



Lisbon School
of Economics
& Management
Universidade de Lisboa

MASTER
MONETARY AND FINANCIAL ECONOMICS

MASTER'S FINAL WORK
DISSERTATION

WHAT ARE THE COSTS OF LARGE BANKS IN BANKING CRISES? A
COMPARATIVE STUDY

AJIBOLA OLUWASEUN ENIFENI

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SUPERVISION:
RITA MARTINS DE SOUSA

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GLOSSARY

BCBS - Basel Committee on Banking Supervision

CDO - Collateralized Debt Obligation

GDP - Gross Domestic Product

OECD - Organisation for Economic Co-operation and Development

OPEC - Organization of Petroleum Exporting Countries

RWA - Risk-Weighted Assets

ABSTRACT

In this research, we study the cost of Banking crises, focusing on analysing the cost borne by large banking systems while comparing them to smaller banking systems. We use a logit regression to ascertain variables most important for our research and we engage in a descriptive and comparative analysis. Most importantly, we analysed the general cost of banking crises and how they affect both developed and developing economies, using variables such as GDP and house prices, specifically between 2000 to 2019. Our results show that banking crises indeed affect GDP and the intermediary function of banks. Houses are used as collateral for loans and, in turn, as assets for Banks; the diminishing value of houses during a crisis also affects interest and the size of credit the bank is willing to offer. We finally enhance the study by comparing the cost of crises between developed and developing economies. The results suggest that larger banking systems face higher risks, but their huge capitalisation mitigates these risks, and the effects of crises borne by groups of economies are different. Active regulation and supervision have proven to help prevent and greatly minimise the effects of banking crises.

KEYWORDS: Banking Crises, Banking Regulations, Central Banking, Financial Crises

JEL CODES: C10, E50, G01, G21, G28

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ACKNOWLEDGMENT

I want to thank my family for their encouragement and comprehensive support throughout my master's degree when I needed it the most.

I would like to specially thank Professor Rita Martins de Sousa for her support and guidance towards this project; She was a true mentor and teacher; all her suggestions and corrections were practical and essential towards completing this project.

THE COSTS OF LARGE BANK IN BANKING CRISES

By Ajibola Oluwaseun Enifeni

1. INTRODUCTION

The sustenance and stability of banks have always been affected by crises usually caused by banks' risk-taking behaviour. Frequent and dynamic crises have always characterised banking. These failures have commonly risen due to lack of proper supervision and regulation and Banks zealous practices.

The failure of a single large bank can disrupt the financial and economic activities of countries around the world, these are known as the too big to fail banks, and they have failed in the past due to their risky nature of business.

Due to the large size of some economies financial system, this being evident in their GDP, their failure often hinges on the economic performance and stability around the world, this, therefore, dictates that the size of financial institutions, especially banks, have a relatively direct impact on the costs borne by countries during a financial crisis.

Various regulatory measures have been put in place over time to elevate or reduce the impact of these crises. The most common and important of those regulations are the Basel agreements. Providing better and more capital in the financial system and more balanced liquidity is its germane goal. Harnay & Scialom. (2016) concluded that bank funding and liquidity regulation are the core of Basel III.

Establishing these regulations is not enough as enforcing and supervising banks' risky activities is equally important; some of those risky activities have been loosely regarded as "innovations". These innovations significantly hampered the world's economy during the 2008 financial crisis.

These regulations need to evolve as banking activities are equally ever-changing continually; the 2008 financial crisis highlights this viewpoint as the evolving activities of

banking to an extent caused by the creation of complex financial instruments was a significant factor that led to the crisis (Claessens & Kose, 2009).

Failure on the part of regulatory bodies to supervise and put proper regulation to guide and control the decisions of large banks with massive deposits has been a major deterrent to the stability function of Central Banks around the world.

When crises occur, the whole economy is usually affected, depositors, shareholders, liability holders, taxpayers, the government, and the financial market. This is a systemic crisis.

Depositors need to be convinced that their banks are stable and solvent, a single panic is a potential catalyst for disruption of the whole banking system as panic usually results in large and disruptive withdrawals by depositors. Those depositors eventually request for their deposits, and this sends a shock to other depositors banking with solvent banks. As banks do not necessarily have all deposits in liquid form and as such banks assets are impacted, eventually a crisis birthed by a system risk.

Bank Capitalisation is equally important as it has been observed that higher bank capitalisation leads to higher profitability, and banks with a higher capitalisation have proven to perform better during banking crises (Köster & Zimmermann, 2017).

This research analyses the cost of banking crises due to economies with large banking systems. It further discusses the effects of banking crises on output variables such as GDP and house price and compares the effects and costs on both developing and developed economies as these economies have been observed to have different economic problems and structures.

Therefore, the following questions guide the research analysis:

1. What are the costs of banking crises in economies with large banking systems?
2. What are the effects of banking crises on GDP and House prices?
3. The cost of banking crises are the same in developed and developing countries?

The remainder of the paper is organised as follows: Chapter 2 provides the literature review; Chapter 3 provides the Data sourced and the research methodology. Chapter 4 focuses on the Results and discussions, and Chapter 5 is the conclusion.

2. REVIEW OF LITERATURE

2.1. What is a banking crisis?

A banking crisis is the liquidity and insolvency of one or more banks in the financial system. Due to bank's significant losses, banks face critical liquidity shortage to the extent that it disrupts its ability to repay the debts it has contracted, and the withdrawals demanded by its depositors.

Laeven & Valencia (2013) defines banking crisis with a comprehensive approach by looking at the pre-crisis signs and the post-crisis interventions. They defined it as the significant signs of financial distress in the banking system, which are characterised by various widespread consequences such as significant bank runs, losses in the banking system, or bank liquidations, as well as significant banking policy intervention measures in response to the losses in the banking system (Laeven & Valencia, 2013).

Significant changes in credit supply and prices of assets, disruptions in credit availability to borrowers, inability to meet the required capital equity and government support are major occurrences during a financial crisis (Claessens & Kose, 2009).

Banking crisis also leads to capital flights by financial investors due to doubts about the solvency of a country's financial system. These capital flights usually have negative effects on the securities and currency markets of such countries. They emerge when share prices fall and due to panic sale of assets which are usually seen as clear indicators that banks would become insolvent (Grossman, 2016).

Central banks of advanced economies have major goals of maintaining price stability and the stability of their financial system as the effects of financial instability are widespread and harmful to the economy. During a financial crisis, the central bank has to bail out insolvent banks and finance budget deficits by issuing money (Cukierman et al., 1993).

Banking crises affect the level of inflation and shrink the available credit for economic expansion. It usually leads to panic, which eventually causes bank runs by depositors to withdraw their deposits before their banks close; even solvent banks experience these runs because depositors do not usually know solvent banks and those that are insolvent. Financial crises are sometimes the outcome of irrational decisions such as bank runs and panics (Claessens & Kose, 2009).

De Bandt et al. (2012) explains how banking activities might be correlated as bank contagion; a possibility of bad news regarding the failure of a bank might harm the stability of other banks. Systemic risk could be seen as evidence of bank contagion with simultaneous failures in the banking system.

Banking crises have widespread effects on the economy; therefore, Central Banks' decision to solve the instability is equally important as their response might affect the confidence of depositors and bankers. Exposure to a lot of risks is one of the banes faced by large banks. They perform an intermediation role by matching lenders with savings made by the bank's depositors. These deposits are large liabilities in a bank's balance sheet because depositors as economic agents expect to have access to their savings whenever they want to; this puts banks at liquidity risk as these deposits have been used to serve the intermediation role. The USA sub-prime mortgage crisis of 2008 is an example of a financial crisis partly caused by excessive borrowing and lending (Dam, 2012).

