Concentration - Stability Islamic Banks (1)

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The Impact of Industry Concentration on Stability:
The Case of Indonesian Islamic-Commercial Banks

Abstract

This study aims at investigating the impact of banking industry's concentration on the stability of Islamic commercial banks in Indonesia. This study uses a single country setting of 14 Islamic-commercial banks in Indonesia from 2011 to 2020. The data utilized in this study comprise all Islamic-commercial banks' assets in Indonesia, excluding commercial banks with Islamic business units. The influence of concentration level on the stability of Islamic-commercial banks is investigated using a panel data model. According to Hausman's test, the fixed-effect model is more suitable than the random-effect model. The findings indicate that the "concentration-stability" hypothesis is supported-robust using two concentration level measurements: CR4 and HHI. It is implied that banks tend to be more stable at the higher competition level. From the bank's specific characteristics, only the cost to income ratio which has a significant influence on the stability of the bank, as expected. Other bank-specific characteristics, such as bank size, credit risk, and income diversity, have no substantial influence on observed bank stability. A robustness check is performed by estimating new models that include multiple control variables that do not change the effect of concentration level on bank's stability. This study adds to the literature by demonstrating the "concentration-stability" hypothesis in the Indonesian Islamic-commercial banking industry. Moreover, this study's results confirm the previous study's findings using different methods and measures of industry concentration. In addition, this study is relevant in the context of merger action of three large Islamic commercial bank

I. Introduction

Governments, financial institution agents, depositors, and debtors have begun to recognize the importance of Islamic banks' position in the financial system as their market share has increased internationally. Previous research has found that Islamic banks have a more stable financial condition than conventional banks. Islamic banks have witnessed an 8% increase in loan-to-deposit ratio, a 2.2% decrease in non-performing loans, and a 2.9% increase in capital adequacy ratio. In times of crisis, Islamic banks tend to be more stable (Demirgüç-Kunt and Detragiache, 2005; Cihák et al., 2012).

The absence of interest is the most prevalent feature that separates Islamic banks from regular ones. Islamic banks that adhere to Islamic standards forgo any transactions involving interest by substituting profit or loss sharing and goods-services exchange (Siddiqi, 2000). Sharia-compliant finance does not permit the charging of interest payments (riba), as only goods and services may be priced. Sharia-compliant finance, on the other hand, is based on profit-loss and risk-sharing on both the liability and asset sides. In reality, however, Islamic scholars have created products that mimic traditional banking products, substituting fees and dependent payment mechanisms for interest rate payments and discounting. Furthermore, because they are closely tied to real-estate transactions, leasing-like products are popular among Islamic banks. (Thorsten, Beck; Asli, Demirguc-Kunt & Ourda, 2013).

Since the passage of Law No. 7 of 1992 on Banks, Indonesia has had a dual banking system that includes both conventional and Islamic banking services. More precisely, Law No. 21 of 2008 on Islamic Banks has allowed public and private banks to expand their business to Indonesians who, for the most part, practice Islam as their religion. Since 1991, Indonesia has seen a considerable surge in the creation of Islamic commercial banks. Furthermore, the asset has significantly increased in the past decade. In 2020, the asset was about 408.75 Trillion Rupiah, a 200.05% growth from 2011 with an average annual growth of 13.33%. That growth is higher than the total banking industry growth of 9.68% YoY in the same period. However, the number of Islamic-commercial banks has shown slow growth. It grew from 6 banks in 2009 to 11 banks in 2010, and that number remained constant until 2013. In 2020, the number of Islamic-commercial banks was 14, a one-bank addition every two years.

With the assets growing rapidly and the number of banks that are not changing significantly, the Islamic-commercial banks in Indonesia are under low competition from the competition view. It can be seen from the concentration ratio (CR4) of Islamic-commercial banks that amounted to 0.58 on average from 2011 to 2020. The competition level of Islamic banks in Indonesia is lower than their conventional counterpart. The CR4 of Indonesian conventional banks in the same period was about 0.47. That condition implies that the banks can maximize their profit from optimizing banks' market power, which helps banks' profit increases their stability. On the other hand, that condition potentially reduces consumer welfare through the higher margin rate.

There are two schools of thought in the banking industry on the relationship between concentration and stability: the "concentration-fragility" and the "concentration-stability"

hypothesis. According to the "concentration-stability" or "competition-fragility" hypothesis, banks cannot collect monopoly rents in a competitive market, resulting in lower profitability and less stability (Keeley, 1990). On the contrary, according to the "concentration-fragility" or "competition-stability" concept, more competition in the banking market forces banks to offer borrowers cheaper lending rates. As a result, banks' default risk is lowered because borrowers have a better likelihood of loan payback. (Boyd, Nicolo, & Jalal, 2006).

Many pieces of evidence support both two views in the case of conventional banks. Studies conducted by Risfandy, Tarazi, and Trinugroho (2020), Thu et al. (2019), Kabir and Worthington (2017), Kasman and Kasman (2015) Chang et al. (2008), and Beck, Demirgu, and Levine (2006) discovered that when the level of competition rises, bank stability suffers. The "concentration-stability" idea is therefore validated. The other findings, on the other hand, supported the "concentration-fragility" concept. The research steered by Ijtsma, Spierdijk, and Shaffer (2017), Shijaku (2017), Mirzaei, Moore, and Liu (2013), and Amidu and Wolfe (2013) revealed that the higher concentration had an inverse impact on the banks' stability. Interestingly Calice et al. (2021) demonstrated the unique result. It was non-linear relation between concentration and stability. Furthermore, it also depended on the level of concentration. They found that when the concentration is approximately 50% or less, concentration has a positive impact on the banks' stability. Meanwhile, when the concentration is at 65% or more, it will impact negatively on the stability of bank.

