

Competitiveness and Bank Stability: Empirical Study on Banking Listed on the Indonesia Stock Exchange Period 2011-2020

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Abstract

Banking is an institution that maintains financial system stability, but on the other hand, banking is a business institution that is inherently risky in getting a return on its business. This paper analyzes the impact of degree of competitiveness, bank size, and revenue concentration on bank stability on the Indonesian stock exchange during the period 2011-2020. The Lerner Index is used as an inverse proxy for degree of competitiveness, the natural logarithm is used as a proxy for bank size, and the Herfindahl Hirschman Index is used as a proxy for revenue concentration, while the Z-Index and NPL ratio are used as proxies for bank stability. The results show that degree of competitiveness has a negative relationship with stability. The power squared of the Lerner Index is also used to capture the possible non-linear relationship between degree of competitiveness and stability and shows positive results indicating the relationship between degree of competitiveness, and stability is non-linear. Bank size has a negative effect on stability. Revenue concentration shows no relationship with stability.

Keywords

Degree of Competitiveness, Bank Size, Revenue Concentration, Bank Stability

1. Introduction

The role of banking as an agent of trust is defined as a safe financial institution in carrying out various kinds of financial activities. These activities include depositing funds, investing, transferring, and other financial activities. Based on these activities, funds will be collected which will be channeled by banks into loans to creditors for various purposes, usually for business purposes that will

help the growth of a country. As an institution that maintains monetary stability, banks have a significant role in maintaining the stability of the State's financial system.

As an institution that maintains financial system stability, it is considered important to be able to maintain bank stability; on the other hand, banks are still business entities that are inherently risky in obtaining profits. The greater the risk faced, the greater the return that can be obtained. The two sides related to the role and characteristics of banking are inseparable, but related to the level of competition, it is still interesting to study, because there are two conflicting views, the findings of different relationships, and different findings depending on the characteristics of the bank the banking environment in which it operates.

There are several literature studies related to competition and banking stability, but there are two different views from conflicting findings related to competition and banking stability. The first view related to competition and banking stability is the traditional view pioneered by Keeley (1990) with the competition-fragility view which argues that increased competition causes the bank's charter value to decrease, which in turn causes banks to increase the risk of default through increasing asset risk and reducing capital. An alternative view was pioneered by Boyd & De Nicoló (2005) with a competition-stability view which states that banks will be more unstable when the level of competition between banks decreases, the greater the concentration of banks in the loan market increases instability through increased risk, due to higher interest rates charged to consumers can make it more difficult for them to repay loans.

The relationship between the level of competition and bank stability does not always get results that explicitly support one view and reject another. There are several studies that find results that are inclined to one view but do not reject another view, and assume that the relationship between the level of competition and banking stability is not linear (U-Shape). Berger et al. (2009) stated that the two strands of literature need not produce contradictory predictions regarding the effects of competition and market power on banking market stability. Nuraini (2019) stated that higher market power will have a positive impact on stability but in the higher market power, the benefits will also be reduced. This illustrates that the relationship between the level of competition and banking stability is not always linear, at one point it seems to favor one view, but also does not reject the other view because there are indications and potential conditions for other views to occur.

The role of banking as an institution that maintains financial system stability is important to maintain its stability, on the other hand, banks are still business entities that are inherently risky in obtaining profits, where the greater the risk faced, the greater the returns that can be obtained. The two sides related to the role and characteristics of banking are inseparable, but how their influence and relationship with the level of competition are still interesting to study because there are two views that in a sense contradict each other, the findings of different relationships, the development of the banking system and regulations which

continues to be improved, and the findings differ depending on the characteristics of the banking environment in which it operates. This makes this study wants to provide further reinforcement of research findings, especially in Indonesia. This article will organize as follows: Introduction, Literature Reviews, Research Method, Results and Discussion, and Conclusions.

2. Literature Reviews

2.1. Banking Stability

Bank stability cannot be easily assessed using a single measure; a series of sensitivity checks is run using various indicators of bank stability (Turk Ariss, 2010). Monetary and financial stability must be controlled because they influence each other, if there is a disturbance between the two sectors it will have a negative impact on economic growth (Syahyunan et al., 2017). For example, a high inflation rate can lead to an increase in interest rates and if banks are too aggressive or not careful in making decisions, it may lead to an increase in non-performing credit risk, which in turn can trigger the collapse of banks and other financial institutions, monetary system and disrupt the stability of consumer prices.