Large banks are majorly faced with credit, operational, market and liquidity risks:

- Credit Risk is the risk faced by the creditor (Banks) in the event of the unfulfillment of debt obligation by the debtor either on the amortisation or principal of the offered credit at maturity. ".....low rates in turn prompted a hunt for yield on the part of banks and institutional investors. Financial innovations sought to provide higher returns to serve this desire, but the consequence was higher risk and/or increased opacity e.g., via higher credit risk in structured products and sub-prime loans." (Barrell & Davis, 2008, p. 6).
- Operational Risks in banking are the risk of loss that accrues from inadequate or failed internal systems, controls, procedures, or policies due to errors by employees, breaches, fraud, or any external event that affects the traditional banking process. The Basel I framework described Operational risk as all risks which are neither market nor credit risk. In Basel II and III, Operational Risk is the risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events. This revised definition includes legal risk (Basel Committee on Banking Supervision, 2006).
- Market or Systemic Risk is the risk associated with the uncertainty relating to an investment decision. This risk is dependent not only on a single entity or industry but also on the whole market's performance. Systemic risks are the reaction between institutions' negative performance in general terms (Tunay et al., 2020).
- Liquidity Risk is a major factor leading to bank failures through bank runs. Financial institutions such as banks depend heavily on borrowed money in the form of Bank deposits to achieve their intermediary goals. Liquidity risk is simply a situation whereby an entity cannot liquidate its assets to meet its needs without impacting its market price. Liquidity risk affects the ability of a bank to trade its assets. Claessens & Kose (2009) explain that bank runs occur when there is a suspicion by many depositors that their

banks would become insolvent; this leads to further fear. Eventually, the bank is limited by time in liquidating assets.

These risks pose major threats to banks and the economy they operate in, and they lead to various costs which could lead to insolvency of banks. The prevention of these costs has been well studied and established that it is quite important for regulations to be put in place to prevent banks from becoming insolvent. It is also evident that the larger the banks, the more risk they are willing to take; the intermediation role of large banks makes them more exposed to risks as the loans they give out might not be fully repaid, leading to various non-performing loans and write-offs; this makes the available funds in banks lesser than the deposits made by their customers, banks capital is usually in place to cover such loans, but banks might also need to liquidate their assets. Banks may have to liquidate all their assets at a loss, which may lead to bank failure (Diamond & Dybvig, 1983; Reinhart & Rogoff, 2013; Grossman, 2016).

2.2. Banking crises in a long-run perspective

Claessens & Kose (2009) concluded that identifying and dating banking crises is quite complicated. Reinhart et al. (2008) also emphasised the importance of having reasonably accurate output data when analysing the cost of banking crises as it helps to determine the severity of the crisis. Nevertheless economic output data (GDP) for most countries before the twentieth century are quite inaccurate, this, therefore, is a major limitation when trying to assess the impact of crises.

Banking crises have been observed to have lasting negative effects on the economy (Kenny et al., 2021). Banking crises have occurred over different periods, from before the First World War, the interwar period, the great depression, post World War II to the subprime crises. However, the earliest banking crisis occurred in the 18th century during the Amsterdam banking crisis of 1763, largely caused by credit crunch because of the Seven years' war (Schnabel &

Shin, 2003). During the industrial revolution, the United Kingdom experienced various banking crises with huge drops in economic growth in the years after, with long-lasting negative effects on the economy (Kenny et al., 2021).

Determining the end of a banking crisis is crucial in understanding the costs it has generated, regulations to be enacted, and forecasting the possibility of another crisis in the future. In essence, when do we consider a crisis to be over? Hoggarth et al. (2002) consider that a banking crisis ends only when output growth returns to the pre-crisis period.

Laeven and Valencia (2013) suggest that banking crises occur in cycles; they found that banking crises usually occur during credit cycles. The study showed 35% of the episodes studied were preceded by a credit boom.

Many pre-First World War reoccurring banking crises like the various crises suffered in England between 1825 and 1890 and the U.S. across the nineteenth and twentieth century were preceded by huge economic expansion due to gold inflows and speculations. These periods were characterised by the boom-bust cycles with more expectations and speculations about economic growth leading investors to seek more investment opportunities and fewer investments into less-credit worthy projects, which ultimately causes accumulation of debts. These upward movements have been observed not to stop and stabilise equilibrium, thereby upholding the boom-bust theory (Grossman, 2016).

When a large bank fails, this collapse of the single bank could be regarded as a banking crisis (Grossman, 2016). The failure of Union Générale, France in 1881, City of Glasgow bank, Scotland in 1878 and Credit Anstalt, Austria in 1931 have all been regarded as banking crisis emanating from a failure of a single large bank.

Aliber & Kindleberger (2011) regarded the 1873 crisis, which emanated in Austria & Germany and affected Holland, Italy, Belgium, U.S and eventually Britain, Russia and France, as the first truly international crisis.

The interwar period (1918-1939) had frequent and more severe crises than the preceding ones, with a 40% fall in the number of commercial banks operating in the U.S., with over 11,000 banks being suspended in 1933 (Grossman, 2016). Macroeconomic fluctuations characterised this phase - the end of the first world war and rebuilding created a boom that eventually collapsed in 1921; another boom emerged after this period and eventually collapsed as a result of the 1929 great depression. The interwar period experienced fear leading to contagion as depositors lacked confidence in their banks and wanted to liquidate their deposits, leading to the collapse of financial institutions in Germany & Austria and suspension of banks in the U.S. (Grossman, 2016).

Growth in financial crises can be traced back to the early 1980s, when the U.S. experienced a serious recession primarily linked to the Federal Reserve's capitalist monetary policy. There was also a huge drop in government spending, and a prolonged and uneven recovery followed this period due to tax cuts by the U.S. government (Aliber & Kindleberger, 2011).

Governments aimed for the stability of the banking system through an increase in regulation; this was due to the severe crises during the interwar period, more countries adopted banking codes used by few countries in the past to limit entry into the banking system, stipulated capital requirements that need to be met by banks in operation, as well as banks balance sheet requirements (Grossman, 2016). The commonwealth banking act of 1945 set interest rates during war periods (Claessens & Kose, 2009). These regulations were still in place even after the end of the war until the 1980s.

The regulations after the interwar period were to a great extent effective "... after the end of the second World War, nearly 30 years would pass before the industrialised world was again subject to serious episodes of banking instability." (Grossman 2016, p. 450).

After the war periods, substantial growth was observed in the banking system. The stability and progress were associated with the economic growth experienced in industrialised countries,

increasing demand for banking services. Regulations had also restored confidence in banking activities. Grossman (2016) stated that these regulations were relaxed in the late 1960s. There was an increase in trade liberalisation, which wiped out interest rate control on lending and allowed foreign entry into the domestic banking market. The OPEC oil shocks of 1973 and 1979 also created instability in the banking system. To save the instability, regulators eliminated the existing interest rate cap, and banks had more freedom; this only led to an increase in instability.

