THE DEVELOPMENT OF TYPES AND MEASUREMENT OF BANKING RISK: A LITERATURE REVIEW

Tri Hanani[*, a,1]

[a] University of Mataram, Mataram, Indonesia
[1] trihanani@unram.ac.id*

Abstract

Banking is one of the vital industries of every country. Healthy banking supports the stability of a country's economy so banking risks are crucial to be analyzed. The purpose of this article is to identify banking risk and its measurement as well as to explore the comparison of theories and empirical studies of risk in large and small banks. This article was compiled using the literature review method from several studies related to bank risk and its measurement published in the period 1997 to 2020. This study shows that banking risk is currently divided into eight types, namely: credit risk, market risk, liquidity risk, operational risk, compliance risk, legal risk, reputation risk, and strategic risk. Several theories developed in the banking sector include the unstable banking hypothesis, the too-big-to-fail hypothesis, the agency cost hypothesis, and the small bank advantage hypothesis.

Keywords: Banking, Risk, Risk Measurement.

I. INTRODUCTION

Banking has an important role in the economy. A country's strong economy is supported by sound banking. This is evidenced by various economic crises in the past caused by banking failures. International Monetary Fund [1] explained that financial crises can arise due to the failure of one or more financial institutions whose effects spread to the entire system such as the financial crisis that hit several Asian countries such as Thailand, Indonesia, Malaysia, and Korea in early 1997. The crises was caused by macroeconomic factors and banking issues [2]. This is due to the role of banks in collecting public funds and channeling them back to businesses that help strengthen a country's economy. If at any time there is a large bank default and has a systemic impact, the government is usually forced to issue a bailout policy that takes up a lot of funds to keep the economy stable [3].

Due to the crucial role of banking in the world economy, various parties try to create healthy and strong banking. The government and various regulatory bodies launch policies and carry out regular supervision of the business of each bank. In addition, various studies have been conducted to analyze banking risk. The scope of this research will discuss previous studies related to banking risks, such as the development of types of banking risk and their measurement, and the development of theory and empirical research on banking risk based on bank size.

From 1997 to 2020, studies related to banking risk had discussed topics such as credit risk, market risk, liquidity risk, operational risk, compliance risk, legal risk, reputation risk, and strategic risk. In section 3a, we review banking risk and its measurement. In session 3b, there will be a discussion of various theories used in banking risk studies. There are several hypotheses that are often used such as the unstable banking hypothesis, too-big-to-fail hypothesis, agency cost hypothesis, and small bank advantage hypothesis. Researchers believe that research related to banking risk and its measurement will continue to develop in line with the demands for healthy and sustainable banking. Through this paper, we also identify several unanswered questions related to banking risk in the summary and conclusion session.

II. RESEARCH METHOD

This article was compiled by reviewing the previous literature and theories related to banking risk. The review analysis was carried out on previous articles on the topic of banking risk, banking regulation, measurement of bank risk, large bank risk, and small bank risk published in the period 1997 to 2020.

III. RESULTS AND DISCUSSIONS

A. Bank Risk and Risk Measurement

Risk is the potential loss due to the occurrence of an event. Banking risk is the possibility of losses that can be experienced by banks due to one or more events. To identify and anticipate risks to the banking industry, various regulations are issued by international and national institutions. One of the international institutions that publish the banking regulatory framework is the Bank for International Settlement (BIS). In July 1988, BIS issued the Basel Capital Accord or better known as Basel 1. Basel 1 aims to strengthen the stability of the international banking system and regulate a consistent and fair banking system. Basel 1 introduces the minimum credit risk and capital that must be met.

The many banking crises that occurred in the 1990s prompted the Bank for International Settlements to revise Basel 1 by issuing "A Revised Framework on International Convergence of Capital Measurement and Capital Standard". Improvements made in Basel 2 include minimum capital requirements, institutional capital adequacy, internal assessment processes, and effective disclosure. Basel 2 also explains 3 (three) types of risks in the first pillar of financial stability, namely Credit Risk, Market Risk, and Operational Risk.

