Income Diversification and Bank Stability in Indonesia: Does Market Volatility Matters?

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Abstract

Banks are not only carrying out traditional activities but are also expanding their business into non-interest activities known as diversification. Some of the previous research showed that diversification positively affects bank stability. However, during the 2008 global financial crisis, highly diversified banks tended to collapse. Here I investigate the effect of income diversification and diversification-market volatility interactions on bank stability. The method used is a GMM dynamic panel at 97 conventional banks in Indonesia from 2001-2019. The results show that diversification has no significant effect on the stability of banks in Indonesia. On the other hand, after the model considers market volatility, income diversification is proven to have a positive and significant impact on bank stability. However, when market volatility increases, diversification has a negative and significant effect on bank stability. The results of this study imply that high market volatility in the event of a future recession will make non-interest activity conducted by banks lower financial stability and aggravate the economic condition.

Keywords: bank, diversification, stability, volatility

I. Introduction

The 2008 global financial crisis (GFC) highlighted the importance of banking stability because of its vital role in mobilizing financial resources for the real economic sector. Recently, the world has been facing another crisis, namely the covid-19 pandemic, which has severely affected the economy. One of the reasons was the pandemic crisis affected not only got shocked from the demand side, such as consumption and investment, but also the supply side of goods and services (Verick et al., 2022). The scarring effect of this pandemic also has the potential to raise the risk of a global recession in 2023, which is currently attracting the attention of economists. Therefore, it is important to maintain banking stability amidst the current conditions because disturbances in the banking industry have an impact on worsening overall output fluctuations.

Nowadays, banks are expanding their businesses into non-interest-bearing activities known as diversification in addition to their conventional activities (fund intermediation). Banks implement a diversification strategy to increase income and reduce risk (Chiorazzo et al., 2008). Several empirical studies have been conducted to prove the effect of implementing a diversification strategy on bank stability. Research showed that diversification positively affects bank stability because it can reduce risk by placing its finances in various assets (Khatak et al., 2021; Tariq et al., 2021; Liang et al., 2020). However, during the 2008 global financial crisis, highly diversified banks tended to collapse. It shows that high diversification does not guarantee high stability for a bank. The negative effect of diversification on bank stability has also been

found in several studies (Adesina, 2021; Deyoung & Roland, 2001). The inconclusive debate about the direction of the relationship between diversification and banking stability presents a research gap that will be examined in this study. Here I investigate the effect of income diversification on bank stability.

The diversification strategy adopted by this bank has resulted in a closer relationship between the bank and the money market (Crimmel & Elyasiani, 2021). As a result, shocks to the money market can impact bank risk, both individually and systemically. Movements in financial markets are also one of the leading indicators for the economic cycle, which are useful in conditions of future uncertainty. Based on this, I apply financial market volatility factors in looking at the effect of diversification on bank stability. This research contributes in several ways. First, research on this topic is still limited in Indonesia, even though the increasing contribution of income diversification and the increasing importance of bank stability need to be their main concern in times of uncertainty after the COVID-19 pandemic. Second, I involve the interaction of market volatility and diversification to see the effect on bank stability. Third, diversification measurements are not only seen from one indicator but three indicators used: the Adjusted Herfindahl Hirschman Index, Laeven and Levine, and the non-interest income.

II. Methodology and Data

The data is secondary data in unbalanced panels, a combination of bank-level data in Indonesia, and time series data from 2001 to 2019. The number of banks observed was 97 conventional banks. Data related to bank specifications come from the financial statements of each bank, while market volatility and macroeconomic data come from the World Bank. The variables used in this study are detailed as follows.

Table 1. Research Variables

Variables	Description	References
Dependent variables		
Z-score	Return on assets (ROA) plus rasio equity to total assets divided by the standard deviation of ROA. It used for bank stability measurement.	Khatak et al. (2021)
Key variable of interest		
Income diversification		
AHHI	The diversification indicator that has range of 0 to 0.5. AHHI equals to zero when diversification is minimum, 0.5 otherwise. $AHHI = 1 - \left[\left(\frac{net\ interest\ income}{total\ operating\ income}\right)^2 + \left(\frac{non\ interest\ income}{total\ operating\ income}\right)^2\right]$	Liang et al. (2020)
LL	LL is another indicator to measure diversification on bank-level data. It can measure as follows. $1 - \left[\left(\frac{net\ interest\ income - non\ interest\ income}{total\ operating\ income}\right)\right]$	Maghyereh & Yamani (2022)
Non-interest income	Ratio of non-interest income to total income	Gupta & Kashiramka (2020)
Market volatility	Stock market volatility	Tan (2012)
Control variables		

Variables	Description	References
Bank-specific variables		
Capital adequacy ratio (CAR)	Ratio of equity to total assets	Tariq (2021)
Profitability	Return on equity as bank profitability measurement	Maghyereh & Yamani (2022)
Loan	The ratio of total loans to total assets. It reflects the composition of asset.	Park & Oh (2022)
Deposits	The ratio of total deposits to total assets. It represents the liquidity risk.	Park & Oh (2022)
Credit risk	Natural logaritm of non-performing loans to total loans	Ozili (2018)
Bank ownership	DFOR is dummy for foreign bank which 1 if a bank is subsidiary of a foreign entity; 0 otherwise. DGOV is dummy for central government owned bank which 1 if a bank is owned by central government; 0 otherwise. DBPD is dummy for local government owned bank which 1 if a bank is owned by local government; 0 otherwise	Gupta & Kashiramka (2020)
Macroeconomic variables		
Real GDP growth	Percentage change of real gross domestic product	Khatak et al. (2021)
Inflation	Percentage change of consumer price index	Khatak et al. (2021)