Stability is usually understood in the context of risk measurement (Nuraini, 2019). Stability is proxied by 2 risk measurement indicators, namely the Z-Index which measures the stability of the achievement of risk adjusted profitability and the NPL ratio which reflects credit risk and is the result of each bank's risk taking behavior.

Banking stability is directly proportional to the profits obtained by banks; the greater the profits obtained by banks in one period will increase bank stability in that period. Financial stability is captured by the volatility of bank income, insolvency risk and capitalization (Soedarmono et al., 2011). One method of capturing bank stability based on risk adjusted profitability is the Z-Index, where according to Fernández & Garza-García (2015) the Z-Index increases when the rate of return and capitalization rate increases, decreases when there is volatility in ROA. Z-Index combines some of the most significant variables in statistically derived combinations, therefore providing a useful interpretation of the bank's overall risk (Liyangamage, 2015). The larger the Z-Index indicates that the bank is in a stable condition with a positive rate of return and the volatility of returns is in a stable range.

The Z-Index is a measure of the inverse of the bank's overall risk, taking into account the average equity to total assets (E/TA) at the bank's capital level; this is done to be able to see the achievement of risk adjusted profitability that has been achieved by banks during the study period. Z-Index is an inverse proxy for the probability of failure, which combines profitability, leverage, and return volatility in one measurement (Berger et al., 2009).

Credit risk is one of the most visible sources of banking risk. An increase in the bank's credit risk profile is related to the high level of non-performing loans, if the NPL level cannot be controlled, it will lead to an increase in the risk of

banking failure. NPL is an important macroprudential indicator that must be considered by regulators to assess the stability of the banking system (Kasman & Kasman, 2015). Wibowo (2016) stated that the higher the NPL ratio, the higher the risk borne by the bank, which is reflected in the greater capital that must be reserved by the bank to absorb risk. NPL can be interpreted as an inverse proxy of bank stability or the tendency of banks to take risks.

Bank stability is an important factor in maintaining financial system stability and the economy at large. Economic stability can be hampered when the ability of banks to channel credit, provide financial services, and other payment systems is disrupted due to problems with the condition of the bank's internal financial system. There is some literature that discusses bank stability, but studies related to the level of competition and banking stability are one of the studies whose findings are still debated.

2.2. Competitive Level

The traditional competition-fragility view assumes that increasingly fierce competition will reduce the power of banks to print profits and encourage banks to take excessive risks in an effort to obtain higher profits, or it can be said that banking stability will decrease when competition between banks increases. Berger et al. (2009) increased competition in the 1980s eroded monopoly rents and led to an increase in bank failures in the United States, in a situation where a large number of banks compete, profit margins are eroded and banks may take excessive risks in increasing their profits.

In contrast to the previous view, the alternative competition-stability view assumes that banks with greater loan market power will charge higher interest rates on customer loans and make it more difficult for borrowers to repay their loans, thereby exacerbating the moral hazard incentive of borrowers to switch to riskier projects and may result in a group of bank clients being riskier because of adverse selection considerations. Banks operating in an uncompetitive banking industry tend to generate risky loans that undermine their stability (Amidu & Wolfe, 2013). High credit interest rates also create adverse selection in the process of bank lending, bank customers who apply for credit are only those with high risk because customers who have low risk tend to avoid financing from banks and look for other funding sources (Wibowo, 2016).

There are several methods in determining the level of bank competition, through a structural approach (panzar rosse) or through a non-structural approach (Lerner Index). There are criticisms of the Panzar Rosses measurement method, where the measurement is not accurately assumed to be a measure of long-term and sustainable competition. In contrast, related market power is better captured by carefully developed proxies that are allowed to vary at the bank level and over time such as the Lerner Index (Turk Ariss, 2010). The Lerner Index reflects the level of competitiveness of each bank so that it can be observed its relationship with bank stability measured for each bank.

The Lerner Index is used to measure the level of market power because if it is related to the market structure, banking in a perfectly competitive market has almost no market power, while banking in a monopoly competition has a large level of market power. The more competitive a market means the lower the existing market power, and conversely the less competitive a market means the market power in the market will show a higher level (Lubis, 2012). The Lerner Index can indicate a bank's market power from the bank's ability to set prices beyond marginal cost.

