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Rural Banks Stability: Evidence From Bali

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Abstract. Many researchers are interested in studying banking stability, but few specifically study the stability of rural banks. This study aims to understand the stability of rural bank in Bali. The latent variable of rural banks stability was measured in two ways, namely firm-level stability and systemic stability measures. The method used to measure firm-level stability was z-score. Systemic stability was measured by calculating the firm-level stability measures in aggregate for all rural banks in Bali. The results show that the stability of rural banks in all areas of Bali was in a stable condition. Overall, the stability of rural banks in the province of Bali was at 99.4913%. This means that the probability of rural bank's instability in Bali was very low at 0.5087 % in the period of study.

Keywords: Banking Stability, Financial Crisis, Rural Banks

JEL Codes: G01, G21, G32

1. Introduction

Indonesia has experienced a very severe banking crisis in 1998. During the crisis, the banking capital adequacy ratio (CAR) reached -15.7% and non-performing loans (NPL) reached 48.6% (Nurdiana, 2020). The financial crisis had a very severe impact on the Indonesian economy so that 70 percent of companies listed on the capital market suddenly became insolvent or bankrupt (Hasan, 2018). During the crisis, inflation was as high as 70% (Anggraeni, 2019). Economic growth during the crisis experienced a contraction of -13.1% (Kevin, 2018).

Hardy and Pazarbasioglu (1999) say that basically the problems that exist in the banking industry can be classified into two major groups, namely "severe distress" and "full-blown crisis". Banking problems are classified as severe distress or serious problems if banking problems have accumulated to a certain point, but have not met one of the conditions of a banking crisis. Banking problems are classified into a full-blown crisis if the banking conditions have met one of the banking crisis conditions as defined by Dermirguc-Kunt and Detragiache (1998).

In general, financial crises can be caused by internal or external factors. The financial crisis in Indonesia, such as in 1997/1998, was triggered by the declaration of Thailand's inability to pay its foreign debt as evidence of the influence of external factors. The 1997/1998 crisis in Indonesia also proved the government's inability to maintain internal financial stability at that time to dampen external influences. Financial stability is defined as a condition in which the financial system consisting of financial institutions, financial markets and financial infrastructure can accept shocks and harmonize with existing conditions so as to reduce the possibility of disruptions in the financial intermediation process thereby significantly changing the allocation of savings. become a profitable investment opportunity (Gadanecz & Jayaram, 2009).

The financial structure in the UK and the United States is dominated by the capital market, while the financial structure in Japan, Germany and including Indonesia is dominated by banking institutions (Zulverdi et al., 2005). With the dominance of the financial structure by banking institutions in Indonesia, banking stability becomes a very important thing to pay attention to. If banking stability is well maintained, the financial system as a whole will be able to accept shocks and harmonize with existing conditions so as to significantly change the allocation of savings into profitable investment opportunities.

Based on data from the financial services authority in Indonesia, it shows that non-performing loans (NPLs) of rural banks in the province of Bali have increased from time to time. NPLs in the first quarter of 2015 was 4.89%, while at the end of the fourth quarter of 2018 it had become 10.32%. This means that there has been a 210% increase in NPLs. In general, it is stated that a bank is still in a healthy condition if the NPLs are below 5%. Thus the NPLs of rural banks in the province of Bali have reached more than double the maximum that should be maintained

Data on financial services authorities in Indonesia also states that the amount of credit disbursed by commercial banks in the province of Bali in 2019 was Rp. 81,273 trillion, while the total loan disbursed by rural banks is Rp. 11.287 trillion. Based on these data, it is true that rural banks' lending is still much smaller than that of commercial banks. However, if there is a continuous increase in NPLs of rural banks, it is not impossible that the economy in the province of Bali will experience quite serious impact.

The contribution of this research is to conduct a study that measures the stability of rural banks using the z-score method. The z-score value is commonly used to measure individual bank stability. The condition of banking stability is obtained by combining the overall stability of individual banks. Furthermore, the contribution of this research is also to calculate the probability of instability of the rural banks in Bali.

