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"**FINANCIAL STABILITY THROUGH STRESS TESTING**"

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DECLARATION

I thus certify that the content of this thesis is entirely original, and that all information and materials consulted, including but not limited to the internet, have been correctly cited and identified in accordance with the standards.

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Abstract

Currently, there is a great deal of discussion about the financial sector. Banks, in particular, face a significant challenge when determining how much capital to allocate to protect themselves against various types of risk. To determine whether or not the bank's capital ratios are adequate at this time, the secondary method is to conduct stress testing. In country-specific financial stability reports, stress testing was first mentioned as part of the FSAP (Financial Sector Assessment Program), which focused currently, the financial sector is the subject of much debate. Specifically, banks face a significant challenge when deciding how much capital to invest in protecting themselves from various risk types. When stress testing was first mentioned as part of the FSAP (Financial Sector Assessment Program), it was incorporated into country-specific financial stability reports focused on economic analysis. Initially, they only participated in FSAP in part; later, Organizations like the IMF and the World Bank, as well as senior management, regularly used them to assess financial sector stability. Research into the theoretical underpinnings of stress tests, which are commonly used in developing countries like Turkey, is underway. Anahtar Kelimeler: on economic analysis, which was first introduced into the program, covers banking, financial stability, risk management, and stress tests. While initially participating in a limited number of exercises, they were later hired by regularity institutes like the IMF to conduct financial sector stability assessments. A theoretical perspective will be taken on stress tests, which are widely used in developing countries like Turkey.

 Keywords   financial stability, risk management, and stress tests

CHAPTER #1

Introduction

Introduction

"Financial stability" is used in economics and finance literature to refer to a state of financial stability that includes all types of financial difficulties. There are also definitions that are solely concerned with leakages that cause the financial system to operate inefficiently. As a result, the financial system is robust and stable, allowing for efficient resource allocation, risk management, and distribution, in addition to efficient resource allocation, occur in the financial system. Understanding and predicting the elements that impact the financial system are critical for its long-term survival and stability. It is necessary to identify the factors that contribute to financial stability before moving forward with the process. It has been suggested that multidisciplinary techniques be used to take into account the financial system's complexity. In recent years, numerous scholars have focused on the linkages between financial institutions, as well as the ties between bank networks and the economy as a whole. Systemic risk metrics (Battiston et al., 2012b) and analyses of individual banking systems (Upper, 2011, Glasserman and Young, 2015) have been produced using methods from network science (Van Lelyveld and Liedorp, 2004, Upper and Worms, 2004). The study of robustness, repair costs, and topological properties, as well as the consequences for systemic risk of each of these approaches, Dehmamy et al., 2014, having a clear understanding of the factors that are contributing to the problem allows for the development of more effective mitigation strategies. The most risky loans are the ones that have the greatest impact on the most severe deterioration of bank balance sheets. Throughout the upcoming phases of financial insecurity, according to the Federal Reserve, loan losses are expected to rise as a result of crises, the current economic downturn, and other factors, among other things. Altintaş (2012) describes the situation as becoming more severe and widespread as bank balance sheets continue to deteriorate, according to the author. There are two main approaches to analyzing financial stability: traditional factors such as macroeconomic forecasts and early warning indicators, and stress testing. Traditional factors include things like inflation and unemployment rates. In order to determine whether or not banks in developing countries have sufficient capital reserves, (Battiston et al., 2012a, 2016; Caldarelli, 2007) this new system is being implemented. In order to determine whether or not banks in developing countries have

sufficient capital reserves, traditional factors such as macroeconomic forecasts and early warning indicators, as well as stress testing, are used.

Individuals, communities and companies need to be able to invest, expand, and participate in a well-functioning economy, but without increasing the system's vulnerability to abrupt downturns in the larger economic environment in order to be deemed stable financial systems. To counteract these negative effects, an unstable system may be more vulnerable to a shock to the economy, which may considerably reduce employment and economic activity while also impeding the flow of credit. In addition to loans and lines of credit for both enterprises and people, as well as checking and savings accounts, retirement accounts and other important components of a sophisticated financial system, the financial system offers a wide variety of resources and services.

Lenders, investors, and savers can all find each other through a variety of markets and intermediaries, both in the US and worldwide. So the Federal Reserve maintains a close watch on the linkages between these parties and the possible financial dangers that may ensue. The Federal Reserve uses the study's findings to help strengthen the financial system.

Financial stability is monitored by the Federal Reserve and other domestic authorities in an effort to identify and mitigate possible threats, as well as the associated risks and repercussions. One such group is the Financial Stability Oversight Council (FSOC). Systemically significant financial institutions are subjected to more rigorous oversight as a result of the intensified supervision of these institutions. Banks and other financial institutions are tested as part of the supervisory stress test on their ability to continue lending money in the face of bad market conditions. Capital frameworks that include supervisory stress tests and non-stress capital needs are created by merging these two sets of data. In order to meet the Board's stress testing guidelines, companies must also undertake internal stress tests based on their risk profiles and make the results of these tests public. Among other things, additional macro prudential elements include an examination of institutions' loss absorbing capacity under a common macroeconomic scenario with characteristics similar to those experienced during a severe recession; conducting horizontal testing across large institutions to understand the extent to which large institutions can absorb losses; and identifying salient risks in the event of a crisis. One of the most helpful tools in the area of macroprudential policy is stress testing of macroeconomic and financial problems.

Financial institutions' resilience and capital planning procedures may be evaluated using the hypothetical scenarios shown, not estimates of a severe economic downturn and financial market stress. When the economy is doing well and when it is not, the severity of the macroeconomic scenario and the global market shock that are utilized each year are both changed yearly in order to offset this natural propensity for financial system risks to grow and decrease. Using the scenarios, you can figure out how vulnerable the financial system is to certain kinds of hazards, and you can also pinpoint which institutions are most vulnerable to those risks.

1.2 Instruments for ensuring financial stability

This financial sector analysis aims to identify and develop appropriate political interventions to address the threats that face the financial sector (Basset, W., & Berrospide, J. (2018). It is necessary to identify and forecast factors that have an impact on financial stability in order to maintain financial stability. At this point, it is critical to identify the factors that contribute to economic instability and to take steps to mitigate those factors. This information makes it possible to take more effective precautions when this is specified. Uncertainty in the stock market, (Vodenska et al., 2016, 2020). Rising interest rates, deterioration of bank balance sheets, and other factors are all contributing to an increase in financial instability. Risky loans are the most significant contributor to the bank's balance sheet deterioration. Stress testing is done using both traditional and newer methods in order to evaluate financial stability.

1.3 Stress Testing

As part of a stress test, a portfolio or the entire financial system is subjected to a variety of hypothetical scenarios. It can be used to predict what will happen if applied to the entire system. This method relies on more than a simple numerical calculation to predict the likelihood of a shock. A stress test is generally used to evaluate the financial health of banks and other types of financial institutions, according to Finals (2012). To put it another way, to put it another way, stress tests are used to estimate the amount of money that will be lost in the event of a rare but probable risk. There are several types of stress tests macro prudential, micro prudential, crisis management, and internal risk management based on their intended use. Most stress tests are micro prudential stress tests. Macro prudential stress tests are the most common type of stress testis is necessary to conduct stress tests on the macro prudential (surveillance) system in order

to determine how vulnerable the financial system is overall. . (Huang et al., 2013, Greenwood et al., 2015; Sakamoto and Vodenska, 2016, Sakamoto and Vodenska, 2017). Macro prudential stress (supervisory) tests, for example, are conducted on a portfolio of financial institutions in order to assess and evaluate their risk management systems. The third type of stress testing is intended to be used in crisis situations to aid in the response. The primary goal of crisis management is to provide inputs to banks so that they can be recapitalized and restructured as quickly as possible. Basset, W., & Berrospide, J. (2018). Stress tests are included in the final category because they are used to improve internal risk management. Examples of macro prudential stress testing include the Financial Stability Assessment Program, Internal risk control stress testing is demonstrated in action through the use of risk metrics. The word "stress test" has come to refer to a variety of various things depending on who you talk to. According to the International Monetary Fund, stress testing is a critical component of macro prudential analysis since it can aid in the monitoring and prediction of potential vulnerabilities in the financial system. A macroeconomic stress test (such as the one that will be used in this study) is a tool that is used to determine the level of risk exposure associated with a set of variables that are relevant to the research topic under consideration. Through the usage of institutions, it is possible to draw attention to particular happenings that have occurred. Stress testing does not include activities that are undertaken as part of a stress test because they are not considered stress tests (Smolyak et al., 2020), a number of different tactics are employed in order to uncover a varied spectrum of extremes. A response from the financial industry, as well as plausible conditions, are also conceivable.