Some opinions state that sometimes the value of the Lerner Index is at minus or below zero, this can happen when banks do not operate optimally until the value of marginal costs is above the value of pricing bank products and services. Lerner Index can be negative when the bank does not work optimally, namely when the price of their product or service is lower than the marginal cost (Soedarmono et al., 2011).

2.3. The Relationship between Competitive Level and Banking Stability

The relationship between the level of bank competition and its stability is one of the subjects of discussion that is still being debated by academics and business people. The impact of bank competition on financial stability remains a widely debated issue, both among policy makers and academics (Beck et al., 2012). In one study proved that banking competition would increase bank stability, but in another study, it had a negative impact on banking stability (Amidu & Wolfe, 2013).

Under the competition-fragility view, a more competitive or less concentrated banking system will be more fragile, or it can be said that bank fragility increases as the level of competition increases. Higher charter/franchise value arising from increased market power may deter excessive risk-taking behavior by bank management (Fu et al., 2014). Banks with large market power tend to be more careful and avoid high-risk business activities to maintain their charter/franchise value to remain high.

There are several studies that examine the level of competition and banking stability, and find the results support the competition-fragility view and consider that a higher level of competition will actually have a negative impact on banking stability, Turk Ariss (2010) stated that increased competition can damage bank stability, and could have significant implications for depressed banking systems in developing countries. Beck et al. (2012) also stated that increased competition will have an impact on greater risk-taking incentives in countries with strict activity restrictions. These results indicate that increased competition will erode bank profit margins, which in turn encourages banks to tend to take excessive risks in an effort to increase profits; the quality of loans provided by banks becomes worse, causing the risk of bank fragility to increase.

An alternative view of competition-stability view assumes that the level of

competition will actually increase banking stability, because banks that are in a less competitive market will operate less efficiently and charge high loan interest rates on borrowers, and cause the risk of default to increase and banks to be closer to debt his downfall. Higher market power means charging higher loan interest rates, but in a dangerous environment, entrepreneurs who pay higher loan interest rates prefer to increase the risk of their investment projects (Nuraini, 2019). An increase in the competitive banking market will increase banking profits because banks will be more selective in monitoring loans which will ultimately reduce the bank's share of non-performing loans (Goetz, 2018).

Several studies examining the level of competition and bank stability found results that were different from the traditional view; some findings supported the alternative competition-stability view, such as Fernández & Garza-García (2015) increasing bank competition has resulted in greater financial stability. An increase in the level of competition and a decrease in market power encourage financial stability in the banking sector (Noman et al., 2017). Banks operating in uncompetitive banking industries tend to generate risky loans that undermine their stability (Amidu & Wolfe, 2013). These findings indicate that banks that have a large level of market power tend to set credit interest rates that are too high, so that it has an adverse selection effect in the banking credit distribution process. Investors tend to avoid financing from banks with high interest rates.

Contradictions between the two views continue because there are differences in research results and findings, but Berger et al. (2009) find that the two views are not always contradictory, even if market power in the loan market results in a riskier credit portfolio, overall bank risk. There is no need to increase as banks can use various risk mitigation techniques to overcome these problems. A neutral view was also found by Fu et al. (2014) showing that there is a negative relationship between market strength and banking stability, but this risk can be mitigated through better institutional development and tighter capital requirements. Although there are several views regarding the relationship between competitions and banking stability, the regulator continues to strive to maintain banking stability and continues to update regulations by reflecting on the historical failures that have occurred in several banking cases in the past.

2.4. Bank Size

The increasing size of the company increases the possibility of a decrease in transparency as a result of expansion in several geographic markets, business lines, and the use of sophisticated financial instruments facilitates the formation of complex corporate organizations, these developments can reduce managerial efficiency and company internal control, and can increase operational risk (Fu et al., 2014). The larger the size of the bank, the more difficult the level of control, although now it has been facilitated by the improvement of information technology where the weaknesses related to these limits can be reduced, but to optimally control a large bank is still more difficult when compared to controlling a

bank whose size is relatively small.

