

H3: The size of the bank has negatively effects on efficiency of the bank

In terms of financial concepts, liquidity has a positive role in stimulating growth through investment (Thorsten, 2023) This money is more likely to be credit than cash in current investments (Bolek and Wolski, 2012). However, the creation of liquidity by banks can result in increased risks of fragility and failure (Thorsten, 2023).Liquidity can be interpreted as a condition to determine its ability to meet its increasing obligations consisting of long-term debt and current liabilities (Kollmann, 2021). In measuring cash assets or other relative amounts of assets that can be easily converted into cash without losing value to cover short-term liabilities can also be seen as liquidity (Martin Hodula, 2021); (Diandian Ren; et al, 2022). Liquid assets consist of cash and balances of banks, debtors and securities (Doan & Bui, 2021).Liquidity can help companies to avoid certain situations such as selling assets at distressed prices to force them to grant liquidation, paying additional fees to lawyers and bankruptcy as well which means more liquidity

increases the likelihood of bankruptcy being reduced (Robin, 2022). As a result, the time to convert assets into cash and the level of certainty associated with this conversion can be seen as two important dimensions of liquidity (Kafidipe et al., 2021).

The inability of banks to provide funds will lead to liquidity risk. Risk occurs if the amount of funds disbursed in the form of financing is greater than deposits or public deposits collected by banks. This incident can pose risks that must be borne by banks (Sante et al., 2021). The results of this study are supported by Achmady;et al (2021); Balaj & Rudhani (2019) that liquidity has no effect on financial performance. Efficiency is included in one component of financial performance. This statement is supported by Hasibuan (2023).

Several researchers also have conducted research on the relationship between liquidity and bank efficiency, including (Amrina & Kaban, 2021); Fadilah (2022) and Anggraini & Nugroho (2021) prove that the known liquidity of FDR has a positive effect on the efficiency of the bank concerned. Therefore, the hypothesis is that liquidity has a positive effect on bank efficiency.

H4: bank liquidity has a positive effect on bank efficiency.

METHODS

The population in this study is conventional banks that have been registered with the Financial Services Authority (OJK) for the quarterly period per December from 2013 to 2022. Sampling in the study was carried out using the Purposive Sampling method. Researchers use purposive sampling because researchers have certain criteria in selecting samples.

The samples was selected based on predetermined sample criteria, including: Conventional banks, numbering 10 banks out of a total of 110 banks that have annual financial statements from December from 2013 to 2022 and have complete data during the observation period. Next, The ten conventional banks selected are banks that have the largest share of assets in Indonesia. The list of banks is as follows.

Table 1. Research Sample

No.	Bank-Bank
1.	Bank Bank Nasional Indonesia
2.	Bank Central Indonesia
3.	Bank Rakyat Indonesia
4.	Bank Mandiri
5.	Bank Tabungan Negara
6.	CIMB Niaga
7.	UOB Indonesia
8.	Citi Bank
9.	DBS Indonesia
10.	Permata

Source : The Financial Services Authority OJK, (2023)

This research uses secondary data, namely data obtained through annual financial statements that have been provided by banks on The Financial Services Authority (OJK) website. Operating Cost in Operating Income (BOPO) is a ratio of comparison between operating costs and operating income in measuring the level of efficiency and the ability of banks to carry out their operations (Dewa Ayu Putu Mas Wiadnyan&Luh Gede Sri Artini, 2023). This ratio can be formulated as follows:

BOPO : Operating Expenses / Operating Income

Asset Diversification

The equation related to asset diversification used in this study refers to Manh Hung Pham & Nhat Minh Nguyen (2023) which can be explained in the following equation:

$$ADIV_{i,t} = 1 - \left(\left(\frac{CLOAN_{i,t}}{EA_{i,t}} \right)^2 + \left(\frac{IBLOAN_{i,t}}{EA_{i,t}} \right)^2 + \left(\frac{SEC_{i,t}}{EA_{i,t}} \right)^2 + \left(\frac{OTHEREA_{i,t}}{EA_{i,t}} \right)^2 \right)$$