Therefore, the principal output of the portfolio is an estimate of the change in value of the portfolio, where If a bank's balance sheet or income statement are not available, its portfolio can be viewed through the lens of the bank's capital adequacy ratio (which is more commonly used in this context). Knowing that they aren't always correct, on the other hand, can help you make better decisions while buying purchases. There are a variety of ways in which they rely on the researcher's discretion. A stress test cannot be used to diagnose anything because it is non-specific due to the three components involved; hence, it is regarded as more of an art form than a diagnostic tool in most cases. The considerations for this project include numerous arbitrary assumptions, quantitative approaches, and human judgement (Quagliarello, 2009, p. 23). It can be shown in Figure 1 that when the negative impact is selected, it has a greater influence than

when the positive impact is selected (one factor or more) Putting a system through its paces after it has been developed can be accomplished in one of two ways. The first is to employ an external source of stress to increase your anxiety. Selecting the first of the two options available the following is an example of a bottom-up approach in action: it is implemented in a way prescribed by the authorities as follows:

As advocated by the International Monetary Fund, financial institutions should be granted the ability to analyses the impact of a macroeconomic shock on their balance sheet and profits. Following that, all of the data is gathered in order to allow the researcher to draw conclusions about the subject matter. Make a thorough examination of the system as a whole in order to determine how the update affects its overall operation. The opposing method, defined as a bottom-up method, has taken the role of the old top-down strategy, which is known as the opposite way. Choose whether to administer the shock bank by bank or throughout the whole banking system's entire portfolio of institutions, if needed. Systemically important financial institutions must undergo supervisory stress tests as well as company-run stress tests, both of which are essential components of increased oversight. It is determined whether companies are appropriately capitalized to sustain losses during periods of harsh economic conditions while satisfying their obligations to creditors and counterparties and remaining in a position to lend to consumers and small- and medium-sized businesses, respectively. A risk-aware capital structure that takes into account both supervisory stress test findings and non-stress capital needs, in addition to supervisory stress test results, necessitates the employment of a supervisory stress capital buffer. Additionally, corporations must comply with the Board's stress testing guidelines, which vary depending on the risk profiles of enterprises under consideration, and conduct and publicly report the results of their own company-run stress tests. Also included in the scope of this program is a focus on macro prudential components, such as the safety and soundness of the participating institutions. Cross-institutional horizontal testing and assessment of how counterparty stress will affect some or all of the largest and most interconnected financial institutions in a macroeconomic scenario resembling a severe recession are necessary in order to understand how these institutions will be affected by a wide range of external factors. Economic and financial stress testing is a critical component of macro prudential policy, notably in the area of financial stability. This hypothetical scenario is meant to test the long-term sustainability of banks and their capital planning systems in the event of a severe economic downturn and

financial market pressures. Federal Reserve changes the severity of its yearly macroeconomic scenario and global market shock during years of strong economic development to counteract the financial system's natural inclination to accumulate risks and induce risk aversion during periods of poor economic growth. Stress testing may be used to estimate how vulnerable the financial system is to significant shocks, as well as highlight prospective issues for institutions that have been subjected to stress testing, among other things.

1.4 Stress testing has a significant impact.

A fully functioning financial system facing total collapse was unthinkable during the period of the 2007-09 credit crisis, which erupted in the United States in August 2007 and quickly spread to Europe and then the rest of the world without sparing any countries as "an equal opportunity menace" (i.e. central banks, regulators, deposit insurance, supervisors, etc.). A series of large failures in 2007 turned the credit crisis and the subsequent recession into a breakdown disaster for the whole financial system, which had looked to be normal up until that point (BIS, 2009a, b; Claessens & Kose, 2013). Financial stability is essential to genuine economic activity; in times of economic development, every firm looks to be doing well and in times of extreme financial hardship, every company appears to be doing badly (e.g., BCBS, 2010), regardless of its fundamentals While it may take some time to rebuild faith in the financial system, it will never be the same system again if that trust can be rebuilt, as it can with a fragile silk thread. Because of the bailout of Bear Sterns in March 2008, the failure of Lehman Brothers in September 2008, and AIG's subsequent nationalization, the American financial sector was widely distrusted. This, however, was just the beginning of the problem. Federal Deposit Insurance Corporation (FDIC) difficulties include "too huge to fail" and "moral hazard" (Allison, 2012), as well as a failure to achieve balanced distribution of risk (Farhi and Tirole 2012). (See Shull, 2010; Stern & Feldman, 2004). Government backing for the Federal Deposit Insurance Corporation (FDIC) is unreasonable, according to Stiglitz and Greenwald (2003). (Also see Blackburn, 2008). Due to the Federal Reserve's "expansionary monetary policy," which allowed for lax lending by banks due to low-cost liquidity globally, the Global Financial Crisis (GFC) was triggered (Bracke & Fidora, 2008; Shin, 2011). (Brunnermeier, 2009).

1.5 Research Question

1. Are central banks prepared to play a role in financial stability?
2. Are capital requirements necessary and enough to keep the financial system safe?
3. What should be done about the risk measures in banking sector?
4. Is narrow banking the best way to deal with the problem of financial stability?
5. Is it important for financial stability that monetary policy be used to keep things stable?"

1.6 Objective of the study

The objectives of the study are as follows:

- To examine the financial stability of banks.
- To examine the risk measures.
- To examine the problems facing in financial stability.
- To examine the relationship between financial stability and monetary policy.

1.7 Significance of the Study

Due to the fact that no one ever anticipated a full-fledged financial system could be brought to its knees and faced with utter collapse despite several attempts, the global financial system did not collapse in 2007-2009. (I.e. central banks, regulators, deposit insurance, supervisors, etc.). After a string of catastrophic failures, the credit crisis and recession of recent years have devolved into a systemic collapse (BIS, 2009a, b; Claessens & Kose, 2013). When the economy is thriving (i.e. when there is an economic or financial boom), every business seems to be doing well; when the economy is in grave difficulties, every firm appears to be doing poorly (Gorton, 2008, 2009, 2010; Greenspan, 2008; Mendoza & Terrones, 2012; Reinhart & Rogoff, 2011; Restoy, 2008). FDIC subsidies are ridiculous, according to Stiglitz and Greenwald (2003). (Also see Blackburn, 2008). In some analysts' opinion, the Federal Reserve's policy to maintain interest rates low caused a global oversupply of the dollar, which resulted in cheap liquidity across the globe" (Bracke & Fidora, 2008;). The Great Financial Crisis was precipitated by banks' "loose lending" and "easy credit environment" as a consequence of "expansive monetary policy" (Schwartz, 2009; Brunner Meier, 2009). In past years, stress testing was frequently discussed as a way to

determine financial soundness, but its importance has expanded dramatically since the global economic crisis. The Committee routinely reminds industry participants of the significance of stress testing, as it is not a stand-alone risk management tool (i.e. VaR).

CHAPTER #2

LITERATURE REVIEW

2.1 LITERATURE REVIEW

The author's thorough study on financial stability and risk variables has culminated in this work. Bank stress testing is also addressed in this chapter, as is the way in which it benefits banks. This thesis begins with a notion of financial stability and then focuses on stress testing banks. Maintaining a stable basis for resource allocation is essential in a market economy. In order to achieve this aim, financial and monetary stability is required. By minimizing resource misallocation, stability may decrease long-term savings and investment. Financial instability and, eventually, a financial crisis may arise if economic entities (such as people and corporations) are in a bad financial state. In their study, Breuer, T., and summer, M. ignored the banking sector (2018). Claims that an unstable economy may have an impact on the economy as a whole. When it comes to making macro monetary policy and setting price stability, central banks' internal forecasting and evaluation procedures are built on the shoulders of these two roles. Monetarists use the term "monetary stability" to refer to the overall stability of prices, which may be measured via inflation or deflation. There must be a precise bottom line for the central bank and an analytical framework for the elements that drive inflation in order to reach an acceptable inflation rate. Breuer, T., & summer, M. (2018). It's far more difficult to preserve financial stability when a central bank's inflation objective is not being reached than when it is. What is the point of this? Market equilibrium takes precedence over any causes that can initially contribute to an imbalanced situation in classical economics. In the 1990s, financial markets across the globe grew increasingly linked, which led to a rise in the number of research attempting to explain economic instability. Constancio, V. (2017) performed a survey on the topic of economic stability. He used the term "stable" to characterize a well-functioning financial system in his concept of financial stability. Financial stability is defined as what was discovered in this research study, which is why this survey was more concerned with keeping the economy

stable than it was with obtaining financial stability. According to Houben et al. (2004), since there were only a few scholars looking at financial stability at the time, there was no generally acknowledged definition or analytical framework for evaluating it.