In the case of the dual banking system, the study of Risfandy, Tarazi, and Trinugroho (2020) revealed that concentration level does not affect the Islamic banks' stability. However, by studying the banking industry in eighteen MENA countries, Albaity, Mallek, & Noman (2019) found the positive impact of concentration on the Islamic banks' stability. Therefore, it would be interesting to apply the "concentration-stability" hypothesis specifically on the Islamic banks by using a single-country setting i.e., Indonesia. Moreover, by applying that hypothesis in the case of Indonesian Islamic banks, it is relevant to the current situation. It is because, by early 2021, the Indonesian Islamic banking market structure had been dramatically altered as a result of merger activity by the three major Islamic commercial banks, namely Bank Syariah Mandiri, Bank Negara Indonesia Syariah (BNI Syariah), and Bank Rakyat Indonesia Syariah (BRI Syariah) that recently becomes Bank Syariah Indonesia (BSI). The Indonesian Financial Service Authority (OJK) has authorized the merger by the directive of OJK board commissioner number 4/KDK.03/2021. Therefore, by early of 2021, the concentration ratio of Indonesian Islamic banks had significantly risen to about 0,56. Conversely, without merger, that concentration is only about 0,49. Moreover, that situation surfaces research question to prove the Celice, et al. (2021) finding, does the higher concentration level positively or negatively affect Islamic banks stability in the context of a single country setting.

Based on the reasons stated above, this paper aims to study the impact of the concentration level on the banks' stability to prove one of the two hypotheses present in the Indonesian Islamic commercial banking industry. This paper is divided into five sections; the next section is the literature review on conceptual theory and previous studies regarding competition and stability, the banking industry in general, and Islamic banking specifically. The third section discusses the

research method used in this study. Section four is the result and discussion, and the last section is the conclusion and policy implications of this study.

II. Literature Review

2.1. Background Theory

The debate over the concentration-stability hypothesis began when Keeley (1990) released an essay demonstrating how higher bank competition leads to increased bank failures in the United States. According to him, when multiple banks compete, profit margins shrink, causing institutions to take unnecessary risks in order to maximize returns. It will therefore result in a reduction in the quality of loan portfolios, increasing bank instability. As a result, the more concentrated banking sector is made up of larger institutions that can leverage on economies of size and breadth while diversifying their assets. In a more competitive economy, banks have less motivation to thoroughly screen their clients, increasing the risk of fragility. This is due to the fact that banks gain less informational rent from their relationships with debtors (Allen & Gale, 2004).

Competition in the banking system can also impact stability through a phenomenon called "financial contagion." Banks are price takers under perfect competition, and none of them has any motivation to lend liquidity to struggling banks, badly hurting the whole industry when the problematic bank collapses. Moreover, when the banking system is more concentrated with a small number of large banks, it will be monitored easier by the financial authority. Thus, the banking system is more resilient to shocks (Allen & Gale, 2000). A financial crisis is also claimed to happen more likely in a less concentrated banking system (Allen & Gale, 2004; Boyd, Nicoló, & Smith, 2004). The less concentrated banking system is more vulnerable to crises because it lacks significant financial products that may benefit from large profits, functioning as a buffer against asset quality degradation.

Contrary to the arguments in support of the concentration-stability view above, some argued that it is also possible that increased bank competition will lead to a decrease in financial instability, as known as the "concentration-fragility" view. Banks with market power could enjoy more profit by charging a higher interest rate. This higher interest rate may lead to riskier loan portfolios because of adverse selection and moral hazards. Safer borrowers may be discouraged because of higher funding costs, but other borrowers may be involved in riskier activities to cover the high funding cost, increasing the probability of default. Financial stability will then be undermined because of the increase in non-performing loans (Boyd & O, 2005; Stiglitz & Weiss, 1981).

Beck, Demirgu, & Levine (2006) suggested that because of organizational complexity, larger banks in a concentrated financial system might be difficult to oversee.. Transparency may also decrease as the banks become larger and more complex as they expand across multiple business lines and geographical locations. Because of these, regulatory actions may be less effective in avoiding excessive risk exposure. Proponents of this view also argued that larger banks in a more concentrated banking system tend to receive high public guarantees, which can cause moral

hazard problems (Amidu & Wolfe, 2013). Mishkin (1999) posited the "too-big-to-fail" concept, which argues that as banks become too big, the moral hazard problem may worsen when managers make hazardous investments on the idea that they will be covered by the government's safety net.

2.2. Previous Studies

The empirical research on the relationship between bank concentration and stability offers numerous reasons in support of the competition-stability nexus, the competition-fragility nexus, or possibly both nexuses. Follow is presented previous empirical works of literature related to the issue of concentration and stability of banks. Firstly, the studies which support the "concentration-stability" nexus will be presented. Beck, Demirgu, & Levine (2006) investigated the effect of bank concentration and regulation on the possibility of a systemic banking crisis. They used CR3 to measure bank concertation. Using data from 69 countries from 1980 to 1997, they discovered that a more concentrated financial sector is less likely to have a systemic banking crisis. Chang et al. (2008) investigated the impact of concentration level on the stability of banks in the Brazilian banking system. They used HHI and the bank's non-performing loan (NPL) as the proxy of concentration level and stability of banks, correspondingly. Their study revealed the inverse relation between concentration level and NPL (fragility of banks) and therefore, the "concentration-stability" hypothesis is supported.