2. Research Elaboration

Swank (1996) states that banks have different characteristics from other business entities as follows.

1) Banks provide services that are vital to modern society; Banks are information specialists who enable them to bridge between surplus units and deficit units; Banks also accept and transform risk, so that they can provide liquidity to facilitate all forms of financial transactions.

2) In contemporary financial systems, a bank has an important position against other banks known as the interbank market. As a consequence, the failure of one bank can lead to a banking crisis.

3) Banks are institutions that play a very important role in government financial policy, thus bank behavior is important for the central bank in order to influence the real economic sector of a country.

The difference between banks and other companies is also related to the funds that can be collected from the public in the form of savings (savings, demand deposits and time deposits). Funds collected by banks in the form of deposits are debts for banks. The cost of bank debt (cost of debt) is much lower than the debt of other companies (non-bank). Because banks manage large amounts of public funds, banking stability is important to be maintained.

2.1. Definition of Stability

In this study, the main issue of research is banking stability. Before understanding banking stability, it is necessary to first know the definition of financial stability and instability. Gadanecz and Jayaram (2009) define financial stability as a condition in which the financial system consisting of financial institutions, financial markets and financial infrastructure can accept shocks and harmonize with existing conditions so as to reduce the possibility of disruptions in the financial intermediation process thereby significantly changing the allocation of savings into profitable investment opportunities (Kocisova, 2015). Tsomocos (2003) defines financial instability as a condition in which a number of bank customers fail to pay and a number of banks experience liquidity difficulties without having to go bankrupt, resulting in a significant decline in the profitability of the banking sector. Thus, banking stability can be defined as a condition in which banking institutions accept shocks and align with existing conditions so as to significantly change the allocation of savings into profitable investment opportunities. Furthermore, a banking crisis can be defined as an unstable (extreme) banking condition in which banking institutions cannot accept shocks, resulting in disturbances in the financial intermediation process. Disruptions that occur during a banking crisis have resulted in banks experiencing one of the following criteria being met: (1) non-performing assets account for 10% of the total assets of the banking system; (2) the cost to save the banking system reaches 2% of the Gross Domestic Product (GDP); (3) there is a transfer of ownership of banks on a large scale to the government; and (4) there is a widespread bank-run or there is an emergency action taken by the government in the form of freezing public deposits, closing bank offices for a long period of time, or implementing a comprehensive deposit guarantee (Dermirguc-Kunt and Detragiache, 1998).

2.2. Stability Measurements

Freixas and Ma (2014) measure stability based on the risks faced by banks. Bank risk is classified into four risks, namely asset/portfolio risk, insolvency risk, illiquidity risk, and systemic risk. These risks are measured using several indicators such as Non-Performing Loans (NPL), z-score, distance to default, and other accounting data. The International Monetary Fund (IMF) has also developed Financial Soundness Indicators (FSIs) to measure financial stability using 40 indicators consisting of 12 core indicators (Core Financial Soundness Indicators) and 28 supporting indicators.

Table 1. IMF´s Core Financial Soundness Indicators

Category	Indicators
Capital adequacy	1. Regulatory capital to risk-weighted assets, Ratio (%) 2. Regulatory Tier 1 capital to risk-weighted assets, Ratio (%)
Asset quality	3. Non-performing loans to total gross loans, Ratio (%) 4. Non-performing loans net of provisions to Capital, Ratio (%) 5. Sectoral distribution of loans to total loans, Ratio (%)
Earnings and profitability	6. Return on assets, Ratio (%) 7. Return on equity, Ratio (%) 8. Interest margin to gross income, Ratio (%) 9. Non-interest expenses to gross income, Ratio (%)

Category	Indicators
Liquidity	10. Liquid assets to total assets, Ratio (%) 11. Liquid assets to short-term liabilities, Ratio (%)
Exposure to foreign exchange risk	12. Net open position in foreign exchange to capital, Ratio (%)

Source: International Monetary Fund (2015)

In various countries, many studies have attempted to identify conditions that can ensure the maintenance of stable financial conditions. Research that has been conducted from various countries related to financial stability can be seen in Table 2.