One variable that may be targeted in order to attain financial stability is far more difficult to nail down than a target inflation rate or price index is. This is because the banking system is most typically linked to financial stability. Currently, the banking sector is integrating itself into the global financial system, a process that has already started. As the global economy grows and diversifies, so too does its complexity. In other words, even if the banking sector remains strong, the interaction between banks and other financial sectors, as well as internal economic inequalities and foreign markets, will have an effect on financial stability. In this case, Constancio V. (2017) There is no such thing as monetary or financial stability that is independent of each other; rather, they are mutually reinforcing. The difficulty in assessing financial stability may be observed in a variety of ways: Currently, it's impossible to pin down what exactly constitutes "financial stability." To some extent, this is due to the fact that it covers such a broad variety of financial themes as banks, securities businesses, insurance firms, and so on (money market and capital market). There is a broad spectrum of parties involved, from the federal government to private firms to everyday residents, which is one of the reasons for the program's success Another essential element to consider is that of the legal and financial systems. Using these ideas, Truman (2003) proposes a broader term for all economic activity: "the economy." Using a systematic approach to the problem. The whole financial stability is likely to be compromised if any one of these financial stability components has a problem. The financial system is becoming more unable to manage the risks posed by an expanding number of worldwide exposures by businesses, individuals, and governments. Financial organizations are finding it more and more difficult to clearly define national borders. However, despite the fact that most banks still have considerable local exposures, the world's top financial organizations have a significant worldwide reach. "Systemic risk" refers to a system's susceptibility to both external and internal shocks. It is possible that they will completely destroy a system if they are not properly recognized and handled. As a consequence, regulators must regularly monitor the health of the world's banks. During a financial crisis, a bank's capacity to weather the storm is determined through stress testing.

Financial institutions' health is affected by a multitude of elements, but the two most critical are I adequate capital and (ii) high-quality liquid assets. A network's macroprudential vulnerability can only be established to the extent that its banks are linked. According to this article, well-capitalized banks have a better chance of being stable as a whole since they have access to liquid, high-quality assets, and manage portfolios that are well-balanced. New insights have been achieved by looking at a third component in relation to network structure and dynamics in our global financial system. However, a third element has gotten little attention in compared to the other two (Beltratti and Stulz 2012; Calice et al., 2013; Distinguin et al., 2013; Miles et al., 2013; European Central Bank, 2014; DeYoung and Jang, 2016), The ability of the financial system to withstand and recover from early-stage shocks of a financial crisis is critical to financial stability. If the economy is solid, there is little risk of a financial crisis spreading across the whole system. In an environment where financial stability is the norm, a single instance of financial instability is unusual. According to a JAMA research, Corona C., Nan L., and Zhang G. were shown to have a lower risk of cardiovascular disease (2019). Because of the interconnectivity of the financial system's numerous components, such as infrastructure, financial institutions, and financial markets, there is always a risk when dealing with money. There may be a time when the financial system is robust, but this might change at any given time.

2.2 Stability in the financial markets.

This may be done using a collection of target variables that we discussed before. Illusions about financial stability may be detected using conventional approaches. It's safe to say that financial stability is nonexistent as a consequence of this situation. Davis started a discussion on the internet over this topic (2001). In order to maintain financial stability, there must be no negative consequences for the economy. However, there are a few factors worth noting. Early writers usually blamed financial instability on cyclical excess. Studies by Galati and Moessner (2011). Speculators' desire to profit is generally acknowledged as a driving force behind their on-margin purchases of extra financial assets. When the value of valuable assets unexpectedly drops, the economy and financial markets may be adversely damaged. When looking at financial instability from the perspective of monetary policy, Breuer and summer (2018) discovered that various factors may contribute to financial instability. Our world is always in change, and both of these techniques may help us better understand it. However, microeconomic theory either disproves these previously held assumptions, or completely disregards them. This has led to a better

understanding of how agents behave and how this might contribute to financial instability. According to Greenlaw D., Kashyap A. K., Schoenholtz K. L., and Shin, H. S., there have been two distinct definitions of financial stability in recent years (2012). Allen and Wood (2006) describe financial stability as the financial system's ability to absorb exogenous shocks, such as (Allen and Wood, 2006). Financial stability may be characterized in a variety of ways, all of which are discussed in depth in the sections that follow. Financial stability is defined as the absence of system-wide occurrences (crises) that disturb the financial system over a long period of time, according to the majority of them (crises).

Another crucial factor to examine is the security of the financial system. In a stable financial system, it is possible to maintain employment levels that are close to the natural pace of the economy and eliminate price volatility of real and financial assets that might affect monetary stability or employment levels. It is called "financial dissipation" when major, unexpected, and unwanted events take place in a financial system and because financial imbalances to be dissipated (Borio and Drehman, 2009). There is no need to worry about the stability of this system. These systems aid the actual economy and other financial systems by buffering the effects of sudden changes in market conditions. Only a stable system makes this feasible. Financial stability is vital to long-term economic growth since the financial sector enables the vast majority of real-world transactions. There are moments when the absence of financial stability makes the need of financial stability clear. Due to banks' reluctance to lend to productive businesses, asset values have deviated greatly from their genuine value. Prolonged acute instability, according to the UN, may lead to bank runs, hyperinflation, and a stock market crash. Public trust in the financial and economic institutions of the United States might be significantly eroded as a result of this. The name of the game is Schinasi (2004).

2.3 financial Stability of the factors

Bankruptcy and unemployment may grow as a result of an economy's debt reduction initiatives, while productivity and market confidence may suffer as a result. The counter-cyclicality of credit risk is underlined in business cycle models that may be used to theoretically anticipate NPLs. It was Ning Liang and David Kohn (2019). Following the financial accelerator theory Lee, M., Gaspar R. & Villaruel, M. L. constructed an essential theoretical framework for how the financial sector drives macroeconomic performance (2017). There are ideas out there about

credit cycles, non-performing loans (NPLs), and loan loss provisions. While the economy is expanding, NPL ratios are falling.

Banks' increased confidence in economic prospects may be leading to strong loan growth. Both the borrowers and the lenders may be put in a tough financial position as a result of these actions. There would be a surge in non-performing loans (NPLs) if excessive credit expansion occurred. The lack of credit has a negative impact on the domestic economy. These theoretical frameworks cannot fully explain the macroeconomic consequences of NPL. Regulators and supervisors have a direct impact on a company's institutional quality. A better understanding of banking practices and risk management methods may be gained by comparing the laws and regulations of different countries. C. Trucharte, A. Marcelo, and A. Rodriguez (2018). Macroeconomic performance has a direct impact on the health of bank balance sheets and their capacity to service their debt. Despite these discrepancies, NPL is often connected to macroeconomic variables such as GDP growth, unemployment, and inflation.

Several studies have shown that the structure of the financial system has a significant impact on the stability of the economy (Allen and Gale, 2004; Ibrahim, 2006). According to his findings, financial stability is more likely to be achieved via a market-based financial system. Stankova, L., was the first to notice the link (2014). Using revolutionary research, experts identified the relationship between a country's monetary structure and general financial well-being. Crisis hypothesis states that Stankova L. (2014). This article offers a number of suggestions for avoiding financial instability. Outlines probable reasons and suggests remedies. Hannoun, H. (2010, February) devised a ratio of stock market activity (or size) to bank system loans to distinguish between a market-based and a bank-based financial system.

2.4 Monetary Regulations

- The supply and demand for money and credit are the focus of monetary policy. Monetary policy refers to the actions taken by a central bank or government to influence the availability, cost, or use of money and credit, as well as the use of monetary tools to achieve certain aims. Monetary policy primarily affects economic activity by adjusting the amount of money in circulation and the interest rate.
- The availability of money or credit, and (b) the cost of borrowing money.

It is possible for the central bank to employ the same tools to control credit as it does to control interest rates. Interest rates, open market operations, changeable cash reserve requirements, and selective credit controls are all methods of implementing monetary policy. According to R.P. Kent, monetary policy is the process of controlling the expansion and contraction of the money supply in order to achieve a certain goal, such as full employment. Money supply control by the central bank may be used as a weapon to achieve economic policy objectives," says A. J. Shapiro. To put it another way, money policy is any action done by the central bank at its own discretion to influence the economy.

- Money supply, for example,
- Interest rates, or the cost of money.

D.C. Rowan cites item c as an important consideration.

In other words, monetary policy is not a goal in itself. This function includes managing money and credit in order to advance the government's overall economic strategy in order to achieve predetermined objectives. Monetary policies have been implemented in different nations, at different times, and in varying economic situations. Choosing a country's monetary policy may be challenging since there are so many competing objectives. In view of the economy's unique features and needs, the monetary authority should choose the right monetary policy aim.

Officials from the Federal Reserve perform a regular review of financial stability by conducting a baseline vulnerability assessment. The Board of Directors and the Federal Open Market Committee receive these reports on a yearly basis (FOMC). Each of these four areas is rigorously monitored and assessed on a regular basis using a variety of data sources and ideas derived from talks and interactions with both local and international colleagues. Investors' willingness to take on risk is a crucial signal when valuation pressures are excessive, as seen by asset prices that are beyond their historical norms. A larger risk of asset values collapsing suddenly due to increased valuation pressures as a consequence may be seen here.