Kasman and Kasman (2015) examined the concentration level on the financial stability of banks in Turkey. They used the Boone indicator and Adjusted learner index as a proxy of concentration level and both NPL and Z-Score as a proxy of stability. According to their findings, an increase of concentration would increase NPL but it will lower the Z-score. Kabir and Worthington (2017) examined the impact of concentration level proxied by learner index on the stability of banks which measured by z-score, non-performing loan (NPL) and distance to default in the banking industry of 16 countries which cover both conventional and Islamic banks. Their study found that increasing market power will make the banks more stable. There was also a negative impact of the learner index on the bank's NPL. Moreover, a positive relation between learner index and distance to default was founded. Therefore, those results suggest that "concentration-stability" hypothesis is supported for both Islamic and conventional banks. Thu et al. (2019) investigated the influence of competition level, market concentration, and efficiency of banks on the banks stability in China, Hongkong, Malaysia, and Vietnam. The competition level and market concentration are measured by learner index and CR3, respectively. Their study revealed that an increase in competition level will negatively affect the banks' stability. Similarly, an increase in market concentration will lead to the stable condition of banks. Therefore, the "concentration-stability" hypothesis is supported by their study.

For Islamic banks case, Albaity et al. (2019) revealed that Islamic banks in MENA nations have been proven to be more stable rather than the conventional one in a less competitive industry. However, greater competition exacerbates Islamic banks' risk-taking behavior and renders them more vulnerableascribed. In principle, Islamic banks eliminate interest, speculation, gambling, and complex derivatives in favor of profit-and-loss sharing and risk-sharing. As a result, Islamic

banks cannot earn interest and must rely on non-interest income such as fees and commissions. Furthermore, the financial structure of assets in an Islamic bank's portfolio differs from that of conventional banks in that Islamic banks must fund their asset portfolios with equity and deposits, whereas regular banks can use both stock and debt. As a result, the risk profile of Islamic banks is lower than that of regular banks in order to achieve profitability. Islamic banks are more stable since they have a reduced risk profile. (Albaity et al., 2019; Doumpos, Hasan, & Pasiouras, 2017; Hassan & Aliyu, 2018; Thorsten, Beck; Asli, Demirguc-Kunt & Ourda, 2013)

Then, the studies which advocate the "concentration-fragility" hypothesis will be explored. By using CR5 and HHI as a concentration measure, IJtsma et al. (2017) assessed the influence of market structure on the stability in the EU banking system in the period of 1998-2014 by considering both bank-level stability and country-level stability. The results showed that, concentration negatively affects stability both at bank and country level. They argued that the similarity of results at both levels is a sign of robustness not found in previous related literature. Shijaku (2017) studied the influence of bank concentration on the possibility of a country experiencing systemic bank fragilit. He discovered findings that support the concentration-fragility theory by using on-site bank balance sheet information to establish a proxy of bank stability and HHI and CR to quantify market concentrations.

Over the period 1999-2008, Mirzaei et al. (2013) evaluated the impact of market structure on profitability and stability for 1929 banks in 40 developing and mature markets. Using the CR5 as a proxy for market structure, their research discovered that the CR5 has a negative and substantial influence on bank stability in industrialized nations. By using Learner Index and HHI as a proxy of competition level, Amidu and Wolfe (2013) studied the impact of competition on the stability of banks in emerging economies. Their study revealed that higher concentration levels hardly affect the stability of banks and therefore, "the concentration-fragility" hypothesis is preferred to explain the impact of competition level on the stability of banks in emerging markets.

In associated to bank's specific variables, Numerous studies estimate the effects of bank's specific variables such as Cost to Income ratio (CIR), Financing to Asset ratio (FTA), Income Diversification (ID), and Asset growth on bank stability. Shijaku (2017) found that bank operation efficiency which is proxied by CIR has a negative relationship with the stability condition. This is strongly supported by Aun et al. (2019) that investigates the effects of competition from Islamic banks on financial stability and profitability in Indonesia. This study indicates that the CIR which is a proxy to bank operation efficiency has a negative and statistically significant relation with banking stability. The results also depict that credit risk which is proxied by FTA ratio has typically impacted bank stability. As observed in the previous study in Ghana, Adusei (2015) showed an inverse relation between credit risk and bank stability from the rural banking industry data. Although, the relationship is statistically insignificant.

In terms of income diversification, Cihak & Fund (2014) found that more revenue diversification tends to raise stability in major Islamic banks, implying that shifting from lending-based

operations to alternative income sources may enhance bank stability. This suggests that income variety has a favorable influence on financial stability. The contribution of income diversification is also explained by the study of Nisar et al. (2018) who demonstrate the effect of income diversification on the profitability and stability of South Asian commercial banks from 2000 to 2014. According to the findings of the study, bank income diversification has a favorable influence on both profitability and stability. Another bank-specific indicator, asset growth, may be quantified by the bank's size. Pham et al. (2021) studied the determinant of bank stability in emerging market and the result discovered that a higher bank size will positively boost its stability since a larger bank is typically more efficient due to economies of scale. The finding was also associated to the empirical result of Khasawneh (2016) which showed a significant and positive relationship between bank size and bank stability.