This becomes even worse when banks have confidence that they will not be allowed to fail by the government because it can pose a systemic risk to the country (too big to fail). The case will be more severe if the bank believes that they are too big to fail and tend to be protected explicitly or implicitly by the government safety net (Turk Ariss, 2010). Larger banks are often more likely to accept public guarantees and, as such, are managed inefficiently and are more likely to fail (Amidu & Wolfe, 2013).

There are several opinions regarding bank size in controlling operational risk, where Thakor (2000) states that large banks tend to do credit allotments, they have less credit investments but of higher quality which improve their financial health. Large banks are likely to have a better system than small banks, coupled with advances in technology and information that make the control system more controlled.

Control of large banks will be increasingly dominant, large efficient banks will look for less efficient banks to be targeted for acquisition and converted into more efficient banks (Wibowo, 2016). Meanwhile, from the bank's internal point of view, having a larger size can be a competitive advantage through a market capitalization strategy by looking for smaller, less effective banks to acquire in order to dominate the market more dominantly.

The bank's traditional income is sourced from the sector of yield on loans to generate interest income, apart from interest income, banks can still add to their service lines to increase their income channel known as non-interest income. Shijaku (2017) found that the concentration of bank income further increases the likelihood that a country will experience systemic fragility. Ovi et al. (2014) stated that Banks can diversify their income to offset the loss of income due to reduced lending activity. More channels will provide benefits in the form of banking security, where when the loan sector experiences a decline, banks can maintain stability through the non-interest income sector.

This is not entirely a positive thing, because the more channels that banks have, if the managerial functions related to control and organization are not adequate, it will have a bad impact because more and more must be controlled while they do not have a concentration on a specific share and just follow the flow. Diversification of bank income plays an important role in shaping bank performance, but it depends on the ownership structure of banks and their experience in doing business (Luu et al., 2020).

2.5. Income Concentration

The study of income concentration also finds an interesting discussion where the effect will depend on the environment in which the banking system operates. Some of the literature that tested it on the loan market, which is much more dominant, may not have an effect on concentration because banks will logically adjust their strategies and anticipations in earning profits from interest income.

Syahyunan et al. (2017) find income diversification is not related to stability, the main thing that must be considered is credit activity, Indonesian banking loan interest rates are relatively higher than other countries in ASEAN.

3. Research Method

This study empirically examines the level of competition and banking stability during the period 2011-2020. The data is in the form of a bank's annual financial report obtained from DPI (Indonesian Banking Directory). The criteria for sampling, namely:

- 1) Conventional commercial banks that have an IPO no later than 2011.
- 2) Conventional commercial banks in Indonesia that have financial statements (financial position, profit and loss, calculation of financial ratios) for the period 2011-2020.
- 3) Banks that have never been delisted from the IDX during the 2011-2020 period.

Based on these criteria, the number of samples collected from commercial banks listed on the IDX is determined to be 21 banks that can be sampled in the study.

Bank stability is a condition where banks can maintain their financial performance for a certain time and are not involved in financial problems in carrying out their business operations. Banking stability is proxied based on 2 perspectives, namely the Z-Index which measures the stability of the achievement of risk adjusted profitability and the NPL ratio which reflects credit risk which is the result of each bank's risk taking behavior.

The Z-Index is a measure of the inverse of the bank's overall risk, taking into account the average equity to total assets (E/TA) at the bank's capital level; this is done to be able to see the achievement of risk adjusted profitability that has been achieved by banks during the study period. Z-Index is an inverse proxy for the probability of company failure, which combines profitability, leverage, and return volatility in one measure. The higher the Z_i value, the better the stability of the bank (Berger et al., 2009).

$$Z_i = \frac{(ROA_i + E/TA_i)}{\sigma ROA_i}$$

Note:

Z_i : Z-Index of bank i .

ROA_i : Return on Assets of bank i .

E/TA_i : Average equity per total asset o bank i during the study period.

σROA : Deviation standard ROA of bank i during the study period.

To increase goodness of fit and reduce the possibility of simultaneous bias, the Z-Index value is transformed into log form Amidu & Wolfe (2013). Based on these considerations, after obtaining the value of the Z-Index, a logarithmic transformation will be carried out to reduce bias and increase the goodness of fit of the regression.