Businesses and households with excessive debt are more vulnerable to financial difficulty if their profits or assets' value decreases. Firms and families that are heavily in debt may be forced to significantly reduce their spending, which could have a negative impact on the economy as a

whole. As a consequence, financial institutions and investors lose money when businesses and people fail to pay back their debts.

With excessive leverage, financial institutions are less able to withstand losses in the event of an unforeseen shock. Limited lending or asset sales are the only options lenders have in these situations. If enough people respond in this manner, it might have a significant impact on the availability of credit for individuals and enterprises alike a large increase in financial resources investing money in assets that are difficult to sell or have lengthy maturities, even if financial institutions promise to refund the money in a short period of time, is a risk. Investors may be tempted to withdraw money from their accounts rapidly in times of crisis because of this change in liquidity and maturity. A "run" is what we call this. A financial organization may be forced to sell assets at "fire sale" rates if a run on the firm occurs, resulting in catastrophic losses and, in some circumstances, bankruptcy. Internal Fed discussions on monetary policy and supervisory and regulatory problems are based on these findings. If you haven't already, you need to know what the Federal Reserve thinks about these vulnerabilities, as well as how they could interact in its Financial Stability Report, which is released twice a year. The report, which is released twice a year, gives a concise summary of the financial system's current risks. They also help the Federal Reserve work with other watchdogs, such the Financial Stability Oversight Council and the Financial Stability Board, to promote financial stability.

2.5 Types of Financial System Vulnerabilities and Risks

Asset valuation and risk tolerance are two important concepts to understand.

When economic factors such as future predicted cash flows and interest rates are taken into account, the prices of assets are referred to as "asset valuations." A rise in investors' risk appetite might lead to higher levels of risk or the development of new dangers that are not yet fully recognized as a consequence of historically high prices that are unwinding. This could lead to financial and economic instability. Due to the fact that assets that have a longer life span than the obligations that support them, or assets that do not have publicly available information, may be particularly problematic in this dynamic, it is widely believed that.

Excessive borrowing is a problem, but it helps keep the value of the company up.

On the other hand, determining if an asset's price is overvalued in comparison to its fundamentals is a highly complex process. The results of an analysis are often influenced by a

variety of factors, including valuation metrics, developments in areas where asset prices are rising rapidly, the size and speed of inflows into an asset class and the implications of unusually low or high volatility in certain markets, among others.

- **Loans taken out by both enterprises and private persons.**

Businesses and individuals that take on excessive debt have a larger risk of income loss or a decrease in the value of their assets. It is possible that these shocks might cause enterprises and households who are severely indebted to significantly reduce their expenditure, which could have a detrimental impact on the entire economy. If they default on their debts today, their chances of getting credit in the future will be significantly reduced.

• Leverage in the Financial Markets

Due to the financial crisis, the financial system and the economy might be further impacted by highly leveraged financial system intermediaries (those with much more debt than equity). A negative shock to the economy would further hasten the decline in economic activity for banks with high levels of debt if lending standards are tightened and balance sheets reduced beyond what is required. "Fire sales," in which assets are sold at rock-bottom prices as soon as losses are realized, may occur in highly leveraged institutions, particularly if these institutions have a significant share of short-term funding. A negative feedback loop might occur if the assets of other financial institutions are devalued as a consequence of these fire sales.

When it comes to banking leverage, the Federal Reserve has a robust data collecting programme in place. A Consumer Credit Report based on data from the Dodd-Frank Act stress testing is also included in the quarterly reports. Nonbank financial leverage may be studied by conducting regular surveys of lenders, such as the Senior Credit Officer Opinion Survey, and cooperating and exchanging data with all financial regulatory agencies.

• Financial System Risks and Maturity Transition

Long-term assets may be funded by the financial system because short-term obligations are aggregated. The conventional banking system and other depository institutions have long used consumer deposits as part of the financing for long-term automobile and house loans. Nonbank

financial institutions have mushroomed in recent decades. Despite the fact that mutual funds invest in long-term debt instruments, investors may withdraw money from their accounts on a daily basis. The financial crisis of 2007–09 and the breakout of COVID-19 in March 2020, among other events, highlight the emergence of systemic vulnerabilities that endanger financial markets and the wider economy when long-term assets are linked with short-term financing. Many investors pull their money out of the market after a bad surprise because their risk aversion has grown. An additional layer of security is provided by the conventional banking system's deposit insurance program. Short-term investments such as repurchase agreements (commonly referred to as "repos") or commercial paper put financial institutions like money market mutual funds at risk of default. Financial crisis of 2007–09 and pandemic in 2020 put a lot of strain on the money market mutual funds." As a result, the Federal Reserve keeps a close check on the maturity transformation and liquidity risk of the financial system, as far as data and measures allow.

• Stability measures at a firm level

Banks may analyze their solvency risk levels using capitalization and returns as risk cushions and the z-score, which is frequently recognized as an indicator of an institution's stability (volatility of returns). The z-widespread score's popularity can be attributed to its simplicity (negative) ihák and Hesse; Laeven and Levine (2009) (2010).The likelihood of a financial institution's insolvency, or the likelihood that the value of its assets falls short of the value of its debts, can be calculated by multiplying the standard deviation of its return on assets (measured as a percentage of total assets). As a consequence, a higher z-score indicates a decreased likelihood of bankruptcy. It was used by Demirgüç-Kunt and Detragiache in 2008, as well as Beck, Demirgüç-Kunt, and Levine in 2007 to evaluate the stability of commercial banks.

There are several problems with the z-score as a financial stability indicator. Because the z-score is only dependent on accounting data, this technique of scoring has a major flaw. As a consequence, the tools provided confine accounting and auditing systems. It is possible to overstate the stability of a financial institution using the z-score, according to the formula. The z-score may overlook the risk that the collapse of a single financial institution would influence the health of the whole financial system since each financial institution is assessed on its own. The z-score is useful in instances when more complicated, market-based data is unavailable. Z-scores

may also be used to compare the default risk of many institutions, regardless of their ownership or function.

Institutional stability may be assessed using Merton's model in a variety of ways. This tool is commonly used to estimate an organization's capacity to pay its debts as well as the possibility of a default on its commitments. As with a call option on an institution's owned assets, the Merton model (also known as the asset value model) treats equity in the same manner. It is possible to price the "put" (which indicates the firm's credit risk) to reflect the firm's credit risk via put-call parity (PCP). Volatility-weighted estimates of the asset's worth are used when debt holders "use their put option" because they anticipate payback. The Merton model can estimate the possibility of a company's credit failure based on its obligations exceeding its assets (the asset/liability level necessary to enter and escape default are set at various thresholds). The data from credit default swaps has been exploited in later studies to widen the scope of Merton's model to cover a larger spectrum of financial activity. For example, Moody's uses the KMV model to assess credit risk and calculate the likelihood of a default. Another market-based measure of corporate default risk is the Distance to Default, which is based on Merton's idea (DD). Additionally, it assesses the firm's solvency risk and liquidity risk.

2.6 New Approach to Monetary Policy

As a key objective of the central bank since 2001, when monetary policy was initially introduced unofficially and formally in 2006, achieving price stability has been the central bank's fundamental goal, with short-term interest rates serving as the central bank's principal instrument. With this technique, inflation has stabilized at a level of about single digits after many years of high inflation, which was largely unaffected by external shocks. Even if inflation targeting has its benefits, the global financial crisis has revealed that disregarding financial stability can have long-term negative effects for both macroeconomic stability and price stability. Central banks have been obligated to monitor the financial system for indicators of risk accumulation and asset price bubbles under a long-standing norm, and they have been held to this standard for decades.

Using a single instrument to target numerous variables at the same time, on the other hand, is impossible for a central bank to do.

In 1999, R. Clarida and colleagues (J. Gali, M. Gertler) published a paper titled The likelihood of a conflict between the levels of interest rates required to maintain financial stability and the levels of interest rates required to maintain price stability is high if the levels of interest rates required to maintain financial stability and the levels of interest rates required to maintain price stability differ. Even though a low policy rate may be sufficient to keep inflation at a predetermined level during periods of high economic development fueled by productivity gains, it will not be sufficient to prevent the accumulation of macroeconomic financial hazards in other conditions. For example, during a global boom period, increased risk appetite fuels capital flows to emerging markets, balance sheet mismatches become magnified, and financial stability risks accumulate as a result of resource allocation being distorted by rapid credit growth and real exchange rate (Benar, B. Erdoan, T. Gürgür) appreciation. As a matter of course, lower short-term policy rates are required in order to offset the macroeconomic risks associated with an excessive increase in the value of the currency.