Despite industry and bank's specific variables, several control variables are expected to have a contribution to explaining the stability of Islamic commercial banks, namely economic growth, exchange rate growth, M2 to GDP ratio, and a dummy of Covid-19 pandemic. Economic growth is predicted to give either a positive or negative impact on stability. Pham et al. (2021) found a positive relationship between economic growth and the stability of banks in Vietnam. Moreover, in the case of Islamic banks, Khasawneh (2016) discovered the positive impact of economic growth on the stability of Islamic banks in MENA countries. He argued that an increase in economic growth reflects an expansion in all economic activities which increases the ability of debtors to meet their obligations. On the other hand, Soedarmono, Machrouh, & Tarazi (2011), Amidu & Wolfe (2013), Kasman and Kasman (2015), and Thu et al. (2019) suggested a negative impact of economic growth on the stability of banks. It was due to excessive risk-taking behavior during economic booms.

The use of exchange rate growth as a determinant of banking stability is relatively rare. However, one study found the negative impact of exchange rate depreciation on the stability of banks. It was due to that when the exchange rate is depreciated, the asset quality will deteriorate (Malika, 2020). A greater M2 to GDP ratio suggests excess liquidity in the financial market and, as a result, may presage a lending boom. When it is not accompanied by prudent credit monitoring, it may create instability for the banking industry (Jahn & Kick, 2012). Both exchange rate growth and the M2 to GDP ratio are rarely used as an explanatory variable in the analysis of banking stability, especially in Islamic banks. Therefore, it will potentially be a novelty of this study. Lastly, follow Elnahass, Trinh, & Li, (2021) covid-19 pandemic is involved as an explanatory variable and it is expected to give a worse impact on the banks stability

II.   Methodology

This study's main objective is to assess the influence of industry concentration on Indonesian commercial-Islamic banks' stability. The estimation also includes banks' specific characteristics, such as cost to income ratio (CIR), loan to asset ratio (LTA), income diversification (ID), and asset growth. Moreover, the models are also extended with the inclusion of macro-factors as control

variables. Those control variables are also utilized to conduct a robustness check. This study is inspired by scholars who estimated those issues, such as Cihak and Hesse (2008), Mirzaei, Moore, and Liu (2013), Maggie, Rebecca, & Molyneux (2014), IJtsma, Spierdijk, and Shaffer (2017), and (Shijaku, 2017).

3.1. Data

The data used in this research are the annual financial performances of 14 Islamic-commercial banks in Indonesia in the periode of 2011 to 2020. In those observed periods, the number of Islamic commercial banks in Indonesia is 14 banks, and therefore, this study covers all of the population (excluding the Syariah business unit of conventional banks). The bank-level data are sourced from the banks' financial statements published by the Indonesian Financial Service Authority. The data of macroeconomic variables are collected from the Statistic of Economy and Finance, published by the Bank of Indonesia.

The Z-score is used to assess bank stability which quantifies the danger of bank bankruptcy; a higher z-score indicates that the bank is further away from default. When compared to other regularly used indicators such as NPL, z-score is seen to be a stronger indication of bank stability because NPL is generally backward-looking and strongly procyclical. (Baselga-pascual, Trujillo-ponce, & Cardone-riportella, 2015; Cole, Cumming, & Taylor, 2019; Poghosyan & Čihak, 2011). In empirical literature about bank stability, the log of z-score is often preferred compared to the simple z-score. This is due to the fact the distribution of the simple z-score tends to be heavily skewed, whereas the log of z-score is not (Houston, Lin, Lin, & Ma, 2010; Laeven & Levine, 2009). We follow this approach in this study.

The log z-score as an independent variable is used as a measurement of individual banks' stability. Following Cihak & Hesse (2008), the log z-score is computed as shown below.

$$lz = \log\left(\frac{k + \mu}{\sigma}\right)$$

Where k is equity capital and reserves as a percent of asset, μ is the average return as a percentage of the asset (proxied by return on asset or ROA), and σ is the standard deviation of return on assets as a proxy for return volatility. Several explanatory variables are in the model. The operationalizations of these variables are described in Table 1 below.

Table 1: Variables Description

Variables	Proxy	Description	Expected Sign
CR4	Concentration Level	An industry level of concentration of Indonesian Islamic commercial banks is measured by the concentration of assets held by the four largest banks divided by the total asset of banks within the industry. The higher value of this variable indicates the higher concentration.	+/-
Herfindahl-Hirschman Index (HHI)	Concentration Level	Another alternative of concentration of Indonesian Islamic commercial banks. HHI is calculated as the sum-squared of the bank's asset to the total Islamic-Banking Industry Asset. The higher value of this variable indicates the higher concentration	+/-

Cost to Income Ratio (CIR)	Efficiency	A measurement of banks operating efficiency, calculated by gross operating expenses divided by gross operating income. The higher ratio reflects that banks are operationally inefficient.	-
Financing to asset ratio (FTA)	Credit risk	A measurement of credit exposure in the structure of assets, computed by total bank financing divided by total assets of banks. A higher ratio is higher credit risk	-
Banks Asset	Banks Size	The natural logarithm of banks total assets in billion Rupiah	-
Income Diversity (ID)	Diversification	A measurement of how far the banks diversified their source of income. A higher value of this variable represents the higher degree of diversification The calculation of income diversity follow Cihak & Hesse, (2008): $$ID = 1 - \left| \frac{(Net\ interest\ income - other\ operating\ income)}{total\ operating\ income} \right|$$	+
Growth	Business Cycle	A rate of yearly economic growth	+/-
Exchange Rate Growth (ER_G)	External Risk	A rate growth of domestic currency (IDR) towards foreign currency (USD)	-
M2 to GDP	Financial Deepening	Measure a deepening of the Indonesian financial system	+/-
Covid-19	Dummy	??	