Based on Bank Indonesia Regulation (PBI No. 14/15 of 2012) concerning the assessment of the quality of commercial bank assets, the quality of loans, known as the collectibility of loans, is measured by the period of payment of debtor's obligations to the bank, which is divided into five categories, namely 1) current; 2) under special attention; 3) substandard; 4) doubtful; 5) stuck. The NPL ratio is the ratio of loans with collectibility of 3, 4, and 5 compared to the total loans owned by banks. The higher the NPL ratio, the higher the risk borne by the bank, which is reflected in the amount of capital that must be reserved by the bank to absorb risk. NPL can be interpreted as an inverse proxy of bank stability or the tendency of banks to take risks.

The Lerner Index is used to measure the level of market power because if it is related to the market structure, banking in a perfectly competitive market has almost no market power, while banking in a monopoly competition has a large level of market power. The more competitive a market means the lower the existing market power, and conversely the more uncompetitive a market means the market power in the market will show a higher level (Lubis, 2012). The Lerner Index can indicate a bank's market power from its ability to set prices above marginal cost.

The level of competition is related to how big the bank's ability to dominate market share, which market niche is targeted, and whether there are competitors facing banks in carrying out their business operations, how much market power the bank has in the inverse proxy with the Lerner Index. Berger et al. (2009) suggested that the Lerner Index is calculated by the following formula:

$$\text{lerner index}_{i,t} = \frac{P_{it} - MC_{it}}{P_{it}}$$

Note:

P_{it} : Ratio of total income to total assets of bank i in period t .

MC_{it} : Marginal cost of bank i in period t .

Marginal bank costs are estimated using a translog of bank costs which are explained as follows:

$$\begin{aligned} \ln \text{Cost}_{i,t} = & \beta_0 + \beta_1 \ln Q_{i,t} + \frac{\beta_2}{2} \ln Q_{i,t}^2 + \sum_{k=1}^3 \gamma_{k,t} \ln W_{k,i,t} + \sum_{k=1}^3 \varnothing_{k,t} \ln Q_{i,t} \ln W_{k,i,t} \\ & + \sum_{k=1}^3 \sum_{k=1}^3 \ln W_{k,i,t} \ln W_{j,i,t} + \varepsilon_{i,t} \end{aligned}$$

Note:

$\text{Cost}_{i,t}$: Total cost of bank i in period t which consists of the cost of three bank production on inputs (labor costs, capital costs, and operating costs).

$Q_{i,t}$: Total output of banks as proxied by total assets of bank i in period t .

$W_{1,i,t}$: Bank i 's labor costs in period t are estimated through labor costs to total assets.

$W_{2,i,t}$: Bank i 's cost of capital in period t which is estimated through interest expense to total third parti funds.

$W_{3,i,t}$: Bank i 's operational costs in period t which is estimated through other

operational and administrative expenses to total assets.

The derivative result of the translog function of costs to total assets is used to estimate marginal cost, which is explained as follows:

$$MC_{it} = \frac{Cost_{i,t}}{Q_{i,t}} \left(\beta_1 + \beta_2 \ln Q_{i,t} + \sum_{k=1}^3 \phi_k \ln W_{i,t} \right)$$

Note:

MC_{it} : Marginal cost of bank i in period t .

$Cost_{i,t}$: Total cost of bank i in period t which consists of the cost of three bank production on inputs (labor costs, capital costs, and operating costs).

$Q_{i,t}$: Total output of banks as proxied by total assets of bank i in period t .

$W_{1,t}$: Bank i 's labor costs in period t are estimated through labor costs to total assets.

$W_{2,t}$: Bank i 's cost of capital in period t which is estimated through interest expense to total third parti funds.

$W_{3,t}$: Bank i 's operational costs in period t which is estimated through other operational and administrative expenses to total assets.

The relationship level of competition is a quadratic value of the level of competition variable, which is used to see how the relationship between the level of competition and competition is with the dependent variable under study, so it is hoped that the relationship between the level of competition and stability can be determined, and it can be determined whether the relationship is linear or non-linear. The square of the Lerner Index is calculated by squaring the value of the Lerner Index (Berger et al., 2009).