In contrast, low policy rates maintained for an extended period of time may have the effect of increasing domestic absorption while putting the country's price stability at danger. If the situation calls for it, interest rates on internal and external accounts, for example, may be adjusted accordingly. Since the middle of 2010, the CBRT has been concentrating on global imbalances, capital flows, and macro-financial risks in order to maintain price stability while avoiding a deterioration in financial stability. Since the middle of 2010, the CBRT has been concentrating on global imbalances, capital flows, and macroeconomic financial concerns in the face of this backdrop. According to the Central Bank of the Republic of China, a widening mismatch between domestic and external demand, as well as a rise in short-term capital inflows, has heightened the dangers to financial stability in the country (CBRT). Consequently, the CBRT has devised a new policy mix to ensure financial stability while without jeopardizing price stability in the process.

Both short-term capital inflows (in order to prevent excessive appreciation pressures) and domestic credit expansion (in order to calm the growing macroeconomic concerns) had to be regulated. The new framework incorporates a variety of instruments to accomplish this goal in addition to the traditional policy rate, including reserve requirement ratios and interest rate corridors, among other things.

2.7 Implementation of the Policy

Having raised the issue of macro-financial imbalances in the middle of 2010, the Bank of England claimed that a variety of policy instruments might be more effective in dealing with the issue. Following a brief experiment in 2009, the CBRT began proactively deploying the reserve requirement ratio as a regulatory instrument to relieve the trade-offs caused by large inflows of capital towards the end of the year 2010, and has continued to do so. Because of the use of reserves as a policy instrument, banks were required to hold larger amounts of cash, and as a result, they stopped paying interest on reserves. In a second phase, the CBRT amended the operational structure to allow for more flexible methods of liquidation. In the aftermath of the financial crisis, the overnight interest rates were used to determine the lower and upper borders of the interest corridor (Kara, H., and M. Orak, 2008), although the one-week repo auction rate was used as the primary policy instrument. It has become a more active policy instrument due to the increased volatility in overnight market rates as a result of the CBRT's ability to change liquidity in the market. Because of the CBRT's ability to alter liquidity in the market, it has become a more active policy instrument (details explained below).

New policy measures were required at the end of the third quarter of 2010, as a result of increased capital inflows, a widening current account deficit, and a rapid expansion of credit in the economy. The CBRT came to the conclusion that, rather than boosting interest rates in response to a rapid expansion in credit, it would be preferable to use other policy instruments to achieve the same result instead. According to the CBRT, which was founded in 2008, reduced capital outflows were achieved by lowering short-term interest rates and raising reserve requirement ratios, which resulted in lower capital outflows. As a result of shifting reserve requirements, the banking sector's liabilities have also increased. The policy mix included measures to prevent currency rate misalignments and macroeconomic instability by limiting short-term speculative capital inflows. This was a critical component of the strategy. The combination of a widening of the overnight borrowing-to-lending gap and an increase in the interest rate corridor allows for more active management of short-term money market volatility than was previously possible. The Bank thought that by lowering the average return on short-term funds and increasing the volatility of short-term interest rates, it would be able to lower the return-to-risk ratio for speculative short-term positions and deter capital inflows into the economy over a shorter period of time. Credit growth capture is the second component of these

methods, and it serves to reduce macroeconomic and financial imbalances by capturing credit growth. This was accomplished through a progressive increase in the reserve requirement ratios in the financial sector (CBRT, 2010a, Inflation Report 2010). When interest payments on necessary reserves were reduced, the CBRT increased the weighted average reserve ratio while boosting liability coverage. Requirement ratios for short-term maturities of banking sector obligations were separated by maturity in order to support financial stability and to extend the maturity of banking sector liabilities in the event of abrupt changes in global risk appetite (sudden stop).

2.8 Communicating the Monetary Policy

In the wake of the "great moderation" period (approximately from the 1990s to the mid-2000s), economic relationships became more predictable, giving rise to the belief that economic dynamics can be explained by a straightforward analytical framework. When it comes to the financial community as a whole, money manufacturing has long been regarded as a "science" by all parties involved. A simplified New Keynesian model, which was extensively accepted during this time period, was used by practically all inflation-targeting central banks during this period. The only variables in these models are short-term interest rates and inflation, which makes it simple to understand how the central bank is behaving and what its objectives are. The only variables in these models are short-term interest rates and inflation. During the Great Moderation, this simple-to-understand and time-tested technique contributed greatly to the simplification of monetary policy communication by making it easier to grasp.

Since the global financial crisis of 2008, there have been significant shifts in monetary policy. This isn't exactly a well-kept secret. Over the past few years, central banks have become increasingly concerned with issues such as financial stability, credit expansion, and asset price volatility. Macroprudential instruments are being investigated more and more regularly these days in order to ensure financial stability. Complexity is overstated in simple log-linearized models, but our one-of-a-kind multiple instrument framework method does the opposite. Given the shifting global viewpoint, the CBRT has revised its policy framework to incorporate financial stability into the inflation-targeting framework, which was previously absent. This technique was initially difficult to transmit because the majority of economic players and central bank monitors were unfamiliar with the new approach when it was adopted. This was primarily due to the fact

that these new policies were based on judgement rather than on generally accepted theoretical frameworks or considerable empirical evidence, which made it difficult to communicate effectively during the implementation of the new policy plan. In the absence of clarity regarding the transmission channels for new policy instruments, including those relating to the interest rate corridor and necessary reserves, it has been increasingly difficult to communicate the monetary policy agenda. CBRT (2011b) is a non-profit organization dedicated to the advancement of science and technology. Due to the modification of the bank's goal function, there was a significant amount of communication problem. It was interpreted as a sign that the inflation targeting framework had been dropped altogether. Towards this end, the CBRT has created an active communication strategy that is being implemented throughout the organization. Responding to these concerns, the central bank has taken a cautious approach to managing inflation risks, always keeping the greater goal of price stability at the center of its thinking. A second point of worry raised by the CBRT was that a failure to address existing macroeconomic imbalances could have a long-term negative impact on price stability in the future. Additionally, the statement emphasized the CBRT's determination to maintain a close eye on inflation and take additional steps if necessary as a result of the new policy measures enacted. The result has been that, despite all of the concerns about the new policy mix, inflation expectations have remained rather steady over the past several months. The difference between inflation expectations and actual inflation expectations has narrowed, even in the medium term... At a time when inflation was falling, the new policy mix was implemented, which contributed in avoiding inflation expectations from worsening even more.

Theoretical Framework
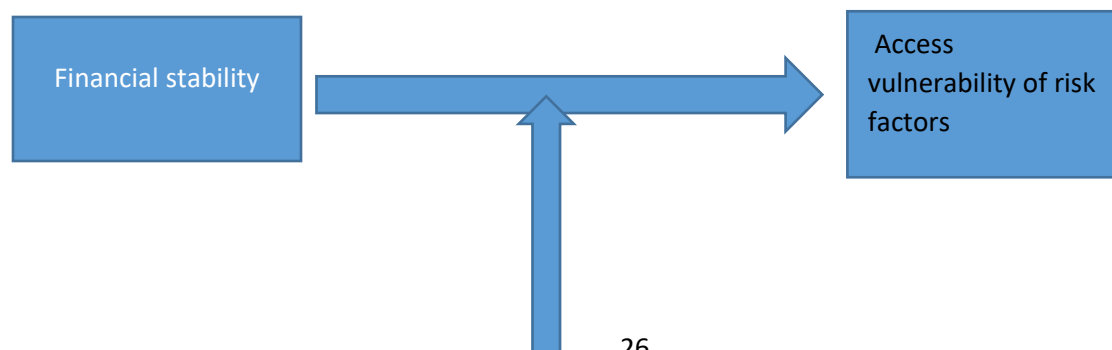
<div style="text-align: center; border: 1px solid #000; padding: 20px; max-width: 300px; margin: 0 auto; background-color: #5B9BD5; color: white;">
Impact of Monetary Policy
</div>

Hypothesis

H1: Financial stability has significant direct impact on risk factors

H2: Monetary policy will moderate the relationship between financial stability and risk factors

CHAPTER #3
RESEARCH DESIGN AND METHODOLOGY

Research Philosophy

A major theme in research philosophy is the creation and preservation of knowledge, as espoused by Saunders, Lewis, and Thornhill (2009). In the event that a concept gained widespread acceptance, the method research is conducted would be radically transformed. This will include theories about the research design and methods. Each of these schools of thought is referred to as a philosophical school. This inquiry is based on a positivistic understanding of science. Saunders et al. (2009) state that each research must begin with a social fact that can be assessed, then employ a survey to collect data, analyze the findings, and make conclusions. It is the tenet of positivist philosophy that facts are derived from the pursuit of truth.