Source: Compiled by authors from several references (2021)

3.2. Model Development

The impact of concentration and Islamic-commercial banks stability will be estimated using a panel-data regression model that refers to Cihak & Hesse (2008) with several modifications in variables following Mirzaei, Moore, and Liu (2013), Maggie, Rebecca, & Molyneux (2014), IJtsma, Spierdijk, and Shaffer (2017) and (Shijaku, 2017). The estimation can be written as follow.

$$lZ_{i,t} = \beta_0 + \beta_1 CR4_{i,t} + \sum_{n=4} \beta_n B_{i,t} + \varepsilon_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$
$$lZ_{i,t} = \beta_0 + \beta_1 HHI_{i,t} + \sum_{n=4} \beta_n B_{i,t} + \varepsilon_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$
$$lZ_{i,t} = \beta_0 + \beta_1 CR4_{i,t} + \sum_{n=4} \beta_n B_{i,t} + \sum_{n=3} \beta_n C_{i,t} + \varepsilon_{i,t} \dots\dots\dots\dots\dots\dots\dots(3)$$
$$lZ_{i,t} = \beta_0 + \beta_1 HHI_{i,t} + \sum_{n=4} \beta_n B_{i,t} + \sum_{n=3} \beta_n C_{i,t} + \varepsilon_{i,t} \dots\dots\dots\dots\dots\dots\dots(4)$$

Four estimation models are used to estimate the impact of concentration level on the Indonesian Islamic commercial banks' stability. As a dependent variable, the log of z-score is used as a proxy for banks' stability. In the estimation model (1), CR4 is utilized as a proxy of the concentration level. The banks' specific variables are captured in the vector $B_{i,t}$, consisting of bank efficiency (CIR), credit risk (LTA), size (Asset), and income diversification (ID) of banks *i* at time *t*. Those banks' specific variables are used in all estimation models. In the estimation model (2), HHI is employed as a proxy of concentration level, an alternative way to see whether or not the different concentration level measures impact the banks' stability. The underlying reason to separate those two measures of industry concentration is that the multicollinearity problem

potentially exists if they are put together in one model. When the CR4 and HHI give a positive and significant influence on stability, therefore the "concentration-stability" hypothesis is proven. Contrary, once those variables have a negative and significant influence, it will support the "concentration-fragility" hypothesis.

Estimations of model (3) and (4) come from estimation model (1) and model (2) respectively with several additional macro and external variables, represented in vector $C_{i,t}$. The vector consists of GDP growth, exchange rate growth, financial deepening (M2/GDP), and the presence of the Covid-19 pandemic in 2020 which is a dummy variable. The additional variables in model (3) and model (4) are intended to give a robustness check in order to see if there are any different impact of concentration level and banks' specific variables on the banks' stability. All estimation models will be assessed using panel data regression. The Hausman test will also decide if all estimate models should use a random-effect model or a fixed-effect model. Furthermore, the White and Wooldridge tests will be used to discover heteroscedasticity and serial-correlation problems in order to obtain the best estimator of all models.

III. Results and Analysis

4.1. Descriptive Statistic

Table 2: Descriptive Statistics

This table presents the descriptive statistics of variable used in the econometrics model. The variables presented in this table are in their level form.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Bank Z-Score	140	7.288	6.919	-2.289	31.217
LTA	140	0.659	0.136	0.000	0.970
CIR	140	0.882	0.297	0.442	2.921
Income Diversity	140	0.263	0.275	0.000	1.531
Asset (Billion IDR)	140	18.400	24.000	0.300	127.000
GDP Growth (% YoY)	140	4.525	2.455	-2.700	6.170
Exchange Rate Growth (% YoY)	140	0.760	1.189	-0.273	3.800
Inflation (% YoY)	140	4.235	2.180	1.680	8.390
M2 to GDP Ratio (%)	140	39.566	1.955	36.738	44.700
HHI	140	0.184	0.017	0.167	0.217
CR4	140	0.567	0.070	0.488	0.693

Table 2 shows the descriptive statistics of the variables across banks and periods and the macroeconomic variables during observation periods. Eight of ten variables have a low data variability. Meanwhile, the rest show high variation. The two variables with high data variation are the bank asset and exchange rate growth. The high variation of assets reflects that a few banks with a larger size dominate the Indonesian Islamic commercial banking industry. The exchange rate has a high variation due to this volatile variable.

4.2. Results

Before conducting the regression analysis, the panel data model requires the Hausman test to determine the best estimation methods. It is either a random or fixed-effect model. A classical assumption test is also conducted to ensure that the model does not suffer from heteroscedastic and serial-correlation problems. The Wooldridge test addresses the serial correlation problems, while the heteroscedasticity problem is addressed using the White test. Table 3 shows the results of the Hausman, Wooldridge, and White tests for all models. As mentioned above, the model (1) and (2) estimate the impact of concentration level measured by Concentration Ratio (CR4) and Herfindahl-Hirschman Index (HHI) as well as banks specific factors on the stability of Indonesian Islamic commercial banks. Then, model (3) and model (4) are estimated as a robustness check that includes macroeconomic variables as the controls. The intention of inserting control variables is to see whether the estimation model results (1) and (2) change when the additional control variables are present.