Table 2. Financial Stability Indicators

Peneliti	**Tahun**	**Negara**	**Kategori (Indikator-indikator)**	**Bobot**
Gersl and Hermanek	2007 2008	Czech Republic	Capital adequacy (CAR)	0,05
			Asset quality (NPL/TL)	0,25
			Profitability (ROA, ROE)	0,25
			Liquidity (LA/TA, LA/TD)	0,25
			Interest rate risk (Net position/TA)	0,10
			Foreign exchange risk (FX1, FX2)	0,10
Central Bank of the Republic of Turkey	2008	Turkey	Asset quality (NPL/TL, NPL/E, FA/TA)	1/6
			Liquidity (LA/TA)	1/6
			Exchange rate risk (FX1, FX2)	1/6
			Profitability (ROA, ROE)	1/6
			Capital adequacy (CAR, FC/TA)	1/6
			Interest rate risk (Net position/E)	1/6
Albulescu	2010	Romania	Financial development index	0,20
			Financial vulnerability index	0,40
			Financial soundness index	0,25
			World economic climate index	0,15
Bank of Albania	2010	Albania	Asset quality (NPL/TL, NPL/E, FA/TA)	1/6

Peneliti	Tahun	Negara	Kategori (Indikator-indikator)	Bobot
			Liquidity (LA/TA, STA/STL)	1/6
			Exchange rate risk (FX1, FX2)	1/6
			Profitability (ROA, ROE)	1/6
			Capital adequacy (CAR, FC/TA)	1/6
			Interest rate risk (Net position/E)	1/6
Maudos	2012	Spain	Profitability (ROA)	No defined
			Solvency (CAR)	
			Efficiency (CI)	
			Asset quality (NPL/TL)	
Ginevičius and Podviezko	2013	Lithuania	Capital adequacy (CAR)	0,223
			Asset quality (NII, TL/TA, DELINQ, LD)	0,208
			Management (NIE/GI)	0,166
			Earnings (PPP/RWA, NI/RWA)	0,225
			Liquidity (TD/TL, LIQ)	0,178
Laznia	2013	Slovakia	Profitability (ROA)	0,30
			Liquidity (TD/TL)	0,30
			Capital adequacy (CAR)	0,10
			Asset quality (NPL/TL)	0,30
Trovska and Mihajlovska	2013	Macedonia	Insolvency (CAR)	0,25
			Credit risk (NPL/TL, GNPL)	0,25
			Profitability (ROE, NIE/GI)	0,20
			Liquidity (LA/TA, LA/TD)	0,25
			Currency risk (Net FX/OF)	0,05

Source: Kocisova (2015)

Based on Table 2, it can be seen that the main indicators that are widely used to understand and measure financial stability are CAMELS (C - Capital Adequacy, A - Asset Quality, M - Management, E - Earning, L - Liquidity, S - Sensitivity to Market Risk) . Männasoo and Mayes (2009) stated that CAMELS is a method that has a significant ability to detect financial distress.

Another method commonly used to measure individual bank stability is the z-score. The calculation of the z-score used by researchers generally refers to the formula used by Boyd and Runkle (1993) as follows.

$$z = \frac{(k - \rho)}{\sigma} \quad (1)$$

Where k = - Equity / Assets, ρ is the average of the return distribution (r̂), σ is the standard deviation and z is the probability of default. The bank is declared default if the value of r̂ (Profits / Assets) smaller than the value of k. The performance of one bank with another is compared not only based on return but also based on risk. Furthermore, banking stability is measured by combining the stability of individual banks.