Deregulation was also rampant amongst the Nordic European countries around the 1980s as interest rate ceilings on loans and deposits were removed; this led to an increase in various instruments such as Bonds and relaxed foreign exchange controls in the money market, which allowed foreign banks to operate domestically. The subsequent period around the 1990s led to an increase in household and corporate debts, with increases in bank lending, house and stock prices soared, eventually leading to the failure of many large banks (Aliber & Kindleberger, 2011; Grossman, 2016).

The U.S. government experienced a recession in 2001 and tried to stabilise the economy by reducing interest rates. This created capital liquidity and investors were willing to take more risks by engaging in riskier investment; investors were more concerned about their returns on investments and did not take much caution into the level of risk attached to those investments (Dam 2012). Mortgage Brokers were willing to continue connecting borrowers and banks to believe that house prices would continue to rise. Borrowers were also willing to borrow more to finance houses, and the low rates were the best opportunity to achieve this. Even though most of these borrowers had little to no assets to back up this credit, this would eventually increase house prices (Dam, 2012).

In the 21st century, the 2008 financial crisis is considered the most severe crisis. Claessens & Kose (2009) mentioned various causes of the crisis which are similar to previous crises,

namely: the increases in unstable asset price; credit booms which led to excess lending and borrowing and eventually leading to huge debt burdens as well as bad debts; failure on the part of regulatory bodies to supervise and put in place proper regulation to guide and control the decisions of large banks with huge deposits (Dam, 2012).

The U.S. enjoyed a great period of boom after the 2000 dot-cum bubble, with great economic expansion and economic growth due to the expansionary fiscal policy incorporated by the U.S. government with great tax cuts, reduction in interest rates (Grossman, 2016). This led to the growth of the housing market in the U.S. and innovation ensued as financial instruments such as mortgage-backed securities were created. Investors did not know the composition of most of these securities, with many of these products ended up being worth absolutely nothing (Dam, 2012).

Rating agencies also compounded the problem as investors were willing to invest in these collections of securities called 'tranches' as they seemed attractive and had good ratings. Senior tranches were given triple-A ratings, but they contained subprime loans. These were packaged with other loans and sold together. Investors would have invested less in them if rating agencies had given these tranches lesser and accurate ratings (Dam, 2012).

Default on loans held by owners of low-quality mortgage debt led to increases in the number of defaults on the debt obligation; this crisis rapidly spread across Europe due to the size of these U.S. banks (Grossman, 2016) and the interconnectedness of banks in the global banking system (Tran et al. 2016).

Barrell & Davis (2008) also mentioned that low real interest rates stimulated asset price bubbles due to increases in lending and the need for improvement in the regulatory framework. Nonetheless, the 2008 financial crisis was not solely caused by these factors but had its unique causes, such as the extensive use of complex financial instruments such as the CDOs,

leveraging of financial institutions, high dependence of the global financial markets on the U.S. economy (Claessens & Kose, 2009).

Looking at the long run, we can conclude that deregulation, financial innovation without proper monitoring and lack of proper supervision have been evident causes of banking crises in the past. The provision of proper regulation can be important in preventing or minimising the effects of these crises.

2.3. Regulatory Measures – Basel Agreements

The 2008 financial crisis has made the significance of Banking regulations more crucial, becoming a major topic both economically and politically. Previous regulations such as the Basel I proved to be less efficient as they've focused mainly on micro-prudential supervisions (Harnay & Scialom, 2016), emphasised the robustness of financial institutions balance sheets to avoid shocks.

Indeed, the current issues faced by many financial institutions require more than micro-prudential supervisions as Tran et al. (2016) put: “In the wake of the recent global financial crisis, the Basel Committee on Banking Supervision (BCBS) introduced a number of new macro-prudential regulatory measures designed to address the systemic risk due to bank interconnectedness in the global banking system. This regulatory framework, known as Basel III, contains a central piece of reform that strengthens capital requirements.” (Tran et al. 2016 p. 98).

As we see in the previous section, financial crises have occurred in various periods in history. Economists and financial regulators have looked at several measures to avoid them from occurring again. The recent Basel III, widely adopted in internationally active banks, is a global regulatory framework for capital adequacy, stress testing, and market liquidity risk.

Since then, the Basel III regulation has been put in place to reduce risks taken by large banks and prevent such crises from occurring in the future. Today, banks must meet certain standards to operate, with the minimum capital adequacy ratio that banks need to maintain at 8%; this is the bank's capital to its risk-weighted assets. Risk-weighted capital requirements and leverage restrictions can reduce the excessive risk-taking behaviour and make banks reveal information on the risks they face (Blum, 2008).

The Basel III focused mainly on core requirements such as providing better and more capital in the financial system and more balanced liquidity. The Basel III came into operation to reinforce the three pillars laid down in Basel II and strengthen regulation and the micro-prudential supervision of each bank while also covering macroprudential aspects of regulation; in essence, system-wide risks (Filipe & Sousa, 2013).

Bank funding and liquidity regulation are the core of Basel III (Harnay & Scialom, 2016). With more emphasis on capital regulation to ensure systemic stability rather than a risk-based approach. The new Basel approach now focuses on major changes with more structural regulations and better resolution approaches. Considerable importance is being placed on liquidity, funding, and solvency; also, more detailed supervision of banking operations than before the 2008 financial crisis.

TABLE 1 – Main differences between the Basel Agreements

	Basel I	Basel II	Basel III
Objective	It was formed with the main objective of enumerating a minimum capital requirement for banks.	It was established to introduce supervisory responsibilities and to further strengthen the minimum capital requirement.	The major objective was to specify an additional buffer of equity to be maintained by banks.

Risk Focus	The least risk-focused out of the three (3) accords.	Introduced a three-pillar approach to risk management: Minimum capital, Supervisory review process, and Market discipline disclosure.	In addition to the three pillars of Basel II, it also included assessment of liquidity risk.
Consideration of Risk	Only credit risk is considered in Basel I	Includes a wide range of risks, including operational, strategic, and reputational risks.	Liquidity risk was included in Basel III. It also addresses systemic risk in its two dimensions, the time dimension mitigating procyclicality and a cross-sectional dimension mitigating interconnection and contagion risk.
Predicting future Risks	Backwards-looking as it only considered the assets in the current portfolio of banks.	Forward-looking compared to Basel I since the capital calculation is risk sensitive.	Forward-looking because macroeconomic environmental factors are considered in addition to the individual bank criteria.

Source: Filipe & Sousa (2013 p. 628), with adaptation by Author

Former approaches to banking regulations have been regarded as micro-prudential, with more focus on the individual rather than the whole. As seen in Table 2 below, the objective of a micro-prudential approach is quite different to that of the macro-prudential approach, with the major objective of the latter being to limit the risk of occurrence of financial distress with significant losses in terms of the real output for the economy. At the same time, the former focuses on limiting the risk of episodes of financial distress at individual institutions, with an oversight on the impact on the whole economy.

Also, the Macro-prudential approach is quite endogenous as it looks at the collective behaviour of each institution in the system. On the other hand, individual institutions behaviours are being monitored under the micro-prudential approach.

TABLE 2 – Micro-Prudential vs Macro-Prudential Risks.

	Macro-prudential Approach	Micro-prudential Approach
Proximate Objective	Limit financial system-wide distress.	Limit distress of individual institutions.
Ultimate Objective	Avoid output (GDP) costs.	Consumer protection (Investor/depositor).
Characterization of risk	Endogenous: Dependent on collective behaviour.	Exogenous: Independent of Individual agents' behaviour.
Correlation and common exposure across institutions	Important.	Irrelevant.
Calibration of prudential controls	In terms of system wide risk: Top-down.	In terms of individual institutions risks: Bottom-up.