Table 3: Results of Hausman, Wooldridge, and White Test

Model	White Test		Wooldridge		Hausman	
	H0: Constant Variance		H0: No first-order autocorrelation		H0: Random Effect Apply	
	p-value	Result	p-value	Result	p-value	Result
Model 1	0.0000	Reject H0	0.0052	Reject H0	0.0228	Reject H0
Model 2	0.3162	Cannot Reject H0	0.0085	Reject H0	0.0475	Reject H0
Model 3	0.0000	Reject H0	0.0045	Reject H0	0.0275	Reject H0
Model 4	0.0000	Reject H0	0.0019	Reject H0	0.0262	Reject H0

Source: Authors Calculation

The heteroscedasticity problem is identified in the model (1) (3) and (4) with the p-value of the White test in those models are significant at alpha 1%, respectively. Furthermore, serial correlation problem is also detected in all the estimation models because the p-value of the Wooldridge test is significant at alpha 10%. Therefore, to get the best estimation, the robust standard error estimation is employed to solve that problem, both heteroscedasticity, and serial correlation problems. The Hausman test results showed that the p-value is significant at alpha 5%The test, therefore, suggests that Fixed Effect Model (FEM)is appropriate for all models. Table 4 below demonstrates the result FEM model test after the regression is estimated by using the robust standard error estimation.

Table 4: FEM Result Model (1) and (2)

Variable	Model 1	Model 2
Constant	-3.7366	-1.2931
	(3.7326)	(3.3603)
Concentration	1.5932*	1.7416*
	(0.8277)	(0.8776)
Financing to Asset Ratio	-1.2858	-1.0025
	(0.8490)	(0.76)
Cost to Income Ratio	-1.0607**	-1.0331**
	(0.4155)	(0.4231)

Variable	Model 1	Model 2
Income Diversity	0.5957	0.5785
	(0.3567)	(0.3572)
Asset	0.4802*	0.4423
	(0.2667)	(0.2541)
R Squared-Within	0.3483	0.3287
R Squared-Between	0.1812	0.1881
R Squared-Overall	0.1873	0.1894
N	133	133

*) **) Significant at 10% and 5%

In Model 1 concentration ratio is CR4 while in Model 2 concentration ratio is HHI

As shown in Table 4, based on the result of the model (1) and (2), the concentration level measured by both CR4 and HHI reveals the positive and significant impact on the stability of Islamic-commercial banks in Indonesia. An increase in concentration ratio by 1 point improves the stability by 1.6%. The other market concentration measurement, HHI, reveals that when the HHI rises by 1 point, it increases the stability by 1.74 %. Both the two concentration measurements are significant at a 5% confidence level. These findings support the "concentration-stability" or "competition-fragility" hypotheses. It can be inferred that in the higher concentration level, the stability of Islamic commercial banks will be more stable.

Those results are in-line with Albaity et al. (2019) who studied the impact of concentration level on the Islamic banks' stability in a multi-country setting. That study advocated the "concentration-stability" hypothesis due to the positive and significant impact of concentration level on the Islamic bank's stability. Therefore, by using the single country setting, this study is also consistent with the result from the study of multi-country settings in the context of Islamic banks' concentration and stability. Moreover, The results were also supported by the scholars which studying "concentration-stability" hypothesis in the context of the conventional banking system, such as Risfandy, Tarazi, and Trinugroho (2020), Thu et al. (2019), Kabir and Worthington (2017), Chang et al. (2008) and Beck, Demirgu, and Levine (2006) who found the positive impact of concentration level on the banks' stability.

Several argumentations explain the "concentration-stability" view. Albaity et al. (2019) contended that in a more competitive market, banks are unable to achieve abnormal returns, resulting in a decrease in bank profit. The decreased revenue, therefore, reduces banks' ability to deal with market forces and shocks, encouraging a higher level of risk-taking behavior (Fu et al., 2014). Thu et al. (2019) who discovered that higher concentration was related to bank stability, claimed that in a highly competitive market, banks gain market share by boosting deposit rates and lowering lending rates to entice consumers to lend and take on debt. The narrow interest-rate spread can lead to a rise in bank costs and a decrease in bank earnings, severely damaging bank stability. Aside from that, banks might be more generous in their lending standards, lowering the quality of their loans. As a result, banks are confronted with poor or non-performing loans, which raise bank risks and weaken bank stability. Moreover, To

achieve profitability, Islamic banks have a lower risk profile than regular banks. As a result of their lower risk profile, Islamic banks are more stable (Albaity et al., 2019; Doumpos, Hasan, & Pasiouras, 2017; Hassan & Aliyu, 2018; Thorsten, Beck; Asli, Demirguc-Kunt & Ourda, 2013)