The collapse of Lehman Brothers in 2007 again shook the banking world. "A Global Regulatory Framework for More Resilient Banks and Banking Systems" or Basel 3 was launched to establish a regulatory framework and provide a robust banking system that prevents systemic vulnerabilities. Basel 3 focuses on increasing the protection of liquidity ratios by issuing a Liquidity Coverage Ratio and Net Stable Funding Ratio.

Based on the 2009 Bank Indonesia Regulation, there are eight types of risks faced by banks, including credit risk, market risk, liquidity risk, operational risk, compliance risk, legal risk, reputation risk, and strategic risk. The following is an explanation of each of these risks:

1) Credit Risk

Risk due to failure of debtors and or other parties in fulfilling obligations to banks. Credit risk is the main risk of banking because it can trigger bankruptcy. Research related to credit risk is growing rapidly, especially related to credit risk measurement models. Altman & Saunders [4] conducted a literature review on credit risk measurement in the last 20 years. Credit risk is classified measurement methods into three models: expert and subjective system analysis, accounting-based credit scoring system, and other credit risk models [4].

Credit risk as measured by subjective analysis relies on the character of the borrower, such as the 4C analysis consisting of character, capital, capacity, and collateral [4]. There are at least four approaches to measuring credit risk with accounting-based scoring, such as the logit model, probit model, linear probability, and discriminant analysis. As for other models, Altman & Saunders [4] summarize several models, such as the risk of ruin, the Black-Scholes-Merton Model, default risk, the capital market-based model, and neural network analysis.

In 2000, the International Monetary Fund (IMF) also launched an indicator to measure the financial vulnerability of banks called CAMEL. CAMEL consists of capital adequacy, asset quality, earnings and profitability, and liquidity. The use of CAMEL as a measure of banking vulnerability is widely used in various countries. CAMEL indicators related to credit risk include asset quality because loans are assets for banks. Financial ratios related to the quality of loans provided are Non-Performing Loans (NPL). The higher the NPL, the lower the asset quality.

Credit risk analysis also discusses the risk of credit concentration. Experience shows that the risk of credit concentration is the main cause of banking decline [5]. The more concentrated the credit, the greater the risk. One of the concentration risk estimation models is Value-at-Risk (VaR) developed by Pykhtin [6]. Although this model is more appropriate to use in a homogeneous portfolio than a heterogeneous portfolio [6]. In addition, the IMF also proposes broad disclosures on credit concentrated on the same individuals and institutions that exceed regulatory limits, especially lending to related parties and related partners. In Indonesia, this is called the LLL (Maximum Lending Limit) whose percentage for commercial banks and BPR/S is determined by the regulations of the financial services authority or commonly call "OJK".

2) Market Risk

Market risk is the risk in the balance sheet and off-balance sheet positions including derivative transactions and is the result of changes in overall market conditions such as changes in option prices. The market risk of a bank increases the more diversified its operations and financial instruments hold. The most relevant components for measuring market risk are interest rate and exchange rate risk [1].

To better anticipate market risk, a bank is recommended to perform sensitivity to market risk. Interest rates can turn into market risk due to the mismatch in the duration of bank assets and debt. Banks borrow in the form of public savings and deposits and earn returns from channeling credit to the public and investing in financial instruments. Errors in speculating the results obtained from investment activities in financial instruments can result in banks not being able to bear the interest burden on customer deposits. Researches related to banking market risk include how to anticipate market risk. Hendricks et al. [7] found that regulations regarding minimum banking capital based on bank internal risk measurement were able to protect banks from market risk. However, the exact minimum percentage of capital is still a matter of debate.

Basel 3 issued two new minimum capital requirements for traded investments, namely: "incremental risk capital" (IRC) and "stressed VaR"[8]. So that the previous minimum capital requirements only concern "current VaR" and "specific risk charge". The impact of this new method of calculating minimum capital is still a matter of debate, whether it can minimize market risk and liquidity risk, especially during times of crisis, or is it even more burdensome for banks [8].

3) Liquidity Risk

Liquidity risk is the risk of a bank's inability to meet maturing obligations from cash flow funding sources/high-quality liquid assets that can be magnified without disrupting the Bank's activities and financial condition. The high-quality liquid assets here need to be underlined. Diamond & Rajan [9] explain that if the credit given requires a certain effort or skill to make cash, it is included in illiquid assets. Liquidity risk is one of the main risks in banking. Without good liquidity, banks cannot carry out their business operations.