The increasing size of the company, increasing the possibility of decreasing transparency as a result of expansion in several geographic markets, business lines, and the use of sophisticated financial instruments facilitate the formation of complex corporate organizations, these developments can reduce managerial efficiency and company internal control, and can increase operational risk (Fu et al., 2014). Control of large banks will be increasingly dominant, large efficient banks will look for less efficient banks to be targeted for acquisition and converted into more efficient banks (Wibowo, 2016). Meanwhile, from the bank's internal point of view, having a larger size can be an advantage through a market capitalization strategy by looking for smaller, less effective banks to acquire in order to dominate the market more dominantly. The size of the bank is measured by performing a natural logarithmic transformation of total banking assets such as research by Berger et al. (2009), Fernández & Garza-García (2015), and Wibowo (2016).

Income concentration is the ratio of banking income based on its source, where the greater the concentration of banking income, it can indicate that banks are more focused on traditional bank activities, because the ratio of interest income will be much greater than the ratio of bank non-interest income. Income concentration is calculated using the Herfindahl Hirschman Index with the following function:

$$\text{HHI}(\text{REV}) = \left(\frac{\text{NON}}{\text{NETOP}} \right)^2 + \left(\frac{\text{NET}}{\text{NETOP}} \right)^2$$

Note:

NON: non-interest income bank.

NET: interest income bank.

NETOP: net income total bank.

The higher the value of the Herfindahl Hirschman Index, the more focused banks are on a single bank activity, the lower the diversification of the bank's income (Amidu & Wolfe, 2013).

To examine the relationship between the level of competition and bank stability, this study uses the following model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Note:

Y: banking stability as measured by Z-Index and NPL.

α : constant.

β : regression coefficient.

X_1 : market power (inverse proxy level of competition).

X_2 : quadratic market power (inverse proxy level of competition).

X_3 : banking size.

X_4 : income concentration.

e: confounding variable.

4. Results and Discussions

Based on the selected sample on the Indonesia Stock Exchange for the 2011-2020 period, and the availability of data from the annual financial reports published by banks at the Indonesian Banking Directory, a total of 210 financial statement data have been collected. The description of the data used in this study is presented in **Table 1**.

Table 1. Description variables.

	ZIN	NPL	LIN	LIN2	LNTA	REV
Mean	3.076119	0.026870	0.284021	0.099519	32.07923	0.757602
Median	3.092650	0.024000	0.279000	0.077825	32.34463	0.757325
Maximum	4.537200	0.101600	0.691100	0.477620	34.89069	0.949854
Minimum	0.738600	0.002100	-0.210700	0.000046	28.71727	0.506742
Std. Dev.	0.808855	0.016466	0.137630	0.080572	1.518039	0.100687
Skewness	-0.351134	1.465898	-0.130464	1.153044	-0.219827	-0.073100
Kurtosis	2.924355	6.092254	3.142059	4.753772	2.198565	2.159193
Observations	210	210	210	210	210	210

Source: Processed by the results of statistical process.

Most banks can be said to have stability based on risk adjusted profitability (ZIN) which is relatively stable during the 2011-2020 period.

Some banks have NPL ratios above 5%, this can be because banks are in relatively tight competition in the credit competition market so that banks take risks that can be said to be excessive to cause adverse selection in decision making, but the majority of banks can still be said to be in a good ratio because it has an NPL ratio below 5%.

The level of competition (LIN) in Indonesian banking can be said to be a monopolistic market share, where each bank has its own market share. Competition can also be said to be relatively tight because the sample banks are IDX banks and have been registered for at least the last 10 year period of the study conducted.

The square of the Lerner Index (LIN2) is the value of the squared Lerner Index (LIN). After the logarithmic transformation, the total asset value has an interval that is not too large between one another. The concentration of banking income listed on the IDX for at least a 10-year period since the research was conducted, shows that there are differences between one bank and another in the focus of determining their operating income.

Panel Data Regression Analysis in this study uses the random effects method for the regression of the dependent variable Z-Index which is the risk adjusted profitability of the bank and the fixed effect method for the regression of the dependent variable NPL which is the risk taking behavior of the bank. The selection of the method is based on the results of the previous Hausman test, so that the model is declared as the most appropriate model for testing panel data regression on each dependent variable. The results of panel data regression of each dependent variable for this study can be seen in **Table 2**.

The results show that an increase in the level of market power (decreased level of competition) will be followed by an increase in banking stability based on risk adjusted profitability. These results are consistent with the competition fragility view and are similar to studies conducted by Beck et al. (2012), Berger et al. (2009), Fu et al. (2014), Nuraini (2019), Syahyunan et al. (2017), and Turk Ariss (2010) where the greater the level of market power owned by the banking sector (decreased level of competition), the more stable the bank from the perspective of risk adjusted profitability.