Source: Borio (2003 p. 2).

Claessens et al. (2010) noted little to no attention towards systemic risks in the pre-crisis period. Therefore, the bank leverage ratio protects the institution from underestimating the level of risk they are exposed to, unlike the previously adopted RWAs (Hellwig, 2009).

Post-crisis, more structural banking regulation has also been put in place with new banking laws such as The Volcker rule and French Banking Law. These attempts to separate and regulate banking activities, with its major goal being to segregate sole speculative activities carried out by banks as it prohibits proprietary trading and limits certain fund activities. The Volcker Rule, like French banking law but adopted in the U.S., is also a regulation that prohibits banks from conducting certain investment activities with their accounts, it also limits banks dealings with hedge funds and private equity funds. These rules were all put out in response to the financial crisis of 2008.

The importance of these rules cannot be over-emphasised. As Boot & Ratnovski (2016) stated, the risk of involving banking trading activities with traditional banking activities has potential for more risk exposure, this is because these large banks often tend to move towards

trading activities which eventually undermines the commercial duties leaving them more exposed to various risks such as market risks.

Can we thereby conclude that these rules, laws, and regulations are sufficient? Or are they a catalyst for further threats to banking operations and financial stability as a whole? “.... banks are subject to minimum capital requirements. When a bank fails to maintain adequate capital standards, it may face mandatory restrictions on its activities and incur reputational costs from adverse market reactions. The regulatory requirements may therefore affect the interrelationships among liquidity creation, capital, and bank profitability.” (Tran et al. 2016 p. 106).

Therefore, a continuous and extensive approach towards banking operations with a combination of financial and public economics is recommended as banking activities are also continuously evolving (Harnay & Scialom, 2016).

2.4. Banking crises: Comparing costs

Grossman (2016) explained that defining what a crisis is itself is complicated, and there is no universally accepted definition of a financial crisis. Hoggarth et al. (2002) also reiterated the complexity of measuring banking crises.

Nevertheless, when Banking crises occur, four major stakeholders have been identified to be the most affected as much as the economy: Shareholders as they have direct equity in these banks, Liability holders as they have funds in the form of deposits, Taxpayers through government intervention and lastly the financial market itself as these institutions are intercorrelated and affected through contagion (Grossman, 2016; Hoggarth et al., 2002).

The cost borne by shareholders is far-reaching as shareholders may be requested to provide capital more than their initial investment to satisfy creditors. This type of capital has been referred to as 'uncalled capital, which happened historically after the failure of the City of

Glasgow Bank in 1878; these eventually led to the insolvency of over 85% of the bank's shareholders (Grossman, 2016).

Government and Taxpayers whose funds are used to settle depositors during crises also suffer costs as the government aims to return the financial system to the pre-crisis period; only then can the crisis be considered over (Grossman 2016; Hoggarth et al. 2002). Taxpayers might even see increases in their tax burden if the funds recovered from selling failed banks assets are not enough to cover their debts. Governments sometimes have also been forced to inject capital to recover failed banks; this happened, for instance, in Germany during the Great Depression (Grossman, 2016).

Bank recapitalisation has also been a huge burden on economies' output. As Caprio & Klingebiel (2003) estimated the fiscal costs on GDP at 55% in Argentina (1980-82), 47% in China (1990s), 25% in Côte d'Ivoire (1988-91), 24% in Japan (1990 – 2003), and 11.2% in Finland (1991-1994).

In analysing banking crises, various approaches have been employed. Kaminsky & Reinhart (1999) examined the twin crises (banking crisis and other crises) with a signals approach by studying and differentiating the behaviours of economic indicators before and after a crisis; this was achieved by identifying individual variables to indicate the likelihood of crisis once a set value is surmounted.

Since the 2008 financial crisis, there has been more scrutiny on the role of banks in analysing the policies to prevent such crises in the future. The risks taken by banks have also contributed to crises, as Keeley (1990) discusses how higher risks with lower returns cause instability of the financial system.

Macroeconomic instability, low banking profitability and high foreign exchange risk are recognised as three key crisis-prone conditions, and they pose major stress to financial stability as high inflation. Usually, around 20% or more is associated with low growth in terms of trade,

tends to increase the probability of banking crisis (Dutttagupta & Cashin, 2008). Similarly, in their findings on the twin crises, Kaminsky & Reinhart (1999) concluded that banking crises are often associated with large exchange rate movements, especially currency crises.

Samad et al. (2020), Dutttagupta & Cashin (2008), Kaminsky & Reinhart (1999) mentioned various indicators such as GDP growth, fiscal deficits, interest rate and inflation as major variables used to measure the effects of crises on economies, not only limited to these macroeconomic variables, monetary indicators have equally been used to measure and monitor financial crises with foreign exchange reserves, credit extended by the government to the private sectors all being an indicator.

In Minsky's classical approach, exogenous shocks to the financial system such as huge displacement or innovation and the increases in the supply of credit during economic expansion and the ensuing decline in supply have increased the likelihood of a financial crisis (Aliber & Kindleberger, 2011). Such innovations can be related to the 2008 financial crisis, which was to a reasonable extent caused by the creation of complex financial instruments, as mentioned by Claessens & Kose (2009).

Hoggarth et al. (2002) measured the fiscal cost of crisis by measuring variables such as the percentage of non-performing loans, bank credit to GDP ratio, the fiscal cost to GDP ratio, and the currency crisis across various countries.

Dutttagupta & Cashin (2008) analysed banking crises between 1990 – 2005 in a sample involving 50 emerging market and developing countries, of the 19 variables mentioned. Their model focused mainly on five variables which they regarded as the most important, namely: nominal depreciation, bank liquidity, banking profitability, liability dollarization and inflation. These variables cut across various factors such as monetary conditions, external vulnerability, the health of the banking sector and the macroeconomic environment in which these banks operate.

Reinhart & Rogoff (2013) called the financial crisis an equal opportunity menace while also stating that the frequency of occurrence of these crises is similar in both advanced and emerging economies. The 2008 financial crisis affected many developing countries; however, countries with a closer relationship with the world economy were more affected by the financial crisis. Even though emerging markets were grossly impacted by the financial crisis, a general analysis using similar variables across developed and developing countries would reveal varying and opposing results (Samad et al., 2020).

Caprio & Klingebiel (1997) presented cross-country data on various episodes of bank insolvencies since the 1970s and found that banking crises are more costly in the developing world than in developed countries as these crises bear more burden on the incomes of such countries.

It would be unfair to compare developed and developing economies markets using broad variables such as real GDP growth and domestic real credit growth as such data are deficient in developing nations, with observations that credit growth played a significant role in developing countries who had these financial limitations (Barrell et al., 2010). Developing countries are also faced with vast socioeconomic issues which are gravely dependent on the activities and outcomes of financial institutions and regulators across the world. As Caprio & Klingebiel (1997) placed:

“Developing country banking systems are experiencing widespread problems that need to be dealt with since finance, particularly banking, is so important to long-run economic development (King and Levine 1993; Schiantarelli and others 1994). The World Bank and other multilateral institutions clearly must do something. The size of banking system losses shows that resources are being misallocated on a large scale and that growth is being commensurately reduced. And because governments are devoting funds to fixing banking problems, these funds are not available for health, education, or other programs. Because incentives are a large part of the problem, however, major financial sector lending is not recommended unless developing country authorities adopt a more incentive-compatible regulatory framework. Thus, the World Bank may well

have to reject requests for financial sector loans when countries' banks are insolvent.”