Chen et al. [10] found that liquidity risk is an endogenous determinant of bank performance. In addition, liquidity risk can reduce bank profitability (ROA) but can increase the net interest margin [10]. Tests on rural banks also show that liquidity can predict bank profitability [11].

The measurement of liquidity risk is generally carried out with liquidity ratios, such as the acid (quick) ratio and cash ratio. The more liquid a company, the more flexible an entity to make business decisions [12]. In addition to liquidity risk, banks also face solvency risk, namely the ability to pay the long-term debt. Solvency risk is often measured by the total debt-to-total capital ratio, total debt-to-equity ratio, and long-term debt-to-equity capital ratio [12].

4) Operational Risk

Operational risk is the risk due to inadequate and or non-functioning internal processes, human error, system failure, and or the existence of external events that affect it. The literature on operational risk is still younger than credit risk and market risk [13]. However, operational risk is not a new thing in the banking world, but in the pre-Basel 2 period, this risk had not received much attention [14].

This operational risk relates to the era of corporate governance. Unfortunately, what data describes the exact measure of operational risk is still a matter of debate [14]. However, some researchers have begun to conduct empirical research related to operational risk. Sturn [13] conducted a study related to the impact of market reactions on banking operational risk in Europe as proxied by operating losses. This is under the proposal of De Fontnouvelle et al. [15] which states that operating loss is an important data source for banking operational risk, although it has several weaknesses, such as being highly dependent on the size and extent of bank activity.

5) Compliance Risk

The banking industry is highly regulated. Many regulations are binding on the banks. It is not caused by bank failures that can have a systemic impact. Compliance risk is the risk due to the bank not complying with and not implementing the applicable laws and regulations. Similar to operational risk, there is not much literature that reviews compliance risk. Kunt et al. [16] found that compliance with the Basel Core Principles (BCP) is positively and significantly associated with bank resilience. This is different from previous research, which stated that compliance with BCP had no significant effect on banking resilience in 25 countries [17].

6) Legal Risk

Legal risk is the result of lawsuits and or weaknesses in the juridical aspect. Legal risk is often referred to as legal risk. One way to anticipate legal risk is to provide legal protection for every bank activity, under the Basel Core Principles [1]. There is not much literature that reviews legal risks in banking in detail. What the measurement is like and the extent of the legal risk is still a question mark.

7) Reputational Risk

Reputation risk is a risk due to a decrease in the level of stakeholder trust originating from negative perceptions of banks. This negative perception of the bank's reputation can arise from various events, such as internal fraud, operational losses, and asset damage [18]. The lack of empirical literature that examines reputational risk is an opportunity for future research. Until now, a model that can measure the reputation risk of a bank accurately and comprehensively has not been found. Some such as Xifra & Ordeix [19] try to make CSR a reputation risk management system. Empirical studies found in the new banking literature discuss the impact of reputation risk proxied by operational losses on market reactions [18].

8) Strategic Risk

Strategic risk is the risk due to inaccuracies in the making and or implementation of a strategic decision and failure to anticipate changes in the business environment. Some researchers such as [20] tried to examine the effect of merger and acquisition decisions in the banking industry on bank performance, but they did not disclose mergers and acquisitions as an indicator of bank risk. Frigo & Anderson [21] argue that strategic risk management can improve corporate governance and risk management. However, the measurement of strategic risk still leaves gaps in the banking risk literature. Decisions such as what is considered to pose a strategic risk are still a question mark.

In addition to examining each banking risk, several studies have tried to modify measures of banking risk such as CAMEL and financial ratios by combining them with other indicators. Liang et al. [22] tried to combine financial ratios with corporate governance indicators to predict bankruptcy. As a result, solvency ratios and profitability

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ratios as well as board structure and ownership structure are the dominant factors that can predict bankruptcy more accurately [22].

B. Development of Size-Based Banking Risk Research

Are big banks riskier than small banks? This is still a matter of debate to this day. Leaven et al. [23] found that large banks tend to have greater risk because they tend to have lower capital ratios, less stable financing, and carry out high-market risk activities. Leaven et al. [23] explain that there are at least three theories that support the assumption that large banks are riskier than small banks, namely: the unstable banking hypothesis, the too-big-to-fail hypothesis, and the agency cost hypothesis.