Where: ADIV as asset diversification is an investment strategy that involves spreading investments across various assets or asset classes to reduce exposure to risk. The main goal of asset diversification is to maximize returns by investing in different areas that would each react differently to the same event, CLOAN as financing to customers also known as customer financing, is a strategy where businesses allow customers to pay for a product or service over time, instead of requiring full payment upfront, IBLOAN as placement in another bank is often referred to as an interbank deposit. This is an arrangement between two banks where one bank holds funds in an account for another institution. The bank holding the funds opens a "due to" account for the other bank, SEC as placement in securities also known as a private placement, is the sale of securities to a small number of private investors, OTHEREA as placement in other productive assets, EA as is the sum of all four numerators, and Bank Risk as the higher the NPL ratio indicates the greater the uncollectible financing. This will also increase bank monitoring costs and have an impact on lowering bank revenue levels, thereby reducing bank efficiency levels. This failure will also have a significant impact on bank operations, increase costs, so as to reduce profits and bank performance or efficiency (Bolarinwa, S. T., Olayeni, R. O., & Vo, 2021)

NPL = Non-performing Loans / Total Financing

Bank Size = Total Asset

The larger the size of the bank, the more complex the service and the more sophisticated so that costs can be reduced and efficiency increases. But on the other hand, the size of the

bank can also have an impact on increasing operational costs so that it affects the amount of costs that must be paid by the bank. In the end, the high cost of this can reduce the level of efficiency.

Liquidity

Bank Indonesia Circular Letter No. 17/44/DPM dated 16th December 2015 formulates FDR's function as equation 7 as follows:

FDR = Financing/Third Party Funds

The greater the financing distributed to customers, the more the bank's profit-sharing income increases. This increase in bank revenue also has an impact on the level of bank efficiency. In this study to identify the effect of asset diversification, bank risk, bank size, and bank liquidity on bank efficiency used multiple linear regression analysis methods were used. Here's the model

$$Y_{it} = a + b_1X_{1it} + b_2X_{2it} + b_3X_{3it} + b_4X_{4it} + e_{it}$$

Information:

X_1 : asset diversification, X_2 : bank risk, X_3 : bank size /size, X_4 : bank liquidity, a : constant, b : coefficients e_{it} : errors in the panel data

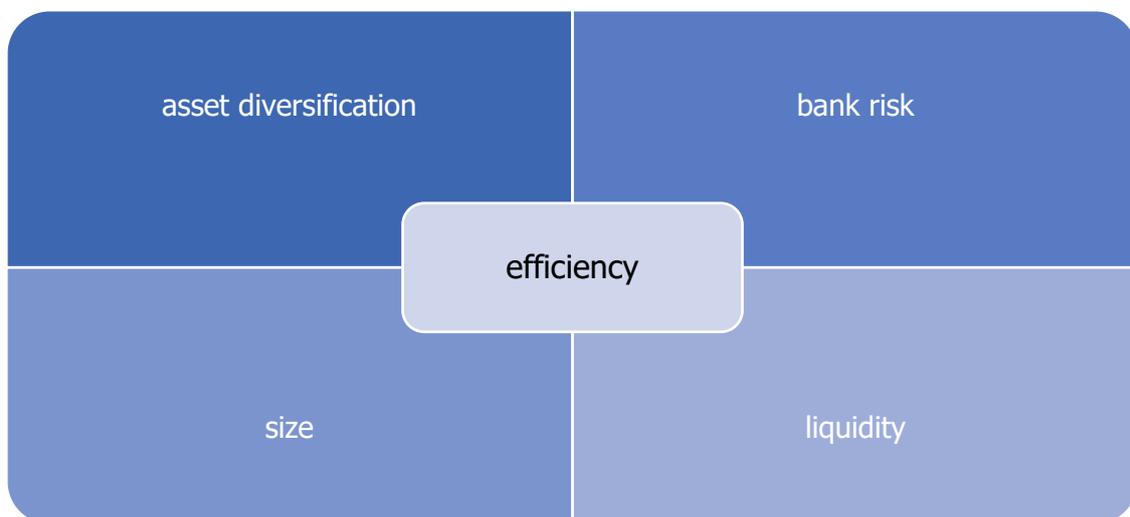


Figure 1. Research Framework

The research framework above wants to know the effect of asset diversification, bank risk, size and liquidity on efficiency. The hypotheses between the research variables are as follows; H1 : asset diversification has negative effects on bank efficiency, H2: Bank risk has positive effects on bank efficiency, H3: The size of the bank has negatively effects on efficiency of the bank, H4: bank liquidity has a positive effect on bank efficiency.

RESULT AND DISCUSSION

The model fit test is used to select the best model in the research. To determine the best regression model using the Chow test, Hausman test.