3.2 Methods of Study

There are two main types of research methods: inductive and deductive (Trochim, 2006; Ume Sekrann, 2009). Rather than starting from scratch, this research relies on preexisting theories to assess a hypothesis. A broad generalization and specific observational methods are used to determine the assertion of existing theories and the production of new hypotheses in the immediate investigation's research technique, which is deductive.

3.3 Nature of the Study

The two basic types of business research are quantitative and qualitative (Sekaran, 2003; Mehrad, A., Tahriri Zangeneh, 2019). Data are the emphasis of quantitative research, while meaning and interpretation are the focus of qualitative research. The in-depth investigation of ideas possible with qualitative procedures is complemented by the rigorous testing of theories made possible by quantitative approaches. Even though this investigation is quantitative, the hypothesis will be examined statically.

3.4 Research Design

The research design is the strategy for performing the investigation. Researchers use a range approaches to achieve the study's objectives. This is an area where you may feel confident if you read the aforementioned book "Affiliations: Ruder, D L. Marczyk (2005). The fundamentals of research methodology and design "Experimentation and conclusive study designs are always available, according to Saunders et al. (2016). For the purpose of validating the hypotheses that have previously been proposed, the present study employs a conclusive research design, particularly a descriptive design.

3.5 Data Collection

We gather secondary data in order to perform our research (Sekaran, 2003). When conducting an investigation, the researcher or his helpers may utilize secondary data, which are records that have previously been gathered or acquired by someone else. It's not out of the question that the data may be made public. For further information, speak with Ajayi (2017) Ajayi In this research, internet questionnaires were the primary means of gathering data. A single data collection method or a series of data collection methods might be used for data gathering (Saunders et al., 2016). This study relied on secondary data sources.

Macro stress tests are used to evaluate the banking industry's resilience in the face of the most extreme yet realistic scenarios (see Figure 1 for the stress testing framework). These methods, as well as those of induction and deduction and analogy have been used. Analysis of this issue also includes factorial and comparative analysis in addition to statistical or mathematical techniques. Bank of England statistics, databases, World Bank, International Monetary Fund (IMF) Financial Stability and Accountability Program (Eurostat), Basel Committee (and individual bank

websites) were all used to undertake an econometric study of macro prudential banking data (Taskinsoy, 2018).

An actual bank instead of a fictitious one was employed in the stress test, following the paradigm developed by Cihák (2007). Top-down macro stress testing (TD) is used in combination with a baseline scenario and two unfavorable scenarios to analyze credit, interest rate, and exchange rate risks. With the looming macroeconomic shocks and harsher capital and liquidity restrictions of Basel III in mind, this statistic looks at the entire effect on GDP as a proportion of capital adequacy and capital injection. There are 56 deposit takers included in the MAST's three-year stress testing horizon, which is based on data from 2013 through 2015 (Q4), according to MAST. Thirty-one of the country's thirty-two registered banks controlled the vast bulk of the MR1.82 trillion in financial assets at the end of 2015. More than two-thirds (74.6% or RM1.74 trillion) of the shares were held by 18 banks and 13 investment banks (RM84 billion). According to a recent research, 22% (or RM520 billion) of total consolidated banking assets were held by locally incorporated foreign-controlled banks (25). According to the most current available statistics, Malaysia's five biggest banks control more than 70% of the country's total financial assets (IMF, 2013; 2015). The link between stress testing, macroeconomic projections, and early warning indications is widely misunderstood and ambiguous. First and first, it is important to point out the conceptual distinctions between the macro stress test and the stress test employed in this study. The following is a succinct explanation of macroeconomic forecasting, as provided by Sorge: (2004).

Equation E (Xt+1) = g1 in mathematics (xt Zt)

Forecasting function that translates variables X and other factors Z into a predicted future outcome vector. It is used to foretell the future. For an unpredictable random variable, t reflects the sequence of events that have transpired up to this point in time (t). A model for early warning signs may be defined as follows:

One of the most difficult parts of creating an early-warning system is figuring out which subsets of X and Z are the most telling indicators of impending danger. There is no crisis if a critical macroeconomic variable (X) falls below the pre-determined thresholds (i.e., xt+1 > x), but there is a crisis if x falls over the pre-determined thresholds. Micro- or macro-stress tests use historical or hypothetical events, paired with a number of assumptions, to establish whether or not

individual banks or financial sectors can withstand severe but plausible shocks that have not yet occurred. It is possible to get the result f (X, Z) in the scenario when X and Z are real values. Financial system distress (Y) divided by x, x is equal to Y when only the most extreme events are considered. The sum of all measures is here. It is possible to compare financial system vulnerabilities across portfolios and scenarios by employing the statistic known as the correlation coefficient.

3.6 Variables' Metrics and Scale

Analytical, statistical, and economic methods can only be used to variables that can be measured and quantified, as well as related to other risk factors. With the aid of Cihák, we've compiled a list of frequently-used words (2007). Acute stress may have a significant influence on a company's ability to maintain its solvency, but capital as a stand-alone amount does not provide a clear indicator of how sensitive it is to shocks. Capital must be evaluated as a ratio in order to be a useful in the evaluation of financial soundness (e.g., Tier 1 capital/RWAs, the ratio of capital to GDP), The capital ratios of these three companies are used as variables in stress tests: For the CET1 Ratio, use the formula below: The CET1 Capital to RWAs Ratio is 4.5%. 6% of the total Tier One Capital is allocated to RWAs (in dollars). Total assets divided by first-tier capital (3.1.1)

Adding Tier 1 and Tier 2 capital yields an overall capital ratio of 8%, which is calculated as follows: For the purposes of CET1, the risk-weighted asset (RWA) is employed (common equity Tier 1). We may calculate the capital adequacy ratio using this technique (CAR). To put it another way, CAR equals RC / (10.5 percent) (3.1.2) Risk-weighted assets (RWA = W percent), credit risk-weighted assets (CRWA), market risk-weighted assets (MRWA), and operational risk-weighted assets (ORWA) are shown in this table, along with the study's minimum CAR requirement. Between Basel II and Basel III, the components of capital underwent significant transformations (see Table 3 for details on the Basel III phase-in arrangements). Tier 1 capital ratios and the bank's capital adequacy ratios are critical indicators of the firm's financial soundness (FSIs). It is 2.5 percentage points more than Basel III's total capital requirement of 8 percent, which is the CAR threshold rate of 10.50 percent. There have been several micro and macro stress tests conducted in both countries, but this hurdle rate is substantially higher than

any of them. When the necessary data is entered into the calculations above, RWAs may be computed (return on investment).

A key macro stress test statistic is the amount of capital entering the country as a percentage of GDP. Banks that fall below the hurdle rate's minimum capital requirements must employ all available options, including a government backstop, to achieve those needs (i.e. CAR of 10.5 percent or 6 percent of the Tier 1 capital ratio). Unable to raise the requisite amount of capital, an institution is termed insolvent. qI is made up of the letters C + I RWA (3.1.4) It is important to remember that capital injections (whether from the government or the bank owners) are equivalent to a percentage of risk-weighted assets (i.e., RWA = 8 percent * market risk + operational risk + w percent A&).

C RWA (3.1.5) implies that the capital injection will not be utilized to boost RWAs to meet regulatory CAR (p=10.50 percent) as long as q is equal to zero. The solution is I = 0.105 * RWA – C when p is reduced by 10% in the calculation. It is important to make bigger financial infusions when q is higher than 0. There is a huge danger of default in the conventional banking sector, which is at the core of what they do. Four stress shocks are used to assess credit risk, the first of which serves as a baseline for all subsequent testing. As a result of these changes, these are the new provisioning standards that have been implemented: 2 percent for passing loans, 5 percent for special mention loans, 15 percent for nonperforming loans, 30 percent of speculative loan reserves, and 100 percent of losses. Because the collateral is worth 50%, the borrower is required to pay a 50% cut. It is applied to the aggregate levels of non-performing loans (NPLs), resulting in asset quality degradation on a large scale in an unfavorable environment. Because RWAs and capital are undervalued, the banking sector's capacity to absorb losses is placed under strain, resulting in its failure. Additionally, the default rate is raised to 5% for pass loans, 10% for special mention loans, 25% for substandard loans, and a whopping 50% for doubtful loans. In the worst-case scenario, banking provisioning rises by 38%. This is the third time that the economy has been hit hard by a credit shock. The credit shock has resulted in an increase in the number of non-performing sector loans. Only 4 percent of the overall lending went to interbank loans; the rest went to the general government (2%), non-financial firms (8%) and the domestic sectors (6%), as well as other financial corporations (6%). Credit shock 4 is used to assess concentration risk by counting the number of defaults among the most important counterparties.

The NPLs are, in this case, at level 3. When a counterparty fails to live up to its promises, banks face increased credit risk and replacement expenses. The great majority of big banks utilize very sophisticated Monte Carlo simulations to evaluate the credit risk of their loan portfolios. According to (Ieda et al., 2000), the following data is available: To express the default mode numerically, consider the following examples:

N

In other words, $L = Divi (1 - ri)$

i=1

In probability theory, Di is equal to 1 minus the probability of Pi.