Table 2. Result of panel data regression.

Variable	Coefficient		Std. Error		t-Statistic		Prob.	
	Z-Index	NPL	Z-Index	NPL	Z-Index	NPL	Z-Index	NPL
C	4.046150	-0.233058	0.578509	0.036999	6.994097	-6.299060	0.0000	0.0000
LIN	1.727353	-0.081405	0.159297	0.024110	10.84363	-3.376398	0.0000	0.0009
LIN2	-1.795206	0.128531	0.279191	0.034494	-6.430030	3.726137	0.0000	0.0003
LNTA	-0.045781	0.008148	0.016392	0.001084	-2.792919	7.516070	0.0057	0.0000
REV	0.246349	0.011720	0.125303	0.009826	1.966036	1.192748	0.0506	0.2345

Source: Processed by the results of statistical process.

An increase in the quadratic level of market power (decreasing the level of excessive competition) will be followed by a decrease in banking stability based on risk adjusted profitability. These results indicate that the relationship between the level of competition and the stability of banks listed on the IDX is not linear and is similar to the research conducted by [Berger et al. \(2009\)](#), [Kasman & Kasman \(2015\)](#), and [Nurain \(2019\)](#) which showed that the level of competition was too high. The higher the relationship between the level of competition and banking stability will show the opposite direction from the initial relationship or resemble the letter U.

The stability of banks listed on the IDX will decrease when there is an increase in their assets, similar to research conducted by [Ali & Puah \(2018\)](#), [de-Ramon et al. \(2018\)](#), [Fu et al. \(2014\)](#), and [Kasman & Kasman \(2015\)](#) where the larger the size of the bank, the stability based on risk adjusted profitability will decrease.

The concentration of banking income is not related to banking stability, because banks always make adjustments to all operational risks, especially related to their income. Similar to [Syahyunan et al. \(2017\)](#), the main thing to note about the unrelatedness of banking stability to income concentration is credit activity, Indonesian banking loan interest rates are relatively higher than other countries in ASEAN.

Any increase in the level of market power (decreased level of competition) will be followed by an increase in stability based on risk taking behavior. These results are in accordance with the competition fragility view and similar to the findings of [Beck et al. \(2012\)](#), [Fernández & Garza-García \(2015\)](#), [Kasman & Kasman \(2015\)](#), and [Nuraini \(2019\)](#), the greater the level of market power owned by banks, the more the banking stability is based on risk taking behavior.

The increase from the quadratic level of market power (decrease in the level of excessive competition) will be followed by a decrease in banking stability based on risk taking behavior. These results indicate that the relationship between the level of competition and the stability of banks listed on the IDX is not linear, similar to the findings of [Berger et al. \(2009\)](#), [Fernández & Garza-García \(2015\)](#), [Kasman & Kasman \(2015\)](#), [Nuraini \(2019\)](#), and [Wibowo \(2016\)](#) shows that at a high level of competition, the relationship between the level of competition and banking stability will show the opposite direction from the initial relationship or resemble the letter U.

Bank size (LNTA) is negatively related to NPL indicating stability based on risk taking behavior in banks listed on the IDX will decrease when there is an increase in the size of the assets they have and similar to the findings of [Beck et al. \(2012\)](#) and [Wibowo \(2016\)](#), the larger the size of the bank from banks, stability based on risk taking behavior will decline.

Revenue concentration (REV) is not related to NPL, similar to the findings of [Kasman & Kasman \(2015\)](#) where income concentration is not related to stability based on risk taking behavior, it is indicated that banks always make adjustments to any risks that may occur to maintain their franchise value.

Simultaneous test (F-Test) and coefficient of determination (Goodness of Fit)

Table 3. Simultaneous test & coefficient of determination.

	Z-Index	NPL
R-squared	0.400055	0.790653
Adjusted R-squared	0.388349	0.763494
S.E. of regression	0.083383	0.011066
F-statistic	34.17452	29.11251
Prob(F-statistic)	0.000000	0.000000

Source: Processed by the results of statistical process.

are used to determine the effect and the percentage of the contribution of the simultaneous influence of the independent variable on the dependent variable. Simultaneous test results and coefficient of determination are described in **Table 3**.