Table 2. Test Chow
Redundant Fixed Effects Tests, Equation: Untitled, Test cross-section

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.268244	(9,86)	0.0248
Cross-section Chi-square	21.299167	9	0.0114

Source: Secondary data output after processing, 2023; Citra, 2023)

The results of the Chow test show that the Prob Cross-section value is less than alpha (α : 0.05). Thus the best model used is the Fixed Effect Model compared to the Common Effect Model.

Tabel 3. Hausman Test
Correlated Random Effects - Hausman Test,
Equation: Untitled, Test cross-section, random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	4	1.0000

Source: Secondary data output after processing, 2023; Citra, 2023)

* Cross-section test variance is invalid. Hausman statistic set to zero.

** WARNING: robust standard errors may not be consistent with assumptions of Hausman test variance calculation.

Hausman test shows that the Probability value of chi-square is 1 more than alpha (α :

0.05), Namun, terdapat keterangan bahwa robust standard errors may not be consistent with assumptions of Hausman test variance calculation. Therefore, the best model remains the fixed effect model. The Lagrange test does not need to be done because from the Chow test and the Hausman test a fixed effect model was selected.

Table 4. Multiple Linear Regression Analysis Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Sign	Hypotesis
Constanta	0.849529	0.104614	8.120574	0.0000		
Asset					Significant	yes
Diversification	-0.151102	0.026692	-5.660937	0.0000		
Risk (NPL)	3.055068	1.329928	2.297168	0.0240	Significant	yes
Size Bank	-2.64E-08	3.99E-08	-0.661004	0.5104	Not significant	No
Liquidity					Not significant	No
(FDR)	0.099128	0.114154	0.868374	0.3876		
R square	0,639538					
Prob Fstatistic	0,000000					

Source: Secondary data output after processing, 2023; Citra, 2023)

Based on the results of the t-test, the value of the three variables, namely asset diversification and risk, has a probability value of less than 0.05, so it can be concluded that asset diversification has a significant effect on bank efficiency and has a negative relationship with bank efficiency. Bank risk has a significant positive effect on efficiency. The variable size of the bank and the liquidity of the bank have no effect on efficiency. For the F test, significant means that the entire independent variable has an effect on the dependent. The R-square value is also relatively high, at 63%. This means that all independent variables are able to explain the dependent by 63% and the rest are explained by other variables.

The Effect of Asset Diversification on Bank Efficiency

Asset diversification has a significant negative effect on efficiency with an alpha of 0.0240. That is, asset diversification is carried out precisely reducing bank efficiency. This can be caused by 3 things. First, the inability of banks to carry out asset strategies appropriately so that bank efficiency decreases. Second, differences in interests between managers and shareholders make diversification strategies inefficient. Third, the more diversified the company, the more difficult it will be to control so that information asymmetry increases, causing inefficiencies.

The results of this study are in line with Doaei,et al (2015), Ayusaleha (2022) showed that asset diversification, bank risk, and bank liquidity had a negative effect on efficiency caused

by the inability of banks to carry out asset strategies appropriately. Accuracy in carrying out strategies will actually have an impact on decreasing the level of efficiency of Islamic banks. This finding is consistent with Pham (2021) that for the four largest banks, asset and funding diversification impair cost efficiency. Pham & Nguyen, (2023) states that diversified funding banks with majority government ownership show higher cost efficiency but lower profit efficiency than other banks. Based on these previous studies, asset diversification affects bank efficiency. This result is supported the hypothesis that asset diversification has negative effect on efficiency bank.

However, other studies stated that asset diversification has positive effect on efficiency. This finding supported by Pham & Nguyen (2023), explained asset diversification as a strategy to reduce risk and as an effort to increase efficiency. (Elsas, Hackethal, & Holzhäuser., 2010) also mention that diversified banks will acquire the skills to make efficient business decisions. This is supported by Pham (2021) which measures Efficiency with three dimensions of bank diversification, namely, asset diversification, funding, and income.

The Effect Bank Risk on Bank Efficiency

Bank risk has a significant positive effect on efficiency. This is due to several things. First, the increasing bank risk then the bank will be more prudent so that efficiency can increase and the risk ethics increase the bank will develop strategies so that efficiency can increase. Second, high risk often leads to increased awareness of available resources. Banks become more wary of unnecessary spending and tend to optimize the use of resources so as to achieve efficient results. Third, banks that trade and invest have a high level of risk but high return and banks are able to manage risk to achieve profitable results, so the return on risk can have a positive impact on the overall efficiency of the bank. Fourth, banks that dare to take risks in adopting new technologies and innovating in services can achieve efficiency in the long run. Innovation can result in cost savings and improved operational efficiency. Finally, banks that choose to take large risks but have the ability to manage risk through portfolio diversification can increase bank efficiency. Previous research that also supports the results of this study that the threat of risk, and monitoring and review of risk has a statistically significant positive effect on organizational efficiency at a 5% level of significance (Egiyi & Regina, 2022), (Saif Ullah, 2023).