Where n signifies the number of exposures, pv is the default rate of exposure I in the future, vi is the quantity of exposure, ri is the recovery rate ($0 < ri \leq 1$), and L is the portfolio loss assuming a random variable 1 or 0. A loss of indeterminate value, L; is the anticipated value. Estimating counterparty credit risk exposure at default through the Standardized Approach (SA-CCR) was established by the Basel Committee (CCR). The default exposure is set to EAD = alpha + (RC + PFE) if SA is enabled. (3.2.3)

Alpha (RC) is the replacement cost, and PFE (RC) is the potential future exposure (PFE). When a bank owes money to an entity to which it has no exposure, this formula may be used to compute the maximum amount of derivative contract value it can have in the netting set and the amount of net collateral it has on hand. To calculate the reaction coefficient, use the formulas below:

There has been no activity on NICA; a value of 0 shows this. The value of V and C must be larger than TH, the amount of money that must be transferred to satisfy this need (BCBS, 2014). In a Monte Carlo simulation, the credit risk and loss of a derivatives portfolio are compared side by side. In order to evaluate credit exposure and loss, the following are used: actual (AE), total (TE), and prospective (PE) (PPE). It was Aziz and Charupat (1998) that came up with a type of "formalization" in the form of "formalization" (Aziz and Charupat, 1998). (PE).

To sum up, the following is what happens when AE (ct) = max0:

Because of this, the contract's value at the specified time (t) is higher than or equal to V(c, t) (c, t). The contract's value must be higher than or equal to V(c, t) (t). In the event of a default on a debt instrument, the maximum additional loss that may occur between the default time (t) and the debt instrument's maturity time (T) constitutes the potential exposure. It may be used to convert future values (FV) into present-day value, for example, using the method PVt () (t). The amount of money that may be lost in a particular amount of time (t). As described by mathematical definitions, the equation (c, t) is written as follows: (3.2.6) to put it another way, the loss can't exceed the entire amount of exposure, which includes both present and future exposure.

CHAPTER # 4
Results & Discussion

From 2011 to 2015, the banking industry's CAR was an average of 15.41 percent. At least two percentage points higher than banking sector rates in industrialized nations notwithstanding the lower ASEAN-5 average of 16.73 percent.

Table 4: Pre-Stress Testing Financial and Macroeconomic Indicators

Financial soundness indicators (%)	2013	2014	2015	Average
Regulatory capital to risk-weighted assets	14.57	15.03	15.52	15.04
Regulatory Tier 1 capital to risk-weighted assets	13.21	13.26	13.42	13.30
Non-performing loans net of provisions to	8.34	7.49	6.99	7.61

capital				
Non-performing loans to total gross loans	1.96	1.76	1.62	1.78
Return on assets (ROA)	1.45	1.53	1.26	1.41
Return on equity (ROE)	15.52	15.80	12.61	14.64
Interest margin to gross income	52.88	60.73	61.96	58.52
Non-interest expenses to gross income	49.85	42.38	46.30	46.18
Liquid assets to total assets (liquid asset ratio)	12.37	13.32	19.26	14.98
Liquid assets to short term liabilities	38.61	42.09	108.87	63.19
Net open position in foreign exchange to capital	11.24	14.24	13.88	13.12
Real gross domestic product (GDP)	4.7	6.0	4.8	5.17
Consumer price index (CPI)	2.1	3.1	2.7	2.63
General government balances	-4.1	-2.7	-3.0	-3.27
Current account balance	4.0	4.6	2.1	3.57
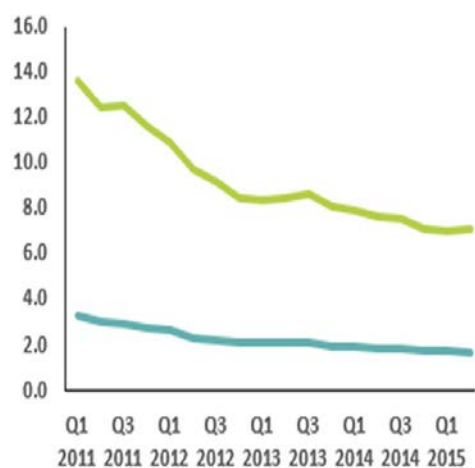
To put it another way, since 2011, the banking sector's gross non-performing loan (NPL) percentage has decreased by 14 percent, and by 2015, the NPL ratio was lower than the ASEAN-5 average of 2.0 percent. Non-performing loans (NPLs) that are not backed by collateral will be

covered in the event of a default. According to financial and macroeconomic indicators, the 5th wave35 of the taper tantrum, which lasted from May to August of 2013, has had a substantial effect. Global factors continue to threaten Malaysia's manufacturing sector and its currency (the ringgit). Everyone and everything has been involved in the previous two decades, from fast boom-and-bust cycles to excessive company leverage, home debt, US monetary tightening, and asset market volatility to capital flight.

4.2 Macro Stress Testing Results Analyzed Statistically

As a consequence, according to the results of the inquiry, the banking sector's financial strength indicators (FSIs) deteriorate dramatically in a dire scenario and decrease even more. The Kolmogorov-Smirnov Test (K-S test) results suggest that the assumption of normality is fulfilled, and hence the null hypothesis36 would be kept, and it would be stated that there is no statistically significant difference between the three stress situations.

		Baseline	Adverse	Severely Adverse
N		14	14	14
Normal Parameters	Mean	7.0452	3.0100	-.1955
	Std. Deviation	14.13225	9.12176	5.15013
Most Extreme Differences	Absolute	.302	.295	.170
	Positive	.302	.295	.170
	Negative	-.269	-.228	-.107
Kolmogorov-Smirnov Z		1.131	1.104	.637
Asymp. Sig. (2-tailed)		.155	.174	.812

In Table 12, the results are statistically significant when a baseline is excluded ($t = -.782$ and the

35

Sig. p (.448) is greater than 0.05), and they are even more so when the adverse scenario is considered (t =.2.867 and the Sig. p (.013) is greater than 0.05) and the seriously adverse scenario is considered, as shown in Table 12. Based on these results, we cannot rule out the null hypothesis since the level of significance is more than the predetermined alpha of.05. There are two situations when the null hypothesis is discarded, and it is shown that the difference is statistically significant in both.

	Test Value = 10					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Baseline	-.782	13	.448	-2.95476	-11.1145	5.2050
Adverse	-2.867	13	.013	-6.99000	-12.2567	-1.7233
Severely Adverse	-7.407	13	.000	-10.19548	-13.1691	-7.2219

To assess the impact on Malaysia's banking system's financial stability of macroeconomic issues, it was essential. It is possible to explain most of the KLCI's performance with the exception of crude oil (p = 0.151 > 0.05) and of the NASDAQ (p = 0.170 0.05). Due to this finding being statistically significant (p = 0.00005), we reject the null hypothesis (significance of the F-test). The KLCI (the dependent variable) and the main indices (the independent variables) were shown to have a positive connection (multiple R = 0.970). The fact that the number is so close to +1 illustrates how strong the connection is. The coefficient of determination is 0.941, which indicates that the independent variable X can explain 94% of the variance in KLCI's performance.

Regression statistics

Multiple R	0.970
R Square	0.941
Adjusted R Square	0.940
Standard Error	97.01744
Observations	1000

ANOVA

	df	SS	MS	F	Sig. F
Regression	10	148518550.9	14851855.0	1577.906	0.000
Residual	989	9308847.4	9412.384		
Total	999	157827398.3			

KLCI	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Crude Oil	-0.405	0.282	-1.436	0.151	-0.958	0.148
Gold	0.483	0.025	19.324	0.000	0.434	0.532
S&P500	0.374	0.063	5.952	0.000	0.251	0.497
DJIA	0.011	0.005	2.159	0.031	0.001	0.021
Nasdaq	0.016	0.012	1.373	0.170	-0.007	0.039
FTSE	-0.180	0.012	-14.720	0.000	-0.204	-0.156
DAX	0.016	0.008	2.001	0.046	0.000	0.032
CAC	-0.051	0.008	-6.254	0.000	-0.067	-0.035
N225	0.034	0.001	25.126	0.000	0.031	0.036
Hang Seng	0.032	0.002	17.046	0.000	0.028	0.035

Table 15 Regression analysis on the ringgit's value versus 10 major currencies is presented in this paper. Researchers have discovered a favorable correlation between the (independent X), which is based on the multiple R, and the Malaysian ringgit – Financial stability (0.966) Indicating that there is a strong connection between the ringgit and other major currencies, the correlation is close to one. Based on the R2 value of 0.934, it can be stated that independent X is responsible for 93% of the change in dependent Y. (the performance of the ringgit).