In (Caprio & Klingebiel, 1997 p. 21)

Among the costliest crisis since 1970 covered by Laeven & Valencia (2013), developing economies represented 80% of the countries that had a massive increase in their public debt during their crisis period. Only Ireland and Iceland were the developed countries with a significant increase in their public debt majorly due to the large size of their financial system, this being evident in their GDP. Therefore, this indicates that the size of financial institutions (Banks) has a relatively direct impact on the costs borne by countries during financial crises, with larger banks having higher costs on these economies.

Various studies on banking crises have looked at mostly its effect on the economy. As preventing and maintaining financial stability is one of the major functions of Central banks, trade openness, interest rate, rate of inflation, the real growth of GDP, and even house prices have been used to measure the costs of a financial crisis. Banking crises have been observed to be preceded by a decline in output and characterised by the growth of credit, rise in interest rates and appreciating real exchange rates (Kaminsky & Reinhart 1999; Barrell et al. 2010; Claessens & Kose 2009).

The application of good prevention, containment, and resolution policies is important in reducing the cost that these crises have on the economy (Caprio & Honohan, 2012).

3. DATA AND METHODOLOGY

This chapter aims to provide information about the variables, sources of data analysed and the methodology utilised.

3.1. Data Collection

This research work sourced data mainly from the most recent Global Financial Development Database (GFDD) of 2019 from the World Bank and House Prices are from USA Federal reserve economic data (FRED). Due to some missing data across varying data sets and periods, the data period runs from 2000 to 2017. The database mainly consists of variables from 20 OECD countries and 15 emerging economies loosely referred to as the Next Eleven and BRICS.

A list of the mentioned countries is in Appendix A. A summary of the variables utilised and their sources can be found in Table 3.

TABLE 3 – Variables and Data Source

Variable	Source	Definition of Variables
Banking Crisis	GFDD	Dummy variable for the presence of banking crisis (1=banking crisis, 0=none); Laeven, M. L., & Valencia, M. F. (2018). Systemic banking crises revisited.
Bank cost to income ratio (%)	GFDD	Operating expenses of a bank as a share of sum of net-interest revenue and other operating income.
Stock price volatility	GFDD	Stock price volatility is the average of the 360-day volatility of the national stock market index.
GDP (Current USD)	GFDD	GDP (Current USD).
U.S. House Price Index	Federal Reserve Economic Data	All-Transactions House Price Index for the United States, Index 1980: Q1=100, Quarterly, Not Seasonally Adjusted.

3.2. Preliminary data analysis

From the dataset present in the World Banks GFDD of 2019, logistic regression was carried out amongst variables to test the level of significance for our research and analysis. Bank cost to income ratio, Bank credit to bank deposits, Bank noninterest to total income and Stock price

volatility were among the most important variables with significance in the logistic regression in our preliminary analysis. (See Appendix B)

From the logistic regression model in Appendix B, our research focused on the bank cost to income ratio and stock price volatility.

3.3. Methodology

To understand the cost of banking crises, a relationship between banking crisis; the dependent variable and Bank cost to income ratio was analysed. This can be mathematically represented as follow:

$$Y = \alpha + \beta X + \varepsilon, \quad (1)$$

Where Y represents the dependent variable, which is a dummy variable for the presence of banking crisis where 1 means there is a banking crisis and 0 means there is no occurrence of banking crisis; α is a constant; β is the correlation coefficient in relation to the independent variable; X is the independent variable, which is bank cost to income ratio, lastly ε is the residual variable to cover possibility of measurement errors.

T-test was used to analyse the cost of banking systems as we aim to observe if larger banking systems incur a higher cost than smaller banking systems during crises. We will compare the mean of the two groups to assess their significance. Countries banking systems variables used are the cost to income ratio during crises. The countries are split into two groups, 20 Developed and 15 emerging countries.

The mean cost to bank ratio for a large banking system ($1869094.65 \pm 2982670.673$) was higher than the mean cost for a small banking system ($1107907.97 \pm 3471183.889$), as depicted in table 5.

For validity and relevancy of comparison, Levene's test tested homogeneity of variance between the two groups. Levene's test was significant ($F = 0.092$, p-value 0.762) at a 5% level

of significance, implying that the variances of the two groups were homogenous. Thus, the equal variance assumption is used in t-test results.

Furthermore, the measure of effect size using Cohen's *d* further supports the findings of the t-test. Cohen's *d* was obtained as follows:

$$d = \frac{(\text{mean } 1) - (\text{mean } 2)}{\text{Std Dev}} \quad (2)$$

The Pearson correlation was used in our analysis to measure the effect of banking crises on output variables such as GDP and House prices. The analysis proved that there is a significant relationship between the house price index and GDP.

We analysed the mean cost to income ratio between developed and developing economies banking systems. An independent t-test was conducted to test a statistically significant difference between the mean costs to income ratios for developed and developing countries. The results of the independent t-test are shown in table 6.

4. RESULTS AND DISCUSSIONS

Banking crises have led to a decrease in financial institutions. There are developed policies governing the financial sectors that should address the risks faced by banks. Changes in the financial state have affected every bank, private, public, large, and small.

The largest financial institutions have been proposed with supervisory changes affecting their banks. Following the regulations guarantees that banks will continue to compete financially and provide credit to businesses and individuals.

Outside shocks have affected banks in the past and in recent times, which is expected to happen even in the future. When banks become insolvent, these affect all banks regardless of their size, a systemic risk.

4.1. Cost of Banking crisis: Do large banking systems face more costs?

Analysis results show no statistical difference between the small and large banking systems regarding the risk they face, and the cost borne. It is evident by the confidence intervals, having a range of values from the negative to a positive number and implying that zero is included in the gap; this would help us make deductions about the cost to income ratio between small and large banking systems.

Larger banking systems are expected to increase their banking capital ratios. Higher capitalisation in their banks would lead to reduced risk rates and, therefore, customers demanding increased risk sensitive rates. In the long run, the productivity of the bank as a business is lowered. On the other hand, lower bank capitalisation has led to smaller banking systems not investing as much and engaging in less risky banking activities (Köster & Zimmermann, 2017), leading to a higher productivity rate by their banks. Although not higher than the larger banks, the productivity is significant.

Countries with smaller banking systems are known to have smaller assets; during an outside shock such as a pandemic, smaller tension of solvency problems is realised in smaller banking systems. Although there is no clear proof for the crisis origin in these systems, they hardly escape downtown during an emergency. Prager & Wolken (2008) state that commercial banks owning less than \$1 billion assets reported the highest profits during their first quarter after the 2008 financial crisis. The smaller banks, even though their records show profits in these years, their capital ratios fell.

In the United States, mergers and acquisitions are common practices for the stability of their financial system. As bigger ones acquire small banks, issuing shares is also an important measure the U.S. has used to sustain its banking system. Myronenko et al., (2018) mentioned that this method of capital generation has been effective due to the amount of U.S. banks that are among the largest in the world.