This result also supported the hypothesis that bank risk has positive effect on efficiency. This result inline with several research show that banks must choose to take large risks but having the ability to manage risk through portfolio diversification can increase bank efficiency. Previous research that also supports the results of this study that the threat of risk, and

monitoring and review of risk has a statistically significant positive effect on organizational efficiency at a 5% level of significance (Egiyi & Regina, 2022), (Saif Ullah, 2023).

However, other research stated that risk bank has negatif effect on efficiency. This statement supported by Boamah, et al (2022) that the relationship between credit risk and bank efficiency can be explained by The "Bad Luck" Hypothesis. The relationship between non-performing loans and bank efficiency can be explained by the bad luck hypothesis put forward by Berger and DeYoung in 1997 (Pung, Vu, & Tran, 2021).

The Effect Size of the Bank on Bank Efficiency

In this study, the size of the bank was not significant to efficiency. This can be caused by several things. First, certain banks may have a limited business focus on a particular service or product, so their size becomes relatively insignificant in achieving efficiency in its business scope. Second, small or medium-sized banks have not achieved optimal scale in operations and have not been able to provide cost-competitive services whereas, larger banks have the opportunity to face challenges in managing the scale of their operations. Third, the size of the bank does not have to be large, this is because advances in technology have allowed small banks to adopt technology systems and infrastructure that are just as efficient as large banks. This can help small banks compete effectively without having to have a large size. Finally, the efficiency of a bank is not only determined by its size, but management's ability to manage resources well and optimize operations. Several studies that support this research with the results that bank size does not affect cost efficiency within the study period (Titus & Akinlo, 2021) , Yet another group of studies suggests that bank size has no impact on cost efficiency (Sapci & Miles, 2019);(Mutarindwa et al., 2021).

This finding was not supported the hypothesis, the hypothesis stated that firm size have negative effect on efficiency. This finding supported by several studies showed that firm size has a negative relationship with knowledge production efficiency and mature stage clusters have a negative relationship with knowledge commercialization efficiency and overall efficiency with the DEA Model (Titus & Akinlo, 2021).

The Effect Liquidity on Bank Efficiency

In this study, liquidity had no effect on bank efficiency. This is because bank efficiency has more to do with how banks manage their operations, reduce overhead costs, increase productivity, and improve service quality than how liquid the bank is. In addition, actual efficiency is more influenced by how the bank manages these resources and optimizes operational costs whereas liquidity is considered part of the bank's business strategy is not the main determinant of the efficiency of a bank. It can be said, liquidity does not affect bank efficiency, where

efficiency is classified as financial performance. The results of this study are supported by Achmady;et al (2021); Balaj & Rudhani (2019) that liquidity has no effect on financial performance. Efficiency is included in one component of financial performance. This statement is supported by Hasibuan (2023) that financial performance is the ability to manage finances effectively, efficiently, and be able to achieve goals that can be seen from financial reports as information about financial conditions.

This result was not supported the hypothesis. The hypothesis showed that bank liquidity has a positive effect on bank efficiency. This hypothesis in line with research of (Amrina & Kaban, 2021); Fadilah (2022) and Anggraini & Nugroho (2021) prove that the known liquidity of FDR has a positive effect on the efficiency of the bank concerned. Therefore, the hypothesis is that liquidity has a positive effect on bank efficiency.

CONCLUSION

This study concludes that asset diversification actually reduces bank efficiency. The increased bank risk, the better efficiency. Then, the size of the bank and liquidity have no effect on efficiency. Based on the results of this study, there are suggestions that can be given to various parties who have an interest in the results of the research, including for banks studied, especially related to diversification and risk, namely: (i) Banks need to review the diversification strategy that has been implemented. There may be some areas or types of assets that do not fit the risk profile and objectives of the bank. (ii) Banks need to ensure that the risks associated with each asset and portfolio as a whole are well-identified, measured and managed. (iii) Banks need to look for opportunities to automate repetitive processes and reduce overall operational costs. This study has limitations, namely the variables studied there are only four variables, namely asset diversification, bank risk, bank size, and liquidity. In addition, in measuring efficiency, BOPO variables are used as proxies of efficiency. Future research can use maxdea and stochastic frontier to measure efficiency.

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