The calculated standard error of the regression (0.1094198) helps to the explanation of MYR's unpredictable behavior. In terms of statistical significance, there are statistically significant links between the USD and the PHP (p=0.000 0.05), the SGD (p=0.000 0.05), the THB (p=0.000 0.05), the EUR (p=0.000), the GBp (p=0.031 0.05), the Japanese yen (p=0.012 0.05), and the Australian dollar. A statistically significant difference between the dollar's value in relation to the Indonesian rupiah and the Chinese yuan couldn't be found in either of these two exchange rates.

Statistically insignificant are the negative correlations between the US dollar and the Malaysian ringgit (-0.011) and the dollar and the British pound (-0.011), as seen in Table 16. The remaining currency pairings have a statistically significant association, which is an excellent indication. As shown by the negative correlation coefficients, the value of the Malaysian ringgit (MYR) is adversely connected to increases in the exchange rates of the Singapore dollar, the Japanese yen, the Swiss franc, the Australian dollar, and the Canadian dollar.

Since the USD-MYR correlation coefficient is higher than the USD-GBP correlation coefficient, we may conclude that there is no statistical significance in this connection. As a result of the ASEAN-5 nations' tight economic and cultural links, the ringgit has a strong relationship with the currencies of its counterparts in the area. Next to USD-BHT (0.867), USD-GBP was the only independent variable to have a negative correlation with the other variables (-0.496). Only one of the independent variables, USD-BHT, exhibited a negative correlation with it (-0.011). A large part of the MYR's volatility is explained by inverse correlations between the US dollar and the AUD, Yen, and Yen-JPY currencies. AUD/USD and USD/JPY are correlated in the opposite direction. The performance of the USD-HBT and the ringgit have no statistically meaningful link (2.411)

Chapter # 5

CONCLUSION

Compared to the baseline scenario, both the aggregate capital ratios and bank profitability were somewhat lower in the alternative scenario (i.e., not a real stress situation). The CAR and Tier 1 capital ratios declined by 1.64 percent and 1.38 percent, respectively, in reaction to the severe yet realistic and hypothetical shocks. There were 13.564 percent and 11.924 percent, respectively, after the stress test was completed for the CAR and Tier 1 capital ratios. When the 10.5 percent Basel III minimum capital requirement is taken into consideration, banks' CAR and Tier 1 ratios are at least two percentage points higher than the 10.5 percent necessary. From 1.41 percent to 1.24 percent, ROA (Return on Assets) and ROE (Return on Equity) dropped as a consequence of regulatory tightening, respectively (a change of -2.30 percent).

The baseline scenario increased the risk of net foreign exchange exposure from 13.12 percent to 14.31 percent as a result of Malaysia's ringgit's rapid depreciation in relation to major currencies (an increase of 9.1 percent). The dollar (generally) and the euro are two of the most prominent

currencies (in specific). Extensive study of financial soundness indicators (FSIs) throughout the banking sector resulted in low-risk ratings for CAR and Tier 1. As a whole, the CAR and Tier 1 categories obtained a score of 1.13 and 1.05 in the CAR and Tier 1 categories, respectively (FSIs). Following this assessment, a credit rating of 1.33 was awarded to the Malaysian banking sector, indicating that it has enough liquidity. Based on the ratio of liquid assets to total assets, the default analysis assigned net foreign exchange exposure to capital and liquid assets to total assets the probabilities of 2.70 and 2.30, respectively (3.0 meant high risk). While their CAR and Tier 1 capital ratios were outstanding, the PD rating of 2.83 showed that pre-adjustments made in the baseline scenario before the beginning of bad scenarios negatively affected their capital ratios during the disastrous scenarios. It is clear that the financial institution faces increased credit risk and consequent losses as a consequence of its high proportion of gross nonperforming loans (NPLs) to total loans. It was very likely that the project would fail if it received a score of 4.0. There was a substantially greater effect on capital ratios from the worst-case scenario than the best-case scenario, but the latter had a lot lower impact. Specifically, the CAR and Tier 1 capital ratios fell by 3.81% and 3.37%, respectively, within the same time period. 1.55 percent GDP shortfall necessitated an injection of capital of $4.59 billion, which resulted in a gross domestic product shortfall of $4.59 billion, to make up for the deficit (the cost of insolvent banks to the government). After all that was accomplished, the operation netted 326 people. In the worst-case scenario, no bank was forced into liquidation or had its banking license revoked, despite the fact that numerous other financial institutions had been. Increased provisioning has the biggest average effect on bank capital ratios in the event of a financial crisis, according to the Federal Reserve (-1.32 percent). Interest rates fell by 0.77 percentage points, nonperforming loans rose by 0.64 percentage points, foreign exchange risk rose by 0.65 percentage points, and interbank contagion rose by 0.65 percentage points as a result, all of which had a negative effect on the economy. (-0.65 percent). is equivalent to 0.45 percent of a percent change (-0.45 percentage point) Compared to the baseline scenario, lower real estate and asset prices, as well as increased unemployment, drove the ROA and ROE ratios into negative territory, resulting in an overall decrease in profitability (-0.54 percent and -1.44 percent respectively).

This resulted in a dangerously close average rating of 3.72, which was considered a severe condition at the time of the survey. An overall rise in risk across the board was identified, suggesting that banks needed to maintain substantial capital buffers. Even though the bank's

balance sheet was weighed down by massive loan losses and a funding freeze, the capital ratios remained above the Basel III minimums; the total capital ratio (CAR) and Tier 1 capital ratio (TCR) both exceeded the Basel III target ratio (7.0 percent) despite massive loan losses and a funding freeze (4.5 percent of CET1 plus 2.5 percent of capital buffer). Banks must raise an extra $10.5 billion in capital by 2019 in order to be compliant with the new capital criteria. On a 1.00 to 10 scale, only the CAR and Tier 1 capital ratios were evaluated worse than 3.00 points out of ten by the agency (2.39 and 2.28 respectively). In terms of Malaysia's financial system, credit and market risks are critical. Credit risk shocks outweigh market risk shocks in all three situations. Under the worst-case scenario, the current CAR and Tier 1 capital ratios would have decreased by 5.31% and 5.112%, respectively, in comparison to their present levels. It's astonishing how stable the CAR and Tier 1 ratios were over this time, despite losses of more than 5 percent in each direction during this period. As a consequence of the $10.52 billion in capital shortfalls, the capitalization needs have increased dramatically (or 3.55 percent of 2015 GDP). Most Islamic banks, regardless of size, would have required to raise more capital to fulfil the 10.5% regulatory capital threshold outlined in the paper. Financial sector returns on assets (ROA and ERA) were at their lowest levels ever recorded by the Federal Reserve, according to Federal Reserve statistics (ROE).

Since this research differs from previous studies, it may be used in a wide range of contexts, including by the BNM, the banking supervisory community, and bank executives. In spite of the fact that BNM has considerable capital reserves derived from highly lucrative local and foreign activities, the bank should avoid becoming unduly dependent on these sources of capital. The BNM and individual banks should reevaluate their credit risk standards and make them even more conservative, as shown in the chart below, since their capital levels would degrade far more under the two worst-case scenarios. For this reason, the Bank of Mexico (BNM) must keep a tight check on the hot real estate market and growing consumer debt in order to ensure that these sectors do not put a strain on financial institutions' capital (banks). Government spending reductions will almost certainly cause banks to hold onto their cash, which will cause the financial system to freeze and increase the number of sovereign debt crises, which will have a negative influence on economic development.

5.2 Study limitation

Financial networks are intertwined on a number of levels. As a multiplex network, the financial system is the most accurate description. The system's stability is defined by the interplay between the contagion process and other levels. It's easy to miss out on potential contagious routes if just one layer of the system is researched at a time.

Problems with the data dealing with massive amounts of data and consolidating it is difficult when viewed as a multiplexed network. However, the International Monetary Fund and the Financial Stability Board (FSB), as well as the Data Gaps Initiative, have all acknowledged that more work is needed in this area. There are three types of endogenous networks. In addition to understanding the internal incentives that drive the emergence of diverse network topologies, it is also vital to understand the stability of external networks. Products and services relating to climate change are available at low prices, and climatic stress testing is carried out. The financial system's susceptibility to climate change has long been acknowledged. Research on financial institutions' direct and indirect exposure to climate risk has recently shifted to a novel and very successful approach known as a network-based climate stress test (Battiston et al., 2017b). Political pressure to learn more about how climate risk impacts financial stability is growing, and we expect academic interest in this topic to soar as a result (for additional information, see section 7). Input-output connections among several economic sectors. There has to be an expansion of current stress testing techniques, as Silva et al. (2016) shown in their research. Network effects in the real economy have been well documented as a possible explanation for a number of macroeconomic aggregate phenomena (; Carvalho et al., 2016

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