This research adopts the following model to test the impact of diversification on bank stability and involve market volatility interactions.

$$Y_{i,t} = \beta_0 Y_{i,t-1} + \beta_1 D_{i,t} + \beta_2 (D_{i,t}{}^{*} V_t) + \sum_{j=1}^{J} \beta^j Z_{i,t} + \sum_{k=1}^{K} \beta^k M_t + \varepsilon_{i,t} \quad (1)$$

where *Y* denotes the dependent variable of bank *i* in year *t*, notation *D* shows the income diversification variable, and *V* represents market volatility. Control variables are described from *Z* and M notations, where Z is a bank-specific variable and *M* is a macroeconomic variable.

This research used the dynamic GMM panel model to overcome the endogeneity problems that often occur in financial data (Susamto et al., 2021). The dependent variable lag in the model shows a dynamic model where the variable itself influences the current variable in the past. Using OLS estimates involving variable lags in the model can result in biased and inconsistent estimators (Baltagi, 2005). Therefore, Arellano-Bond provides a solution with the GMM method, an extension of the moment method. The GMM method uses instrumental variables unrelated to errors to obtain unbiased and consistent estimates.

Furthermore, the Arellano Bond and Hansan Sargan tests were used to test the model specifications. The Arellano Bond test is useful to determine whether there is autocorrelation in the mth order. In contrast, the Hansan-Sargan test is useful to determine the validity of the instrumental variable that exceeds the number of estimated parameters or conditions of overidentifying restrictions.

III. Results

Table 2 displays the results of estimating the effect of diversification measured using AHHI on bank stability. The results show that bank income diversification in Indonesia has no significant effect on bank stability in models I and II. Unlike the case in models III and IV, which include market volatility in the model, the results obtained show that the diversification variable has a significant positive effect on bank stability. On the other hand, as market volatility increases,

implementing diversification can increase banks' risks, so that bank stability decreases. It can be seen from the interaction variable between market volatility and diversification, which has a negative and significant value in the model.

For the robustness check, I use two other diversification indicators: LL and non-interest income. Both indicators give the same results as AHHI, where diversification can affect stability by considering the involvement of market volatility. Furthermore, bank-specific variables such as capital adequacy ratio, profitability, loans, and deposits have a positive and significant impact on bank stability. On the other hand, non-performing loans that represent credit risk significantly negatively affect bank stability. In addition, based on the dummy variable bank ownership, the result is that private bank ownership in Indonesia positively affects bank stability. Foreign banks decrease bank stability, indicating that financial globalization can increase bank risk in Indonesia.

Table 2. Income Diversification-AHHI on Bank Stability using Panel GMM

Variables	Model (I)	Model (II)	Model (III)	Model (IV)
Lagged of bank stability	0.742***	0.742***	0.733***	0.739***
	(0.046)	(0.051)	(0.047)	(0.049)
Diversification	0.044	-0.168	1.287**	1.275**
	(0.287)	(0.282)	(0.571)	(0.581)
Diversification x Market volatility			-0.051*	-0.055**
			(-0.026)	(0.027)
CAR	0.018***	0.018***	0.018***	0.017***
	(0.005)	(0.005)	(0.004)	(0.004)
Profitability	0.013***	0.013***	0.014***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)
Loan	1.195***	1.154***	1.166***	1.090***
	(0.297)	(0.307)	(0.290)	(0.282)
Deposit	0.006***	0.006***	0.005***	0.005***
	(0.002)	(0.002)	(0.001)	(0.001)
Credit risk	-0.016**	-0.017**	-0.017**	-0.017**
	(0.008)	(0.007)	(0.008)	(0.008)
DFOR	-0.463***	-0.448***	-0.526***	-0.521***
	(0.159)	(0.162)	(0.149)	(0.148)
DGOV	-0.053	-0.038	-0.057	-0.069
	(0.082)	(0.080)	(0.087)	(0.082)
DBPD	-0.126*	-0.139**	-0.135*	-0.156**
	(0.068)	(0.064)	(0.076)	(0.075)
GDP		0.019		0.040
		(0.032)		(0.031)
Inflation		-0.010		-0.006
		(0.007)		(0.006)
Constant	-0.319	-0.283	-0.324	-0.432
	(0.283)	(0.383)	(0.290)	(0.351)
Observations	1,512	1,512	1,512	1,512
Number of bank	97	97	97	97
Arellano Bond test	0.445	0.401	0.397	0.362
Hansan Sargan test	0.407	0.345	0.403	0.396

IV. Conclusion

This paper investigates the impact of income diversification on bank stability in Indonesia using bank-level data. It is due to the limited research related to the topic and the unclear relationship between the two based on previous research. This study also involves market volatility by using its interaction with income diversification. The results show that banks with higher diversification tend to have higher stability. It is different when considering the interaction of market volatility and diversification. The higher the financial market volatility, the bank with higher income diversification can cause bank stability to diminish. It can signal banks and policymakers to pay more attention to market volatility conditions in implementing diversification strategies and related regulations.

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