In addition to calculating the z-score to measure the stability of individual banks, researchers can also use the Merton model, which is also known as the asset value model. This model measures the ability of banks to meet their obligations when debt holders will exercise their options to obtain repayment. Options pricing is obtained from the Black-Scholes equation (Shinde & Takale, 2012).

$$C_{call} = S\emptyset(d_1) - Xe^{-rT}\emptyset(d_2) \quad (2)$$

$$P_{put} = Xe^{-rT}\emptyset(-d_2) - S\emptyset(-d_1) \quad (3)$$

Dimana,

$$d_1 = \frac{\log\left(\frac{S}{X}\right) + (r + \frac{\sigma^2}{2})}{\sigma\sqrt{T}} \quad (4)$$

$$d_2 = d_1 - \sigma\sqrt{T} \quad (5)$$

2.3. Research Methodology

This research is a descriptive research with a quantitative approach. Quantitative approach is used because this research seeks to describe phenomena through quantitative data. The variable used in this study is stability which is described through four components with their respective indicators. The data source of this research is secondary data. Secondary data is research data sourced from other parties. In this research, secondary data is taken from financial services authorities. Based on the availability and completeness of data at the Financial Services Authority in Indonesia, this study uses data from 2012 to 2019. During the study period there were 133 banks, but the rural banks that have completed data according to research purposes were 118 banks. Due to the availability of data and characteristics of business of rural banks, the method used to measure the stability of rural banks was combining the stability of individual bank which has calculated using z-score used by Boyd and Runkle (1993).

3. Results and Discussions

The number of loans disbursed by rural banks in the Province of Bali has increased from year to year. Since the first quarter of 2012, the total credit of rural banks included in this research is Rp. 3,448,124,105,000, which consists of loans to related parties amounting to Rp. 24,519.543,000 and loans to unrelated parties amounting to Rp. 3,423,604,563,000. In the fourth quarter of 2019, the total number of credits included in this study had reached Rp. 10,828,096,959,000, which consists of loans to related parties amounting to Rp. 103,656,937,000 and loans to unrelated parties amounting

to Rp. 10,724,440,021,000. During the observation period, there has been an increase in credit with of rural banks an annual average of 16.73%.

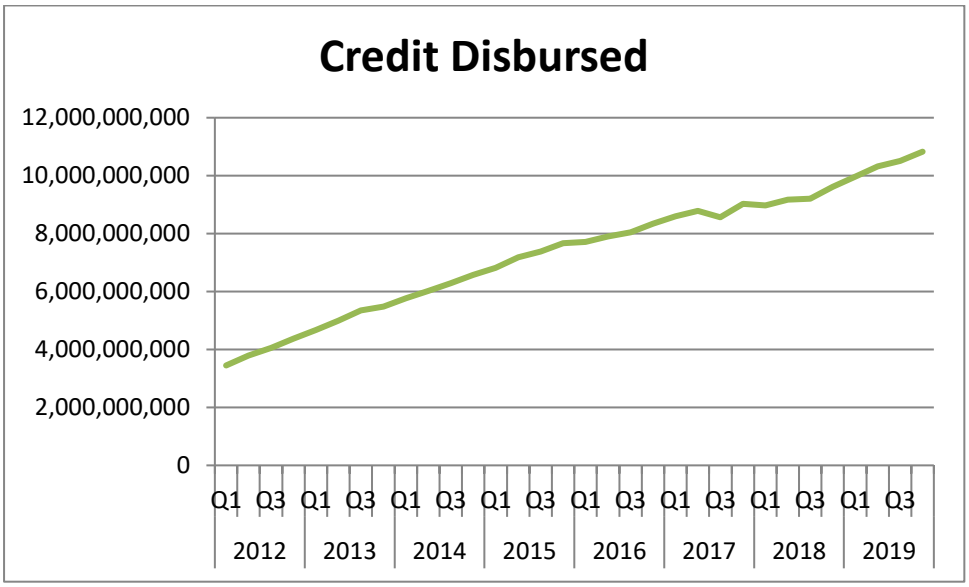

Figure 1. Credit Disbursed by Rural Banks in Bali (in Indonesian Rupiahs)

Rural banks credit quality which had calculated based on non-performing loans (NPL) in Bali at the end of 2012 was 3.30%. By the end of 2019, the NPL in Bali had increased to 11.50%. Almost every year there was an increase in NPL. The average increase in NPL every year is 22.15%.