The too-big-to-fail hypothesis states that the larger the size of the bank, the higher the impact that will arise when a failure occurs, so it requires support from the government [3]. This can lead to moral hazards, such as the tendency of large bank managers to make high-risk decisions [24].

The unstable banking hypothesis is related to the involvement of banks in risky activities such as buying and selling securities [23]. Sharp and erratic market fluctuations can cause liquidity problems for banks. While the agency cost hypothesis states that large banks are riskier because the higher the size of the bank, the more complex its activities and the more difficult it is to supervise. Increased activity can increase agency and governance problems that can trigger systemic risk [23].

One theory related to the low risk of small banks is the small bank advantage hypothesis. Small banks have an information advantage over large banks because small banks rely more on "soft" information than "hard" information [25]. Small banks also allow for building long-term relationships with clients and access to day-to-day information regarding their clients' conditions [26]. Broadly speaking, the small bank advantage hypothesis consists of three arguments, namely structural performance, information advantage, and relationship development [27]. Carter et al. [27] find empirical evidence that small banks make better choices regarding small business loans than large banks. Unfortunately, Mcnulty et al [26] failed to find better credit quality in small banks. Likewise, Zheng et al. [28] who tried to prove the small bank advantage hypothesis in China, failed to find a strong relationship between small banks and small and medium enterprise loans. These differences in results open up new research opportunities to look for determinants of banking risk in addition to size factors, such as competition, governance, and CSR.

The development of banking risk research is also expanded not only to national and international banks that have a systemic impact but also to rural banks. So far, rural banks have not been widely studied because of the difficulty of obtaining financial data. Several studies on banking risk in rural banks include Adusei [11] which examines the effect of risk on the profitability of rural banks in Ghana and Sumiyana & Hanani [29] which examines the performance of rural and national banks in Indonesia.

IV. CONCLUSION

The literature on banking risk has grown rapidly, particularly on credit, market, and liquidity risks. Unfortunately, the literature on several other risks is still not widely developed. Several future research opportunities are related to banking risk and its measurement. First, to date, banking risk has been classified into eight types of risk, namely: credit risk, market risk, liquidity risk, operational risk, compliance risk, legal risk, reputation risk, and strategic risk. In some literature, credit and market risk can be mitigated with minimum capital adequacy. Basel Committee 3 responded to this by updating the procedure for calculating the minimum capital. But are the new minimum capital criteria able to mitigate market and credit risks? This still needs to be studied extensively. Second, operational risk received a lot of attention after the launch of Basel 2. Several previous studies used operational loss proxies as a measure of operational risk. Unfortunately, some other literature also uses operational loss as a proxy for reputational risk. The operational risk and reputational risk measurement models are still a question mark. Further research can focus on developing event-based reputational risk proxies, such as: finding internal and external fraud, directors' capabilities, damage, and growth of company assets. Third, Legal risk and compliance risk are described as two different forms of risk. However, the boundary between the two is still unclear. In addition, there is not much literature that reviews legal and compliance risks in banking in detail. What the measurement is like and the extent of the legal and compliance risks are still question marks. In addition, previous compliance research has focused on using the Basel Core Principles as a basis for analysis. In 2006, the IMF published a banking indicator called the Financial Soundness Indicator (FSI). The FSI has the opportunity to expand the compliance risk literature. What are the implications of FSI in banking in various countries is still a question mark. Fourth, are non-financial risks such as legal, compliance, operational, reputational, and strategic risks possible to be quantified? Uniform quantification procedures make it possible to compare these risks between entities and between countries. The model for quantifying these various risks is still worthy of being a future research opportunity. Last, the risk comparison between large and small banks is still a matter of debate. Several theories developed in the banking sector include the unstable banking hypothesis, the too-big-to-fail hypothesis,

the agency cost hypothesis, and the small bank advantage hypothesis. Various theories state that large banks are riskier than small banks. However, several empirical studies still fail to find empirical evidence of the superiority of small banks over large banks. Future research opportunities may add other factors that influence risk apart from bank size, such as the level of competition. Testing can also be extended not only to commercial banks but also to rural banks and sharia-based banks.

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