Large banking systems, essentially the U.S., have since introduced the Dodd-Frank Act in governing their banks and providing regulation to ensure that their banks are held in higher standards for liquidity and the assets present for them to mitigate risks and thus prevent fatal solvency problems. "To promote the financial stability of the United States by improving accountability and transparency in the financial system, to end "too big to fail," to protect the American taxpayer by ending bailouts, to protect consumers from abusive financial services practices, and for other purposes." (Webel, 2013, p. 1)

Although the Americans opt to repeal the law, it has contributed towards their banks solving their uncertainties in their levels. The policy has thus decreased the risks these banks face, hence ensuring higher productivity.

The mean cost to bank ratio for a large banking system is higher than the mean cost for a small one, as shown in Table 5. Also, larger banking systems have higher capitalisation ratios, hence, are subjected to taking risks; therefore, the cost for management for such risks is higher. Unlike smaller banking systems with lower capitalisation ratios, hence, take low-risk investments, consequently, have a lower cost; this has brought in the difference in the cost of banking in the two groups to differ.

TABLE 4 – Descriptive Statistics - Cost to Income Ratio

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Cost to income ratio	124	14999363	637	15000000	1482362.71	3249492.316	10559200313509.484	7.129	.431
Valid N (listwise)	124								

Source: Author's computation using SPSS.

The deviation of cost of banks from means is very large. It shows that costs for banking in smaller and larger banking systems differ. Not all countries with large banking systems have a large mean for the cost to banking ratio, and the same can be said for countries with smaller banking systems as not all countries with small banking systems have a smaller cost of income to ratio.

Capitalisations in different systems also differ. Countries characterized by larger banks might intend to introduce lower investors risk; thus, their banking performance is healthy with a decreased risk in demand and lower investors risk. While some banks will use higher investors risk with the reduced risk due to capitalism, hence lowering the general output of their banks. On the other hand, small banks might decide to engage in risky investments. The activities in larger banking systems make their performance seem higher than the smaller systems who still decide to take on risky investments, hence lowering their outputs.

This difference has brought in the normality of the banking systems; whether small or large, they still can be grouped further from the two groups, hence an even distribution that is almost close to symmetrical.

TABLE 5 – Group Statistics – Banking Systems

	Status	N	Mean	Std. Deviation	Std. Error Mean
Cost to income ratio	Large Banking Systems	61	1869094.65	2982670.673	381891.847
	Small Banking Systems	63	1107907.97	3471183.889	437328.063

Source: Author's computation using SPSS.

The T-student significance test justifies the size differences, which shows a statistically significant difference for the two banking groups, as shown in Table 5. The mean cost difference results from the systems differences in total assets, and therefore regulating the cost for the risk in larger banks requires a higher price than in smaller banks.

The range between the smaller and larger systems is also vast, and this implies that their cost of banking has a more significant difference between the groups.

The result for banking between the smaller and larger banking systems is too peaked, represented by the larger positive kurtosis. The dataset for banking has a heavier tail to the left; this implies that the cost of banking between the systems is not normally distributed.

It is the role of every business to strive to dwell successfully. In doing so, every business should adapt to the competitive environment. This idea has led to balancing the banks' financial performance in both the assets and liability ratios. To reduce the competition from larger banks, the smaller banks have strategized this idea. It has helped them maintain their profitability in the past decades (Prager & Wolken, 2008). Thus, it has also improved their financial state in terms of risk management, reducing their reliance on larger banking systems. Although the larger banks provide perfect substitutes for the smaller banks, the strategy has helped organise the smaller banks to provide efficiency and thus compete with the larger banks.

On the other hand, the larger banks depend on smaller banks, essentially community banks, for services. Management of community banks has been higher, which has improved the loaning to their affiliates thus, attaining higher profits. The competition between the two has resulted in them attaining almost similar profits realised in the long run.

The strategy has brought in almost similar income ratios for the two groups. As the larger banking systems contain more assets, their income is also higher. On the other hand, the smaller banking systems possess lower assets and realise smaller income.

TABLE 6 – Independent Sample Test – Banking Systems

	Levene's Test for Equality of Variances	t-test for Equality of Means
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	F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances Cost to assumed income	.092	.762	1.308	122	.193	761186.678	582023.595	- 390987.159	1913360.515
ratio Equal variances not assumed			1.311	120.315	.192	761186.678	580600.738	- 388331.731	1910705.087

Source: Author's computation using SPSS.

However, looking at table 6, the ratio for their income according to their investments looks almost equal. From the table, the t-test is not significant at a 5% level of significance ($t(122) = 1.308$, $p\text{-value} = 0.193 > 0.05$); this means that there is no sufficient evidence at a 5% significance level to reject the null hypothesis. Therefore, we conclude that there is no statistically significant difference between the cost to income ratio (A bank's operating expenses as a share of the sum of net-interest revenue and other operating income) for large banking systems and small banking during a banking crisis. This finding is further supported by the 95% confidence interval for the difference between the means of the two groups. The interval -390987.159 to 1913360.515 includes 0, thus indicating that there is a possibility that the mean cost difference between the two groups is 0, implying no significant difference; this provides sufficient proof to deduce that the mean cost during a crisis for large and smaller banking systems is equal, as shown in Table 6.

In sum, all the banking systems experience costs during a crisis. Cohen's d effect size of $0.234 (1869094.65 - 1107907.97) / 3249491.31$ is small; this indicates that the difference between the groups is not statistically significant. These findings support the null hypothesis that there is no significant difference between the mean cost to income ratio during a crisis

between the large and small banking systems. Thus, during a crisis, the banking systems experience high costs to income ratio irrespective of whether it is in large or small banking systems.

4.2. The effects of Banking crises on the economy and U.S. House prices

To understand the cost of banking crises, the Pearson Chi-Square was used to analyse output variables such as House prices and economies GDP. The relationship between Banking crises, GDP and the house price index is significant.

However, there is a positive relationship between the banking crisis and the U.S. house price index as indicated by the positive Pearson correlation coefficient greater than 0.3, as shown in Table 7.

TABLE 7 – US House Prices

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Interval by Interval Pearson's R	.765	.013	.546	.423 ^c
Ordinal by Ordinal Spearman Correlation	.671	.013	2.13	.423 ^c
N of Valid Cases	340			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation, this indicates positive associations between the banking crisis and the house price index. Whenever there is occurrence of crisis, both the house price index is expected to fall.

Source: Author's computation using SPSS.

In general, fluctuations in house prices affects the lending ability of banks. Whenever there is a rise in house prices, banks tend to raise their loan volumes.