Based on the output of the regression results on the simultaneous test of the dependent variable risk adjusted profitability and risk taking behavior, it can be seen that the independent variables simultaneously affect the ZIN variable or bank stability based on risk adjusted profitability and also NPL or bank stability based on risk taking behavior. This is because the simultaneous test on stability based on risk adjusted profitability has an F-count of 34,174 more than the F-table of 2.416, and a significance value of less than 0.05. Risk taking behavior has an F-count value of 29.112 more than F-table 2.416, and a significance value of less than 0.05.

Based on the output of the regression results on the coefficient of determination (Goodness of Fit) it shows that the risk adjusted profitability regression has an R-squared value of 0.4000% or 40.00%, while the adjusted R-squared value which is the adjusted R-squared value is 0.3883% or 38.83%, which means that the independent variables simultaneously have an adjusted influence contribution of 0.3883% or 38.83% and the rest is influenced by other factors outside the study. The results of the bank's risk taking behavior regression show an R-squared value of 0.7906% or 79.06%, while the adjusted R-squared value which is the value of the adjusted R-squared is 0.7635% or 76.35%, which means that the independent variables simultaneously have the adjusted contribution of influence is 0.7635% or 76.35% and the remainder is influenced by other factors outside the study.

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5. Conclusion

Based on these results, it can be concluded that increasing the level of market

power will increase the stability of banks listed on the Indonesia Stock Exchange. This is in accordance with the competition fragility view, where banks will benefit due to market forces, and increased competition will reduce bank profit margins to banks and more excessive in taking risks to survive in the competitive competition.

At a level of market power that is too high, banking stability will decline, this is in accordance with the competition stability view, where banks with high market power tend to set interest rates that are too high, causing bank loans to only be filled with borrowers with a high level of risk relatively high and increasingly sensitive to changes in the economy or business cycle. The increase in bank size also triggers a decline in banking stability, which indicates that bank capitalization must be supported by a more prudent banking system; this is also one of the supports for the competition stability view. The concentration of banking income is still not sufficient to explain its relationship with banking stability because Indonesian banks are more dominant in interest income.

The findings may be input, in order to improve banking stability, users of financial statements are expected to be wiser in determining banking business strategies, encourage more prudent banking performance, understand the risks that can occur when total assets become larger, engage in various risk mitigation activities. to reduce banking risk, as well as determine a more efficient operational performance strategy in order to win the bank market competition by determining the more effective marginal cost in banking operations.

Determining a bank's business strategy is one way to survive in the competition, through a strategy that is conceptualized in a niche market that can provide benefits for banks to dominate the market little by little. When banks have gained dominance over market domination in the niche market, banks are expected to secure their charter/franchise value from high credit risk by various methods, including strengthening buffer capital, credit securitization, credit derivatives, smaller credit portfolios, increasing quality of bank assets, increasing diversification of bank products, and various other risk mitigation techniques.

The larger the size of the bank, the greater the systemic impact that can be caused, it is hoped that the regulator will encourage a more prudent banking system through various policies, such as capital reserve ratios, financial accounting standard policies that focus on stability by maintaining the quality of banking assets, taking into account risks. not only from financial reports (historical in nature) but also taking into account risks based on things that are more forward-looking, and so on.

Suggestions are intended for further researchers; it is better to make improvements to the measurement method between concentration and banking stability. Banking concentration should be measured in a more detailed scope, not only on interest income and non-interest income, but also in terms of the number of sectors from which the two incomes originate, to be able to see in what interest income sector a bank is concentrated, and in a non-interest income sector what banking is more focused. It is hoped that banking stability will not only focus on

financial statements, because basically financial statements are historical, and based on that, it is still insufficient to look at bankruptcy risk in more depth. Merton's probability default measure is one that is recommended because it is more forward-looking which considers banking market value and calculates the distance to default from banking risk. The market value of banking is deemed necessary to be used as a reference because stock exchange banking also takes into account the value of the shares of the company, so it is deemed necessary to include market value indicators, in order to see a clearer pattern of banking on the Indonesia Stock Exchange. Furthermore, the measurement method should consider the factors of economic development from a place where banks operate because banks will logically adjust their business strategies to the prevailing economic conditions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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