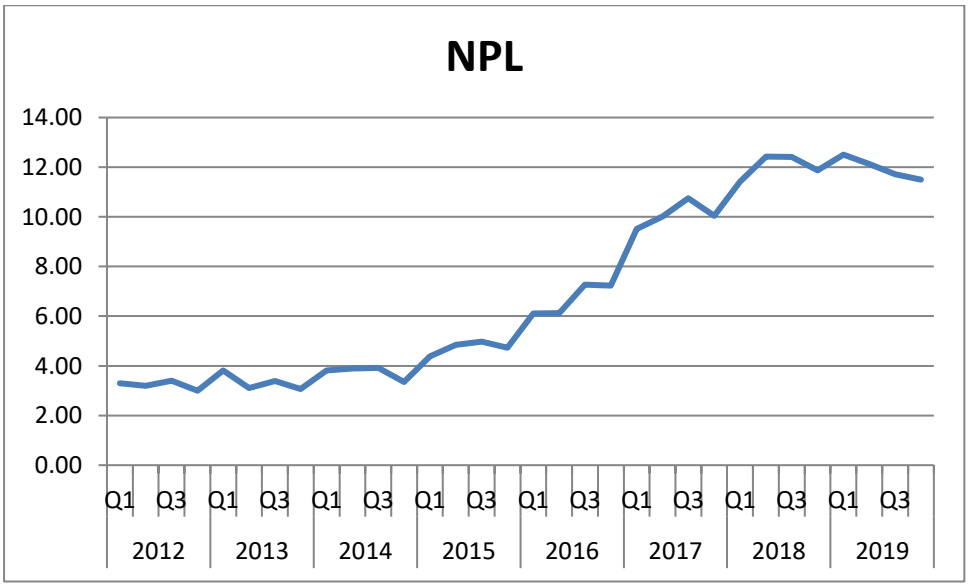

Figure 2. Non-performing loans (NPL) of Rural Banks in Bali

The province of Bali is divided into eight regions, namely Bangli, Badung, Buleleng, Denpasar, Gianyar, Jembrana, Karangasem, Klungkung, and Tabanan. Based on the data that has been calculated, the highest average return on assets was 5.07% in Tabanan, while the lowest average

return on assets was 2.01% in Jembrana. The average return on assets in the province of Bali was 3.57%.

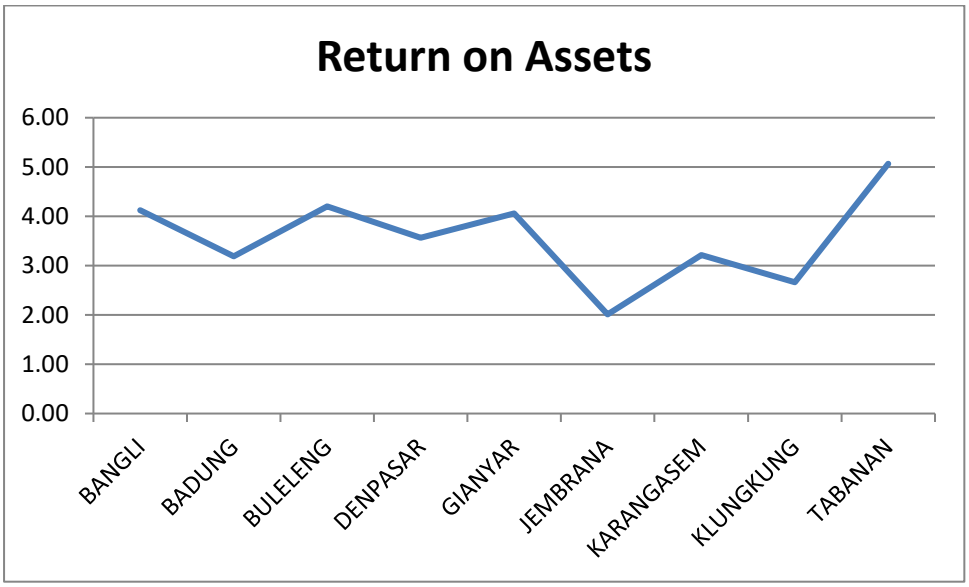

Figure 3. Return on Assets (ROA) of Rural Banks in Bali

The highest probability of instability was 2.3567% in Bangli, while the lowest probabilities of instability were 0.0000% in the areas of Buleleng, Denpasar, Karangasem, Klungkung and Tabanan. In the province of Bali the probability of instability was 0.5087%.