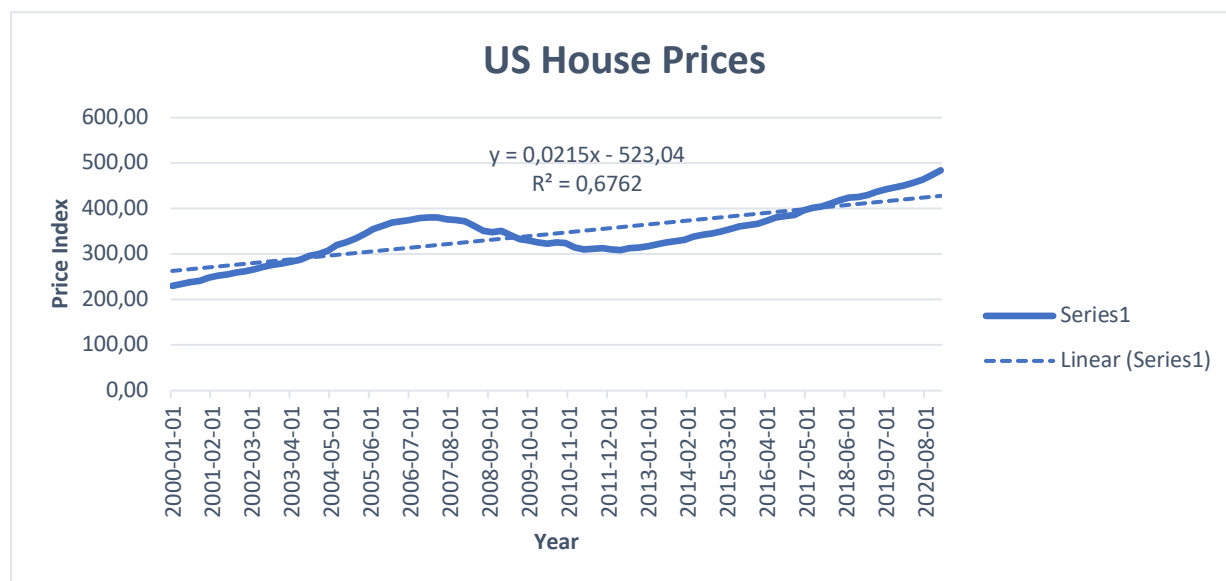
The Non-stability of the house prices tends to affect the cost of bank assets. However, whenever there is an increase in the prices of houses, there is a positive increase in the number of assets owned by the bank. Therefore, an increase in bank loaning, which will eventually lead to an increase in house prices.

During a banking crisis, there is a decrease in bank assets quality, thus decreasing the number of loans in the bank, resulting in a decrease in house prices, this is as evidenced in the case of U.S. economy. "... the precrisis trend in GDP involved unsustainable trends in asset prices, most obviously house prices, driven by a long period of rapid excessive credit growth across most of the advanced economies." (Turner & Ollivaud, 2019, p.1).

A decrease in housing prices is a clear indication for the banks to reduce their loans. Falling house prices will mean that the bank will be forced to reduce its capital ratios by reducing its risky assets. On the other hand, increase in house prices will increase the bank profitability, given that other factors are kept constant.

There is a positive relationship between the U.S. house price index and the GDP. Whenever there is an increase in GDP, there is an expectation for a positive rise in U.S. house prices. An increase in the GDP will increase the residential prices for consumers. These indicate positive associations between the banking crisis and the U.S. house price index.

FIGURE 1 – U.S. House Prices (2000 - 2021)



The above line graph shows a positive linear increase in U.S. house prices, albeit a sharp decrease in 2009, a steady increase in U.S. house prices since the first quarter of 2000. The regression equation has a positive gradient indicating a positive increase in U.S. house prices over the years. The R^2 of 0.6762 indicates that the regression equation, $y = 0.0215x - 523.04$, can predict the house price index with a 67.62% variation in the price index explained by year.

After the third quarter for the year 2009, the economic status for most companies started to rise gradually, and this can be seen in the gradual increase in U.S. house prices after this period.

The previous crisis showed an unsustainable trend in variables such as asset prices; house prices, which are always rising with the rise in the economy (Feneir, 2016).

Pre-crisis trends also have been forecasted to explain the future of GDP. However, there is no success.

A relationship between banking crises and current GDP was analysed using Pearson Chi-square to understand the cost of banking crises.

TABLE 8 – Case Processing Summary – Current GDP

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Current GDP	340	98.8%	4	1.2%	344	100.0%

Source: Author's computation using SPSS.

Furthermore, extrapolation of the pre-crisis trend in the developed countries and applying the potential measures published regularly in the OECD *Economic Outlook* has shown that the forecasted GDP per capita results in a wide loss of almost 10% of GDP. Therefore, extrapolating the per capita would reduce the loss to 3% of GDP. However, this estimation is not perfect as it does not apply to all developed countries as some countries experience bigger banking crises.

There is a negative Pearson correlation between current GDP and banking crises; this implies inverse relationships between banking crisis and current GDP; this indicates that current GDP decreases whenever there is a banking crisis.

These have been brought in by the employment rates in the developed countries. Even though the rate has surpassed the crisis, most of the young working population do not have permanent jobs and are forced out of employment during the crisis. Hence, the income recorded by this group of individuals runs to almost zero, and therefore no savings are also recorded; this has led to an increase in unpaid loans, which affect the banking systems. Such an impact harms the economy.

Whenever there is increased debt to GDP, the bank is at risk. As most of their funds are out, predicting the clearance of such loans will depend on the economy's GDP, which is not always constant as the crisis might affect the GDP.

In conclusion, banking crises affects both GDP and house prices. The effect is negative; there is a decrease in GDP whenever there is a banking crisis, while there is a positive relationship between banking crisis and U.S. house prices.

The effect is realised in all the 20 developed countries. A decrease in GDP will result in the country decreasing the interest rate during the crisis period. Later, post-crisis, it would result in the shooting of such interest rates; hence, affecting GDP, which affects house prices, both during a crisis and after.

Also, whenever there is an occurrence of crisis, bank loaning decreases drastically. Hence, this decrease will cause the housing price to reduce drastically.

As earlier discussed, Stock price volatility was also significant in the logistic regression in the preliminary analysis; whenever there is an expected future decrease in stock price volatility, economic agents expect an occurrence of crisis. It implies future shortages, and the bank will strain to meet the customer demand. Also, consumers tend to make surplus orders to meet their future wants whenever there is a suspected future stock depletion. In doing so, the bank realises crisis due to insufficiencies.

4.3. Comparing the cost of banking crises between developed & developing countries

The sample size for developed countries is 336 and sample size for developing countries being 212. The mean cost to income ratio for developed countries was 61.42 with a standard deviation of 13.42, while for the developing countries was 53.36 with a standard deviation of 12.06 (see Table 9).

TABLE 9 – Group Statistics – Developed and Developing economies

	Country Status	N	Mean	Std. Deviation	Std. Error Mean
Bank cost to income ratio	Developed	336	61.421157	13.4203494	.7321401

Developing	212	53.485041	12.0621449	.8284315
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Source: Author’s computation using SPSS.

The assumptions of the t-test to analyse the mean costs to income ratios for developed and developing countries show homogeneity of variance between both groups, and data should be normally distributed. The normality test was done using the Shapiro Wilk test, and the results are depicted in Table 10.

The homogeneity of variance test was conducted using Levene's test. The p-value for Levene's test was 0.644, implying that the variances of the two groups were homogenous.

The results of the independent t-test are shown in Table 10.

TABLE 10 – Independent Sample Test – Bank Cost to Income Ratio

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	Do	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Bank cost to income ratio	.213	.644	7.007	546	.000	7.9361164	1.1325581	5.7114119	10.1608209
			7.178	483.531	.000	7.9361164	1.1055894	5.7637635	10.1084693

Source: Author’s computation using SPSS.

The t-test was significant at a 5% level of significance (t (546) =7.007, p-value =0.000); this means a statistically significant difference between the mean of bank cost to income ratio for developed and developing countries.

Cohen's d effect size of $0.59 (61.42 - 53.48) / 13.47$ is medium; this implies that the difference between the means of the two countries is statistically significant and is not due to chance. There is sufficient evidence ($t(546) = 7.007$, $p\text{-value} < 0.05$) to reject the null hypothesis at 5% level of significance. Thus, we conclude that there is a statistically significant difference between the mean cost to income ratio of banks in developed countries and those in developing countries.