Furthermore, the results are also in-line with Calice, Leonida, and Muzzupappa (2021). They found that when the degree of concentration level is less than 65%, an increase in concentration will positively affect the stability of banks which is mediating by profitability. Yet, when the concentration level is more than 65%, a rising concentration then creates the banks more fragile due to the higher credit risk. A further explanation is that when the four largest banks have a market share lower than 65%, the higher profitability which is resulted by the ability to set a high-interest rate will compensate the credit risk. However, when the concentration is at 65% or above, a higher interest will be imposed on borrowers. Then, it will increase the borrowers' risk-taking behavior. Since the bank credit risk increase, rising profitability will not compensate the loss due to the higher credit risk and it will increase the likelihood of a banking crisis. Recently, the concentration level of the Islamic commercial bank industry in Indonesia is 49% before the merger of the three largest banks and 56% after that merger. Therefore, the presence of the "concentration-stability" view is relevant with merger and acquisition (M&A), as it happened in the Indonesian Islamic commercial banking industry recently with the concentration level being below 65%. Thu et al. (2019) suggested that M&A activities may lessen competition in the banking sector, boost bank size and market power, and assist banks in achieving economies of scale, improving profitability, and enhancing stability.

Almost all banks' specific factors have the direction of influence that is expected. However, only the CIR variable has a significant impact on the stability in both models. Meanwhile, the bank's asset significantly affects banks' stability only in model (1), whereas in model (2) that variable still has a similar sign but is statistically insignificant. CIR variable, which reflects the efficiency of banks' operation, negatively impacts the banks' stability. This variable has the same meaning in all of the estimation results. These findings are consistent with Shijaku (2017), who found that CIR negatively affects banks' stability. For the Indonesian case, the study of Aun et al. (2019) revealed the negative and significant impact of CIR on stability. It can also be associated with Indonesian Islamic-commercial banks' inefficiency level that is relatively high, 87,7% on average. A higher inefficiency score will lead to instability. Moreover, by using the DEA and SEA approaches to measuring efficiency, Thu et al. (2019) found the negative and significant impact of efficiency on banks' stability. Therefore, maintaining efficiency is important to improve stability. If the banks operate in optimum efficiency, both in terms of minimizing cost or maximizing revenue, it will improve the banks' profitability and stable condition.

The financing to asset ratio (FTA) negatively influences banks' stability, though it is statistically insignificant in both two models. It can be a sign that the increasing domination of loans or financing in the asset structure will potentially create instability for the banks. FTA ratio is a proxy of credit risk and shows the degree to which the bank is expected to change its borrower repayment attitudes. This finding is similar to Adusei (2015) who found a negative relation between FTA and bank's stability in Ghana, however, the impact is statistically

insignificant. It can be inferred that when the banks increase the financing activity, they will be exposed to credit risk and finally affects the stability of banks due to the loss caused by credit risk. It was proven by Alam et al. (2018) and Amidu and Wolfe (2013) who found the negative impact of FTA on the bank's credit risk, proxied by non-performing loans.

Income diversity (ID) also has a positive impact but is statistically insignificant in the two models. In terms of the variable sign, this finding is similar to Cihak & Fund (2014) and Nisar et al. (2018) who found that ID positively impacts the stability of banks. However, they found ID significantly affects the banks' stability. Nevertheless, the findings can indicate that when the banks optimize their income from non-financing activities, their stability potentially improved. In association with revenue diversification, Nisar et al. (2018) suggested that non-interest income can be optimized rather than fee and commission to improve banks' stability.

The asset variable which reflects banks' size has a positive influence and is statistically significant in the model (1). Even though the variable is not statistically significant in model (2), however, its sign is consistent with that in equation (1). Theoretically, this finding supports the "the concentration-stability" hypothesis which implies that increasing bank size will improve its stability Thu et al. (2019). This finding is similar to Adusei (2015); Ahmad khasawneh (2016); Thu et al. (2019) who found the positive influence of a bank's size on the stability of a bank. The larger bank will be more stable due to several reasons. Firstly, according to Basel Accord II, a bank's capital is subject to the bank's asset which is covering the risk from credit. The higher credit is channeled, the higher capital is required. Therefore, well-capitalized banks improve creditworthiness, lowering funding costs and lowering the danger of insolvency, as well as having more capacity to create business and cope with hazards. Then, banks with larger assets benefit from economies of scale, and giant banks may gain from their market strength, creating abnormal profits. Thirdly, larger banks are more likely to diversify their product and lending portfolios than smaller banks, which reduces risk (Mirzaei et al., 2013)

4.3. Robustness Check

In conducting the robustness check, two variables which are represented concentration level as well as bank's specific variables are re-estimated within the presence of macro-economic variables and the time of pandemic in 2020. Table 5 depicts robustness check estimation which is the results of model (3) and model (4).

Table 5: FEM Result Model (3) and (4)

Variable	Model 3	Model 4
Constant	0.1129	3.4081
	(4.8908)	(3.5998)
Concentration	1.5293*	2.3701
	(0.7778)	(1.5585)
Financing to Asset Ratio	-1.104	-0.9416
	(1.0167)	(1.0024)
Cost to Income Ratio	-1.0419**	-1.0284**
	(0.4056)	(0.4202)
Income Diversity	0.5996	0.5875

	(0.3531)	(0.3698)
Asset	0.4757	0.4347
	(0.2784)	(0.2803)
GDP Growth	-0.1158	-0.2408**
	(0.0936)	(0.1109)
Exchange Rate Growth	0.0103	-0.0254
	(0.0675)	(0.0609)
M2 to GDP	-0.0858	-0.0582
	(0.0694)	(0.0821)
COVID-19	-0.4143	-1.4449
	(0.6474)	(1.1783)
R Squared-Within	0.3581	0.3366
R Squared-Between	0.1985	0.1925
R Squared-Overall	0.2012	0.1935
N	133	133

*) **) ***) Significant at 10%, 5%, and 1%, respectively

In Model 3 concentration is CR4 while in Model 4 concentration is HHI

Table 5 reveals that both concentration level has a positive influence on the stability of banks. However, in model (4) which is proxied by HHI, the concentration level is statistically insignificant to affect stability. Nevertheless, by having a similar sign with the results of model (1) and (2), it is clear enough to argue that the "concentration-fragility" hypothesis is again supported. These findings imply that the presence of macro-economic factors, such as economic growth, exchange rate growth, and financial deepening, do not change the impact of the competition level on stability.