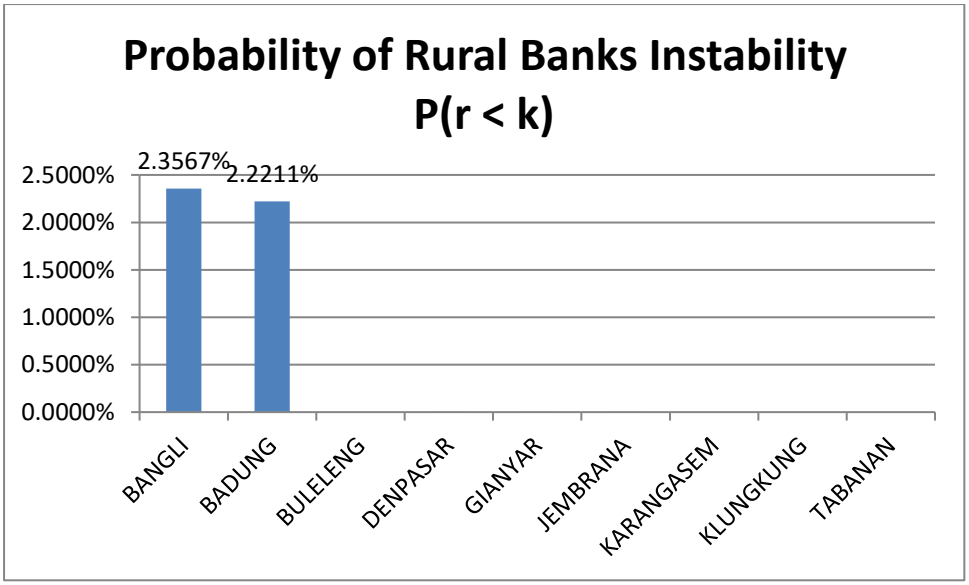

Figure 4. Probability of Rural Banks Instability in Bali

The highest average z-score was in Jembrana, while the lowest average z-score was in Tabanan. The highest stability of rural banks were 100.0000% in Buleleng, Denpasar, Karangasem, Klungkung and Tabanan, while the lowest stability of rural banks was 97.6433% in Bangli. In the province of Bali the stability of rural banks was 99.4913%.

Table 3. The Stability of Rural Banks in Bali

REGION	r̄	σ	k	z-score	P(r < k)	Stability
BANGLI	4.12	5.37	(15.28)	(7.74)	2.3567%	97.6433%
BADUNG	3.19	2.09	(22.90)	(18.08)	2.2211%	97.7789%
BULELENG	4.20	1.14	(20.08)	(23.09)	0.0000%	100.0000%
DENPASAR	3.56	2.37	(28.93)	(22.27)	0.0000%	100.0000%
GIANYAR	4.06	2.35	(23.07)	(18.25)	0.0001%	99.9999%
JEMBRANA	2.01	5.79	(25.60)	(4.77)	0.0001%	99.9999%
KARANGASEM	3.21	2.69	(22.58)	(9.59)	0.0000%	100.0000%
KLUNGKUNG	2.66	0.92	(17.09)	(21.58)	0.0000%	100.0000%
TABANAN	5.07	1.46	(63.24)	(46.80)	0.0000%	100.0000%
BALI	3.57	2.68	(26.53)	(19.13)	0.5087%	99.4913%

4. Conclusions

In this study, banking stability was measured in two ways, namely firm-level stability measures and systemic stability measures. The method used to measure firm-level stability was z-score. By using z-score, the probability of individual bank will be instable can be determined. Systemic stability is measured by calculating the firm-level stability measures in aggregate for all rural banks in Bali. The results show that the stability of rural banks in all areas of Bali is in a stable condition. The conclusion is obtained from the value of stability which was between 97.6433% and 100.0000%. Overall, the stability of rural banks in the province of Bali was at 99.4913%.

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