The mean cost for banking in developed countries is higher than that of developing countries. Developing countries possess low per capita income and are less industrialised, while industrialisation and per capita incomes are at higher levels for developed countries. These differences in the two countries have led to differences in the mean cost of banking, as shown in Table 10. The deviations from the means for banking costs for both countries are higher, implying that the cost of banking is not uniformly distributed in developed and developing countries. Although the distribution is normal, it cannot be uniform across all developed or developing countries.

Variations for the cost of banking are similar in all the countries; developed and developing. In both, there are those with high, medium, and low costs of banking. Thus, they experience similar variations.

Normality for the distribution of the cost of banking is homogenous in both developing and developed countries. Developing countries have a higher standard of living, and the rate of unemployment in these countries is quite low compared to the developing countries, which have higher rates of unemployment. Developing countries thus have lower per capita income and GDP; this manifests in the cost of banking for these economies. Also, in these countries, interest rates in pre-crisis are higher. In the post-crisis period, the interest rates have increased, negatively affecting consumer prices; thus, the cost of banking is affected in the long run.

On the other hand, developed countries have had stable economies in their countries. The few unsustainable economies of the country can sustain their banking without borrowing more from other banks. Developed countries that have borrowed from other institutions can settle their debts fully with the available assets. On the other hand, developing countries have borrowed from different institutions and cannot pay their debts using their available assets. Hence, the debt ratio for developing countries is higher, and thus, they have failed to reach sustainability.

The banking crisis has impacted developing countries as it has affected the financial performance of the countries through trade and exports; this has resulted in a difference in banking costs for the two sets of economies.

The summary statistics, minimum, first quartile, median, third quartile, and the maximum values for developed countries are higher than those of developing countries.

Developing countries depend on their income for survival. The vast majority in developing countries use their income to cater for their basic needs. On the other hand, the living standards for developed countries are higher; they are naturally stable. Thus, their income ratio to bank cost is higher than in developing countries.

Most developed countries have larger banks; larger banks are associated with higher bank capitalisation, which has led to a decrease in risk; hence, the bank investors have also requested low premium risks. Hence, the banks are on the safest side in case of crisis. The mean cost of banking of banks in developed is different from that of developing countries.

5. CONCLUSION

This research aimed to determine the cost of banking crises, focusing on the size of banking systems. Generally, the research's objective is to analyse the cost borne by large

banking systems during the crisis period and compare the effects and costs of crises between developed (20 OECD countries) and developing economies.

From the results of this study, banking crises occur uniformly in all banking systems, either large or small, OECD countries having larger banks also experience similar banking crises as those having smaller banks. All banking systems experience costs during crisis periods. During a crisis, the banks experience high costs to income ratio irrespective of whether they are in a large or small banking system.

Our result also evidenced that banking crises have negative effects on GDP and U.S. house prices, banking crisis generally deflates output in economies and periods of banking crises are characterized with reducing house prices; whenever there is an occurrence of crisis, bank loaning decreases drastically. Hence, as seen in the case of U.S., a decrease in house prices.

The effects on these economies vary as the developing economies face the problem of using funds for recapitalisation of their banking system for other socioeconomic issues; thus, these economies have financial limitations.

Developing economies are also dependent on the outcomes of external financial institutions and regulators. On the other hand, developed economies are also affected by these crises but have larger banks associated with higher bank capitalisation; this has led to a decrease in risk faced but only to a great extent due to strong regulatory policies. Although measures have been developed, especially in the U.S., to curb the expected crisis using past crisis experiences, it is still not easy to prevent.

Proper and adaptive regulations have proven to help forecast an occurrence of crisis and prevent and restore confidence in banking activities; this restored confidence would eventually lead to the stability of banks, both large and small.

The main limitation in this study is the absence of data in some countries, especially data on House prices, as the trend observed in the U.S. house prices might not conform with other countries especially developing countries.

For further research, other variables such as earning asset yield, a solvency ratio could be essential. Also, looking at the effect of the most recent pandemic on banking activities is recommended.

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APPENDIX
APPENDIX A

<i>Countries</i>	<i>Economy</i>	<i>Countries</i>	<i>Economy</i>
Austria	Developed	Bangladesh	Developing
Belgium	Developed	Brazil	Developing
Canada	Developed	China	Developing
Denmark	Developed	Egypt	Developing
France	Developed	India	Developing
Germany	Developed	Indonesia	Developing
Greece	Developed	Iran	Developing
Ireland	Developed	Mexico	Developing
Italy	Developed	Nigeria	Developing
Luxembourg	Developed	Pakistan	Developing
Netherlands	Developed	Philippines	Developing
Norway	Developed	Russia	Developing
Portugal	Developed	South Africa	Developing
South Korea	Developed	Turkey	Developing
Spain	Developed	Vietnam	Developing
Sweden	Developed		
Switzerland	Developed		
Turkey	Developed		
United Kingdom	Developed		
United States	Developed		

Appendix A provides an overview of all countries included in this research.

APPENDIX B

GFDD Data Logistic Regression Model

Variable	Score	df	Sig.
Deposit money bank assets to deposit money bank assets and central bank assets (%)	.387	1	.534
Liquid liabilities to GDP (%)	.505	1	.477
Central bank assets to GDP (%)	.225	1	.635
Financial system deposits to GDP (%)	.270	1	.604
Private credit by deposit money banks and other financial institutions to GDP (%)	.088	1	.767
Domestic credit to private sector (% of GDP)	.619	1	.432

Stock market capitalization to GDP (%)	1.018	1	.313
Stock market total value traded to GDP (%)	.000	1	.993
Gross portfolio equity liabilities to GDP (%)	.064	1	.801
Gross portfolio equity assets to GDP (%)	.002	1	.968
Gross portfolio debt liabilities to GDP (%)	4.266	1	.039
Gross portfolio debt assets to GDP (%)	5.555	1	.018
Syndicated loan issuance volume to GDP (%)	.541	1	.462
Corporate bond issuance volume to GDP (%)	.619	1	.431
Bank net interest margin (%)	.493	1	.483
Bank lending-deposit spread	.662	1	.416
Bank noninterest income to total income (%)	2.209	1	.137
Bank overhead costs to total assets (%)	1.746	1	.186
Bank return on assets (% , after tax)	1.839	1	.175
Bank return on equity (% , after tax)	1.948	1	.163
Bank cost to income ratio (%)	4.084	1	.043
Bank return on assets (% , before tax)	1.252	1	.263
Bank return on equity (% , before tax)	1.547	1	.214
Stock market turnover ratio (%)	.047	1	.829
Consumer price index (2010=100, December)	.218	1	.641
Consumer price index (2010=100, average)	.159	1	.690
Bank concentration (%)	1.032	1	.310
Bank deposits to GDP (%)	.279	1	.598
5-bank asset concentration	2.730	1	.098
Liquid liabilities in millions USD (2010 constant)	1.186	1	.276
Bank nonperforming loans to gross loans (%)	.800	1	.371
Bank capital to total assets (%)	.514	1	.473
Bank credit to bank deposits (%)	3.488	1	.062
Bank regulatory capital to risk-weighted assets (%)	.030	1	.863
Liquid assets to deposits and short-term funding (%)	1.782	1	.182
Provisions to nonperforming loans (%)	1.015	1	.314
Stock price volatility	10.934	1	.001
GDP (Current USD)	.975	1	.323

GDP per capita (Constant 2005 USD)	2.546	1	.111
GNP (Current USD)	.932	1	.334

Source: Author's computation using SPSS.