Except for economic growth which has a negative and significant impact on stability, other macro variables do not have statistically significant impacts. A rise in economic growth potentially creates instability of Islamic banks in Indonesia, and the impact is statistically significant in the model (4). That finding, along with Kasman & Kasman (2015) and Thu et al. (2019), found a negative relationship between economic growth and banks' stability. The argument behind this finding is that during periods of higher GDP growth, banks in emerging and developing countries tend to be more unstable; banks can loosen their monitoring functions and, consequently, increase the risk of insolvency during the peak of the business cycle, as suggested by Amidu & Wolfe (2013).

The growth of the exchange rate has a different sign in the model (3) and (4), however, its impact on stability is statistically insignificant in those two models. Therefore it can be argued that there is no clear relation between exchange rate growth and the stability of Islamic commercial banks in Indonesia. Financial deepening which is proxied by broad money (M2) to GDP ratio negatively affects Islamic banks' stability. However, the influence is statistically insignificant in both two models. From the negative sign of that variable, those findings contradict with Fendel and Stremmel (2016) who found that financial deepening lowers the likelihood of banking crisis. However, when the financial deepening is measured by the ratio of domestic credit to GDP,

whereas the domestic credit is also the part of M2, an increase in that ratio will raise the possibility of a banking crisis, as also suggested by Gupta & Kashiramka (2020). The possible reason behind this finding is that the financing expansion is not accompanied by enough prudential selection. Moreover, Hagen and Ho (2004) also argued that a rise in credit to GDP ratio will lead to the instability of banks due to excessive demand in the money market.

Lastly, we see that the covid-19 pandemic negatively impacts the stability of Islamic commercial banks in Indonesia. However, its influence is statistically insignificant in both two models. Nevertheless, from the negative sign of that dummy variable, it represents enough to argue that during that turmoil, the stability of banks is declining. It is also confirmed by Figure 1 which shows that six out of 14 Islamic commercial banks in Indonesia experienced a decline in z-score in 2020. Empirically, this finding is in line with Elnahass, Trinh, and Li (2021) who found the negative influence of pandemic time on the stability of Islamic banks. They also found that the pandemic eruption has a detrimental effect on the lowering of banks' profitability. It makes sense that during the pandemic disruption, the economic activity is worsened. The business of banks follows the business cycle and therefore the banks' profitability will decline. Then, it will potentially affect the stability of banks. This is due to the that the profitability which is proxied by return on asset (ROA) is the one of components to calculate the stability.

IV. Conclusion and Recommendation

5.1. Conclusion

In recent years, Islamic commercial banks in Indonesia have become more consolidated than regular banks. In terms of competitiveness in the banking industry, several research offer two prepositions of the link between concentration and bank stability. According to the "concentration-fragility" nexus, a more concentrated market and banks with market dominance can earn more by charging higher interest rates, leading to riskier loan portfolios due to adverse selection and moral hazard. Lower profitability reduces the stability of banks. The "concentration-stability" nexus, on the other hand, implies that a more concentrated banking sector likely to be composed of larger institutions that may leverage on economies of size and scope and better diversify their portfolio, potentially boosting their stability.

The purpose of this research is to look into the influence of concentration level on the stability of Indonesian Islamic commercial banks between 2011 and 2020. There are two concentration levels in this study: concentration ratio (CR4) and Herfindahl-Hirschman Index (HHI). Several specialized banking criteria, such as cost to income ratio (CIR), loan to asset ratio (LTA), income diversity (ID), and asset growth, are also used. Some macroeconomic factors are incorporated in different models as a robustness check technique to see whether the result of major variables changes or not in the presence of other variables.

Based on the fixed-effect panel data model, our main results can be reiterated as follows: first, in the more concentrated environment, the banks tend to be more stable; therefore, the "concentration-stability" hypothesis is supported. Second, the banks' specific variables influence

as expected when the banks operate inefficiently to create instability potentially. The more the banks channel financing activity, the more it potentially improves stability. In addition, revenue diversification will theoretically improve banks' stability and, thereby, maximize non-marginal revenue. The size of the banks also impacts the re-supported "concentration-stability" hypothesis. Third, the presence of explanatory factors within models is not affected by the change of previous models without macro factors. Thus, the robustness check procedure successfully confirms that the concentration level has a consistent impact on the banks' stability.

5.2. Recommendation

Recommendation could be given in associated with the merger action of the large three Islamic commercial banks recently. this study justifies that merger will not inversely affect the stability of the Islamic banking industry in Indonesia. However, ex-ante merger monitoring should be conducted by especially the Indonesian Financial Authority and the Indonesian Business Competition Supervisory Commission regulators to anticipate an excessive market power in the future

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